D7.1 – FITMAN Smart-Digital-Virtual Factory Trials Experiences – M18 issue

Incorporating D4.6, D5.5, D6.5 (updates of D4.4, D5.4, D6.4)

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VERSION HISTORY

VERSION	DATE	NOTES AND COMMENTS
0.1	9 Jun 2014	ToC
0.2	10 Jul 2014	ITINNO and VTT Contributions to ToC
0.3	21 Jul 2014	ToC with TXT Contributions
0.4	6 Aug 2014	Final ToC
0.6	28 Aug 2014	Contribution from VTT
0.8	21 Sep 2014	Contribution to section 5 from Volkswagen, Whirlpool, Piacenza, Consulgal, AIDIMA, APR, TANET TRW
0.95	10 Oct 2014	Includes Contribution from former D4.6, D5.5 and D6.5
0.96	13 Oct 2014	Version For peer review
1.0	17 Oct 2014	Final release

Deliverable Peer Review Summary

ID	Comments 1-4 must be evaluated	✓ Addressed (A) Answered
1	Relevance of the work scope, adherence to the target objectives	✓
2	Presentation style, exec summary, readability	✓
3	Partners' contribution evidence	✓
4	Industrial exploitation and impact potentials	✓

Table of Contents

Executive Summary

FITMAN has embedded, starting from the definition of the project work plan, a dedicated set of actions aiming to assess and measure the impact of implementation of FITMAN platform in the selected Trials. That would also be leveraged beyond the project duration for supporting other implementations adopting the platform.
The methodology defined in WP2 has been carefully deployed and monitored both from the operational (T2.5) and content (T[4-5-6].4) perspectives with the objective to collect consistent, homogeneous and meaningful values from Trials.
Task T7.1 takes the ownership for a systematic data collection and consolidation activity
The objective is to observe how Performance Indicators (Business and Technical) evolve along the Trials implementations starting from original (AS-IS - before implementation) values towards targets defined in agreement with the process and business owners. In the meanwhile experiences and lessons learnt are collected (via the Trials' Journals) for providing a comprehensive description of the Trials evolution during the implementation path.
Task T7.1, via collection of experiences, AS-IS vs. TO-BE values of Technical and Business Performance Indicators measures and cross-trial analysis will identify key experiences and consolidate results ,based on the current experimentations held in WP4-5-6.
D7.1 FITMAN Smart-Digital-Virtual Factory Trials Experiences, produced, in the scope of TaskT7.1 Synthesis of Use Case Trials Experiences and based on results from WP2 (FITMAN Verification & Validation Method), the following activities :

- Data gathering from Use Case Trials (WP 4, 5 and 6), including interaction and feedbacks from stakeholders
- Organization, Consolidation and Presentation of Performance Indicators and other relevant data.
- Preparation of the information bases for following tasks in WP7 to issue recommendations and to WP8 and WP9

The current version of D7.1 reflects the status of the trials at M18 of the projects. As requested by Reviewers with RR #3 at M12 Review Meeting, this deliverable has been anticipated by 3 month from M21, as originally scheduled.
What it can be noted is that:

1. No new Business Performance Indicator was introduced from M12 to M18 to keep into account the evolution of Trials with adoption of Specific Enablers from OC (Open Calls)
2. All Technical Indicators were appropriately collected according the V&V Methodology
3. Part of the trials didn't implement yet all the selected performance indicators. As described in Chapter 2 Trial information gathering for Lessons Learnt, out of 86 selected and deployed BPIs, only 43 were collected as evaluated able to provide significant values.
4. As a general comments, data collected for BPIs, need to be further validated, in fact from the collected values appears that the improvement of performance, just after few months from implementation, is in some case on-average well beyond the expected target. See Chapter 4- Business Lesson Learnt for further clarification.

In chapter 5.11 Consolidated Trials Experience it was consolidated the feedbacks from the Trials, specifically in sections 5.11.8 and 5.11.9, are reported the final learning coming from current implementations. Key points refer to :

1. Carefully plan the implementation
2. Take a step by step approach
3. Keep continuous contacts with suppliers of SW components

Task 7.1 will carry on monitoring implementation process and values of entered Performance Indicators will be made available on continuous base to all stakeholders.

1. Task 7.1 Description

1.1. Document Scope and Structure

The overall objective of WP7 is to analyses the outcomes, find-outs and experiences gained during the trials experimentations (WP4, 5 and 6) utilizing evaluation and assessment methods defined in WP2 (Verification & Validation Method). Based on that, Guidelines and Best Practices for further deployment and development could be defined, at the same time recommendations to FI-WARE (classified on different chapters) can be formulated in terms of Lesson Learned and Indicators for trials extensions in Phase III (WP8). The analysis approach for each Use Case Trial, consistently with the FITMAN architecture and with T2.3 (V&V Assessment Package), will address the three levels (single Enterprise, Ecosystem and FI), in this way expected output will result with a granularity and abstraction able to be beneficial to Phase III initiatives, FI-WARE, ICT for Manufacturing and FInES, but even to specific industrial domains and single Enterprises involved in the project.
More in detail the following aspects are going to be addressed in D7.1:

- Set up of an operational environment for information collection and storing, according to defined methods and methodology (T2.4/T2.5)
- Data gathering from Use Case Trials (WP 4, 5 and 6), including interaction and feedbacks to stakeholders
- Organization, Consolidation and Presentation of Performance Indicators and other relevant data
- Develop a consolidated and multi-dimensional (e.g. technical, functional, business, industrial domain, etc) view of the experience gained in Smart-Digital-Virtual experimentation trials

Use Case Trial Experiences will cover a broad range in terms of Industrial domains, business models, operational approaches and management attitudes that will ensure a remarkable data base of information, but it will require an appropriate approach to data analysis and consolidation. In order to elicit valid outcomes, structured and engineered methods need to be put in place. Results from WP2 (FITMAN Verification & Validation Method) will provide an appropriate tool set to extract, in a clear and realistic way, different aspects emerging by Use Case Trials. On top of that competences in Technology, Operations and Business, will analyses and structure data to highlight important aspects or trends.

More in detail this is the structure of the present document:

- Chapter 1 Task 7.1 Description is an introduction to the deliverable and frames the T7.1 objectives.
- Chapter 2 Trial information gathering for Lessons Learnt describes how information have been collected, what is the linkage with T2.5 Support to Trial Data Collection and what are the implemented tools in place
- Chapter 3 Technology Lesson learnt describes what have been the implications related with utilization of various components of the FITMAN platform, as well the implication of their integration in a single software solution. The information are coming both from the technical people and from the business and process owners.
- Chapter 4 Business Lesson Learnt collect and consolidate the experience from Trials under the Business perspective. That is done utilizing may sources, starting from values of defined Business Performance Indicators to the direct feedback from process owners.
- Chapter 5 Trial Experience actually query each individual Trial for their experience in a structured fashion. At the end such experiences are consolidated.
- Chapter 6 Conclusions and next steps draws conclusions and identifies next steps.

- Chapter 7 Reviewed Business Performance Indicators for Smart, Digital and Virtual Factory, contains the revision and in depth analysis of selected Business Performance Indicators taking place from M12 to M18. Originally this content was assumed to be inserted in 3 separated documents (D4.6, D5.5 and D6.5)
- 8 Annex describe the structure of the database where information are stored and implemented queries.

Consistently with Amendment II as requested from Recommendations in M12 Review meeting this version of D7.1 has been released in M18, while new release of D7.1, including specific impact coming from new components will be released at M27 of the project. (as proposed in Amendment #3 in preparation).

1.2. Contribution to Other WPs

T 7.1 collecting experiences, identifying best practices, formulating recommendations: is based on the current experimentations held in WP4-5-6. Collecting values of TO-BE T/B Performance Indicators measures and implementation experiences. Identification of appropriate Technical and Business indicators has been done, consistently with the guideline defined in WP2, by Tasks 4,5,6.4 (Measuring indicators and Governance of Smart, Virtual and Digital Factory Trials).
Results produced in T7.1 will feed:

- T7.[2-6] that will generate recommendations for FI-WARE and FI-PPP
- T8.1: comparative evaluation of trial results, road mapping future trials. This is ancillary to our strategy for Trials expansion in Phase III. Pls talk with T8.2 to distribute activities, but the environment and the goal is quite common between 8.1 and 8.2: Phase III
- T8.2: Focus on Trial expansion The comparative evaluation of each trial performed and reported in T8.1 will inform the development of proposition for expansion of each candidate trial.
- T9.2: socio-economic impact assessment. This starts from WP7 (T7.1) but projects the scenarios to the future 3-5 years (exploitation), by extrapolating from trial results to consider the effect of wider application, taking account of possible evolution of the socio-technical landscape (worst case, best case, most probable case). For instance: which are the conditions for a massive adoption of Cloud in manufacturing (cloud journey based on the cloud strategies our Trials already defined)? Which scenarios provide the fastest potential socio-economic pay off. What scaling effects could be expected it trial results were adopted on a much wider scale. What socio-economic impact (at macro level) could we expect in the different scenario options?
- T10.3 (Project Impact assessment report) It will consider the six step methodology and process for the impact monitoring. The status of the impact factors to maximize the potential for achievement of the impact objectives and the impact success threes will be updated to the situation as at M24

Below in Figure 1 T7.1 relationships with other tasks it is represented in graphical form the relationship among T7.1 and other Tasks.

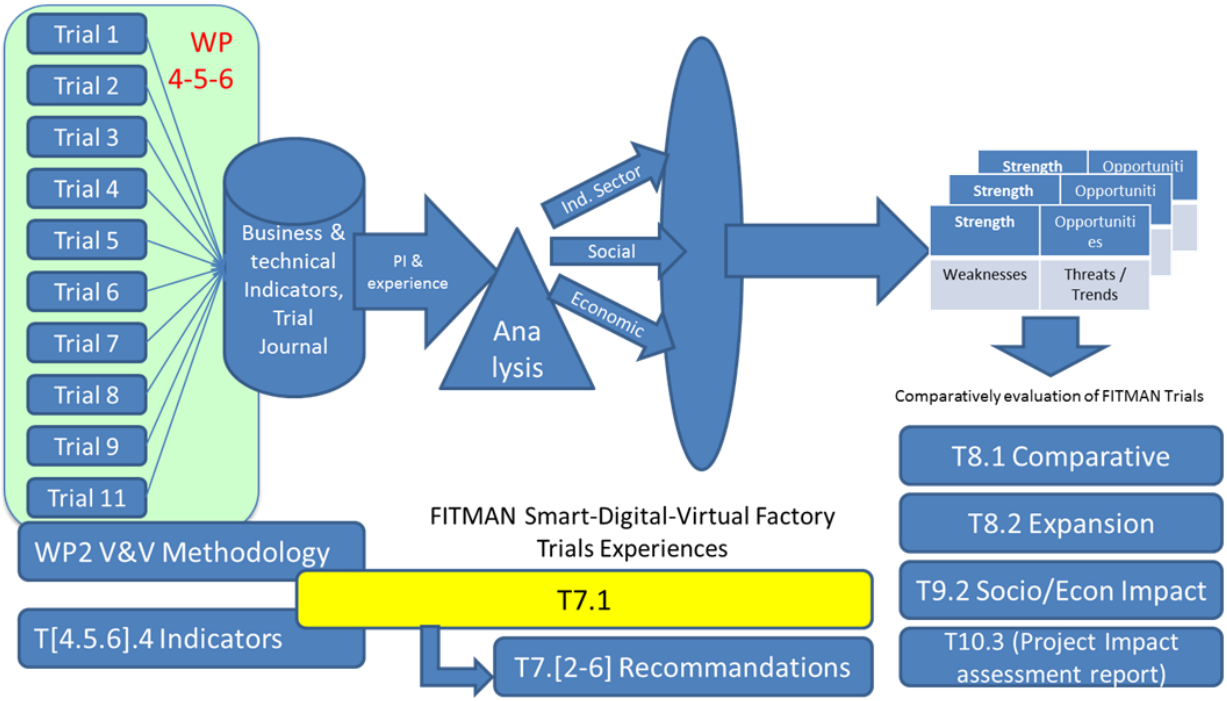


Figure 1 T7.1 relationships with other tasks

2. Trial information gathering for Lessons Learnt

2.1. Introduction to lessons learnt data gathering

Data gathering for lessons learnt concerning the trials is done in the following two ways:

1. With the help of the V&V method developed in FITMAN
2. With survey "Trial questionnaire" executed in T7.1

The purpose of gathering lessons learnt data with help of the **FITMAN V&V method** is on one hand to be able to get experiences and to improve the V&V method itself for its potential use outside the FITMAN project. The experiences and lessons learnt from using the FITMAN V&V Methodology itself is reported in D2.5. On the other hand we will take advantage of the opportunity to gather lessons learnt data concerning also the trials implementation process itself. The data is important from the point of view of validation and verification of the trials, as well as from the point of view of collecting experiences, challenges and obstacles, as well as identifying best practices and formulating recommendations of the implementation process in the trials.
The purpose of gathering the data with the **Trial questionnaire in T7.1** (see Chapter 5Trial Experience) is to enable the collection of trials experiences in a structured way. One of the key outcomes of FITMAN project is to collect and consolidate experiences from the implementation in trials, to elicit from them useful recommendations for FI communities and future potential adopters of the Platform. The questionnaire consists of seven different questions 1) Starting point 2) Trial plan and roadmap 3) Trial structure and implementation strategy 4) People, infrastructures and processes 5) Results at M18 and future expectations 6) Enabling conditions and obstacles, and 7) consolidated trial experience.
Both two data gathering ways are described in more detail later on in this chapter.

2.2. Information Collection through V&V (VTT)

FITMAN V&V method is an important means to obtain data for supporting lessons learnt. It provides a data definition method, collection platform and process support for assessing and measuring FITMAN impact in the trials. The method is divided into three main sections:
1) Business performance indicators
2) Technical indicators at component and trial solution level
3) Verification tests of specific enabler software development.
The method as a whole is collected into the FITMAN V&V Assessment Package. The Assessment Package, as well as the parties using it, is described in the following picture.

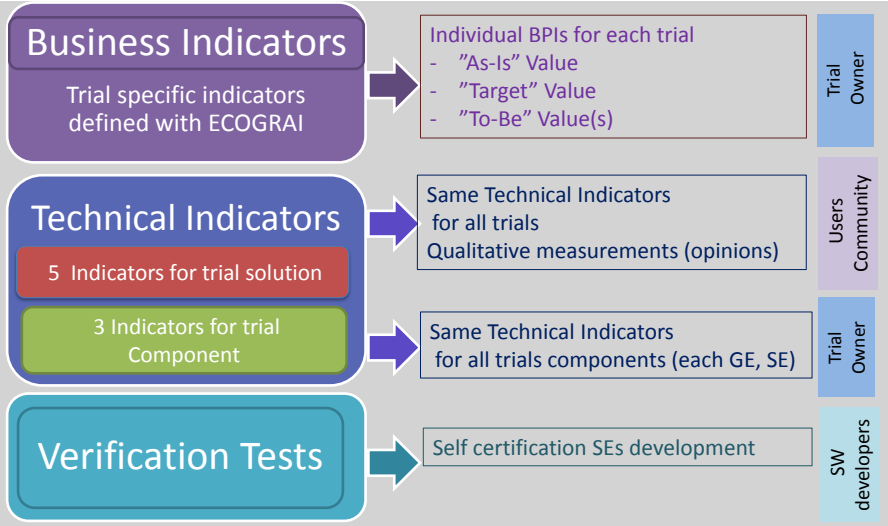


Figure 2 FITMAN V&V Assessment Package overview

The business indicators are trial specific and have been derived with the help of a simplified ECOGRAI method based on the objectives of the trials. The technical indicators are same for all trials, and they include five indicators for trial solutions and three indicators for trial components. The technical indicators have been selected and defined in WP2

In addition to the three sections mentioned above, the method includes also a Trial Journal. The Trial Journal collects unstructured feedbacks from each Trial, addressing both Technical and Business aspects.

All data gathering is done through Survey Monkey forms. The method has also included training sessions for the trials, both for the consortium technology providers and the industrial companies.

The FITMAN V&V assessment process supports trials information gathering for lessons learnt mainly in in three ways:

- Analysis of the indicators and their values
- Experiences of the training sessions
- Trial Journal.

2.2.1 Analysis of the indicators and their values

The indicators are collected both from technical and business perspectives. Data for lessons learnt can be obtained both from the values of individual trials and of cross trial assessment of values of all trials. Cross trial assessment methods are described in D2.5 FITMAN V&V Assessment Summary - M18 issue. The individual values offer lessons learnt data concerning the impact and success of FITMAN project in each trial sector and scope. The cross trial analysis gives input for lessons learnt data concerning comparison of different sections and solutions, comparison of the use of the same components in different environments as well as of the overall success of the project.

As stated earlier, the technical indicators are the same for all trials, and hence also extensive and reliable cross trial assessment can be performed for obtaining lessons learned data. The conclusions will be used e.g. for identifying best practices, sector specific challenges as well as, together with other lessons learnt data, for formulating recommendations.

The business indicators are trial specific and cannot be compared directly. The indicators have however been classified into four categories: 1) cost 2) lead time 3) productivity and 4) quality. This will enable high level cross trial assessment. The values can be compared as percentages of improvement concerning comparisons of "as is" vs. target values, "as is" vs. "to be" values and

"to be" values vs. target values. Some conclusions can be drawn from these comparisons, but the nature of each trial has to be taken into account when analyzing the results.

2.2.2 Experiences of the training sessions

An essential part of successful instantiation of the FITMAN V&V method is communicating it to the trials in a way that they would all have a uniform understanding of the method, and in a way that would make the method as easy as possible for the trials to use. Instantiating a V&V method in a multi-sectorial environment is challenging due to e.g. the differences in schedules and progress of the trials, the large variety of trial cases and a tight schedule in FITMAN project and hence very tight schedules for the implementation work in the trials. For these reasons we hold training events for all trials including both the IT support and the industrial companies of each trial.

The training events had a very interactive nature, and this enabled us to gather valuable data also for the use of gathering lessons learnt data. At the end of each training event we also wrote down comments from the participants. The training events are described in detail in D2.5 FITMAN V&V Assessment Summary - M18 issue. Also experience from the training is reported in the same deliverable.

The feedback as a whole can be used for lessons learnt concerning instantiation of the V&V method.

2.2.3 Trial Journal

Unstructured information for each Trial is collected in the FITMAN V&V Methodology with the Trial Journal. The Trial Journal is available for each Trial in Survey Monkey. It collects unstructured feedback from each Trial, addressing both Technical and Business aspects. It is updated with the most important information each time that there are significant events to point out. The Trial Journal includes two parts: Technical Journal and Business Journal:

Technical Journal

- Registration of the implementation issues encountered in the implementation of the Trial system
- Registration of the operational resilience of the Trial (e.g. major bugs, blocking errors, etc.)

Business Journal

- Collection and analysis of the most important operational issues faced in the implementation of the system in the Trial, e.g. organizational and business difficulties, degradation of the business system.

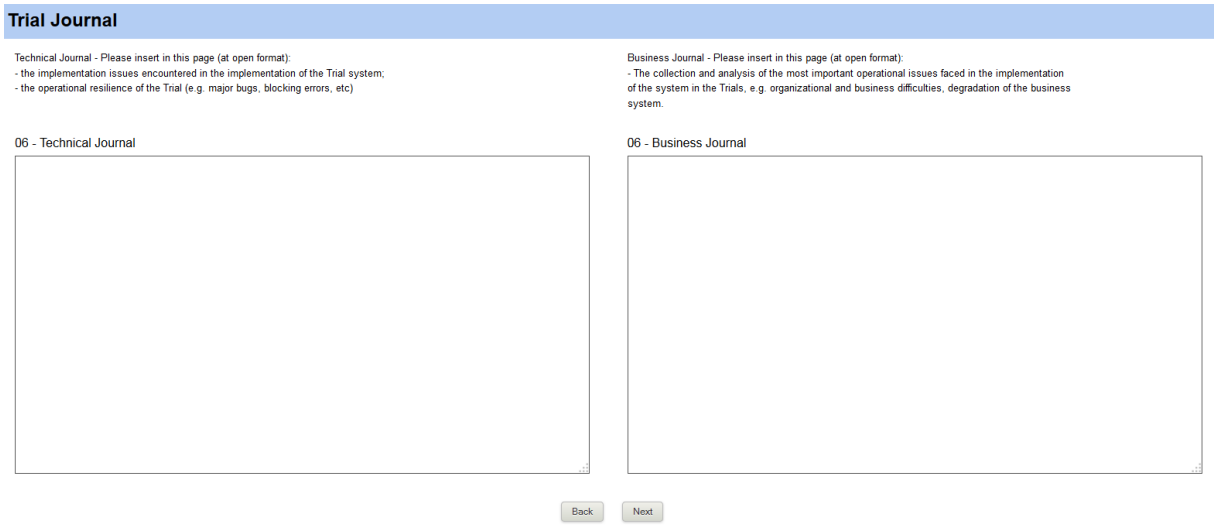


Figure 3 Template of the Trial Journal

The Trial Journal is a key element in obtaining lessons learnt information. We expect to get information concerning both experiences of using the FITMAN V&V method and experiences of the trials implementation process; the information will be highly valuable. It will be described in the following deliverable.

2.3. Information collection through Trial Experience questionnaire

One of the key outcomes of FITMAN project is to collect and consolidate experiences from the implementation in the trials, to elicit from them useful recommendations for FI communities and future potential adopters of the Platform.

To achieve this objective it is crucial that the trials are able to provide their experiences in a structured way and are able to collect values for the defined indicators.

To such purpose each trial has been requested to return a Questionnaire. It structure is reported here below, while actual content is referred in Chapter 5 Trial Experience :

1. **Starting Point**

This section describes the trial initial rationale and the business/technology status before Trial Implementation (In this section are included references to Business Assessment done in WP1, with references to Deliverables/Trial Handbook)

2. **Trial Plan and Roadmap**

This section describes the trial implementation plan and roadmap(s) and on how GEs, SEs and TSCs fit in the trial's plan and roadmap. Specified the reason leading to choices, both technical and business.

3. **Trial structure and Implementation Strategy**

This section describes to trial structure (and phases, with reference to previous section) and how, from the technical, organizational and business perspective the implementation has been addressed.

Are explained how Performance Indicators have been implemented and how associated information are extracted and values for indicators calculated. Specify any backup, risk mitigation, roll-back, etc. event occurred during the implementation including GEs/SEs and TSCs integration and/or implementation issues.

4. **People, Infrastructures, Processes**

Provide a picture of resources allocated and how the organization prepared to the implementation and start-up

5. **Results at M18 and Future Expectations**

With reference to the identified indicator comment the To-Be values, with respect to Initial values (As-Is) and with expected targets. Comments on results, under-achievement, over-achievements and motivate. Identify future evolutions of the results for the existing trial, considering what are the factors that could impact their values.

6. **Enabling Conditions and Obstacles**

Specify, during the trial definition, implementation, deployment and going live, what have been the major factors (internal and external) facilitating or interfering with the actual implementation/deployment and the functioning of the new business process. . Provide also details on issues addressed in integrating or using the GEs so to help providing suggestions to the Technology Foundation project.

7. **Consolidated Trial Experience**

Consolidate your experience from the perspective of providing advice to a potential new implementer of the FITMAN platform in your industry sector.

2.4. Tools

Data collection process in T7.1 was fully based on a Web based technology. The reasons, characteristics and features for this choice has been described in D2.4, but they can summarized as follow:

- Unified vehicle for data collection
- Protected environment (personal and protected access)
- "real time" availability of the last version of data in the central repository with no latency in collecting data

Data collected belong to major categories as defined in WP2 (V&V methodology): Technical and Business Indicators.

In the following picture in is represented the 5 data categories collected via the instantiated surveys.

#	Topic	Survey	Level	What	Who	When
1	BPI	General	Scenario	PI	Trial owners	Start W27 – Jun 30
2	Technical indicators level P5	General	Component	(3 TI : openess, Inter-operability, Ease of Applic)	Trial owner / Technical partner	Start W22 – May 26
3	Trial Journal	General	Trial	Technology and business	Trial owner	On going
4	Technical indicators level T1	Community	Trial	(5: Fullfil, learnability, Underst, User attract, effective)	Community	Start W27 – Jun 30
5	Self certification	Self	Component	SEs (2 + 6)	NTUA + SEs develo pers	On going

Figure 4 Surveys Structure

1. Business indicators collected by scenario

2. Technical Indicators (According level P5 of methodology) for each SW component (GE and SE)
3. Unstructured Data with day-by-day experiences
4. With a community based approach (via a panel of user) and overall evaluation of the FITMAN based trial is collected
5. At SW developers has been requested a specific assessment for the developed SEs

The selected platform is the commercial solution named "Survey Monkey". The reason for the selection of this platform is depicted in D2.3 FITMAN Verification & Validation generic Assessment Package.
In order to run the data analysis data have been extracted from the Survey Monkey repository utilizing the specific functions. For each survey data are extracted in MS Excel (.xls) format.
Data are then imported in a MS-Access database available for reporting and consolidation.
The main functions made available in the MS Access Database are depicted in the following Figure 5 MS Access Functions.
The available functions allow to:

- Launch reports from data collected from General Surveys (for details see Chapter 3 and 3.1). That includes:
  - Analysis of BPI values and progress versus the initial values before implementation
  - Analysis of TPI for the various components of the FITMAN Platform and for the specific trial
- Launch reports from data collected from Community Surveys (for details see Chapter 3 and 3.1)
- Launch the procedures for loading data generated by "Survey Monkey" (General Surveys and Community Based Surveys)

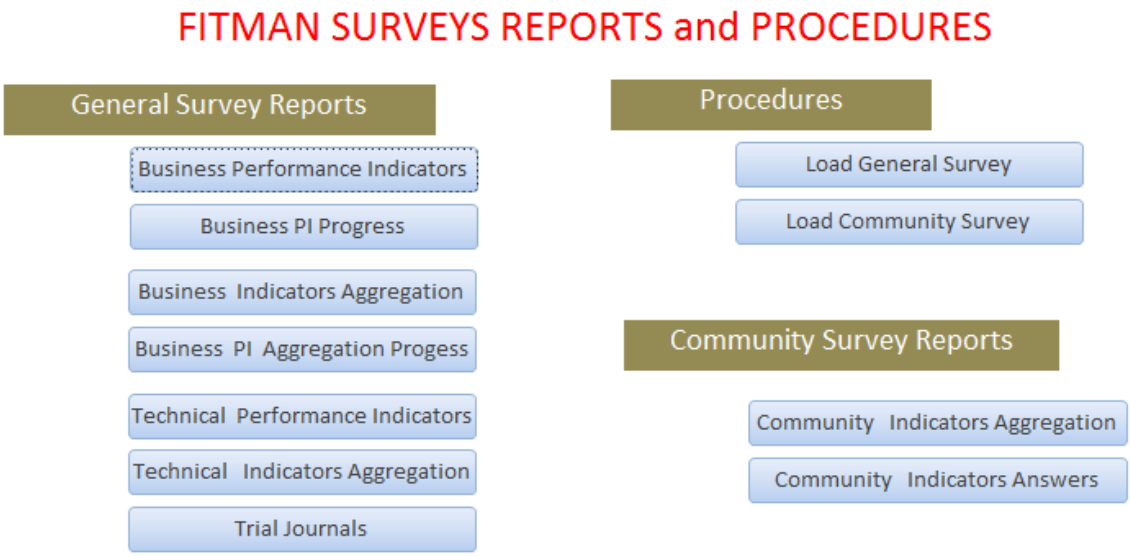


Figure 5 MS Access Functions

According what defined in the methodology the implemented surveys collect values for Technical Indicators and Business Indicators. With reference to the above Figure 4 Surveys Structure, Technical indicators are collected :

- at component level (#2),

- at trial level for Community based Surveys (#4) and
- for each Specific Enablers utilized for the trials (#5).

while Business Indicators are collected for each Trial (#1) and for each Business Scenarios inside the Trial.
Discussion and Consolidation of Technical Indicators is reported in detail in section 3 Technology Lesson learnt while Business Indicators in section 4 Business Lesson Learnt .

The structures of the main implemented tables in the MS-ACCESS DB are reported in section 8.1.1 Tables
Trial Journals
Trial Journals represent logs of Trial implementation, both under the Technical and the Business standpoint. They are a relevant source of information that has been utilized in Chapter 3 Technology Lesson learnt and Chapter 4 Business Lesson Learnt . The detailed content of trial journals is reported in Chapter 8.2.4 Trial Journals

3. Technology Lesson learnt

3.1. Introduction/Method of work

In order to extract meaningful outcomes from a technical point of view, all available data and information that has been gathered in the SurveyMonkey platform had to be examined and consolidated. Following the guidelines of the FITMAN V&V Methodology (as reported in WP2 deliverables), this section provides insights on the basis of data coming from five different, yet highly interdependent, sources of information:

- Technical Indicators in the General Form Survey compiled by the FITMAN Trials
- Technology Journal in the General Form Survey compiled by the FITMAN Trials
- Indicators Collected via the Community Surveys compiled by the Trial Teams
- Assessment on the Specific Enablers compiled by the Software Developers themselves via Self Certification
- Other direct contact and interaction with trial teams.

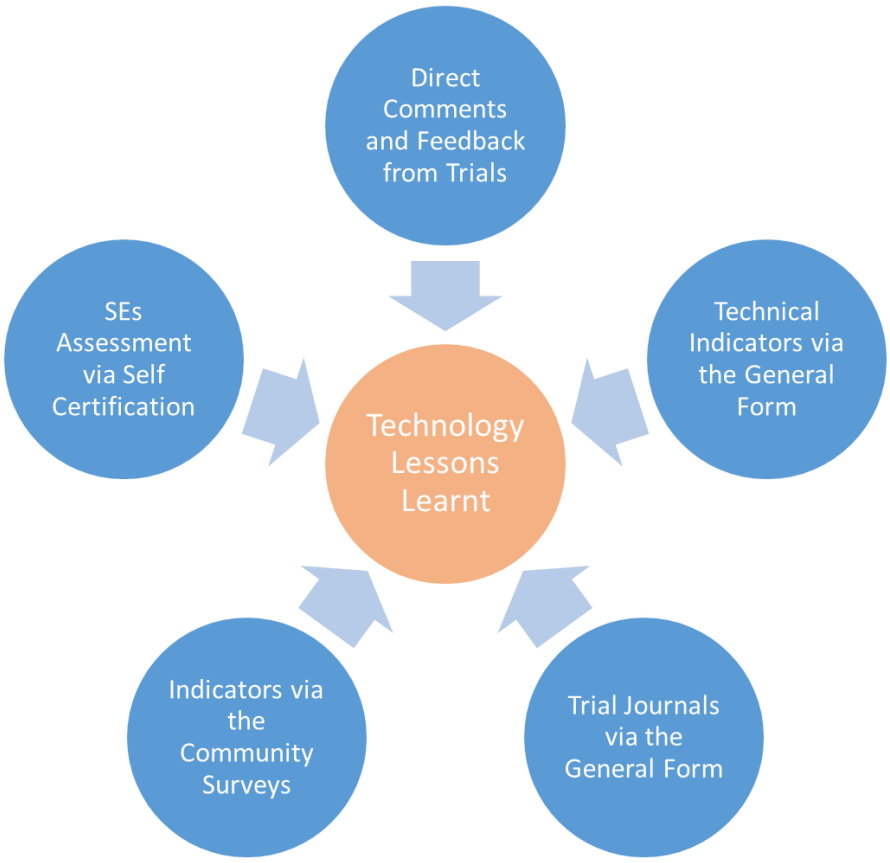


Figure 6 Method of Work – Sources of Information

In order to organize the information received from the aforementioned sources, statistical analysis has taken place in order to effectively analyse the available information and reach a set of conclusions on the basis of available numerical data. At the same time, any descriptive information available – coming from text fields in surveys, comments during V&V application and trial journals' archives etc. – has been thoroughly analysed and cross-combined with the numerical results and the statistical analysis. This way useful outcomes can be extracted concerning:

- The validation of the ready components used (like the FI-WARE Generic Enablers),

- The verification and validation of the components developed in the framework of FITMAN (like the Specific Enablers and the Trial Specific Components) and
- The assessment of the complete solutions designed, implemented and installed in FITMAN trials.

The results of the analysis which took place in the framework of the Work Package 7 of the project are presented in the following sections.

3.2. GEs Insights

3.2.1 GEs Adoption by the trials

In the context of the FITMAN project, seventeen (17) FI-WARE Generic Enablers have been selected and adopted by the FITMAN Trials. The GEs selected belong to the following chapters:

- Applications/Services Ecosystem and Delivery Framework Chapter: 6 GEs
- Internet of Things (IoT) Services Enablement Chapter: 5 GEs
- Data/Context Management Chapter: 5 GEs
- Security Chapter: 1 GE

The following table presents the GEs adopted by each FITMAN trial up to the time the present deliverable has been compiled:

	Smart			Digital				Virtual			Other	Total
	2	4	5	1	3	7	11	6	8	9	N/A	# of
FIWARE Ges	**TRW**	**Whirpool**	**PIACENZA**	**VW**	**AW**	**Cons**	**AIDIMA**	**APR**	**TANET**	**COM+**	**Exploit**	**trials**
Applications/Services Ecosystem and Delivery Framework Chapter												
GE1 Apps.Repository	√			√					√	√		4
GE2 Apps.Marketplace				√					√	√		3
GE3 Apps.ApplicationMashup	√		√	√	√	√	√			√		7
GE4 Apps.LightSemanticComposition								√	√	√		3
GE5 Apps.Mediator	√				√			√				3
GE6 Apps.Registry	√											1
GE7 Apps.BusinessCalculator											√	1
GE8 Apps-BusinessModeler											√	1
Cloud Hosting Chapter												
GE9 Cloud.DCRM - IaaS Data Center Resource Management GE- RI by IBM												0
GE10 Cloud.SM - IaaS Service Management (Claudia by Telefonica)												0
G11 Cloud.ObjectStorage - Object Storage RI by Intel												0
GE12 Cloud.SelfServiceInterfaces - Cloud Portal RI by UPM												0
GE13 Cloud.SDC												0
GE14 Cloud.PaaS												0
Internet of Things (IoT) Services Enablement Chapter												
GE15 IoT.Gateway.DataHandling - Esper4FastData (Orange)	√	√	√		√				√			5
GE16 IoT.Gateway.ProtocolAdapter (Telecom Italia)									√			1
GE17 IoT.Backend.IoTBroker (NEC)	√	√	√		√							4
GE18 IoT.Backend.ConfMan (Telefonica I+D)	√	√	√		√							4
GE19 IoT.Backend.DeviceManagement									√			1
Data/Context Management Chapter												
GE20 Data.PubSub - CAP Context Broker by Telecom Italia					√	√	√					3
GE21 Data.SemanticApplicationSupport (Atos)								√		√		2
GE22 Data.PubSub - Orion Context Broker by TID				√								1
GE23 Data.UDA							√			√		2
GE24 Big Data	√	√										2
Security Chapter												
GE25 Security.IdentityManagement										√		1
GE26 Optional_Security_Enablers.DBAnonymizer												0
TOTAL	8	4	4	4	6	2	3	3	6	7		26

Figure 7 GEs Adoption by FITMAN Trials

3.2.2 GEs Assessment based on Technical Indicators

Given the fact that many FI-WARE Generic Enablers have been adopted by the FITMAN Trials and that each GE has been tested and used by one or more Trials, useful conclusions can be extracted by examining the results of the technical validation performed by each Trial for the GEs it has adopted.

This section presents the validation results per Generic Enabler and per Trial in order to provide an initial assessment of the GEs and at the same time to jump into conclusions about the utilisation of the enablers by the Trials. It has to be noticed that the validation has been performed by using the simplified FITMAN V&V method, according to which each GE is being examined as far as it concerns the following characteristics:

- Openness,
- Interoperability Maturity,
- Ease of Application.

As presented in detail in Project Deliverable D2.5, these characteristics are been assessed by using three technical indicators, respectively, which receive discrete values (levels) from 0 to 3 (see table below).

Technical Indicators for GEs/SEs/TSCs	Levels per Indicator
Openness	• **Level 0:** Open specifications –Developers can view & study the requirements posed and implement them as they wish • **Level 1:** Enablers as a Service – Developers can utilize software provided as a service through open interfaces • **Level 2:** Releasing code as open source - Developers can inspect, download, run and improve the open source code according to their needs. • **Level 3:** Consulting with the use cases about their needs and collaboratively contributing to the source repository, design documents, and bug reports
Interoperability maturity	• **Level 0:** Isolated Approach (No API exposing the GE / SE functionalities) • **Level 1:** Baseline Unified Approach (International Standard exists) • **Level 2:** Open Unified Approach (No International Standard exists) • **Level 3:** Standardized Integrated Approach
Ease of application	• **Level 0:** No applicability in our environment without extra applying actions or means • **Level 1:** Applicable with significant amount of work • **Level 2:** Applicable with some amount of work • **Level 3:** Easily applicable in our environment

Table 1: Technical Indicators based on the simplified FITMAN V&V method

Concerning the assessment of the Generic Enablers using the aforementioned indicators it must be considered that it is absolutely normal – and expected – that different Trials (i.e. enterprises with different IT background, existing systems and IT needs) may assess the same enabler from different points of view and as a result to provide deviating values to the indicators. Examining these deviations is important in order to extract conclusions both for the examined GE and for the trials that validated the Generic Enabler. Of course the same stands for the Specific Enablers which are being analysed in the next section.
The collected results together with relevant extracted conclusions are presented and analysed in the following sub-sections.

3.2.2.1 GE1 Apps.Repository

As per Figure 7, TRW, VW, TANET and COM+ are using this Generic Enabler. The up to date available technical indicators' assessments can be found in the following table:

	COM+	TANET	TRW	VW	Average
Openness	2	2	-	2	2
Interoperability Maturity	1	2	-	1	1.33
Ease of Application	2	3	-	2	2.33

Obviously TRW has not provided the assessment so far since the integration of the GE has not been implemented yet.
All trials agree to the Openness level which is normal since the GE has been released as open source solution.
Concerning Interoperability Maturity, the GE offers a customised API, which however VW decided not to use, so it has been tested by the two other Trials.
As far as the Ease of Application is concerned, the Trials have a different estimation of the amount of work needed in order to apply and use the GE, which for COM+ and VW was considered normal/reasonable, while for TANET limited. The reason for this variation is apparently the different way that the trials decided to integrate the GE in their solutions.

3.2.2.2 GE2 Apps.Marketplace

As per Figure 7, VW, TANET and COM+ are using this Generic Enabler. The up to date available technical indicators' assessments can be found in the following table:

	COM+	TANET	VW	Average
Openness	2	2	2	2
Interoperability Maturity	1	2	1	1,33
Ease of Application	0	3	0	1

Concerning the Openness level the Trials provide the same validation, as expected, although VW and COM+ have faced some problems in utilising the service (RESTful API) offered.
This is the reason why, as far as it concerns the ease of application, the GE receives a very low rating from VW and COM+, while TANET considers that by taking advantage of the service it is pretty easy to apply the GE.

3.2.2.3 GE3 Apps.ApplicationMashup

As per Figure 7, this Generic Enabler is being used by the majority of the trials (7 out of 10) as presented in the following table:

	AW	AIDIMA	COM+	Cons	Piacenza	TRW	VW	Average
Openness	N.A.	2	2	2	3	3	2	2.33
Interoperability Maturity	2	1	1	2	3	3	1	1.86
Ease of Application	2	2	1	2	3	3	1	2

The trials have validated the openness of the GE with 2 and 3 (average 2.33) - only AW has not validated the openness of the GE yet. However, concerning Interoperability Maturity and Ease of Application there are important variations in the ratings provided by the Trials, due to the different needs and mainly the different complexity of the Trials' solutions. VW, COM+ and AIDIMA consider that the service offered has just baseline interoperability, which is the reason that they consider it pretty difficult to apply the GE. On the other side two trials (Piacenza and TRW) state that the service fulfils international standards and it was easy for them to utilise it.

3.2.2.4 GE4 Apps.LightSemanticComposition

The Light Semantic Composition GE has been utilised by the three Virtual Factory Trials (APR, TANET and COM+). The up to date available technical indicators' values can be found in the following table:

	APR	TANET	COM+	Average
Openness	1	2	1	1.33
Interoperability Maturity	1	2	1	1.33
Ease of Application	1	2	0	1

APR and COM+ provided low ratings as far as it concerns all the indicators. It is offered as a service, however according to the two trials without fulfilling expected interoperability standards making its application relatively difficult. TANET, on the other hand, provided a much better validation for the GE which in this specific case was easily utilised and integrated.

3.2.2.5 GE5 Apps.Mediator

The Mediator GE has been utilised by three Trials (AW, TRW and APR), as presented next:

	AW	TRW	APR	Average
Openness	1	1	1	1
Interoperability Maturity	2	3	3	2,67
Ease of Application	2	3	1	2

According to the Trials, the GE, which is just available as a service, has a high interoperability maturity, offering call services' endpoints via WSDL. However, APR considers that a significant amount of work is needed in order to integrate and apply the GE in a complete solution, while AW and especially TRW didn't need to put so much effort in order to utilise the GE. It has to be mentioned that APR is one of the trials which provided very low ratings to all GEs, while TRW on the other hand provided very high ratings to all the enablers under validation. Apparently the expectations of these trials as far as it concerns the GEs differs significantly.

3.2.2.6 GE6 Apps.Registry

The Registry Generic Enabler is to be utilised by TRW which has not completed its validation yet.

3.2.2.7 GE15 IoT.Gateway.DataHandling

As per Figure 7, this Generic Enabler (Esper4FastData) has being used and validated by half of the Trials (5 out of 10), as presented in the following table:

	AW	PIACENZA	TANET	TRW	Whirlpool	Average
Openness	1	1	2	3	2	1,8
Interoperability Maturity	2	3	3	3	3	2,8
Ease of Application	2	3	3	3	2	2,6

According to the assessment, the service offered for the GE is based on international interoperability standards and working as expected, so all trials consider that it has high interoperability maturity. However concerning its openness the trials have different points of view, probably due to the different ways they tried to utilise the service. On the other hand all trials agree that no significant effort is required in order to utilise the service, so in general this GE got very good validation results in these two characteristics.

3.2.2.8 GE16 IoT.Gateway.ProtocolAdapter

The Generic Enabler, developed by Telecom Italia, is being used only by TANET.

	TANET	Average
Openness	1	1
Interoperability Maturity	1	1
Ease of Application	1	1

As shown above, the trial assessed the GE with a low rating as far as it concerns all categories. According to TANET the service was difficult to be utilised and integrated.

3.2.2.9 GE17 IoT.Backend.IoTBroker

As per Figure 7, this Generic Enabler is being used by four out of the ten Trials, as shown in the following table:

	AW	PIACENZA	TRW	Whirlpool	Average
Openness	2	3	3	2	2,50
Interoperability Maturity	2	3	3	3	2,75
Ease of Application	2	3	3	3	2,75

According to the assessment by the four trials, the GE gets very high ratings in all three characteristics under assessment. The trials have used the enabler extensively and they report that it can be applied without significant effort, while it is open and based on international interoperability standards.

3.2.2.10 GE18 IoT.Backend.ConfMan

The situation as far as it concern GE18 is exactly the same with GE17 mentioned above. The Generic Enabler is being used by four trials.

	AW	PIACENZA	TRW	Whirlpool	Average
Openness	3	3	3	2	2,75
Interoperability Maturity	2	3	3	3	2,75
Ease of Application	1	3	3	3	2,5

According to the assessment by Piacenza, TRW and Whirlpool, the GE gets very high ratings in all three characteristics under assessment. The only exception was AW which contrary to the rest of the trial considers that the GE cannot be applied without significant effort. Concerning the two other characteristics all four trials agree that the GE has high openness level and is based on international interoperability standards and can be considered as of high interoperability maturity.

3.2.2.11 GE19 IoT.Backend.DeviceManagement

The Device Management Generic Enabler is being used only by TANET.

	TANET	Average
Openness	2	2
Interoperability Maturity	2	2
Ease of Application	2	2

As shown above the Trial assessed the GE with a pretty good rating as far as it concerns all characteristics. According to TANET the service can be utilised without significant effort and it works as expected.

3.2.2.12 GE20 Data.PubSubCAPContext

As per Figure 7, three trials are using the CAP Context Broker:

	AW	Cons	AIDIMA	Average
Openness	N.A.	2	1	1,5
Interoperability Maturity	2	3	3	2,67
Ease of Application	1	2	1	1,33

According to the three trials, the GE has high interoperability maturity as the service is based on international standards. However AIDIMA and AW didn't find it easy to integrate the GE in their trial solutions. Consugal, on the other hand, considers that just limited effort is required and that the enabler can be utilized without problems.

3.2.2.13 GE21 Data.SemanticApplicationSupport

The Semantic Application Support GE has been utilised by two Trials (COM+ and APR), which have provided their assessments as presented in the following table:

	APR	COM+	Average
Openness	2	2	2
Interoperability Maturity	0	3	1,5
Ease of Application	2	3	2,5

According to the two Trials the GE can be applied without extensive effort, thus it has been integrated without significant problems. However, as far as it concerns its interoperability the enabler gets a very low score by APR since the trial faced problems in utilising the service offered. COMPLUS on the other hand didn't face such issues, so the trial reported that the interoperability maturity of the GE is high.

3.2.2.14 GE22 Data.PubSubOrionContext

As per Figure 7, only VW has chosen to utilise the Orion Context Broker by TID. The assessment provided by the Trial is presented in the following table:

	VW	Average
Openness	1	1
Interoperability Maturity	1	1
Ease of Application	1	1

The GE has been released as a service, however according to VW, only basic interoperability is being provided, which leads to a low rating concerning all characteristics under examination.

3.2.2.15 GE23 Data.UDA

The UDA GE has been utilised by two Trials (AIDIMA and COM+), which have provided their assessments as presented in the following table:

	AIDIMA	COM+	Average
Openness	1	1	1
Interoperability Maturity	2	1	1,5
Ease of Application	2	2	2

According to the two Trials the GE can be applied without extensive effort. COM+ has provided a low rating concerning the Interoperability Maturity, however this stands due to the fact that OpenStack Swift has to be installed in order to interoperate with the GE. In general the GE – which is offered as a service without access to the source code – can be integrated easily following the provided instructions.

3.2.2.16 GE24 Data.BigData

As per Figure 7, two Trials (TRW and Whirlpool) are using this Generic Enabler.

	TRW	Whirlpool	Average
Openness	3	1	2
Interoperability Maturity	3	2	2,5
Ease of Application	3	1	2

The GE has been utilised in a different way by the two Trials. TRW has taken advantage of the service offered without facing any problems which Whirlpool had to put much effort in order to integrate the GE. Both trials however think that in terms of interoperability the GE has acceptable maturity.

3.2.2.17 GE25 Security.IdentityManagement

As per Figure 7, only COM+ has chosen to utilise the Identity Management GE. The assessment provided by the Trial is presented in the following table:

	COM+	Average
Openness	1	1
Interoperability Maturity	3	3
Ease of Application	2	2

The GE is offered as a service, without access to the source code. However, it is based on existing international interoperability standards which made its integration to the Trial's solution easy, without requiring significant effort.

3.2.2.18 Collective Assessment per FITMAN Trial

In the following table the collective assessments each FITMAN Trial has provided to the number of applied GEs are provided. The given numbers for Openness, Interoperability Maturity and Ease of Application are the mean numbers of all assessments of the specific indicator, while the last column provides the overall average accruing from all assessments:

Table 2 Collective Assessment

Trial Category	Trial	No of SEs	Openness	Interoperability Maturity	Ease of Application	General Average
Smart	**TRW**	9	2,71	3,00	3,00	2,90
	Whirlpool	5	1,80	2,60	2,20	2,20
	Piacenza	4	2,60	2,80	2,80	2,73
	Smart Factory averages		*2,37*	*2,80*	*2,67*	*2,61*
Digital	**VW**	4	2,00	1,00	1,00	1,33
	AW	6	1,75	2,00	1,67	1,81
	CONSULGAL	2	2,00	2,67	1,67	2,11
	AIDIMA	3	1,50	1,75	1,75	1,67
	Digital Factory Averages		*1,90*	*1,86*	*1,52*	*1,73*
Virtual	**APR**	3	1,33	0,83	1,50	1,22
	TANET	6	1,80	1,90	2,10	1,93
	COM+	7	1,44	1,44	1,44	1,44
	Virtual Factory Averages		*1,52*	*1,39*	*1,68*	*1,53*
General Averages[1]			*1,90*	*2,02*	*1,96*	*1,96*

The main conclusions that can be conducted from the previously presented table are the following:

- The Smart Factories Trials provide much higher ratings in general, comparing to Digital and Virtual Factories Trials, for all characteristics under validation.
- The Digital Factories Trials provide, in average the lowest ratings as far as it concerns the Ease of Application of the GEs they used.
- The Virtual Factories Trials consider that the GEs they utilised had, in comparison, the lowest Interoperability Maturity.
- TRW and Piacenza provide very good ratings for all the GEs they validated. In general the integration of the GEs in the final solutions for these two Trials has been completed without any issue. Whirlpool and Consugal follow, as far as it concerns the average ratings they provide.
- VW, APR and COM+ provide very low ratings comparing to the rest of the Trials, showing that several difficulties were met during the utilisation of the GEs in their cases.

The following figures aim to provide a visualised overview of the Collective Assessment presented above:

[1] Based on trial categories' averages

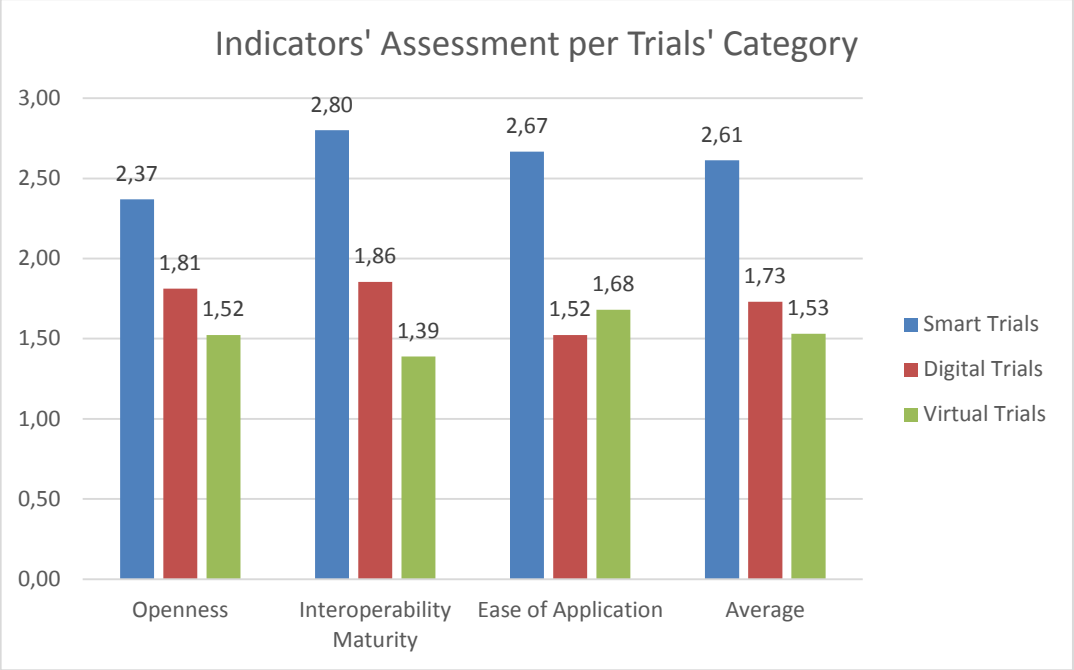


Figure 8 Indicators per Trials' Category

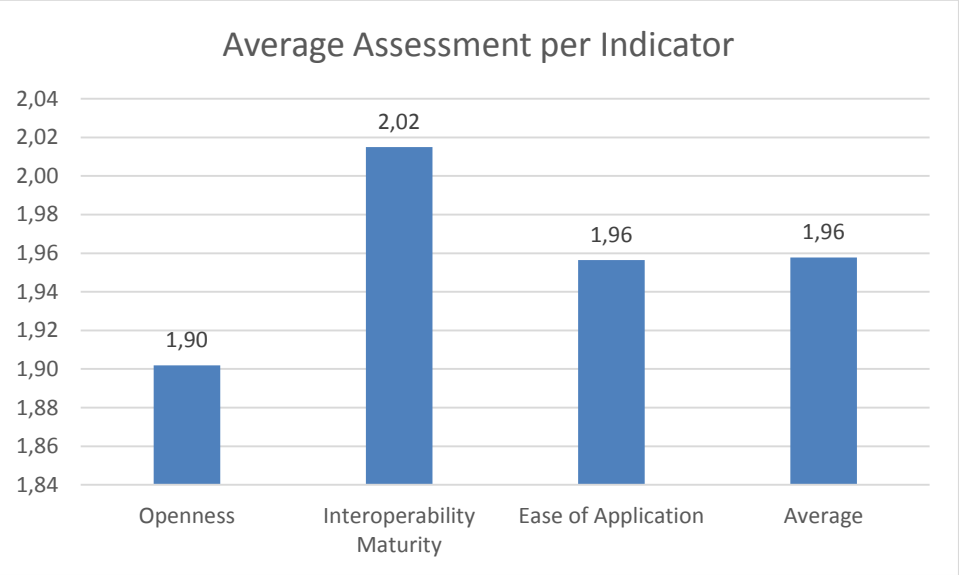


Figure 9 Averages per Indicator

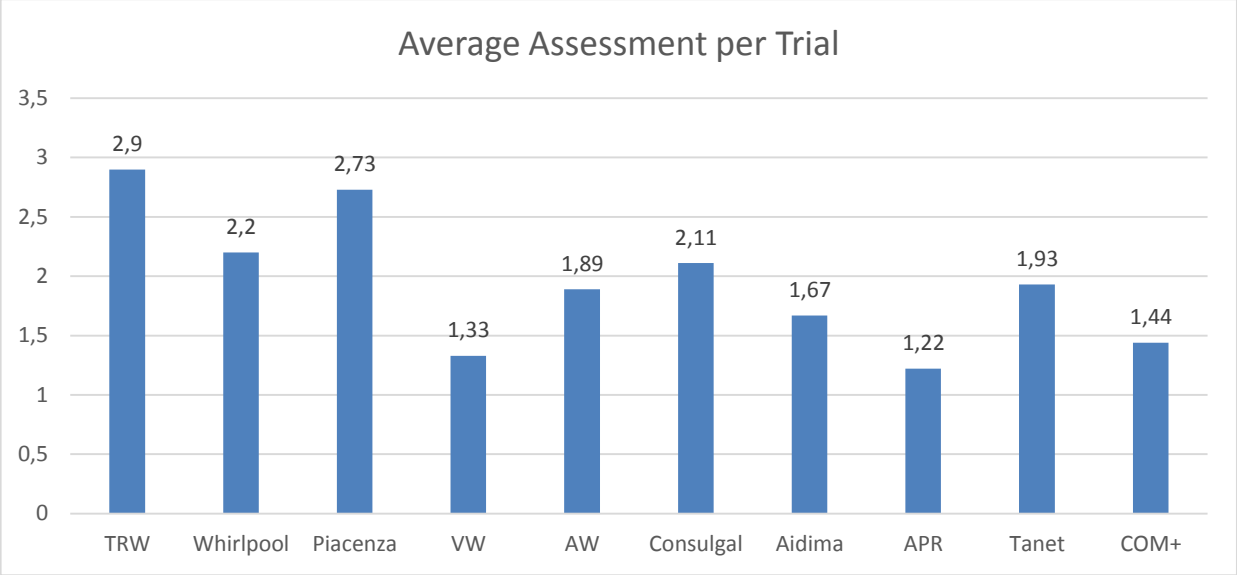


Figure 10 General Average per Trial

3.3. SEs Insights

3.3.1 SEs Adoption by the trials

In the course of the project's implementation, the FITMAN Trials have updated their selection of Specific Enablers (SEs) in order to best serve their needs and the scope of the project. The following table provides an overview on the final SEs adoption by the FITMAN Trials:

				Smart			Digital				Virtual		
				#2	#4	#5	#1	#3	#7	#11	#6	#8	#9
Ref. ID	Specific Enabler Name	Owner	Trial Group	TRW	Whirpool	PIACENZA	VW	AW	Cons	AIDIMA	APR	TANET	COM+
Specific Enablers													
SEI_1	Shop Floor Data Collection	ATOS+UNIN	SF			X		X	X			X	
SEI_2	Secure Event Management	TXT	SF	X	X	X		X					
SEI_3	Unstructured and Social Data Analytics (U-SDA)	NTUA	DF							X		X	
SEI_4	Collaborative Asset Management	ENG	VF				X					X	
SEI_5	Supply Chain & Business Ecosystem Apps (FITMAN-SCApp)	TXT	VF									X	
SEI_6	Metadata and Ontologies Semantic Matching (FITMAN-SeMa)	NTUA	VF					X			X		X
SEI_7	Collaborative Business Process Management (FITMAN-BPM)	ENG	VF				X				X	X	
SEI_8	Data Interoperability Platform Services (FITMAN-DIPS)	TXT	VF								X	X	X

Figure 11: SEs Adoption by FITMAN Trials

Based on the information provided in the context of Figure 5, the following sections aim to provide an initial overview and draft insights on the Specific Enablers utilised by the 10 FITMAN Trials.

3.3.2 SEs Analysis based on Self Certification Results

As it has been agreed by the FITMAN consortium and also reported in previous deliverables (mostly issued in the context of Work Package 2, "FITMAN Verification and Validation Method"), the FITMAN partners responsible for developing the Specific Enablers under consideration would perform a self-assessment of steps P4 (Release Verification) and P5 (Product Validation) of the integrated FITMAN V&V Methodology; the process selected for this purpose was the FITMAN Self Certification Forms.

As reported in FITMAN Deliverable D2.5, the V&V activities were dry-run for 2 Specific Enablers (the FITMAN Anlzer and the FITMAN SeMa, led by NTUA) and then were expanded to the rest 6 Specific Enablers.
Based on the above, the partners responsible for the development of the Specific Enablers filled the respective online Self Certification Forms and the collected results are presented and analysed (per Specific Enabler) in the following sub-sections.

3.3.2.1 Shop Floor Data Collection

The ATOS and UNINOVA partners, responsible for the Shop Floor Data Collection Specific Enabler, reported the following results regarding steps P4 and P5 of the FITMAN V&V Methodology:

	V&V Technique	Result	Comments
Step P4	Alpha Testing	Positive	24 test cases iterations, 0 failed
Step P5	User Acceptance Testing	In progress	Developer Acceptance Survey is open for developers who reuse the SE

Table 3 Shop Floor Data Collection Self Certification Results by ATOS

3.3.2.2 Secure Event Management

The TXT e-Solutions partner, responsible for the Secure Event Management Specific Enabler, reported the following results regarding steps P4 and P5 of the FITMAN V&V Methodology:

	V&V Technique	Result	Comments
Step P4	Alpha Testing	Positive	20 test cases iterations, 10 failed and corrected
Step P5	User Acceptance Testing	In progress	Developer Acceptance Survey is open for developers who reuse the SE

Table 4 : Secure Event Management Self Certification Results by TXT e-Solutions

3.3.2.3 Unstructured and Social Data Analytics

The NTUA partner, responsible for the Unstructured and Social Data Analytics Specific Enabler, reported the following results regarding steps P4 and P5 of the FITMAN V&V Methodology:

	V&V Technique	Result	Comments
Step P4	Alpha Testing	Positive	28 test cases iterations, 7 failed and corrected
Step P5	User Acceptance Testing	In progress	Developer Acceptance Survey is open for developers who reuse the SE

Table 5 : Unstructured and Social Data Analytics Self Certification Results by NTUA

3.3.2.4 Collaborative Assets Management

The Engineering partner, responsible for the Collaborative Assets Management Specific Enabler, reported the following results regarding steps P4 and P5 of the FITMAN V&V Methodology:

	V&V Technique	Result	Comments
Step P4	Alpha Testing	Positive	35 test cases iterations, 3 failed and corrected
Step P5	User Acceptance Testing	In progress	Developer Acceptance Survey is open for developers who reuse the SE

Table 6 : Collaborative Assets Management Self Certification Results by Engineering

3.3.2.5 Supply Chain and Business Ecosystems App

The TXT e-Solutions partner, responsible for the Supply Chain and Business Ecosystems App Specific Enabler, reported the following results regarding steps P4 and P5 of the FITMAN V&V Methodology:

	V&V Technique	Result	Comments
Step P4	Alpha Testing	Positive	8 test cases iterations, 6 failed and corrected
Step P5	User Acceptance Testing	In progress	Developer Acceptance Survey is open for developers who reuse the SE

Table 7 : Supply Chain and Business Ecosystems App Self Certification Results by TXT e-Solutions

3.3.2.6 Metadata and Ontologies Semantic Matching

The NTUA partner, responsible for the Metadata and Ontologies Semantic Matching Specific Enabler, reported the following results regarding steps P4 and P5 of the FITMAN V&V Methodology:

	V&V Technique	Result	Comments
Step P4	Alpha Testing	Positive	12 test cases iterations, 3 failed and corrected
Step P5	User Acceptance Testing	In progress	Developer Acceptance Survey is open for developers who reuse the SE

Table 8 : Metadata and Ontologies Semantic Matching Self Certification Results by NTUA

3.3.2.7 Collaborative Business Process Management

The Engineering partner, responsible for the Collaborative Business Process Management Specific Enabler, reported the following results regarding steps P4 and P5 of the FITMAN V&V Methodology:

	V&V Technique	Result	Comments

Step P4	Alpha Testing	Positive	16 test cases iterations, 0 failed and corrected
Step P5	User Acceptance Testing	In progress	Developer Acceptance Survey is open for developers who reuse the SE

Table 9 : Collaborative Business Process Management Self Certification Results by Engineering

3.3.2.8 Data Interoperability Platform Services

The TXT e-Solutions partner, responsible for the Data Interoperability Platform Services Specific Enabler, reported the following results regarding steps P4 and P5 of the FITMAN V&V Methodology:

	V&V Technique	Result	Comments
Step P4	Alpha Testing	Positive	8 test cases iterations, 3 failed and corrected
Step P5	User Acceptance Testing	In progress	Developer Acceptance Survey is open for developers who reuse the SE

Table 10 : Data Interoperability Platform Services Self Certification Results by TXT e-Solutions

3.3.2.9 Self-Certification Statistics

In summary, the self-certification results suggest that all leaders and development teams applied the same techniques for the Verification and Validation activities, namely Alpha Testing for step P-4 and User Acceptance Testing for step P-5.

Ref. ID	Specific Enabler Name	Owner	Results				
			P-1	P-2	P-3	P-4	P-5
SEI_1	Shop Floor Data Collection	ATOS+ UNINOVA	Not applicable	Not applicable	Not applicable	Alpha Testing	User acceptance testing
SEI_2	Secure Event Management	TXT	Not applicable	Not applicable	Not applicable	Alpha Testing	User acceptance testing
SEI_3	Unstructured and Social Data Analytics (FITMAN-Anlzer)	NTUA	Not applicable	Not applicable	Not applicable	Alpha Testing	User acceptance testing
SEI_4	Collaborative Asset Management	ENG	Not applicable	Not applicable	Not applicable	Alpha Testing	User acceptance testing
SEI_5	Supply Chain & Business Ecosystem Apps (FITMAN-SCApp)	TXT	Not applicable	Not applicable	Not applicable	Alpha Testing	User acceptance testing
SEI_6	Metadata and Ontologies Semantic Matching (FITMAN-SeMa)	NTUA	Not applicable	Not applicable	Not applicable	Alpha Testing	User acceptance testing

Ref. ID	Specific Enabler Name	Owner	Results				
			P-1	P-2	P-3	P-4	P-5
SEI_7	Collaborative Business Process Management (FITMAN-BPM)	ENG	Not applicable	Not applicable	Not applicable	Alpha Testing	User acceptance testing
SEI_8	Data Interoperability Platform Services (FITMAN-DIPS)	TXT	Not applicable	Not applicable	Not applicable	Alpha Testing	User acceptance testing

With regard to step P-4, 151 test cases iterations were created in total for all Specific Enablers, leading to an average of 19 test cases per Specific Enabler. A total 32 test cases iterations (which can be translated to an average of 4 test cases iterations per Specific Enabler) failed when they were initially tested by the Specific Enablers developers. Appropriate action was taken by the corresponding Specific Enablers developers and all test cases that failed have been corrected.

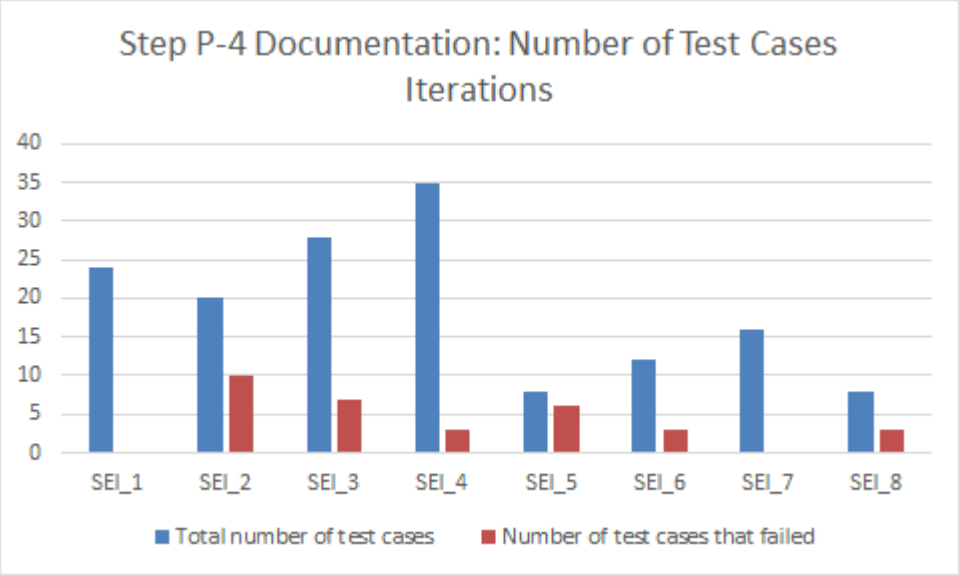


Figure 12 Step P-4 Number of test cases iterations

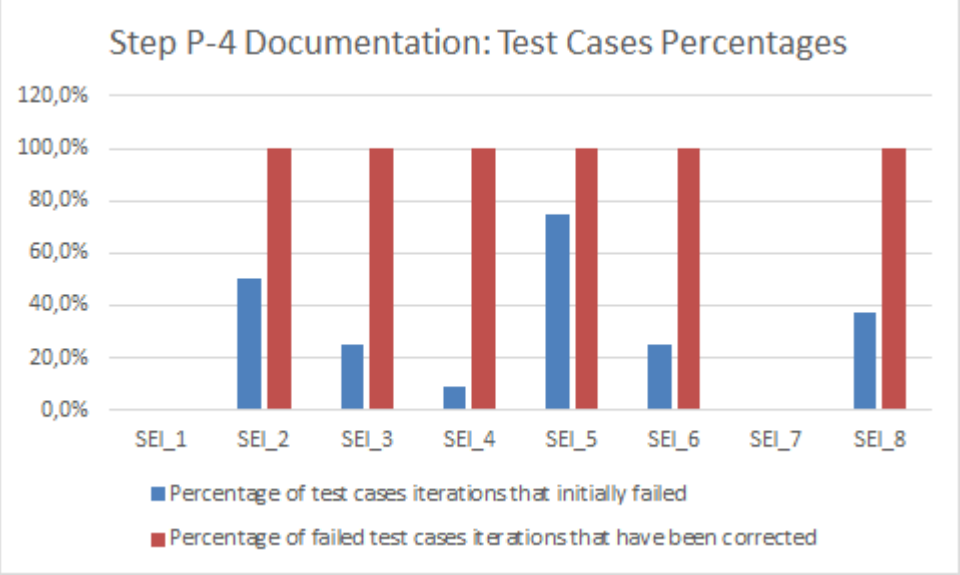


Figure 13 Step P-4 Percentages related to test cases iterations

With regard to step P-5, an average of 11 questions have been created per developer acceptance questionnaire.

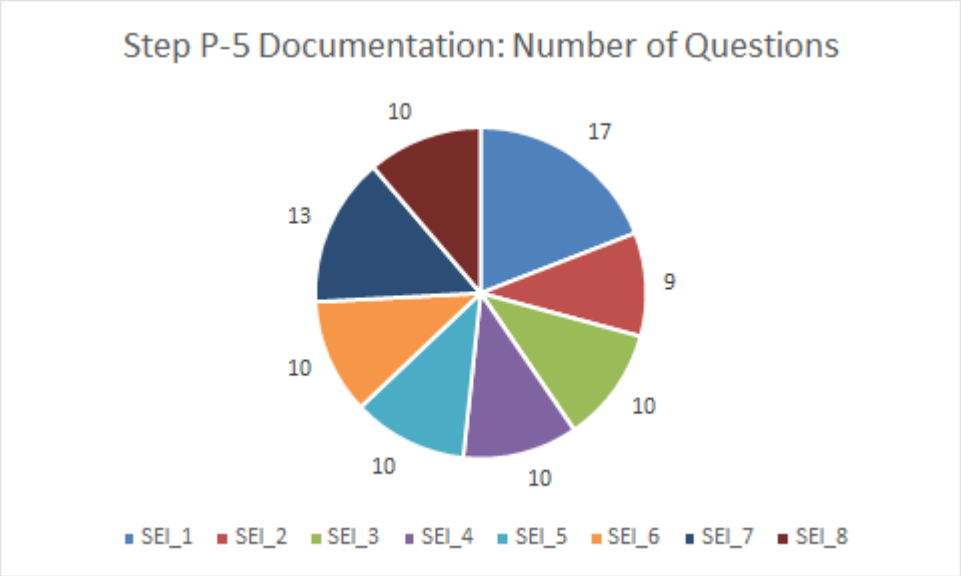


Figure 14 Step P-5 Developer Acceptance Questionnaire: Documentation overview

3.3.3 SEs Analysis based on Technical Indicators

After being assessed via the self-certification forms by their developers, the FITMAN Specific Enablers have been also assessed by their end-users (i.e. the 10 FITMAN Trials) via properly selected Technical Indicators (reported in the context of deliverable D2.2 as part of the integrated FITMAN V&V Methodology and in the context of D2.5 in which the Simplified FITMAN V&V approach has been presented).
Each Specific Enabler has been assessed by the IT team of the Trials utilising it (as presented in Section 3.3.2.1). The collected results are presented and analysed (per Specific Enabler) in the following sub-sections.

3.3.3.1 Shop Floor Data Collection

As per Figure 11, Piacenza, AgustaWestland, Consulgal and TANET are using the Shop Floor Data Collection Specific Enabler. The up to date available technical indicators' assessments can be found in the following table:

	Piacenza	AW	Consulgal	TANET	Average
Openness	3	3	2	2	2.5
Interoperability Maturity	2	2	3	3	2.5
Ease of Application	2	1	1	1	1.25

Table 11 : Shop Floor Data Collection Technical Indicators Assessment

Regarding the Openness indicator, 2 Trials have assessed it with 2 (Consulgal and TANET), while Piazenca and AgustaWestland have assessed it with 3; thus, the resulting mean value is 2.50.

As far as Interoperability Maturity is concerned, Piazenza and AgustaWestland have assessed the Shop Flood Data Collection SE with 2, while the two remaining Trials with 3; thus, the resulting mean value is again 2.50.
Last but not least, Ease of Application receives lower values, as Piazenza has assessed it with 2 and the remaining 3 Trials with 1. The resulting mean value is 1.25.

3.3.3.2 Secure Event Management

As per Figure 11, TRW, Whirlpool, Piacenza and AgustaWestland are using the Secure Event Management Specific Enabler. The up to date available technical indicators' assessments can be found in the following table:

	TRW	Whirlpool	Piacenza	AW	Average
Openness	3	2	-	0	1.25
Interoperability Maturity	3	2	-	2	2.33
Ease of Application	3	2	-	2	2.33

Table 12 : Secure Event Management Technical Indicators Assessment

TRW assessed all three indicators with the exact same value (3), while, in the same time, Whirlpool assessed all three indicators with 2.
From the other hand, AgustaWestland assessed Openness with 0 (resulting in very high differentiation regarding assessments of this specific indicator) and Interoperability Maturity and Ease of Application with 2, which is in accordance with the assessments provided by Whirlpool.
Thus, the mean value of Interoperability Maturity and Ease of Application is 2.5; the respective mean value for Openness is 1.25.

3.3.3.3 Unstructured and Social Data Analytics

As per Figure 11, AIDIMA and TANET are using the Unstructured and Social Data Analytics Specific Enabler. The up to date available technical indicators' assessments can be found in the following table:

	AIDIMA	TANET	Average
Openness	2	-	2
Interoperability Maturity	1	-	1
Ease of Application	2	-	2

Table 13 : Unstructured and Social Data Analytics Technical Indicators Assessment

As it can be easily seen, only AIDIMA has completed the assessment related to this Specific Enabler. Thus, the average is calculated only by this individual assessment.

3.3.3.4 Collaborative Asset Management

As per Figure 11, AIDIMA and TANET are using the Collaborative Asset Management Specific Enabler. The up to date available technical indicators' assessments can be found in the following table:

	VW	TANET	Average
Openness	2	2	2
Interoperability Maturity	1	1	1
Ease of Application	1	2	1.5

Table 14 : Collaborative Asset Management Technical Indicators Assessment

On the one hand, as it can be seen, VW and TANET are in complete accordance regarding the Openness and Interoperability Maturity indicators, having both assessed Openness with 2 and Interoperability Maturity with 1. Thus, the mean values are (respectively) the same for these two technical indicators.
On the other hand, regarding Ease of Application VW has assessed it with 1 ("Baseline Unified Approach (International Standards exists): Offering an API exposing main part of the GE / SE functionalities, in its own format" for Interoperability Maturity and "Applicable with significant amount of work"), while TANET has assessed it with 2 ("Open Unified Approach (No International Standards exists): Offering an API exposing main part of the GE / SE functionalities, in its own format" for Interoperability Maturity and "applicable with limited amount of work" for Ease of Application). Thus, the respective mean value has been set to 1.5.

3.3.3.5 Supply Chain & Business Ecosystem Apps

As per Figure 11, only TANET is using the Supply Chain & Business Ecosystem Apps Specific Enabler. The up to date available technical indicators' assessments can be found in the following table:

	Tanet	Average
Openness	2	2
Interoperability Maturity	2	2
Ease of Application	2	2

Table 15 : Supply Chain & Business Ecosystem Apps Technical Indicators Assessment

The average is obviously calculated only by this individual assessment.

3.3.3.6 Metadata and Ontologies Semantic Matching

As per Figure 11, AW, APR and COM+ are using the Metadata and Ontologies Semantic Matching Specific Enabler. The up to date available technical indicators' assessments can be found in the following table:

	AW	APR	COM+	Average
Openness	2	2	1	1.67
Interoperability Maturity	2	0	1	1
Ease of Application	2	2	2	2

Table 16 : Metadata and Ontologies Semantic Matching Technical Indicators Assessment

All three Trials are in complete accordance regarding the Ease of Application indicator, having all assessed in with 2 – resulting in the same mean value.
Openness is assessed with 2 by two Trials (AgustaWestland and APR), while the COM+ is stricter (1). Thus, the resulting mean value is 1.67.
The lowest mean value accrues for Interoperability Maturity, due to the fact that the three Trials have provided 3 different assessments (2 by AgustaWestland, 0 by APR and 1 by COM+); the resulting mean value is 1.

3.3.3.7 Collaborative Business Process Management

As per Figure 11, VW, APR and TANET are using the Collaborative Business Process Management Specific Enabler. The up to date available technical indicators' assessments can be found in the following table:

	VW	APR	TANET	Average
Openness	2	1	1	1.33
Interoperability Maturity	1	1	1	1
Ease of Application	1	1	2	1.33

Table 17 : Collaborative Business Process Management Technical Indicators Assessment

Regarding Interoperability Maturity, all Trials agree on assessing the Specific Enabler with 1, resulting to the same mean value.
As far as Openness is concerned, VW assessed the Specific Enabler with 2, while the two remaining Trials assessed it with 1, resulting in a mean value of 1.33.
Finally, regarding Ease of Application, VW and APR agreed on assessing the Specific Enabler with 1, while TANET provided a better assessment (2). The mean value that accrued is 1.33.

3.3.3.8 Data Interoperability Platform Services

As per Figure 11, APR, TANET and COM+ are using the Data Interoperability Platform Services Specific Enabler. The up to date available technical indicators' assessments can be found in the following table:

	APR	TANET	COM+	Average
Openness	1	-	1	1
Interoperability Maturity	0	-	1	0.5
Ease of Application	2	-	1	1.5

Table 18 : Data Interoperability Platform Services Technical Indicators Assessment

Based on the two available datasets, APR and COM+ have assessed Openness with the exact same value (1), resulting in the same mean value.
Regarding Interoperability Maturity, APR has assessed the Specific Enabler with 0, while COM+ with 1, resulting once again in the mean value of 0.5.
Finally, regarding Ease of Application, APR has assessed the Specific Enabler with 2, while COM+ with 1, resulting in a mean value of 1.5.

3.3.3.9 Collective Assessment per FITMAN Trial

In the following table the collective assessments each FITMAN Trial has provided to the number of Specific Enablers that will be used are provided. The given numbers for Openness, Interoperability Maturity and Ease of Application are the mean numbers of all assessments of the specific indicator, while the last column provides the overall average accruing from all assessments:

Trial Category	Trial	No of SEs	Openness	Interoperability Maturity	Ease of Application	General Average
Smart	**TRW**	1	3	3	3	3
	Whirlpool	1	2	2	2	2
	Piacenza[2]	2	3	2	2	2.33
	Smart Factory averages		*2.67*	*2.33*	*2.33*	*2.44*
Digital	**VW**	2	2	1	1	1.33
	AW	3	1.67	2	1.67	1.78
	CONSULGAL	1	2	3	1	2
	AIDIMA	1	2	1	2	1.67
	Digital Factory Averages		*1.92*	*1.75*	*1.42*	*1.70*
Virtual	**APR**	3	1.33	0.33	1.67	1.11
	TANET	6[3]	1.75	1.75	1.75	1.75
	COM+	2	1	1	1.5	1.17
	Virtual Factory Averages		*1.36*	*1.03*	*1.64*	*1.34*
General Averages[4]			*1.98*	*1.70*	*1.80*	*1.83*

Table 19 : Collective Assessment

The main conclusions that can be conducted from the previously presented table are the following:

- Interoperability Maturity is the indicator in general assessed lower amongst the three.
- Openness is assessed particularly high by the Smart Trials (the highest average recorded, 2.67) and the remaining two are equally assessed.
- The lowest general average (based on 3 assessments) is given by APR (1.11), while the highest one is provided by TRW (mean value 3, based on 1 assessment).
- Smart Trials seem to assess the respective indicators higher than the remaining two, as this is verified in all three cases, as well as in the GEs validations presented in the previous sections.
- The lowest assessment is given to the Interoperability Maturity indicator by APR (0.33), while the highest (3) is given to all indicators by TRW, to Openness by Piacenza and to Interoperability Maturity by Consulgal.

The following figures aim to provide a visualised overview of the aforementioned information:

[2] One out of the two expected assessments is missing
[3] Two out of the six expected assessments are missing
[4] Based on trial categories' averages

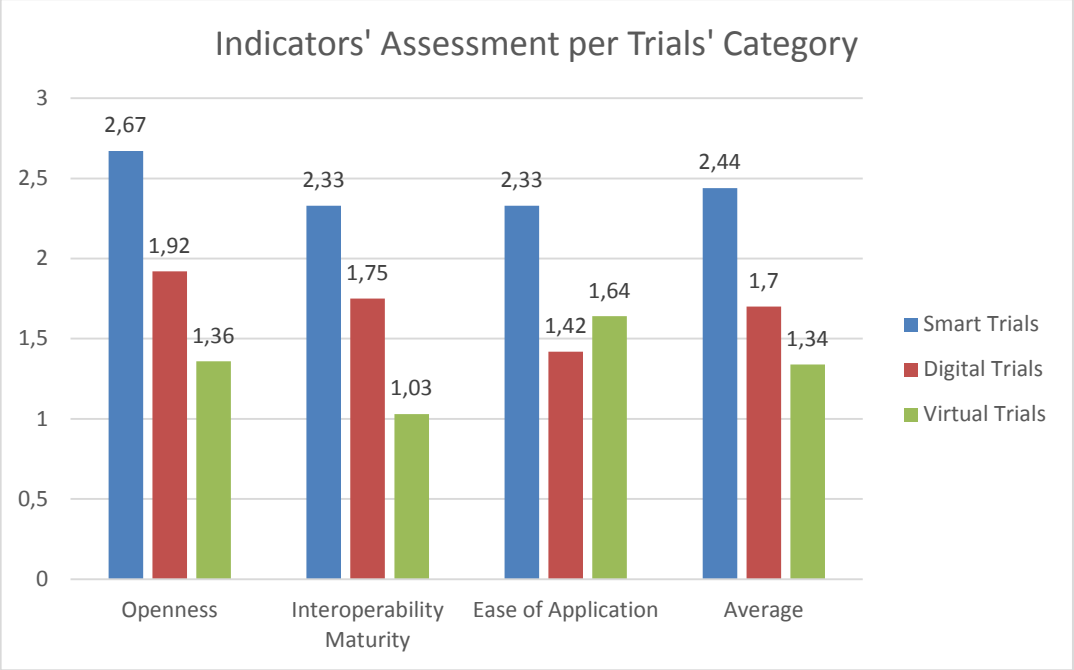


Figure 15 Indicators per Trials' Category

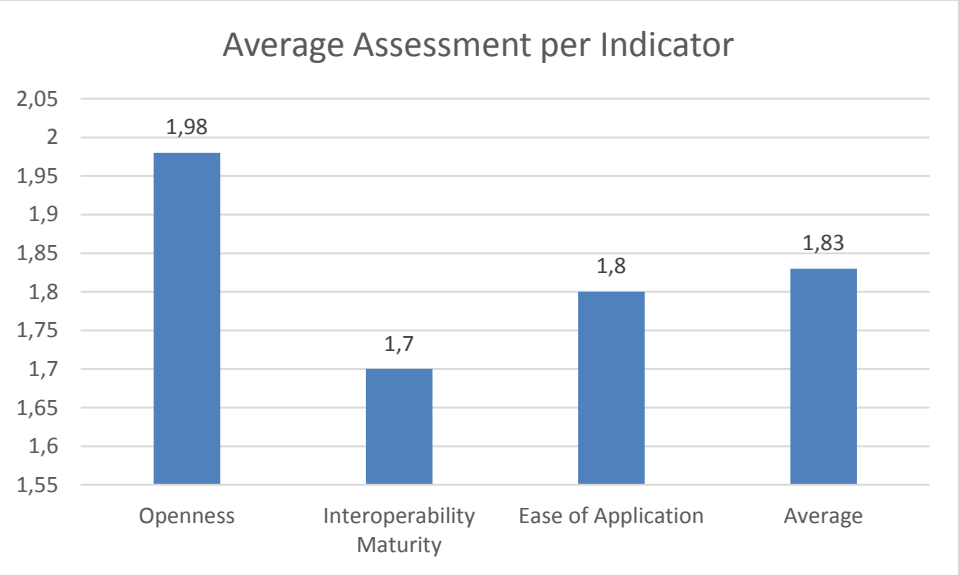


Figure 16 Averages per Indicator

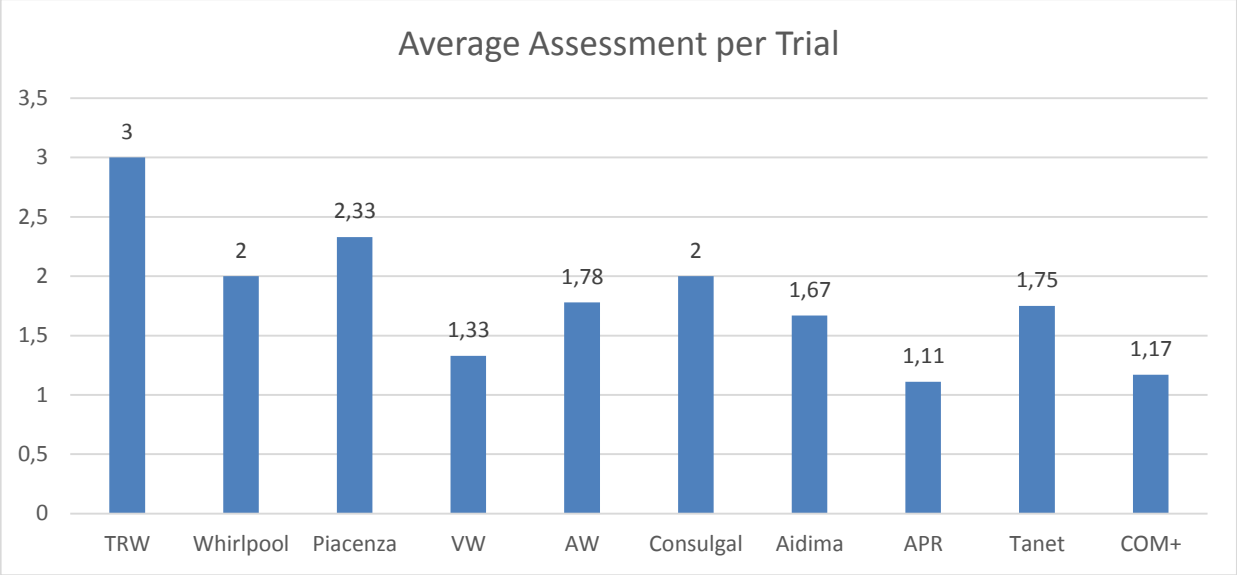


Figure 17 General Average per Trial

3.4. Trial Solution Technical Indicators

In alignment with the V&V Methodology, as already anticipated in D2.5, all Trials had to apply Step T-1, referring to "Trial Solution Validation". During this step, "community-based" assessment, e.g. opinions and subjective perceptions in using the overall Trial solution, was required by all the users of the Trial team. All inputs were systematically recorded with the help of the Community-based Forms and the Technical Journals in SurveyMonkey.
The collected results are presented and analysed (per Trial) in the following sub-sections, while an initial comparative assessment is attempted in section 3.4.11.

3.4.1 Volkswagen (VW)

On behalf of the VW Trial, three members of the Trial team have posted their responses to the Community-based Survey.
On average, the Trial team agrees that the overall Trial solution for VW fulfils all the Trial requirements while it is easy to start to use the solution and learn its functionalities. The team also considers that the solution is attractive and really appropriate for the average user.

Technical Indicator	Response 1	2	3	Average
Fulfilment of requirements	I agree	I agree	I agree	I agree (100%)
Learnability	I agree	I agree	I agree	I agree (100%)
Understandability	I agree	I agree	I agree	I agree (100%)
User's attraction level	I agree	I agree	I agree	I agree (100%)
Efficiency	I agree	I agree	I strongly agree	I strongly agree (33%) + I agree (67%)

Table 20 : Trial Solution Technical Indicators by VW

3.4.2 TRW (TWR)

One member of the TRW Trial team has provided input to the Trial solution validation activities through the Community-based Survey. In general, the opinion of the user for the solution is very positive on the basis that it fulfils all the requirements and that it is very attractive and easy for the average user.

Technical Indicator	Responses 1	Average
Fulfilment of requirements	I strongly agree	I strongly agree (100%)
Learnability	I agree	I agree (100%)
Understandability	I strongly agree	I strongly agree (100%)
User's attraction level	I strongly agree	I strongly agree (100%)
Efficiency	I agree	I agree (100%)

Table 21 : Trial Solution Technical Indicators by TRW

3.4.3 AgustaWestland (AW)

On behalf of AW, three members of the Trial team have posted their responses to the Community-based Survey.
In general, for the Smart case of the trial, they all agree that the solution is efficient and understandable. Learnability and users' attraction level have been positively evaluated, yet the assessment (including the fulfilment of the requirements) will be complete after the end of the experimentation phase. With regard to the Digital case of the trial, the technical indicators will be evaluated during and after the end of the experimentation phase.

Technical Indicator	Responses			Average
	1	2	3	
Fulfilment of requirements	to be evaluated during and after the end of the experimentation phase	to be evaluated after the system implementation	to be evaluated with significant data during and after the conclusion of the experimentation phase	N.A. (100%)
Learnability	the value will be available after the end of the experimentation phase	I agree	the evaluation will be available after the conclusion of the experimentation phase	I agree (33%) + N.A. (67%)
Understandability	I agree	I strongly agree	I agree	I strongly agree (33%) + I agree (67%)
User's attraction level	mock up could be appeal but to be evaluated during and after the test phase	I agree	The values will be available at the end of the system development and during/after the conclusion of the experimentation phase	I agree (33%) + N.A. (67%)
Efficiency	I strongly agree	I agree	I agree	I strongly agree (33%) + I agree (67%)

Table 22 : Trial Solution Technical Indicators by AW

3.4.4 Whirlpool (WHR)

On behalf of Whirlpool, three members of the Trial team have posted their responses to the Community-based Survey.

In general, they all agree that the solution fulfils the initial requirements and at the same time it is appropriate for its intended users, since it is easy and self-clear to understand. Concerning the efficiency of the solution, the Whirlpool team is also positive, considering that the solution does what is supposed to do, however the team believes that there might be room for further improvement of the solution in order to become even more efficient (since no "strong agree" statement was made).

Technical Indicator	Responses			Average
	1	2	3	
Fulfilment of requirements	I agree	I strongly agree	I strongly agree	I strongly agree (67%) + I agree (33%)
Learnability	I agree	I strongly agree	I strongly agree	I strongly agree (67%) + I agree (33%)
Understandability	I agree	I agree	I strongly agree	I strongly agree (33%) + I agree (67%)
User's attraction level	I agree	I strongly agree	I strongly agree	I strongly agree (67%) + I agree (33%)
Efficiency	I agree	I agree	I agree	I agree (100%)

Table 23 : Trial Solution Technical Indicators by WHR

3.4.5 Piacenza (PIACENZA)

On behalf of PIACENZA, one member of the Trial team has provided its responses to the Community-based Survey up to the time this deliverable has been compiled.
According to the responses provided the solution is pretty efficient, it fulfils the identified requirements and at the same time it is easy for the users to understand and to start using it.

Technical Indicator	Responses	Average
	1	
Fulfilment of requirements	I agree	I agree (100%)
Learnability	I agree	I agree (100%)
Understandability	I agree	I agree (100%)
User's attraction level	I agree	I agree (100%)
Efficiency	I agree	I agree (100%)

Table 24 : Trial Solution Technical Indicators by PIACENZA

3.4.6 A.P.R. (APR)

On behalf of APR, only one member of the Trial team has posted responses to the Community-based Survey up to the time this deliverable has been compiled.
According to the responses provided the solution is pretty efficient, it fulfils the identified requirements and at the same time it is easy for the users to understand and to start using it.

Technical Indicator	Responses	Average
	1	
Fulfilment of	I agree	I agree (100%)

requirements		
Learnability	I agree	I agree (100%)
Understandability	I agree	I agree (100%)
User's attraction level	I agree	I agree (100%)
Efficiency	I agree	I agree (100%)

Table 25 : Trial Solution Technical Indicators by APR

3.4.7 Consulgal (CONSULGAL)

On behalf of Consugal, three members of the Trial team have filled in the Community-based Survey.

On average, the Trial team agrees that the overall Trial solution for Consugal fulfils the Trial requirements while it is easy to start to use the solution and learn its functionalities. All team members agree that the solution is easy to understand and at the same time is attractive for the average user. However, as far as it concerns the efficiency of the solution, one of the members thinks that the solution should be much more efficient than it is now. The other two team members do not adopt this opinion on the other hand.

Technical Indicator	Responses			Average
	1	2	3	
Fulfilment of requirements	I agree	I agree	I agree	I agree (100%)
Learnability	I agree	I agree	I agree	I agree (100%)
Understandability	I agree	I agree	I agree	I agree (100%)
User's attraction level	I agree	I agree	I agree	I agree (100%)
Efficiency	I agree	I agree	I disagree	I agree (67%) + I disagree (33%)

Table 26 : Trial Solution Technical Indicators by CONSULGAL

3.4.8 TANet (TANET)

On behalf of TANet, six members of the Trial team have posted their responses. According to the accumulative Community-based Survey, the team believes that the solution is very attractive and that it's easy for the average user to learn how to use it and to understand how it operates. At the same time all team members agree that the solution fulfils all the requirements.

The only objection concerning the solutions comes from one of the six members of the team who believes that there is room for the efficiency of the solution to get improved. However, on average, the team considers that the solution's efficiency is acceptable.

Technical Indicator	Responses						Average
	1	2	3	4	5	6	
Fulfilment of requirements		I agree	I agree	I strongly agree	I strongly agree	I strongly agree	I strongly agree (50%) + I agree (33%) + N/A (17%)
Learnability	I agree	I agree	I agree	I agree	I	I	I strongly

Technical Indicator	Responses 1	2	3	4	5	6	Average
					strongly agree	strongly agree	agree (33%) + I agree (67%)
Understandability	I agree	I agree	I agree	I agree	I agree	I strongly agree	I strongly agree (17%) + I agree (83%)
User's attraction level	I agree	I agree	I strongly agree	I strongly agree	I strongly agree	I strongly agree	I strongly agree (67%) + I agree (33%)
Efficiency	I agree	I agree	I agree	I agree	I agree	I disagree	I agree (83%) + I disagree (17%)

Table 27 : Trial Solution Technical Indicators by TANET

3.4.9 COMPlus (COMPLUS)

On behalf of COMPlus, two members of the Trial team have posted their responses to the Community-based Survey.

The two team members agree that it is easy to start to use the solution and learn its functionalities and that it is attractive to the average user. However, - from a technical point of view – focusing on the fulfilment of the requirements and on the efficiency of the solution, one of the two members has objections, believing that the solution should be more efficient and that some of the requirements are not fulfilled in the way it was expected.

Technical Indicator	Responses 1	2	Average
Fulfilment of requirements	I agree	I disagree	I agree (50%) + I disagree (50%)
Learnability	I agree	I agree	I agree (100%)
Understandability	I agree	I agree	I agree (100%)
User's attraction level	I agree	I agree	I agree (100%)
Efficiency	I agree	I disagree	I agree (50%) + I disagree (50%)

Table 28 : Trial Solution Technical Indicators by COMPLUS

3.4.10 AIDIMA (AIDIMA)

On behalf of AIDIMA, two members of the Trial team have responded to the Community-based Survey.

According to the responses received, the overall Trial solution seams to fulfil all the requirements in a very efficient way. At the same time, the solution is easy and self-clear to understand, concerning the concepts, the terminology and the way it operates in general.

Technical Indicator	Responses		Average
	1	2	
Fulfilment of requirements	I agree	I agree	I agree (100%)
Learnability	I agree	I strongly agree	I strongly agree (50%) + I agree (50%)
Understandability	I agree	I agree	I agree (100%)
User's attraction level	I agree	I agree	I agree (100%)
Efficiency	I agree	I strongly agree	I strongly agree (50%) + I agree (50%)

Table 29 : Trial Solution Technical Indicators by AIDIMA

3.4.11 Collective Assessment

In summary, the results collected per Trial, as well as an indication how representative the sample reported in this deliverable is, are presented in the following table.

Trial ID	Trial Name	Answers provided by M18	Answers expected	Representative Sample
1	VOLKSWAGEN	3	8	37,5 %
2	TRW	1	11	9,1 %
3	AW	3	4	75 %
4	WHIRLPOOL	3	7	42,9 %
5	PIACENZA	1	4	20 %
6	APR	1	2	50 %
7	CONSULGAL	3	10	30 %
8	TANET	6	7	85,7 %
9	COMPLUS	2	3	66,7 %
11	AIDIMA	2	5	40 %

Table 30 : Trial Solution Technical Indicators Summary

In total, the Trial teams consider that the overall Trial solutions deployed with the help of FI-PPP technologies meet their requirements (Strongly Agree: 24%; Agree: 56%) and can be deployed in a reasonable and cost-effective manner (Strongly Agree: 12%; Agree: 76%). All participants agree that the Trial solutions are easy and attractive to use, according to the responses to the Learnability (Strongly Agree: 20%; Agree: 72%), Understandability (Strongly Agree: 16%; Agree: 84%) and User's attraction level (Strongly Agree: 28%; Agree: 64%) indicators.

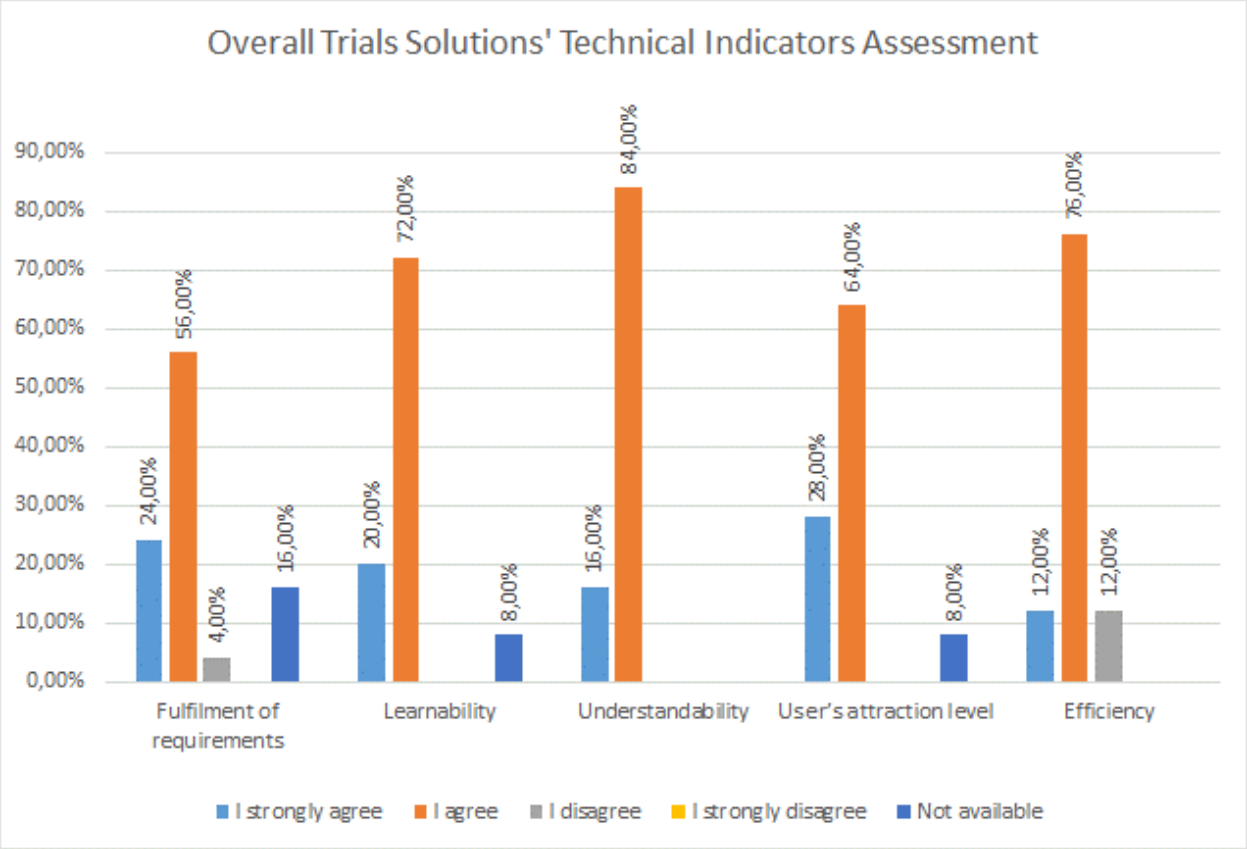


Figure 18: Summary of overall trials solutions' technical indicators assessment

3.4.11.1 Smart Factories

From a Smart Factory perspective, the corresponding Trials have responded that their requirements have been strongly met (60%) and that the attraction level of the trial solutions is very high (60%). All Trials' teams have unanimously appreciated the efficiency of the Trial solutions (Strongly Agree: 100%) while they also agree on the learnability and understandability aspects (Strongly Agree: 40%; Agree: 60%).

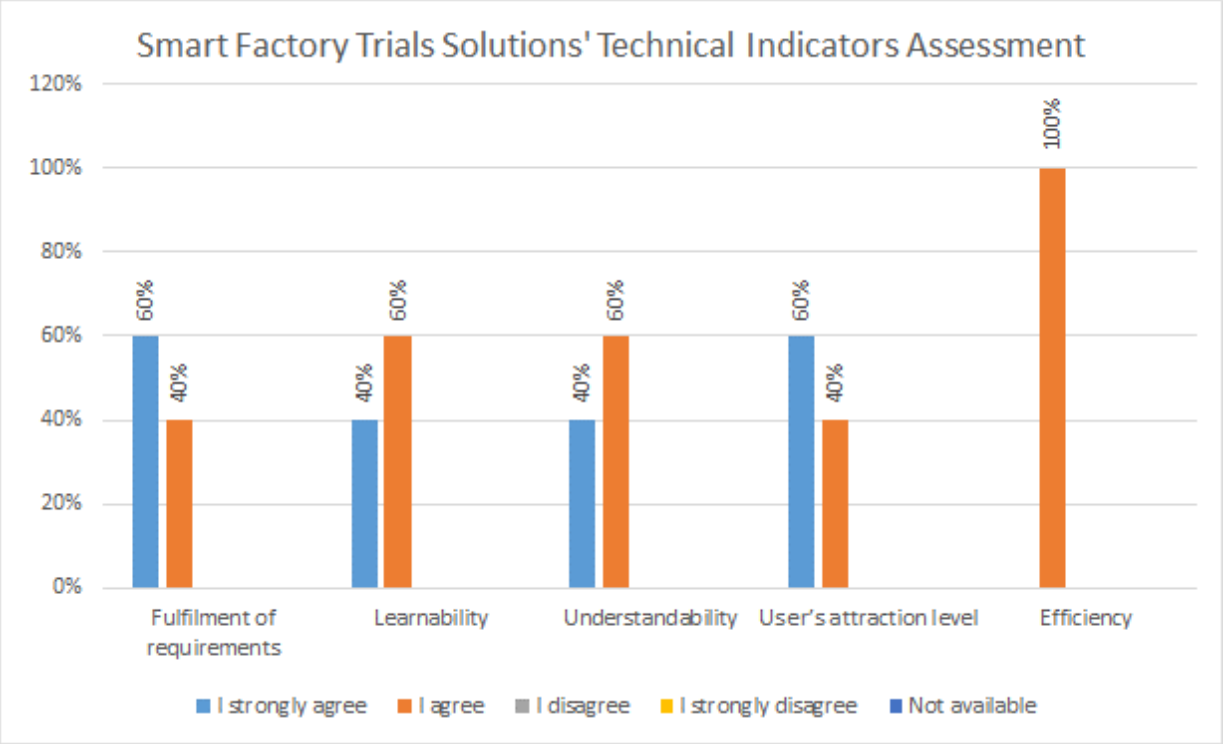


Figure 19: Summary of Smart Factory Trials Solutions Assessment

Indicatively, an extract from the Technical Trial Journal concerning the TRW trial reports that:

> The first important challenge in the implementation of TRW trial is not to interfere with the daily activity of the factory… The definition of the trial architecture selecting the components for achieving the final target has took much effort, due to the lack of awareness regarding the FIWARE GEs and FITMAN SEs instantiation. An important lesson we learned is that the best way to check the functionality of each component is to deploy and use it, since sometimes the instructions and documents provided are not strictly true or they are missing some important information… Due to the management of workers data (even if they are stored and processed anonymously), most of the information handled in the trial cannot be in the public cloud provided by FIWARE.

3.4.11.2 **Digital Factories**

The Digital Factory Trials unanimously agree (Agree: 100%) on the fulfilment of their requirements, understandability and user's attraction level, while they highly value the easiness to start the Trial solution and learn its features (Strongly Agree: 12,5%; Agree: 87,5%). In terms of efficiency, it needs to be noted that 87,5% of the responses consider the deployed solutions as reasonable from a time and resources perspective, yet 12,5% disagreed.

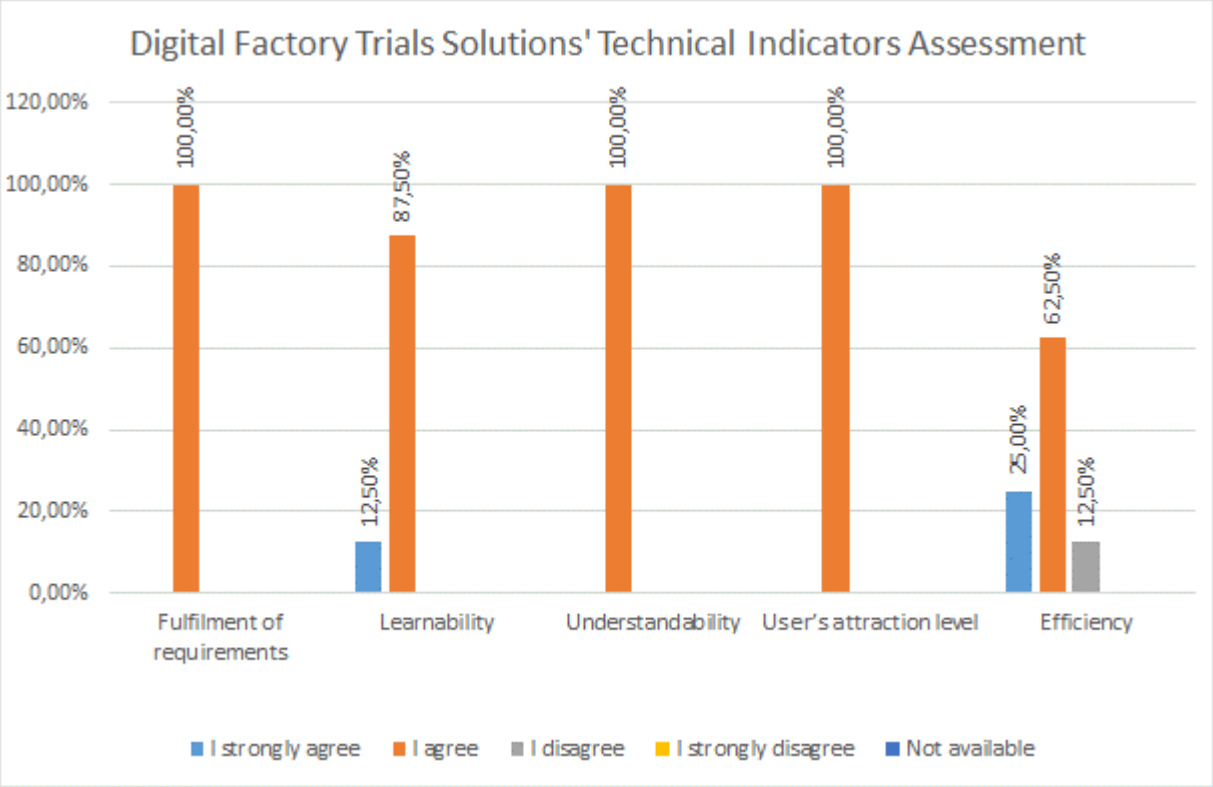


Figure 20: Summary of Digital Factory Trials Solutions Assessment

As specific remark, only an extract from the Technical Trial Journal concerning the AIDIMA Trial reports that:

> UC1: the lack of support of the UDA GE is generating a delay on the total development, deploy and test of this use case. There are inconsistencies between real APIs and documentation. A stronger support from ATOS and a quicker answer are needed. Better documentation on installation is also needed. An access to the source code of the GE would be helpful. The UPV components have been developed waiting for the component to be put in place. --> UC3 Open Call winners have not provided a specification on the private components or a real access to the apps. An intensive work is expected to be done on the final months of the project, though the actual work on data analysis, information provision and testing has been satisfying so far. --> UC2 is already develop and in-place. Minor tweaks appear every time the SE provider generates new versions of the component. A better documentation on production installation and set-up could be helpful for future scenarios where no so much support will be provided.

3.4.11.3 Virtual Factories

With regard to the Virtual Factory Trials, the vast majority (58,33%) of respondents estimate that the Trial's requirements have been largely met, yet approximately 11,1% (coming from 1 trial, namely COMPLUS) seems to disagree and 33,3% (coming from AW) wait for the end of the experimentation phase before providing any assessment. Strong agreement among Trials is reached in terms of learnability (Strongly Agree: 16,67%; Agree: 66,67%), understandabilty (Strongly Agree: 16,67%; Agree: 83,33%) and user's attraction level (Strongly Agree: 33,33%; Agree: 50%). Finally, 83,33% of the participants appreciate that the Trial solution is efficient, but 16,67% appears to disagree (coming from 2 trials, namely TANET and COMPLUS).

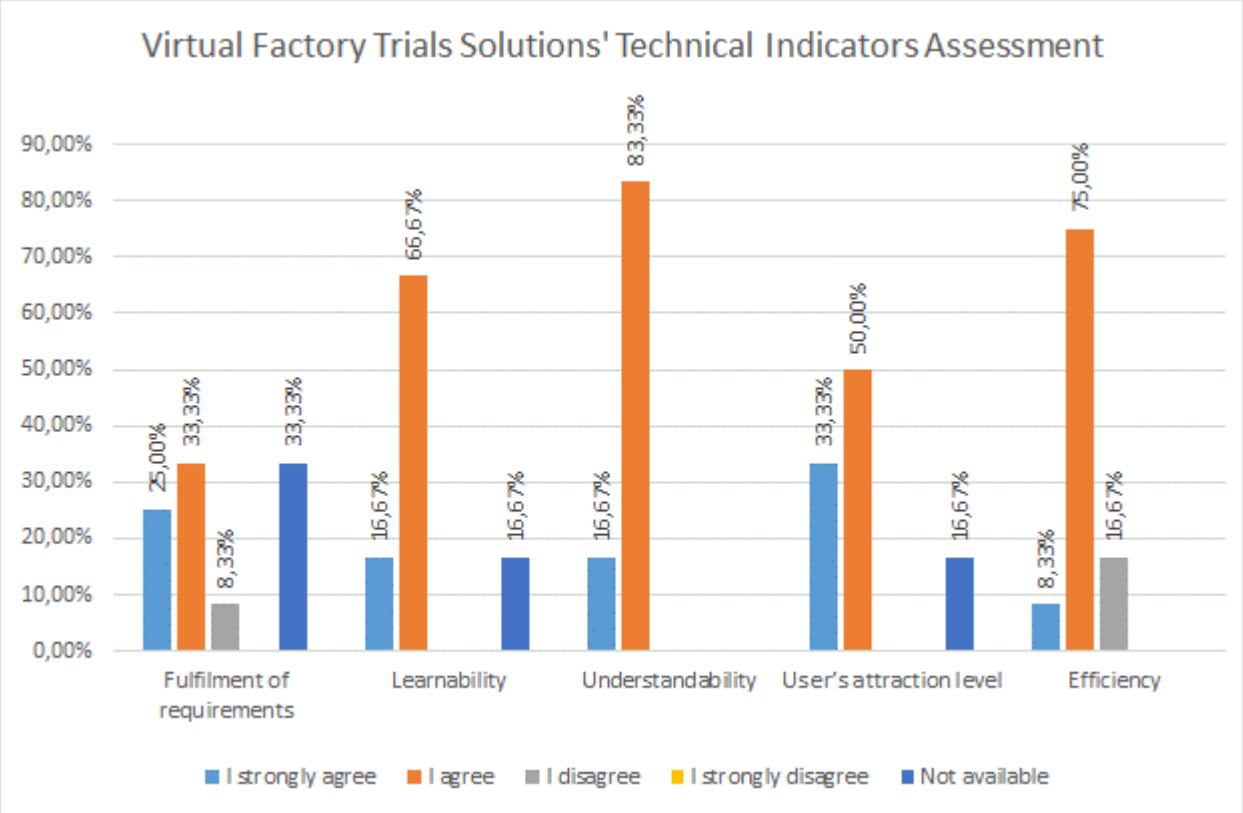


Figure 21: Summary of Virtual Factory Trials Solutions Assessment

Indicatively, an extract from the Technical Trial Journal concerning the TANET Trial reports that:

> In large part, we feel trial users were left to discover the functionality of SE's and GE's due to a lack of documentation. While this may have allowed greater exploration and exploitation of the systems in the long run, it would have been beneficial to receive some form of "Getting Started" documentation. The lack of APIs for many functions, or lack of (again) documentation for APIs, meant that true integration of many of the GE's and SE's was impossible or extremely time-consuming. For a Trial partner seeking to implement the enablers in order for end users to test their functionality, it is essential that integration is possible. Aside from these criticisms, the enablers we have selected have performed their functionality as promised, and the enabler owners have provided support where possible. In addition, new versions of SE's have been released where blocking or high impact bugs were discovered.

4. Business Lesson Learnt

4.1. Business Performance Indicators Analysis

The objectives of this chapter are to present the lessons learnt on the BPIs developed in the frame of the FITMAN project. In order to reach this objective, the data produced by the trials are collected then analysed. Derived from this analysis, comments will be formulated to improve the use of BPIs. A synthesis of the lessons learnt will be proposed in the conclusion.

The plan of this chapter will be:

- First the method of work is presented with the concepts and the application process
- Second, the application of the method to each trial will be described
- Third, a conclusion on the lesson learnt will be proposed.

Method of work

In this chapter the basic concepts of ECOGRAI Method s are recalled along with the description of the work performed.

Definition of a BPI[5]:
BPI (Business Performance Indicator) is a quantified data which measures the efficiency of action variables or decision variables, in the frame of the achievement of an objectives defined for this system. The BPI can measure directly the achievement of the objective (BPI's result) or the trend/progress in the achievement of the objective (BPI's progress) and in this case the efficiency of the decisions.
Example: % of number of manufactured products after the action of the Decision Variable on a given period on the number of manufactured products before the introduction on the same period of time.

There are three types of values that will be used in this document for the ECOGRAI BPIs; the following paragraph gives a definition of each:

- **The AS IS value** is the value measured before the implementation of the FITMAN solution,
- **The TO BE value** is a ratio between the value after the introduction and the AS IS value. At least one TO BE value must be collected.
  The formula to calculate a TO BE ratio is: $\frac{TO\ BE\ Value - AS\ IS\ value}{AS\ IS\ Value}\ x\ 100$
-
- **TARGET Value** is a value defined by the trial owner which must be reached by the System. The TO BE value must evolve in the direction of the Target.

Note from I-VLab: it is recommended to use a ratio but it is not mandatory, values can also be used. The interest to use a ratio is to know at first sight the trend of the evolution of the system.

Characteristics of a BPI:

- easy to be interpreted, to put in work, to use or to exploit
- easily measurable, quantifiable
- representative of the objective of which it measures the reaching

[5] See deliverable D2.2

- available at any time when one needs it

For the analysis of the trial BPIs experiences, the method will cover two aspects.

First, the BPIs denomination proposed in the SurveyMonkey is compared with the BPIs contained in the reference list produced regularly by Interop-VLab. To perform this task the concepts have been recalled at the beginning of this chapter and the BPI reference list is available in the appendix of this deliverable.

Second, the AS IS values, the TO BE values, and the TARGET values are compared in order to determine lessons learnt and, if possible, trends in the running of the trials.
To perform the comparison, the values will be collected and then analysed.
A comparison of the TO BE with the TARGET value allows to get the situation of the system and to determine some action to improve this situation.

Normally, the target value must be defined based on a serious analysis of the system (processes, machining, people, components…) and by the evaluation of the potential improvements by comparison with the present situation. For that it is necessary to start from the AS IS value, to analyse the components of the system in which the BPI is implemented, to evaluate the possibility to improve the running of the system: performance of a machine organisation of the system … then to deduce the value of the target taking in account the introduction of the platform. The target is evaluated with the same unit.
In the majority of the trial, the justification of the target value is not given in the survey.

The work on the BPIs is performed on the ten FITMAN trials. More details on the trials, can be found in the chapter 5 “Trial Experience” of this deliverable.

4.1.1 Application of the method to VOLKSWAGEN BPI

The business scenarios of Volkswagen are based on the Machinery Repository (MR). The MR contains high level information (costs, capacity, technical information etc.) about the machinery and the equipment (production modules) used in different plants of VW. Today the MR is not provided to each engineer of the production planning department. The FITMAN trial aims to change this and to provide the MR to each engineer by using two web-services: "Support MR management" and "Support inquiries".

The trial is composed of two business Scenarios:
BS 1: The web-service "Support MR Management" provide services to update, insert and to delete production modules described in the MR. This service is addressed to the administration and to the management of the MR.
BS 2: The web-service "Support inquiries" is addressed to the real users of the MR. The service supports the workflow of inquiries coming from the management. They provide the information about a production module on the desktop or the I Pad of the inquirer.

Volkswagen is a LE with years of experience and has a worldwide presence. The results from implementation demonstrate that the performance has augmented but the overall dimension of the company and its processes require more time for measures in order to achieve good target results. One consideration must be put into the positive measures of implementation on business scenario 2 which demonstrates that the company´s processes are quite responsive to the FITMAN scenario taking in consideration the industry domain and dimension.

4.1.1.1 Business scenario 1 Management of the Machine Repository

- BPI 1: Machine Repository Update cost after / before the DV/AV implementation during a period (MR UP.COST)
- BPI 2: Machine Repository Update time after / before the DV/AV implementation during a period (MR UP.TIME)

Table 31 Volkswagen Business Scenario 1 data collection

	BS1 – BPI1 MR UP COST	BS1 – BPI2 MR UP.TIME
AS IS	100	100
TO BE 1	-	-
TO BE 2	-	-
TO BE 3	-	-
Target value	**50**	**46**

After the analysis of the BPIs denomination, one difference has been found between the BPI reference list and the SurveyMonkey on the BPI "MR UP.TIME".

The BPI reference list uses this name "Ratio: MR Update time after / before the DV/AV implementation during a period". The SurveyMonkey denomination is "Reduction of the time for updating a production module in MR"
INTEROP-VLab recommends to revert to the initial name because the term "Reduction" is not appropriate for a BPIs but rather for an objective.

BPI 1: Machine Repository Update cost (MR UP.COST)
The target is a reduction in percentage
No values available at the moment. Some main functionality for this BPI will be implemented in Phase 2 (including SEs).

The justification for the target value is not provided in the Survey.

BPI 2: Machine Repository Update time (MR UP.TIME)
The target is a reduction in percentage
No values available at the moment. Some main functionality for this BPI will be implemented in Phase 2 (including SEs).

The justification for the target value is not provided in the Survey.

4.1.1.2 Business scenario 2 data collection

- BPI 3: Inquiry respond time after / before the DV/AV implementation during a period (INQ.RESP. TIME)
- BPI 4: Inquiry respond cost after / before the DV/AV implementation during a period (INQ.RESP.COST)
- BPI 5: Average lead time to access experts knowledge about production equipment (AV.LT)
- BPI 6: Evaluation accuracy after / before the DV/AV implementation during a period (EV. ACC.)

For the Volkswagen BPIs, the Target value is a percentage of the AS IS value.
For example, for the BPI3 below, the target is to achieve a value of 80%, it means a reduction between the AS IS and the Target of 20%

Table 32 Volkswagen Business Scenario 2 data collection

	BS2 – BPI3 INQ.RESP. TIME	BS2 – BPI4 INQ.RESP.COST	BS2 – BPI5 AV.LT	BS2 – BPI6 EV. ACC.
AS IS	**100**	**100**	**100**	**100**
TO BE 1	**95**	**95**	**60**	**90**
TO BE 2	-	-	-	-
TO BE 3	-	-	-	-
Target value	**80**	**90**	**29**	**50**

In order to anonymize the BPIs Values, Volkswagen has given virtual value of 100% representing the AS IS real value.
BPI 3: Inquiry respond time (INQ.RESP. TIME)
The target is a reduction in percentage
The anonymised AS IS value of the inquiry respond time is 100 % **before** the implementation of the platform. The TO BE 1 Value is 95% (after the implementation of the platform).

The TO BE ratio after/before is -5% ($\frac{95-100}{100}\ x100$).

The trial's objective is to decrease the AS IS value to 80% **(- 20%)**. The Target value seems achievable; more measures are needed to confirm the positive evolution.

The justification for the target value is not provided in the Survey.

BPI 4: Inquiry respond cost (INQ.RESP.COST)
The target is a reduction in percentage

The anonymised AS IS value of the inquiry respond cost is 100 % **before** the implementation of the platform. The TO BE Value is 95% (after the implementation of the platform).

The TO BE ratio after/before is -5% ($\frac{95-100}{100}\ x100$).

The trial's objective is to decrease the AS IS value to reach 90% **(- 10%)**. The Target value seems achievable; more measures are needed to confirm the positive evolution.

The justification for the target value is not provided in the Survey.

BPI 5: Average lead time to access experts' knowledge about production equipment (AV.LT)
The target is a reduction in percentage

The anonymised AS IS value of the Evaluation accuracy is 100 % **before** the implementation of the platform. The TO BE 1 Value is 60% (after the implementation of the platform).

The TO BE ratio after/before is -40% ($\frac{60-100}{100}\ x100$).

The trial's objective to decrease the AS IS to reach 29% (-71% reduction). The Target value seems achievable; more measures are needed to confirm the positive evolution.

BPI 6: Evaluation accuracy (EV. ACC.)
The target is a reduction in percentage

The anonymised AS IS value of the Evaluation accuracy is 100 % **before** the implementation of the platform. The TO BE 1 Value is 90% (after the implementation of the platform).

The TO BE ratio after/before is -10% ($\frac{90-100}{100}\ x100$).

The trial's objective is to decrease the AS IS value by 50%. The Target value seems achievable; more measures are needed to confirm the positive evolution.

4.1.2 Application of the method to TRW BPI

The TRW trial if part of the Smart Factory trials of the FITMAN project, the trial is decomposed in two business scenario (BS), the first concerns Risk Modelling and covers aspects such as Risk cataloguing and Evaluation of the consistency of the preventive process.
The second BS concerns the Risk Detection and Information which are more focused on risk monitoring.

The trial is composed of two business Scenarios:

- BS 1 - Risk Modelling
- BS 2 - Risk Detection and Information

TRW trial will use percentage for the numbers given in the table. The principle is the following: the reduction of time is given by the following formula: $\frac{New\ time - current\ time}{current\ time} x\ 100$

TRW is a LE with years of experience and has a worldwide presence. The results from implementation demonstrate that the performance has augmented on both business scenarios but the overall dimension of the company and its processes require more time to evaluate and for measures in order achieve good/aimed target results in each BPI. One other consideration as to do with the targets seeming achievable which indicates that the BPIs are aligned with the company´s dimension and experience.

4.1.2.1 Business Scenario 1 Risk Modelling

The business scenario one BPIs are the following:

- Ratio: Number of standards and regulations after / before the DV/AV implementation during a period (STD.REG.)
- Ratio: Number of accidents and incidents after / before the DV/AV implementation during a period (ACC.INC.)
- Ratio: Number of risks after / before the DV/AV implementation during a period (RISKS)
- Ratio: Number of preventive actions after / before the DV/AV implementation during a period (PREV.ACT.)
- Ratio: Number of human errors after / before the DV/AV implementation during a period (HUM.ERR.)

The value collected through the survey are reported in the following table. The TO BE 1, TO BE 2 and TO BE 3 are the values measured after the implementation of the solution.

Table 33 TRW Business Scenario 1 Risk Modelling

	BS1 – BPI 1 STD.REG	BS1 – BPI 2 ACC.INC.	BS1 – BPI 3 RISKS	BS1 – BPI 4 PREV. ACT	BS1 – BPI 5 HUM. ERR.
AS IS value	NA	NA	NA	NA	NA
TO BE 1	**4**	**9**	21	18	0
TO BE 2	-	-	-	-	-
TO BE 3	-	-	-	-	-
Target value	**5**	**10**	**30**	**30**	**10**

BPI1 Number of standards and regulations (STD.REG.)
Target is an increase in percentage

The AS IS value is not given due to trial's considerations. The TO BE 1 ratio after/before the implementation of the solution is 4%. The number of standards and regulations have been increased by 4%.
The trial's objective is to increase the value by 5%. The Target seems achievable; more measures are needed to confirm the positive evolution.

The justification for the target value is not provided in the Survey.

BPI2 Number of accidents and incidents (ACC.INC.)
Target is a reduction in percentage

The AS IS value is not given due to trial's considerations. The TO BE after/before the implementation of the solution value is 9. The Number of accidents and incidents decreased by 9%.
The trial's target is to decrease the AS IS value by 10%. The Target seems achievable; more measures are needed to confirm the positive evolution.

The justification for the target value is not provided in the Survey.

BPI3 Number of risks (RISKS)
Target is an increase in percentage
The AS IS value is not given due to trial's considerations. The TO BE ratio after/before the implementation of the solution is 21 it means that the Number of risks identified increased by 21%.
The trial's target to increase the AS IS value by 30%. The Target seems achievable; more period of evaluation are needed to analysis the reaching of this target.

The justification for the target value is not provided in the Survey.

BPI4 Number of preventive actions (PREV.ACT.)
Target is an increase in percentage
The AS IS value is not given due to trial's considerations. The TO BE ratio after/before the implementation of the solution is 18 it means that the number of preventive actions implemented increased by 18%.
The trial's target to increase the AS IS value by 30%. The Target seems achievable; more period of evaluation are needed to analysis the reaching of this target.

The justification for the target value is not provided in the Survey.

BPI5 Number of human errors (HUM.ERR.)
Target is a reduction in percentage

The AS IS value is not given due to trial's considerations. The TO BE ratio after/before the implementation of the solution is 0, it means that the Number of **human errors** detected decreased by 0%. The process remains stable.

The trial's objective is to decrease the AS IS value by 10%. The Target seems achievable; more period of evaluation are needed to analysis the reaching of this target.

The justification for the target value is not provided in the Survey.

4.1.2.2 Business Scenario 2: Risk Detection and Information

The business scenario 2 BPIs are the following:

- Ratio: Number of accidents and incidents after / before the DV/AV implementation during a period (ACC.INC.)
- Ratio: Number of deployed monitoring systems after / before the DV/AV implementation during a period (MONIT.SYST.)
- Ratio: Number of risk detections, alarms and warnings set up after / before the DV/AV implementation during a period (RISK DET.)
- Ratio: Number of training sessions after / before the DV/AV implementation during a period (TRAIN. SESS.)

Table 34 TRW Business Scenario 2 data collection

	BS2 – BPI6 ACC.INC.	BS2 – BPI7 MONIT. SYST.	BS2 – BPI8 RISK DET.	BS2 – BPI9 TRAIN. SESS.
As is value	NA	NA	NA	NA
TO BE 1	**9**	**50**	**60**	20
TO BE 2	-	-	-	-
TO BE 3	-	-	-	-
Target	**10**	**55**	**65**	**25**

BPI6 Number of accidents and incidents (ACC.INC.)
Target is a reduction in percentage
The AS IS value is not given due to trial's considerations. The TO BE ratio after/before the implementation of the solution is 9, it means that the Number of accidents and incidents decreased by 9%.
The trial's target to decrease the AS IS value by 10% seems achievable. More period of evaluation are needed to analysis the reaching of this target.

The justification for the target value is not provided in the Survey.

BPI7 Number of deployed monitoring systems (MONIT.SYST.)
Target is an increase in percentage
The AS IS value is not given due to trial's considerations. The TO BE ratio after/before the implementation of the solution is 50 it means that the number of deployed monitoring systems increased by 50%.
The trial's target to increase the AS IS value by 55% seems achievable. More period of evaluation are needed to analysis the reaching of this target.

The justification for the target value is not provided in the Survey.

BPI8 Number of risk detections, alarms and warnings set up (RISK DET.)
Target is an increase in percentage
The AS IS value is not given due to trial's considerations. The TO BE value is 60. The **Number of risk detections, alarms and warnings set up** increased by 60% after/before the implementation of the solution.
The trial's target to increase the AS IS value by 65% seems achievable.

The justification for the target value is not provided in the Survey.

BPI9 Number of training sessions (TRAIN. SESS.)
Target is an increase in percentage
The AS IS value is not given due to trial's considerations. The TO BE ratio after/before the implementation of the solution is 20, it means that the number of training sessions increased by 20%.
The trial's target to increase the AS IS value by 25% seems achievable. More period of evaluation are needed to analysis the reaching of this target.

The justification for the target value is not provided in the Survey.

4.1.3 Application of the method to AGUSTAWESTLAND BPI

The goal of the AgustaWestland trials is to improve performance of two processes associated with safety (tools tracking) and documentation management.

The trial is composed of two business Scenarios:

- BS1: Support for management of documentation
- BS2: Support for monitoring and management of tools' tracking linked to training purpose

4.1.3.1 Business Scenario 1: Support for management of documentation

The BPIs of the business scenario are the following:

- Reduction of avg time to make data available in a digital format to different departments after/before the DV/AV implementation during the period .

In the table below, the value collected through the survey are reported

Table 35 AgustaWestland Business Scenario 1 data collection

	BS1 – BPI1
As is value	Due to AgustaWestland policy this data has been declared confidential.
TO BE 1	Actually there is no any value referring to Trial cases because the experimetation is still developing and running and there are no available values. They will be available at the end of the Experimentation.
Target	**20%**

BPI 1 Ratio: Reduction of avg time to make data available in a digital format to different departments after/before the DV/AV implementation during the period
Target is a percentage of improvement starting from the actual value that is a not public data.

4.1.3.2 Business Scenario 2: Support for monitoring and management of tools' tracking linked to training purpose

The BPIs of the business scenario is the following:

- More tailored training materials linked to the results of new tracking tools approach.

In the table below, the value collected through the survey are reported

Table 36 AgustaWestland Business Scenario 2 data collection

	BS2 – BPI6
As is value	At the moment there is nota significant value referring SMART case.
TO BE 1	Actually there is no any value referring to Trial cases because the experimetation is still developing and running and there are no available values. They will be available at the end of the Experimentation.
Target	**Qualitative target**

BPI6 Ratio: More tailored training materials linked to the results of new tracking tools approach
There is no mathematical formula applicable, as the indicator is a qualitative one. The results will be inserted in a dedicated paper document reporting the base material for the improvement of tailored training for FOD prevention linked to tools used during operational tasks.

The BPIs values are not yet populated in the survey because actually there is no any value referring to Trial cases because the experimentation is still developing and running and there are no available values. They will be available at the end of the Experimentation.

4.1.4 Application of the method to WHIRLPOOL BPI

The Whirlpool trial is part of the digital factory domain in the white goods industry. The trial focuses on two business processes related, for the BS1, to the management of events produced during the assembly of washing units (e.g. quality event) and, for BS2, collection of data (e.g. energy consumption) from the shop floor.

The trial is composed of two business Scenarios:

- Business Scenario 1: Event Scenario
- Business Scenario 2: Big Data Scenario

The Whirlpool trial BPIs values do not use "after/before ratios" for the TO BE values. In the analysis of the BPIs performed below, ratios are provided to ease the understanding and better show the progression of the measured indicators.

WHIRPOOL is a LE with years of experience and has a worldwide presence. The results from implementation demonstrate that the performance has overreached on both business scenarios thus the overall dimension of the company and its processes require more time to evaluate and for more measures to be taken in order achieve good/aimed/realistic target results in each BPI. One other consideration as to do with the target itself that have been overreached which can enunciate a reformulation of the BPIs used for performance assessment and better dimensioning

of the companies processes and productivity concerning its dimension and the FITMAN scenario.

4.1.4.1 Business Scenario 1: Event Scenario

- Ratio: Fall of rate after / before the DV/AV implementation during a period (FOR)
- Ratio: Overall equipment efficiency after / before the DV/AV implementation during a period (OEE)
- Ratio: Breakdown before planned maintenance after / before the DV/AV implementation during a period (BBPM)
- Ratio: Defective parts to rework after / before the DV/AV implementation during a period (DEFP)

In the table below, the value collected through the survey are reported.

Table 37 Whirlpool BPI Business Scenario 1 data collection 1/2

	BS1 – BPI1 WUBI_FOR	BS1 – BPI 2 WUSI_FOR.	BS1 – BPI3 ASFT_FOR	BS1 – BPI4 ASNT_FOR
AS IS value	**0,24**	**0,2**	**4,49**	**4,49**
TO BE 1	0,121	0.118	2.8	2.8
TO BE 2	-	-	-	-
TO BE 3	-	-	-	-
Target	**0,22**	**0,2**	**4**	**4**

After the analysis of the consistency between the Survey BPIs and the BPIs reference list, it was not found any discrepancies concerning the denomination of the BPIs.

Definition: Fall Off Rate (FOR): measured as percentage, represents the internal defectiveness; is the ratio between the number of defects detected along the production line and the total production volume in a specified period (shift; day; month; YTD)

BPI1 Fall of rate (FOR) of bearing insertion station (WUBI)

The AS IS value of the FOR ratio is 0.24, it means that the ratio for 2013 between the number of defects detected along the production line (here in the bearing insertion station) and the total production volume is 0.24% **before** the implementation of the platform (i.e. 2.4 defects detected every 1000 bearing assembly produced).
The TO BE value, after the introduction of the FITMAN system, of the FOR ratio is 0.121.

The TO BE ratio after/before is -49.5% ($\frac{0.121-0.24}{0.24}\ x100$).

The trial's target is to reach a FOR value of 0.22% on the bearing insertion station (i.e. 9% reduction). According to the TO BE 1 ratio (49.5% reduction) the target has been overreached.

The justification for the target value is not provided in the Survey.

BPI2 Fall of rate (FOR) of Seal insertion station (WUSI)

The AS IS value is 0.2, it means that the ratio for 2013 between the number of defects detected along the production line (here in the seal insertion station) and the total production volume is 0.2% **before** the implementation of the platform (i.e. 2 defects detected every 1000 seal assembly produced). The TO BE value of FOR is 0.118%.

The TO BE ratio after/before is -41% ($\frac{0.118-0.2}{0.2}\ x100$).

The trial's objective is to maintain a FOR value of 0.2% on the seal insertion station. According to the TO BE 1 ratio (41% reduction), the target has been overreached.

The justification for the target value is not provided in the Survey.

BPI3 Fall of rate (FOR) of Functional tests station (ASFT)

The AS IS value is 4.49, it means that the ratio for 2013 between the number of defects detected along the production line (here at the **Functional tests station**) and the total production volume is 4.49% **before** the implementation of the platform (i.e. 4.49 defects detected every 100 assembly tested). The TO BE value measured of FOR is 2.8%
0.62 (2.8/4.49).

The TO BE ratio after/before is -37.6% ($\frac{2.8-4.49}{4.49}\ x100$).

The trial's objective is to reach a FOR value of 4% which is an 11% reduction from the FOR AS IS value (4.49%). According to the TO BE ratio (37.6% reduction), the target have been overreached.

The justification for the target value is not provided in the Survey.

BPI4 Fall of rate (FOR) of normative electrical test station (ASNT)

The BPI 4 and BPI 3 share the same values.

Table 38 Whirlpool BPI Business Scenario 1 data collection 2/2

	BS1 – BPI 5 ASFT_DEFP	BS1 – BPI 6 ASNT_DEFP	BS1 – BPI 7 CCPU
AS IS value	**31181**	**31181**	**9.67**
TO BE 1	16764	16764	-
TO BE 2	-	-	-
TO BE 3	-	-	-
Target	**28000**	**28000**	**~~9~~**

BPI 5 Defective parts to rework (ASFT_DEFP**)**
Number of defective parts recorded

The AS IS value is for 2013. Before the implementation of the platform, 31181 parts were recorded being defective, The TO BE Value, after the implementation is 16764.

The TO BE ratio after/before is -46.2% ($\frac{16764-31181}{31181} x100$).

The trial's objective is to reach a DEFP's value of 28000 which is a 10.2% reduction ($\frac{28000-31181}{31181} x100$).

According to the first TO BE ratio (-46.2%), the target value have been overreached.

The justification for the target value is not provided in the Survey.

BPI 6 Defective parts to rework (ASNT_DEFP)
Number of defective parts recorded

The AS IS value is for 2013. Before the implementation of the platform, 31181 parts were recorded being defective, The TO BE Value, after the implementation is 16764.

The TO BE ratio after/before is -46.2% ($\frac{16764-31181}{31181} x100$).

The trial's objective is to reach a DEFP's value of 28000 which is a 10.2% reduction ($\frac{28000-31181}{31181} x100$).

According to the first TO BE ratio (-46.2%), the target value have been overreached.

The justification for the target value is not provided in the Survey.

BPI 7 Conversion cost per unit (CCPU)
Trial's comment: FITMAN system will take some time to impact in a significant way the BPI proposed.

The BPIs values are not yet populated in the survey.

4.1.4.2 Business Scenario 2: Big Data Scenario

The BPI of the business scenario are the following:

- Ratio: Fall of rate after / before the DV/AV implementation during a period (FOR)
- Ratio: Defective parts to rework after / before the DV/AV implementation during a period (DEFP)
- Ratio: Service incident rate after / before the DV/AV implementation during a period (SIR)

Table 39 Whirlpool BPI Business Scenario 2 data collection

	BS2 – BPI 8 WUBR_FOR	BS2 – BPI 9 ASZHBC_FOR.	BS2 – BPI 10 ASZHBC_DEFP	BS2 – BPI 11 ASZHA_SIR
AS IS value	**0,03**	**4,49**	**31181**	**50000**
TO BE 1	**0,05**	**2,8**	**16764**	-
TO BE 2	-	-	-	-

TO BE 3	-	-	-	-
Target	**0,03**	**4**	**28000**	**47500**

BPI 8 Fall of rate (FOR) of Tube Welding station (WUBR_FOR**)**

The AS IS FOR value is 0.03%, it means that the ratio for 2013 between the number of defects detected along the production line (here at the **Tube Welding station**) and the total production volume is 0,03% **before** the implementation of the platform (i.e. 0.03 defects detected every 100 part/assembly produced). The TO BE FOR Value, after the implementation is 5%.

The TO BE ratio after/before is 66.67 % ($\frac{0,05-0.03}{0,03}\ x100$).

The trial's objective to maintain a FOR value of 0.03% is not met. According to the first TO BE value (+66.67%), the target value was overestimated, it could be reviewed in accordance with the evolution of the system.

The justification for the target value is not provided in the Survey.

BPI 9 Fall of rate (FOR) of Functional tests station (ASZHBC_FOR**)**

The AS IS value is for 2013. Before the implementation of the platform, 4.49 parts on 100 parts were defective on the station. The TO BE value of FOR, after the implementation is 2.8%.
The TO BE 1 ratio after/before is -37.6 % ($\frac{2.8-4.49}{4.49}\ x100$).

The trial's objective is to reach a FOR value of 4% (-10.9%). According to the first TO BE value, the target value have been overreached.

The justification for the target value is not provided in the Survey.

BPI 10 defective parts to rework of Functional tests station (ASZHBC_DEFP**)**
The value is a number of defective parts recorded

The AS IS value is for 2013. Before the implementation of the platform, 31181 parts were recorded being defective, The TO BE Value, after the implementation is 16764.

The TO BE ratio after/before is -46.2% ($\frac{16764-31181}{31181}\ x100$).

The trial's objective is to reach a DEFP's value of 28000 which is a 10.2% reduction ($\frac{28000-31181}{31181}\ x100$).

According to the first TO BE ratio (-46.2%), the target value have been overreached.

The justification for the target value is not provided in the Survey.

BPI 11 Service incidence rate SIR (ASZHA_SIR)
Values are in ppm
The BPIs values are not yet populated in the survey.

FITMAN system will take some time to impact in a significant way the BPI proposed. SIR will be computed only at 3rd stage

The justification for the target value is not provided in the Survey.

4.1.5 Application of the method to PIACENZA BPI

Piacenza trial belong to the Smart and Virtual domains, the goal of the trial it to create a Marketplace (virtual factory domain) using shop-floor tracking capabilities (smart factory domain) to sell and purchase production capacity during peak and loss of activity.

The trial is composed of two business Scenarios:

- Business scenario 1: Production Capacity Seller
- Business Scenario 2: Production Capacity Purchaser

4.1.5.1 Business scenario 1: Production Capacity Seller

Three BPIs are defined for the Business scenario 1:

- Ratio: Percentage of forecast error in delivery after / before the DV/AV implementation during a period (FOR.ERR.)
- Ratio: Machine fixed costs per produced unit after / before the DV/AV implementation during a period (MFC)
- Ratio: The quantity of energy spent per meter produced after / before the DV/AV implementation during a period (EPM)

The data measured are reported in the table below:

Table 40 Piacenza BPI Business Scenario 1 data collection

	BS1 – BPI1 MFC	BS1 – BPI 2 EPM	BS1 – BPI3 FOR.ERR.
AS is value	-	-	-
TO BE 1	-	-	-
TO BE 2	-	-	-
TO BE 3	-	-	-
Target	**30**	**30**	**0**

For the BPI "FOR ERR." The BPI denomination in the SurveyMonkey has been changed to include the term "reduction" which is not appropriate for a BPI but rather for an objective. Interop-VLab recommends to revert it to its initial denomination.

BPI 1 Machine fixed costs per produced unit (MFC)
Target is a reduction in percentage
The BPIs values are not yet populated in the survey.

BPI 2 the quantity of energy spent per meter produced (EPM)
Target is a reduction in percentage
The BPIs values are not yet populated in the survey.

BPI 3 Percentage of forecast error in delivery (FOR.ERR.)
The BPIs values are not yet populated in the survey.

4.1.5.2 Business Scenario 2: Production Capacity Purchaser

Two BPIs are defined for the Business scenario 2:

- Ratio: Number of production records including machine identification after / before the DV/AV implementation during a period (PROD.REC)
- Ratio: Average production lead time per meter produced from order to delivery after / before the DV/AV implementation during a period (AV.LT.)

The value measured are reported in the table below:

Table 41 Piacenza BPI Business Scenario 1 data collection

	BS2 – BPI4 AV.LT	BS2- BPI5 PROD.REC
AS is value	-	-
TO BE 1	-	-
TO BE 2	-	-
TO BE 3	-	-
Target	**4**	-

The comparison of the SurveyMonkey BPIs with the BPIs from the reference list revealed one difference. The BPI "PROD.REC." is not present in the SurveyMonkey, the data are then not available.

BPI 4: Average production lead time per meter produced from order to delivery (AV.LT.)
Target is in terms of weeks reduction
The BPIs values are not yet populated in the survey.

BPI 5: Number of production records including machine identification (PROD.REC)

The BPIs values are not yet populated in the survey.

4.1.6 Application of the method to APR BPI

The APR trial in plastic industry is part of the virtual factories trials of the FITMAN project.

This trial is composed of two business scenario (BS):

- BS1: Improving the information quality around Customer Relationship Management (CRM)
- BS2: Improving the information quality around Supplier Relationship Management (SRM)

4.1.6.1 Business scenario 1: Improve information quality in the interaction with customers

- Ratio: Time limit for responding of quotes (current/new product) after / before the DV/AV implementation during a period (RESP.TIME)
- Ratio: % Number of unsuccessful quotes due to high price/Total number of quotes processed after / before the DV/AV implementation during a period (UNSUCC.QUOT.)
- Ratio: % of time for analysis and control of customer recovery after / before the DV/AV implementation during a period (AN.CTRL.)
- Ratio: Average customer recovery after / before the DV/AV implementation during a period (CUST. REC.)
- Ratio: Average time to confirm the order with acknowledgement of receipt (with/without quote) – (ACKN.REC.)
- Ratio: % of time for analysis and control of orders after / before the DV/AV implementation during a period (AN.CTRL.ORD.)
- Ratio: Customer service rate after / before the DV/AV implementation during a period (CSR)
- Ratio: Number of products received back due to faults after / before the DV/AV implementation during a period (RATE.PR)

After an analysis of the consistency of the BPIs in the Survey Monkey, and the BPI from the reference list, no incoherencies were found.

In the table below, the value collected through the survey are reported:

Table 42 APR BPI Business Scenario 1 data collection 1/2

	BS1 – BPI1 RESP.TIME	BS1 – BPI 2 UNSUCC.QUOT	BS1 – BPI3 AN.CTRL	BS1 – BPI4 CUST.REC.	BS1 – BPI5 ACKN.REC
AS IS value	**4**	**60**	**10**	**14**	**4**
TO BE 1	**2**	**36**	-	-	-
TO BE 2	-	-	-	-	-
TO BE 3	-	-	-	-	-
Target	**2**	**30**	**40**	**7**	**2**

BPI 1: Time limit for responding of quotes (current/new product) - RESP.TIME
Current Value and Target are in days
Trial's comment: *The current PI value concerns LM Realisation partner (customer)*

The AS IS value is 4, it means that the Time limit for responding of quotes (current/new product) is 4 days **before** the implementation of the platform. The TO BE Value, after the implementation of the platform, is 2 days.

The TO BE ratio after/before is -50% ($\frac{2-4}{4}\ x100$).

The trial reached its objective which is to decrease the time limit for responding quote to two days. More measurement could be made to see if deviations occur.

BPI 2: % Number of unsuccessful quotes due to high price/Total number of quotes processed - UNSUCC.QUOT.
Current Value and Target are in percentage
Trial's comment: *The current result is reached with selected partner (LM Realisation) during testing phase*

The AS IS value is 60, it means that there is 60% of quotes that are unsuccessful due to high price **before** the implementation of the platform. The TO BE Value is 36% after the implementation of the FITMAN platform.

The TO BE ratio after/before is -40% ($\frac{36-60}{60}\ x100$).

The trial's objective is to decrease the number of unsuccessful quote by 50%. According to the TO BE 1 ration the target seems achievable.

BPI 3: % of time for analysis and control of customer recovery AN.CTRL.
Current Value and Target are in percentage
The BPIs values are not yet populated in the survey.

BPI 4: Average customer recovery (CUST. REC.)
Current Value and Target are in days
The BPIs values are not yet populated in the survey.

BPI 5: Average time to confirm the order with acknowledgement of receipt (with/without quote) - ACKN.REC.
Current Value and Target are in days
The BPIs values are not yet populated in the survey.

Table 43 APR BPI Business Scenario 1 data collection 2/2

	BS1 – BPI6 AN.CTRL.ORD.	BS1 – BPI7 CSR	BS1 – BPI8 RET.PR
As is value	**20**	**93**	**10**
TO BE 1	-	-	-
TO BE 2	-	-	-
TO BE 3	-	-	-
target	**50**	**96**	**7**

BPI 6 % of time for analysis and control of orders (AN.CTRL.ORD.)
Current Value and Target are in percentage
The BPIs values are not yet populated in the survey.

BPI 7 Customer service rate (CSR)
Current Value and Target are in percentage
The BPIs values are not yet populated in the survey.

BPI 8 Number of products received back due to faults (RATE.PR)
Current Value and Target are in number of products
The BPIs values are not yet populated in the survey.

4.1.6.2 Business scenario 2: Improve information quality in the interaction with suppliers

- Ratio: Internal Stock out rate after / before the DV/AV implementation during a period (INT ST OUT)
- Ratio: External Stock out rate after / before the DV/AV implementation during a period (EXT ST OUT)
- Ratio: Value of stock at the end of last period after / before the DV/AV implementation during a period (VOS)

Table 44 APR BPI Business Scenario 2 data collection

	BS2 – BPI9 INT.ST.OUT	BS2 – BPI10 EXT.ST.OUT	BS2 – BPI11 VOS
As is value	**20**	**5**	**230**
TO BE 1	-	-	-
TO BE 2	-	-	-
TO BE 3	-	-	-
Target	**5**	**1**	**180**

Justification for the target value reported in the SurveyMonkey survey for BS2 – BPI9:
Current Value and Target are in percentage
The BPIs values are not yet populated in the survey.

Justification for the target value reported in the SurveyMonkey survey for BS2 – BPI10:
Current Value and Target are in percentage
The BPIs values are not yet populated in the survey.

Justification for the target value reported in the SurveyMonkey survey for BS2 – BPI11:
Current Value and Target are in K€
The BPIs values are not yet populated in the survey.

4.1.7 Application of the method to CONSULGAL BPI

The Consulgal trial is part of the digital domain in the construction industry. The goal is to improve the activities related to concreting tests and concreting plan of big structures (e.g. dams) using tracking capabilities and cloud computing.

The trial is composed of three business Scenarios:

- Business scenario 1: Identification of concrete characteristics and Concreting Plan
- Business scenario 2: Samples collection and testing
- Business scenario 3: Test results treatment and evaluation

The Consulgal trial develops the transition from manual processes to automated processes. It is reflected in the BPIs with very important reduction e.g. target reduction of 98% for the record time. After the target is reached in this particular case it is neither easy nor relevant to define a

new target. Nevertheless it is recommended to review the evolution on a regular basis to check if a deviation occurs.

CONSULGAL is a SME with years of experience. The results from implementation demonstrate that the performance has met the aimed objectives of target on business scenario 1. Nevertheless, on business scenario 2 the target as overreached which can enunciate a reformulation of the BPI used for performance assessment and a better dimensioning of the company´s processes. One other consideration as to do with the SMEs domain and experience since the aimed target evaluation should have other approach.

4.1.7.1 Business scenario 1: Identification of concrete characteristics and Concreting Plan

- Ratio: Average lead time to access the information relating to concrete characteristics and concreting plan after / before the DV/AV implementation during a period (LT Char.&Plan)
- Ratio: time for data exchange between stakeholders after / before the DV/AV implementation during a period (EXCH.TIME)

In the table below, the value collected through the survey are reported

Table 45 Consulgal BPI Business Scenario 1 data collection

	BS1 – BPI1 LT Char.&Plan	BS1 – BPI 2 EXCH.TIME
AS IS	**4**	**8**
TO BE 1	**7,5**	**5,15**
TO BE 2	**5,39**	**6,39**
TO BE 3	-	-
Target	**98**	**98**

Ratio: Average lead time to access the information relating to concrete characteristics and concreting plan after / before the DV/AV implementation during a period (LT Char.&Plan)
Current Value is in hours.
Target is a reduction in percentage.
Values are in seconds.

The AS IS value is 4, it means that Average lead time to access the information relating to concrete characteristics and concreting is 4 hours **before** the implementation of the platform. The TO BE Value is 7,5 which means that the Average lead time to access the information relating to concrete characteristics and concreting is 7,5 seconds (for TO BE 1 measure) and 5,39 seconds (for TO BE 2 measure) after the implementation of the FITMAN platform.

The TO BE 1 ratio after/before is -99.94% ($\frac{7.5-14400}{14400}\ x100$).

The trial objective is to decrease the AS IS value by 98% has been met. More measurement of this measure could be made to see if deviations occur.

The justification for the target value is not provided in the Survey.

BPI 2 Ratio: time for data exchange between stakeholders after / before the DV/AV implementation during a period (EXCH.TIME)
Current Value is in hours.
Target is a reduction in percentage.
TO BE Values are in seconds.

The AS IS value is 8, it means that the time for data exchange between stakeholders is 8 hours before the implementation of the platform. The TO BE Value is 7.5 the time for data exchange between stakeholders is 5.15 seconds (for TO BE 1 measure) and 6.39 seconds (for TO BE 2 measure) after the implementation of the FITMAN platform.

The TO BE 1 ratio after/before is -99.98% ($\frac{5.15-28800}{28800}\ x100$).

The trial objective is to decrease the AS IS value by 98% has been met. More measurement of this measure could be made to see if deviations occur.

The justification for the target value is not provided in the Survey.

4.1.7.2 Business scenario 2: Samples collection and testing

- Ratio: Average number of pages used in the test results recording, archival, after / before the DV/AV implementation during a period (NUM.PAGE)
- Ratio: average lead time needed to perform and record the test results after / before the DV/AV implementation during a period (LT RES.)
- Ratio: time for data exchange between stakeholders after / before the DV/AV implementation during a period (EXCH.TIME)
- Ratio: Average cost needed to perform and record the test result after / before the DV/AV implementation during a period (COST RES.)

Table 46 Consulgal BPI Business Scenario 2 data collection

	BS2 – BPI3 NUM.PAG.	BS2 – BPI4 LT RES.	BS2 – BPI5 EXCH.TIME	BS2 – BPI6 COST RES.
AS IS	**5**	**27,5**	**8**	**2,04**
TO BE 1	**2**	**7,04**	-	**0,55**
TO BE 2	-	**5,58**	-	**0,47**
TO BE 3	-	**7,16**	-	**0,57**
target	**40**	**30**	**98**	**30**

BPI 3 Ratio: Average number of pages used in the test results recording, archival, after / before the DV/AV implementation during a period (NUM.PAGE)
Current Value is in pages
Target is a reduction in percentage
The AS IS value is 5, it means that the Average number of pages used in the test results recording, archival is 5 pages before the implementation of the platform. The TO BE Value, after the implementation of the platform, is 2 pages (for TO BE 1 measure).

The TO BE 1 ratio after/before is -60% ($\frac{2-5}{5}\ x100$).

The trial objective is to decrease the number of page used for archiving by 40%. The target has been met and overreached by 20%, the target should be reviewed in a more challenging approach.

The justification for the target value is not provided in the Survey.

BPI 4 Ratio: average lead time needed to perform and record the test results after / before the DV/AV implementation during a period (LT RES.)
Current Value is in minutes
Target is a reduction in percentage

The AS IS value is 27.5, it means that the average lead time needed to perform and record the test is 27.5 minutes before the implementation of the platform. The TO BE Value, after the implementation of the platform, is 7.04 minutes (for TO BE 1 measure).

The TO BE 1 ratio after/before is -74.36% ($\frac{7.04-27.5}{27.5}\ x100$).

The trial's objective to decrease the AS IS value by 30% is met. The target has been met and overreached by 44%, the target should be reviewed in a more challenging approach.

The justification for the target value is not provided in the Survey.

BPI 5 Ratio: time for data exchange between stakeholders after / before the DV/AV implementation during a period (EXCH.TIME)
Current Value is in hours
Target is a reduction in percentage
The BPIs values are not yet populated in the survey.

BPI 6 Ratio: Average cost needed to perform and record the test result after / before the DV/AV implementation during a period (COST RES.)
Current Value is in €
Target is a reduction in percentage

The AS IS value is 2.04, it means that Average cost needed to perform and record the test result is 2.04 EUR before the implementation of the platform. The TO BE Value, after the implementation of the platform, is 0.55 EUR (for TO BE 1 measure).

The TO BE 1 ratio after/before is -73% ($\frac{0.55-2.04}{2.04}\ x100$).

The trial's objective to decrease the AS IS value by 30% is met. The target has been met and overreached by 43%.

The justification for the target value is not provided in the Survey.

4.1.7.3 Business scenario 3: Test results treatment and evaluation

- Ratio: Average lead time needed to analyse the test results after / before the DV/AV implementation during a period (LT AN.RES.)
- Ratio: Average cost needed to analyse the test result after / before the DV/AV implementation during a period (COST AN.RES.)
- Ratio: time for data exchange between stakeholders after / before the DV/AV implementation during a period (EXCH.TIME)

Table 47 Consulgal BPI Business Scenario 3 data collection

	BS3 – BPI7 LT AN.RES.	BS3 – BPI 8 EXCH.TIME	BS3 – BPI9 COST AN.RES
As is value	**27,5**	**8**	**1,41**
TO BE 1	-	-	-
TO BE 2	-	-	-
TO BE 3	-	-	-
Target	**30**	**98**	**65**

BPI 7 Ratio: Average lead time needed to analyse the test results after / before the DV/AV implementation during a period (LT AN.RES.)
Current Value is in minutes
Target is a reduction in percentage
The BPIs values are not yet populated in the survey.

BPI 8 Ratio: Average cost needed to analyse the test result after / before the DV/AV implementation during a period (COST AN.RES.)
Current Value is in hours
Target is a reduction in percentage
The BPIs values are not yet populated in the survey.

BPI 9 Ratio: time for data exchange between stakeholders after / before the DV/AV implementation during a period (EXCH.TIME)
Current Value is in €
Target is a reduction in percentage
The BPIs values are not yet populated in the survey.

4.1.8 Application of the method to TANET BPI

The goal of TANET trial is to improve its SMECluster IT Platform though two business scenarios, the first concerns the importation of tender opportunities while the other is the improvement of the facilitator roles.

SMECluster is a privately owned network cluster of like-minded SME companies (referred to as member companies or just members) that want to share resources and ideas to reduce costs and increase profits. The business model enables the member companies to bring together the skills and capacity of the smaller businesses in the UK which, when clustered, can tender for larger contracts.

SMECluster enables the member companies to inter-trade and share products at special partner rates so that there are benefits of lowered costs for the members and gives motivation to join the SMECluster.

TANET is a SME with years of experience. The results from implementation demonstrate that the performance has augmented on both business scenarios but the overall dimension of the company and its processes require more time for evaluation and for more measures in order achieve good/aimed target results in each BPI. One other consideration as to do with the dimension of TANET and its experience since there are results of implementation that indicate a clear long-term goals to be achieved.

4.1.8.1 Business scenario 1: Import of tender opportunities

Three BPIs are defined in the BS1:

- Ratio: Tenders accrued monthly after / before the DV/AV implementation during a period (BS1 – BPI1)
- Ratio: Number of Active Facilitators after / before the DV/AV implementation during a period (BS1 – BPI2)
- Ratio: Number of Registered service providers after / before the DV/AV implementation during a period (BS1 – BPI3)

Table 48 TANet BPI Business Scenario 1 data collection

	BS1 – BPI1 TEND	BS1 – BPI 2 FAC.NUM	BS1 – BPI3 SERV.PR.NUM
As is value	**3**	**1**	**23**
TO BE 1	**3**	**2**	**23**
TO BE 2	-	-	-
TO BE 3	-	-	-
Target value	**20**	**3**	**115**

After the analysis of the TANET BPI denominations, no particular differences were found. The result of the analysis of the AS IS, TO BE and TARGET values is reported below for each BPI.

BPI N°1 Tenders accrued monthly
The AS IS Value and TO BE value is in numbers of tenders

The AS IS value is 3, it means that the number of tenders accrued monthly is 3 **before** the implementation of the platform. The TO BE Value (1) is also 3, it means that the number of tenders accrued monthly is 3 **after** the implementation of the platform.

The TO BE 1 ratio after/before is 0% ($\frac{3-3}{3}\ x100$). No changes happened before and after the introduction of the solution.

The TO BE value is expected to be increased by the introduction of the solution. The trial's objective is to reach 20 tenders accrued monthly. More measures have to be performed in order to determine the evolution of the system.

The justification for the target value is not provided in the Survey.

BPI N°2 (Number of Active Facilitators),
The AS IS Value and TO BE value are in number of active facilitators
Trial's comment: *Added Welsh Automotive Forum as facilitator into use case. Discussing inclusion with third partner.*

The AS IS value is 1, it means that the Number of Active Facilitators is 1 before the implementation of the platform. The TO BE Value, after the implementation of the platform is 2.

The TO BE 1 ratio after/before is +100% ($\frac{2-1}{1}\ x100$).

According the TO BE 1 value of 2 (+100% of the AS IS value), the trial's target to reach 3 facilitators after 6 months seems achievable.

The justification for the target value is not provided in the Survey.

BPI N°3, Number of Registered service providers
The AS IS Value and TO BE value is in number of registered service providers
Trial's comment: *SMECluster is not yet advertising for new service providers. This is a long-term goal .*

The AS IS value is 23, it means that the number of registered service providers before the implementation of the solution before the implementation is 23. The TO BE value is 23.

The TO BE 1 ratio after/before is 0% ($\frac{23-23}{23}\ x100$). No changes happened before and after the introduction of the solution.

The trial's objective is to reach 115 registered service providers in 24 months after the implementation of the solution. More measures have to be performed in order to determine the evolution of the system.

The justification for the target value is not provided in the Survey.

4.1.8.2 Business scenario 2: Improvement of facilitator

- Ratio: End-to-end clustering time (hours) after / before the DV/AV implementation during a period (CLUST)
- Ratio: Automated tender input time (minutes) after / before the DV/AV implementation during a period (TEND.AUT)

In the table below, the value collected through the survey are reported

Table 49 Tanet BPI Business Scenario 1 data collection

	BS2 – BPI4 CLUST	BS2 – BPI5 TEND.AUT
AS IS value	**6**	**30**

TO BE 1	**5**	**30**
TO BE 2	-	-
TO BE 3	-	-
target	**2**	**1**

BPI 4 End-to-end clustering time (hours) (CLUST)
Current Value and Target are in hours

The AS IS value of the End-to-end clustering time before the implementation of the solution before the implementation is 6 hours. The TO BE value, after the implementation of the solution is 5 hours.

The TO BE 1 ratio after/before is -16.67% ($\frac{5-6}{6}\ x100$).

The trial's objective is to reach an end-to-end clustering time of 2 hours. It is recommended to define several steps in order to analyse the evolution of the system against the reaching of the target.

The justification for the target value is not provided in the Survey.

BPI 5 Automated tender input time (minutes) (TEND.AUT)
Current Value and Targets are in minutes
Open call components will be used to automate import of tenders - completion planned for M21.

The AS IS value of the automated tender input time is 30 minutes. The TO BE value, after the implementation of the solution remain the same (30 minutes).

The TO BE 1 ratio after/before is 0% ($\frac{30-30}{30}\ x100$). No changes happened before and after the introduction of the solution.

The trial's objective is to reach 1 minutes per automated tender input. More measures have to be performed in order to determine the evolution of the system.

The justification for the target value is not provided in the Survey.

4.1.9 Application of the method to COMPLUS BPI

The process of decision making in supply networks gains on complexity as the number of enterprises, enterprises' capabilities, and the relations between them grows. Furthermore, the distributed nature, the dynamic of the supply networks and the requirements for a holistic approach are challenging the management of the supply networks. In order to support this process it is important to bring all related aspects into one common model that can be deployed for the network visualization. Moreover, visualizing the network will also enable a better understanding of the relations between its members. As a result, this will support the decision making process within the network enabling to establish supply networks with enhanced responsiveness in order to better streamline the logistics and operative processes, to increase

efficiency, to minimize transportation cost, to efficiently manage risk and to improve customer service.

4.1.9.1 Business scenario 1: Network Transparency for more efficient Supplier Search

The BPIs of the Business scenario 1 are the following:

- Ratio: Number of mistakes and errors after / before the DV/AV implementation during a period (DECR. MIST.)
- Ratio: Number of standardized IT landscape / Number of total IT landscape after / before the DV/AV implementation during a period (STD. IT LAND)

The analysis of the SurveyMonkey BPIs versus the BPI reference list revealed one difference regarding the ECOGRAI concepts, the BPI "DECR.MIST" uses the term "Decrease" in the SurveyMonkey forms. This term is not appropriate for a BPI but rather for an objective. Interop-VLab recommends to revert to its initial denomination.

In the table below, the values collected through the survey are reported

Table 50 COMPlus BPI Business Scenario 1 data collection

	BS1 – BPI1 DECR. MIST.	BS1 – BPI 2 STD. IT LAND
As is	50	0
TO BE 1	-	-
TO BE 2	-	-
TO BE 3	-	-
target	**20**	**3**

BPI 1 Ratio: Number of mistakes and errors (DECR. MIST.)
Target is a reduction in percentage
The BPIs values are not yet populated in the survey.

BPI 2 Ratio: Number of standardized IT landscape / Number of total IT landscape (STD. IT LAND)
Current Value and Target are in number of standardised IT landscape
The BPIs values are not yet populated in the survey.

4.1.9.2 Business scenario 2: Transparency and consistency of ITs and documents

- Ratio: Average time for configuration and data entry of LED Network after / before the DV/AV implementation during a period (CONF. DATA)
- Ratio: Level of transparency of the Network according to the trial requirements after / before the DV/AV implementation during a period (LEV. TRANS.)
- Ratio: Average development time for searching of the supplier in the LED Network after / before the DV/AV implementation during a period (SEARCH. SUPP.)

Table 51 COMPlus BPI Business Scenario 1 data collection

	BS2 – BPI3 CONF. DATA	BS2 – BPI4 LEV. TRANS.	BS2 – BPI5 SEARCH. SUPP.
As is	50	**1**	**3**
TO BE 1	-	-	-
TO BE 2	-	-	-
TO BE 3	-	-	-
target	**25**	**50**	**30**

BPI 3 Ratio: Average time for configuration and data entry of LED Network (CONF. DATA)
Target is in hour
The BPIs values are not yet populated in the survey.

BPI 4 Ratio: Level of transparency of the Network according to the trial requirements (LEV. TRANS.)
Where 1 is "no transparency" and 5 "full transparency"
The BPIs values are not yet populated in the survey.

BPI 5 Ratio: Average development time for searching of the supplier in the LED Network (SEARCH. SUPP.)
Current Value and Target are in months
The BPIs values are not yet populated in the survey.

4.1.10 Application of the method to AIDIMA BPI

On a yearly basis, AIDIMA create a trend report. In order to identify trends, AIDIMA's analyst carries out identification of trends manually. By introducing the FITMAN Solution some of these activities are automated, but the core job remains the same. Analysts used their expertise as "their main equipment" because their job is highly decision dependent.

The trial is organized in three business scenario:

- Business Scenario 1 "Furniture Trends Forecasting for Product Development"
- Business Scenario 2 "Opinion Mining in Furniture Products,"
- Business Scenario 3 "Collaborative Work for Product Design,"

4.1.10.1 Business Scenario 1: Furniture Trends Forecasting for Product Development

- Ratio: Search time process per source after / before the DV/AV implementation during a period (SEARCH TIME)
- Ratio: Number of electronic sources analysed by trends experts after / before the DV/AV implementation during a period (SOURCES)
- Ratio: Number of weak signals identified after / before the DV/AV implementation during a period (WEAK SIGN.)
- Ratio: Number of index cards created after / before the DV/AV implementation during a period (INDEX CARDS)
- Ratio: Number of R+D projects based on Home Trends Report after / before the DV/AV implementation during a period (R+D PROJECTS)

- Ratio: Number of new products based on trends after / before the DV/AV implementation during a period (NUMB. PROD.)
- Ratio: Time to market for publishing the Home Trends Report after / before the DV/AV implementation during a period (TIME TO MARKET HTR)

The coherency between the SurveyMonkey BPI list and the reference BPI check results are presented below. Several differences were found in SurveyMonkey BPIs:

- **SEARCH TIME: The term "Reduction" found in the BPI survey is not appropriate for a BPI but rather for an objective.**
- **SOURCES:** The term "Increase" found in the BPI survey is not appropriate for a BPI but rather for an objective
- **INDEX CARDS:** The term "Increase" found in the BPI survey is not appropriate for a BPI but rather for an objective
- **NUMB. PROD:** the description is more explicit in the SurveyMonkey: number of private projects for New Product Development worked out in collaboration with Home Trends Observatory analysts
- **TIME TO MARKET HTR:** The term "Reduction" found in the BPI survey is not appropriate for a BPI but rather for an objective.

Interop-VLab recommend to revert to the initial BPIs denominations.

Table 52 AIDIMA BPI Business Scenario 1 data collection 1/3

	BS1 – BPI1 SEARCH TIME	BS1 – BPI 2 SOURCES	BS1 – BPI3 WEAK SIGN.	BS1 – BPI4 INDEX CARDS	BS1 – BPI5 R+D PROJECTS
As is	**8**	**20**	**200**	**100**	**5**
TO BE 1	-	-	-	-	-
TO BE 2	-	-	-	-	-
TO BE 3	-	-	-	-	-
target	**6**	**40**	**400**	**300**	**10**

BPI 1 Search time process per source (SEARCH TIME)
Time to market for publishing the Home Trends Report (TIME TO MARKET HTR)
Trial's comment: *Current Value and Target in hours per source BPI < 6 months*
The BPIs values are not yet populated in the survey.

BPI 2 Number of electronic sources analysed by trends experts (SOURCES)
Trial's comment: *Current Value and Target in number of sources BPI < 6 months*
The BPIs values are not yet populated in the survey.

BPI 3 Number of weak signals identified (WEAK SIGN.)
Trial's comment: *Current Value and Target are in number of weak signals BPI < 6 months*
The BPIs values are not yet populated in the survey.

BPI 4 Number of index cards created (INDEX CARDS)
Trial's comment: *Current Value and Target are in number of index cards BPI < 6 months*
The BPIs values are not yet populated in the survey.

BPI 5 Number of R+D projects based on Home Trends Report (R+D PROJECTS)

Trial's comment: *Current Value and Target are in number of projects BPI > 6 months. Not contemplated yet*
The BPIs values are not yet populated in the survey.

Table 53 AIDIMA BPI Business Scenario 1 data collection 2/3

	BS1 – BPI6 NUMB. PROD.	BS1 – BPI7 TIME TO MARKET HTR
AS IS	**5**	**15**
TO BE 1	-	-
TO BE 2	-	-
TO BE 3	-	-
target	**10**	**12**

BPI 6 Number of new products based on trends (NUMB. PROD.)
Trial's comment: *Current Value and Target are in number of products BPI > 6 months. Not completed yet*
The BPIs values are not yet populated in the survey.

BPI 7 Time to market for publishing the Home Trends Report (TIME TO MARKET HTR)
Trial's comment: *Current Value and Target are in months BPI > 6 months. Not contemplated yet*
The BPIs values are not yet populated in the survey.

4.1.10.2 Business Scenario 2: Opinion Mining in Furniture Products

- Ratio: Number of companies purchasing biannual Home Trends Report after / before the DV/AV implementation during a period (NUMB. COMP. HTR)
- Ratio: Number of companies professionals attending home trends reports seminars after / before the DV/AV implementation during a period (HTR SEMINARS)
- Ratio: Number of trends research institutes using FITMAN solutions after / before the DV/AV implementation during a period (HTR DEPS.)
- Ratio: Complaints resolution time process after / before the DV/AV implementation during a period (COMPL. TIME PROCESS)
- Ratio: Number of reported complaint response after / before the DV/AV implementation during a period (COMPL. RESP.)
- Ratio: Number of companies using FITMAN opinion mining solutions after / before the DV/AV implementation during a period (COMPANIES)
- Ratio: Number of identified electronic customer opinions after / before the DV/AV implementation during a period (OP. RETRIEVAL)
- Ratio: Number of online fake opinions identified after / before the DV/AV implementation during a period (OP. SPAM)
- Ratio: Number of non- reported customer online dissatisfaction identified after / before the DV/AV implementation during a period (NON-REP. DISS.)
- Ratio: Number of positive online WOM (Word-Of-Mouth) after / before the DV/AV implementation during a period (W-O-M)
- Ratio: Number of opinion leaders identified after / before the DV/AV implementation during a period (OP. LEADERS)

The coherency between the SurveyMonkey BPI list and the reference BPI check results are presented below. Several differences were found in SurveyMonkey BPIs. These finding are

- **COMPL. RESP.:** The term "Increase" found in the BPI survey is not appropriate for a BPI but rather for an objective
- **NON-REP. DISS.:** The term "Increase" found in the BPI survey is not appropriate for a BPI but rather for an objective
- **W-O-M**: The term "Increase" found in the BPI survey is not appropriate for a BPI but rather for an objective
- **NUMBER OF SKETCHES:** The term "Increase" found in the BPI survey is not appropriate for a BPI but rather for an objective

Interop-VLab recommends to revert to the initial BPIs denominations.

Table 54 Business Scenario 2: Opinion Mining in Furniture Products

	BS2 – BPI8 NUM. COMP. HTR	BS2 – BPI9 HTR SEMINARS	BS2 – BPI10 HTR DEPS.
As is	**67**	**100**	**0**
TO BE 1	-	-	-
TO BE 2	-	-	-
TO BE 3	-	-	-
target	**490**	**200**	**2**

BPI 8 Ratio: Number of companies purchasing biannual Home Trends Report (NUMB. COMP. HTR)
Trial's comment: *Current Value and Target are in number of companies BPI > 6 months. Not contemplated yet*
The BPIs values are not yet populated in the survey.

BPI 9 Ratio: Number of companies professionals attending home trends reports seminars (HTR SEMINARS)
Trial's comment: *Current Value and Target are in number of BPI > 6 months. Not contemplated yet*
The BPIs values are not yet populated in the survey.

BPI 10 Ratio: Number of trends research institutes using FITMAN solutions (HTR DEPS.)
Trial's comment: *Current Value and Target are in number of trends research institutes BPI > 6 months. Not contemplated yet*
The BPIs values are not yet populated in the survey.

Table 55 AIDIMA BPI Business Scenario 1 data collection 3/3

	BS2 – BPI11 COMPL. TIME PROCESS	BS2 – BPI12 COMPL. RESP.	BS2 – BPI13 COMPANIES	BS2 – BPI14 OP. RETRIEVAL	BS2 – BPI15 OP. SPAM
As is	**1**	**75**	**0**	**0**	**0**
TO BE 1	**1**	**80**	**1**	**30**	-
TO BE 2	-	-	-	-	-
TO BE 3	-	-	-	-	-
target	**1**	**100**	**3**	**100**	**100**

BPI 11 Ratio: Complaints resolution time process (COMPL. TIME PROCESS)
Current Value and Target are in days
Trial's comment: *The BPI target is inferior to 6 months.*

According to the trials general comments on the BPIs of the business scenario 2, the analysis is reported to the next issue of this deliverable.

BPI 12 Ratio: Number of reported complaint response (COMPL. RESP.)
Current Value and Target are in percentage
Trial's comment: *BPI > 6 months. Not contemplated yet Current Value is between 0-75% AND depending on the type of company, manufacturer or retailer*
According to the trials general comments on the BPIs of the business scenario 2, the analysis is reported to the next issue of this deliverable.

BPI 13 Ratio: Number of companies using FITMAN opinion mining solutions (COMPANIES)
Current Value and Target are in number of companies
Trial's comment: *BPI > 6 months. Not contemplated yet*
According to the trials general comments on the BPIs of the business scenario 2, the analysis is reported to the next issue of this deliverable.

BPI 14 Ratio: Number of identified electronic customer opinions (OP. RETRIEVAL)
Current Value and Target are in percentage
Trial's comment: *BPI < 6 months*
According to the trials general comments on the BPIs of the business scenario 2, the analysis is reported to the next issue of this deliverable.

BPI 15 Ratio: Number of online fake opinions identified (OP. SPAM)
Current Value and Target are in percentage
Trial's comment: *BPI > 6 months. Not contemplated yet*
According to the trials general comments on the BPIs of the business scenario 2, the analysis is reported to the next issue of this deliverable.

Table 56 AIDIMA BPI Business Scenario 2 data collection

	BS2 – BPI16 NON-REP. DISS.	BS2 – BPI17 W-O-M	BS2 – BPI18 OP. LEADERS
As is	**0**	-	**0**
TO BE 1	20	-	1
TO BE 2	-	-	-
TO BE 3	-	-	-
To be	**100**	**10**	**5**

BPI 16 Ratio: Number of non- reported customer online dissatisfaction identified (NON-REP. DISS.)
Current Value and Target are in percentage
Trial's comment: *BPI < 6 months*
According to the trials general comments on the BPIs of the business scenario 2, the analysis is reported to the next issue of this deliverable.

BPI 17 Ratio: Number of positive online WOM (Word-Of-Mouth) (W-O-M)
Target is in positive/negative comments
Trial's comment: *BPI > 6 months. Not contemplated yet*
According to the trials general comments on the BPIs of the business scenario 2, the analysis is reported to the next issue of this deliverable.

BPI 18 Ratio: Number of opinion leaders identified (OP. LEADERS)
Current Value and Target are in number of opinion leaders
Trial's comment: *BPI < 6 months*
According to the trials general comments on the BPIs of the business scenario 2, the analysis is reported to the next issue of this deliverable.

4.1.10.3 Business Scenario 3: Collaborative Work for Product Design

- Ratio: Average lead time for the design process after / before the DV/AV implementation during a period (TIME SAVING TECH. OFF.)
- Ratio: number of design sketches per piece of furniture after / before the DV/AV implementation during a period (NUMBER OF SKETCHES)
- Ratio: number of players taking part in the piece of furniture design after / before the DV/AV implementation during a period (NUMBER OF PLAYERS DES.)

The coherency between the SurveyMonkey BPI list and the reference BPI check results are presented below. Several findings were found in SurveyMonkey BPIs. These finding are

- **NUMBER OF SKETCHES:** The term "Increase" found in the BPI survey is not appropriate for a BPI but rather for an objective.

Interop-VLab recommends to revert to the initial BPI denomination.

Table 57 AIDIMA BPI Business Scenario 3 data collection

	BS3 – BPI19 TIME SAVING TECH. OFF.	BS3 – BPI20 NUMBER OF SKETCHES	BS3 – BPI21 NUMBER OF PLAYERS DES.
As is	**120**	**3**	**3**
TO BE 1	-	-	-
TO BE 2	-	-	-
TO BE 3	-	-	-
target	**100**	**5**	**3**

BPI 19 Ratio: Average lead time for the design process (TIME SAVING TECH. OFF.)
Current Value and Target are in days
The BPIs values are not yet populated in the survey.
Trial's comment: Up to 120 (depends on kind of furniture and project). Future value range 80-100
BPI 20 Ratio: number of design sketches per piece of furniture (NUMBER OF SKETCHES)
Current Value and Target are in number of design sketches per Piece of furniture
The BPIs values are not yet populated in the survey.

BPI 21 Ratio: number of players taking part in the piece of furniture design (NUMBER OF PLAYERS DES.)
Current Value and Target are in number of players
Trial's comment: Current less than 3. Expected more than 3 (as many as the tool allows)

The BPIs values are not yet populated in the survey.

4.2. Lesson learnt on the BPI experiences

In this section, the outcomes derived from the analysis of the values proposed for the BPIs are provided.

This first evaluation of the implementation of the BPIs by the trials demonstrates a good understanding of the concepts and a coherent definition of the values AS IS, TO BE and Target. Perhaps the justification of the target value could be more elaborated in order to determine the limits which could be reached.
This can be done by the analysis of the various components of the Trials in order to evaluate the improvement limits.

The collection of information through the use of web-based survey has introduced the need to adapt the BPIs definition to the SurveyMonkey interface. Some differences regarding the BPIs names were identified and corrected.
We recommend that the calculation of the value of the BPIs will be explicit in the Survey Monkey in order to understand clearly the values and their meaning.

The general trends are that the trials obtain beneficial results and for the results known reached almost the target value. Perhaps the Target values could be readjusted.

4.3. Business Survey results Reports

One of the great advantages coming from the selected data collecting process (via web based platform), is the availability of the most updated data in real time (that is exactly in the same moment the user enters them in the system) and the possibility to run virtually whatever query needed as the information are loaded in an modern relational database as Access from Microsoft. Said that a number of queries have been implemented, but each of the stakeholder will be capable to customize or build his own query, fulfilling his needs.

The section 8.2 Reports contains examples of the reports currently available for monitoring loading and aggregation of BPI. The same information platform will be used in T8.1 for Data Consolidation among Trials and 9.2 for Socio Economic impact analysis..

5. Trial Experience

For each Trail, key aspects are reported here following, according a common structure of data gathering described in 2.3

5.1. Volkswagen

Trial 1: PLM Ramp up for Reduced Time-to-Market (Volkswagen)

5.1.1 Starting Point

VW is one of the world largest automotive OEM and the Business Processes are related to a high financial amount. Within the VW trial already existing Business Processes should be supported and enhanced by the FITMAN Trial Solution.

The standard planning case in new car projects of VW usually do not intend to establish a new production line. Today is the standard planning case to integrate a new car in an existing production line. That's why the trial focuses on the assessment of the integrality of new products in existing production lines.
The trial is focused on improving certainty and reliability of estimated figures of in-house production costs at early phases of the product development process. The costs information is used at early stage of decision making and is based on the digital factory system, tools and planning environment.

To better understand and specify this statement, it is necessary to explain the process of determining or estimating these in-house production costs, which is based on two technical "columns":

- Premises on the product concerning e.g. size, drive train, product modules to be installed, i.e. the product concept.
- Available knowledge on production modules (concerning press shop, body shop, paint shop, assembly shop and in-house logistics) which might be required to produce this product.

Information on these production modules is available in the Machinery Repository (MR) which references detailed production equipment information stored in a variety of Planning Systems' databases (e.g. TeamCenter).
However, this information on production modules is much too detailed to be efficiently utilized for the evaluation whether this module is suitable or required for a certain step of production. Due to this a higher level of abstraction is required.
The information from the Machine Repository is used by the design to consider technological standards in order to evaluate and to minimize the investment costs. The information about each machine facility within the MR will be updated continuously during the entire life cycle and will be used in the following Serial implementation process.

The proposed use of the FITMAN Trial Solution is to make the MR available to all engineers/managers and to provide a web based platform including user authentication, abstracted machinery specifications, evaluation inquiries and managing tools for the MR.

5.1.2 Trial Plan and Roadmap

To achieve the object mentioned above, a system of GEs, SEs and TSCs must be set up.

The components of this system must comply with the requirements of VW and must provide the needed functionalities.
After the selection of provided GEs and SEs was made the following implementation roadmap was used:

5.1.2.1 Stage 1: Experimentation setup

- Getting the information of best practices and tools from the users
- Installing the required GEs
- Understanding the configuration of the GEs and SEs
- Adaptation and configuration of the GEs and SEs
- Developing of the required trail specific components
- Testing of the different trail components separately (GEs, SEs, TSCs)
- Connecting the different components (tool/service chain)
- Insert the initial content
- Testing and finalizing the trail experimentation setup

5.1.2.2 Stage 2: Content setup

- Checking with the trial partners the initial content and extend it
- Do a first evaluation of the content (IT solutions and Processes)

5.1.2.3 Stage 3: Experimentation in the trial

- Providing the service to the end-users
- Collecting feedbacks from the end users
- Completing business and technical indicators

Due to IT security guidelines at VW the system with its components was implemented and tested at Fraunhofer IPK using its technical infrastructure.

5.1.3 Trial structure and Implementation Strategy

For making the system available for all users, the trial solution must be made available via Cloud. Due to the leading position of VW all data has to be treated with high confidentiality and should not be accessible by public in any case. It is hard to provide sustainable security in the standard data cloud, because it is not direct under the control of the enterprise. One threat is that the provider has access to the data and the possibility to vendor or at least to distribute it to third persons. Industries which are mainly based on the knowledge they produced - like the automotive industry - or businesses with very sensible data - like the financial industry - are very restrictive with the usage of public provided clouds. In consequence of this all data has to be stored in a secure environment. This can only be guaranteed by a private cloud. The functionality and security of the private cloud is tested by IPK. The tests included whether the GEs or the SEs tried to establish a connection to cloud external services via internet.
After the successful testing it is ensured that the system complies with all needed guidelines and policies. This results in the following technical Trial structure:

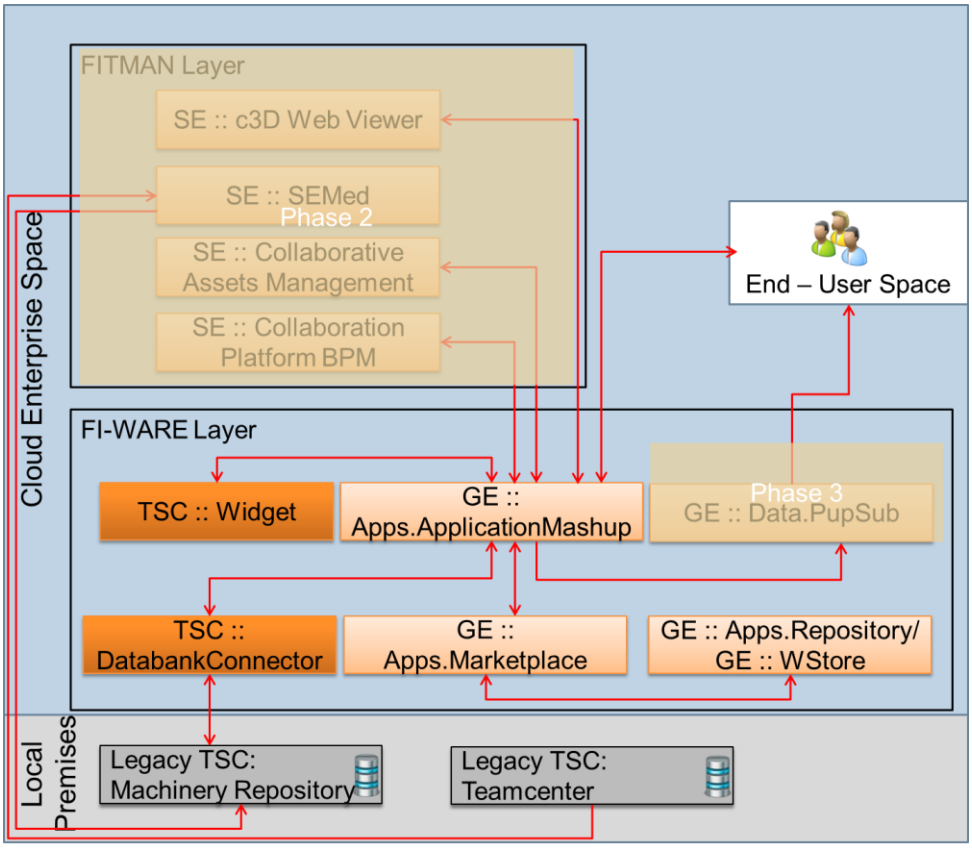


Figure 23 Trial architecture with OC components

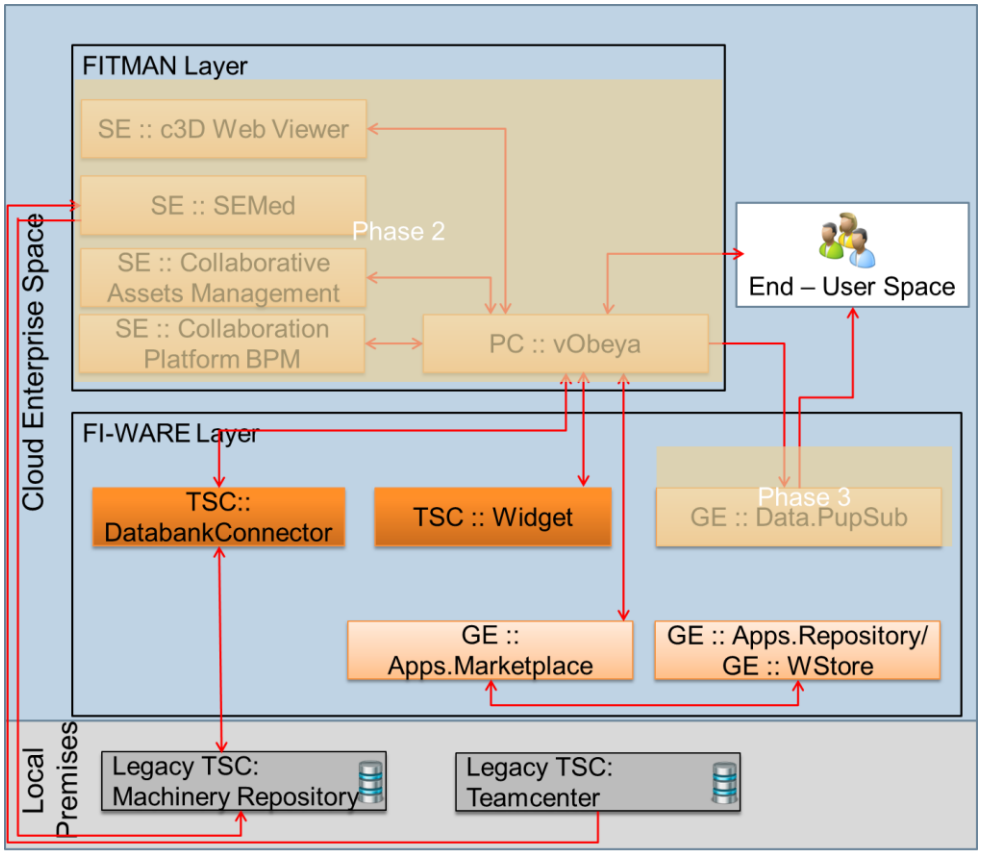


Figure 24 Trial architecture with OC components and vObeya

Phase 2 is assumed to be completed at M18, while Phase 3, the final ones is assumed to finish at M21

The performance indicators of the VW trial were generated related to the existing Business Processes and their main values: the time and costs. These values can be measured easily and only simple calculations are need like "time * hourly wage".

The following Performance Indicators were generated:

- Ratio: Inquiry respond time after / before the FITMAN system implementation during a period
- Ratio: Inquiry respond cost after / before the FITMAN system implementation during a period
- Ratio: MR Update cost after / before the FITMAN system implementation during a period
- Ratio: Average lead time to access experts knowledge about production equipment after / before the FITMAN system implementation during a period
- Ratio: MR Update time after / before the FITMAN system implementation during a period
- Ratio: Evaluation accuracy after / before the FITMAN system implementation during a period

5.1.4 People, Infrastructures, Processes

For setting up and implement such a system, a lot of communication and preparation is needed.

The main keys for preparing the implementation were intense face-to-face meetings between VW and IPK. During these meetings all related information (e.g. objectives, requirements, guidelines, etc.) were discussed.
The people who participated in the meetings were managers and planners from the VW production system planning department and employees of Fraunhofer IPK (researcher, project leader).

After the start-up of the system continuing meetings and telephone conferences were held to provide updates and feedback.

5.1.5 Results at M18 and Future Expectations

Due to confidentiality purposes all Performance Indicators were unified to percentage.

The initial values (As-Is) of the performance indicators were 100% and should be decreased by using the trial solution.
The target values were generated under the aspect how the trial solution and its technical components can support and improve the Business Processes.

As mentioned above the main values of the Performance Indicators and the Business Processes are time and costs. It should be possible to reduce the needed time for a Business Process by using the FITMAN trial solution, a web based service with all needed information and tools.

- **Ratio: Inquiry respond time after / before the FITMAN system implementation during a period.**
  The needed time should be decreased compared to the current value (manual communication like paper) by using the FITMAN trial solution which provides an

inquiry tool with direct and traceable communication, the MR with its production modules and the aggregated information.

- **Ratio: Inquiry respond cost after / before the FITMAN system implementation during a period.**
  The FITMAN trial solution with its MR component should be able to reduce the effort of the planner for evaluating an inquiry.
- **Ratio: MR Update cost after / before the FITMAN system implementation during a period.**
  The FITMAN trial solution with its maintenance and update tool for the MR should be able to reduce the effort of the planner for updating the MR.
- **Ratio: Average lead time to access expert's knowledge about production equipment after / before the FITMAN system implementation during a period.**
  The FITMAN trial solution provides a database with all MR modules with their responsible engineers and the opportunity to contact them. Due to this it should be possible to reduce the lead time for access the expert's knowledge.
- **Ratio: MR Update time after / before the FITMAN system implementation during a period.**
  The FITMAN trial solution with its MR provides a tool for creating, updating and publishing new production modules in shortly. This should result in a decrease of needed time.
- **Ratio: Evaluation accuracy after / before the FITMAN system implementation during a period.**
  The FITMAN trial solution provides aggregated information in early phases of the production planning process. This should result in a more reliable evaluation and should improve the accuracy of this evaluation.

5.1.6 Enabling Conditions and Obstacles

One major "obstacle" can be the size of companies. To handle such a large company many internal guidelines and policies are needed. But these guidelines and policies can be hindering the implementation and usage of new systems or components, especially IT systems.

5.1.7 Consolidated Trial Experience

To implement the FITMAN platform in the industry sector some points have to be considered:

- Make sure all goals/objectives of the planned usage and all needed functionalities are clarified.
- Check the needed functionalities with the provided platform components whether they fit or not. Maybe additional components like SEs or TSCs are required.
- Make sure your infrastructure complies with the component's requirements (Hardware, Software, OS).
- Clarify existing guidelines and policies and check if they interfere with the FITMAN platform components.
- Develop an implementation roadmap and experimentation plan. Maybe it's advisable to test each component on its own and implement the components step-by-step.
- If problems or questions are occurring contact the owner or developer of the component. They can provide help or needed adaptions.

Scenario_Descr	PI_Desc	PI_Name	AS-IS	TO-BE1	Target	BIProgress
INQUIRY SERVICE						
	AV.LT	AVERAGE LT TO ACCEDE THE EXPERTS KNOWLEDGE	100	60	29	56,34%
	EV. ACC.	EVALUATION ACCURACY	100	90	50	20,00%
	INQ.RESP. TIME	INQUIRY RESPOND TIME	100	95	80	25,00%
	INQ.RESP.COST	INQUIRY RESPOND COST	100	95	90	50,00%
		Average Progress of Scenario:				37,83%
MANAGEMENT OF THE MACHINE REPOSITORY						
	MR UP.COST	MR UPDATE COST	100	NA	50	
	MR UP.TIME	MR UPDATE TIME	100	NA	46	
		Average Progress of Trial:				37,83%

Figure 26 Current impact of FITMAN on VW Trial

5.2. TRW

5.2.1 Starting Point

TRW Automotive is a worldwide reference (Tier 1 provider) in manufacturing (machining, handling and assembly) of active and passive systems. TRW Automotive is committed to the protection of the environment, the communities and the workforce where it operates. In their facilities of Pamplona (Spain), TRW assemblies and manufactures power steering systems for passenger cars and commercial vehicles.

The **TRW trial is located in the factory of Pamplona, which is a reference in Health & Safety across TRW Group**. In present, TRW trial adopts the traditional occupational risk prevention methods which are relying on the prevention technician to observe, evaluate and design prevention plans based on the data of medical examination for workers, regulations of manufacturing in shop floor, records from self-diagnosed equipment. The main objective of the first scenario of the TRW trial is Risk Modelling.

Business Process 1: Risk Cataloguing

In a first step, the risks are not catalogued for a particular factory, but are generally defined through studies and the experience of the cataloguers (risk prevention technicians). Afterwards, the concrete risks regarding the TRW factory are selected, customizing the data base and the catalogue for a specific company. The elements that will be catalogued are i) risks: they define a hazard based on a mathematical formula, having up to five levels of dangerousness, and ii) preventive actions: they describe an actuation plan aiming to eliminate or minimize the consequences of the risk, being possible their association with specific level of risk.

Business Process 2: Evaluating Consistency of the Preventive Process

After designing the prevention strategy, the consistency of the plan has to be assessed to assure that there is no contradiction between the proposed actions. The main objective will be to evaluate the whole preventive process ensuring its coherency. For that reason, the formula and preventive actions related to each of the workplaces and machines will be evaluated, checking that there are no opposed orders or actions for the same success. The same tool that will allow the risk cataloguing, will also confirm that the preventive process is possible, without any error due to a wrong plan.

On the other hand, risks are often generated from ergonomic problems during the manufacturing process. Thus we will focus on the analysis of the most relevant techniques and media in the characterization of the different activities that can be utilized by factory employees for risk detection and information transmission. The main objective of the second scenario of the TRW trial is Risk Detection and Information.

Business Process 3: Risk Monitoring

Nowadays the prevention strategy is based on periodic inspections and "planned observations" by the charge of the section controller and prevention technicians. These inspections are insufficient, considering that neither can be guaranteed that the supervisor has the training or the time enough, nor is it possible to detect all the risks by a simple visual inspection. In addition, the measuring and monitoring systems are not customized to the limitations or characteristics of the workers, so the results are not trustworthy in all the cases.

Business Process 4: Risk Intervention and Communication

Nowadays, when the prevention technician observes a risk, the concrete action previously decided on the prevention plan is made. However, the same actions are implemented for the different kind of workers that can be in the factory, so the prevention measures are not

effective enough. Moreover, the workers don't receive a customized plan due to their occupational conditions, or they are not informed if they have done risky actions.

5.2.2 Trial Plan and Roadmap

With the purpose of deployment and evaluation of Future Internet technology to support high-performance proactive safety management strategies in TRW trial will be built on top of the FITMAN Smart Factory platform. As the use case of TRW experimentation is focusing on monitoring the risk of the workers that are working on the production lines which needs to be controlled, in this case, the assembly line of TRW. Thus it specially demands the functionalities of the detection of hazards related to manual load handling and awkward postures in real time by sending event of working status to an automatic event processor to generated risk level of movement postured by the worker.

TRW Trial Platform will exploit FI technologies especially for the IoT services to achieve the expected performance level in terms of risk condition identification and contextualized reaction. As IoT GEs are focusing the ICT solutions for factory floor and physical world inclusion, the Data handling GE, IoTBroker GE, Confman Context Broker GE, and Security Event Management SE are selected to be integrated with the trial.

The SF platform instance deployed at M18 is composed by the following elements:

a) **IoT DataHandling GE**: process of creating event from the data gathered by the legacy monitoring system, and then sent to the subscripted service such as IoT.Broker or web services.
b) **IoT ContextBroker GE**: it retrieves event data from Data Handling GE through web-based interface.
c) **IoT Broker GE**: registers risk event and context information for Data Handling GE.
d) **Apps Mediator GE**: extracts risk event data, transforms formats data into an event message, and sends events to CEP.
e) **Secure Event Management SE**: mediates data exchanges between shop floor event sources and consumer services both within and outside the production facilities, enhancing the safe access control to process risk events.
f) **Ergonomic Monitoring System TSC**: installed in the shop floor to capture the information of worker's movements and posture.
g) **HMI (Web GUI) TSC**: provides highly visual web interfaces base as SaaS, so as to support the factory preventive system working with risk patterns that require a human interaction.
h) **Risk Modelling TSC**: related parameters from analysis tools and risk models will be persisted in the database of the Risk and Prevention Action.
i) **Prevention Action Modelling TSC**: work with the existing prevention action design tools deployed in the prevention office to evaluate the whole preventive process.
j) **Alert Notification Services & Workflow Engine TSC**: classify data and generate alarms associated to the worker and all the other environmental and personal data stored.
k) **Authorization Policies Validation (SAM) TSC**: model the behavior of trustworthy components, and encode initial configuration and access right into a diagram.

At this point the solution is fully-functional so it can be deployed in the TRW shop-floor in order to measure the indicators and provide some results. See the following figure showing the architecture

In the final phase of implementation of the trial, it is planned to integrate the new SEs of the Smart Factory which are the **DyCEP SE (**work on the local premise with monitoring system to provide risk indicators based on the sensed data) and **DyVis SE** (visualization of the events and notifications filtered by the CEP engine in the TRW factory shop floor). Moreover, to add the risk prevention services for App store over the cloud service**, Map Service Widget TSC** will be developed, in addition to the deployment of **Application Mashup GE, Repository GE** and **Registry GE**. Therefore, not only a fully-functional but also a fully-completed solution will be deployed in the TRW factory.

The TRW trial will be implemented partly in the public cloud (IoT Broker GE, Context Broker GE, Application Mashup GE, Repository GE and Registry GE), **in the private cloud** (Mediator GE, Secure Event Management SE, DyVis SE, HMI TSC, Alert Notification Services & Workflow Engine TSC, Map Service Widget TSC, SAM TSC) and **in the local premises of TRW** in Pamplona (Data Handling GE, DyCEP SE, Ergonomic Monitoring System TSC, Risk Modelling TSC, Prevention Action Modelling TSC).

5.2.3 Trial structure and Implementation Strategy

From a technical point of view, the TRW trial implementation plan has been already defined in the previous section, detailing the concrete GEs, SEs and TSCs that has been/will be deployed in each of the stages. As mentioned before, the trial implementation strategy is divided into 3 phases:

a) Phase I implemented at M6: first version of the system deploying the IoT GEs, developing a monitoring system that provides feedback to the workers and prevention technicians about the level of the risk achieved during the production activities.
b) Phase II implemented at M18: fully functional version of the risk detection and communication system, including most of the GEs, SEs and TSCs. In the following architecture the components already deployed are shown, but the new SEs from the Open Calls are not included.

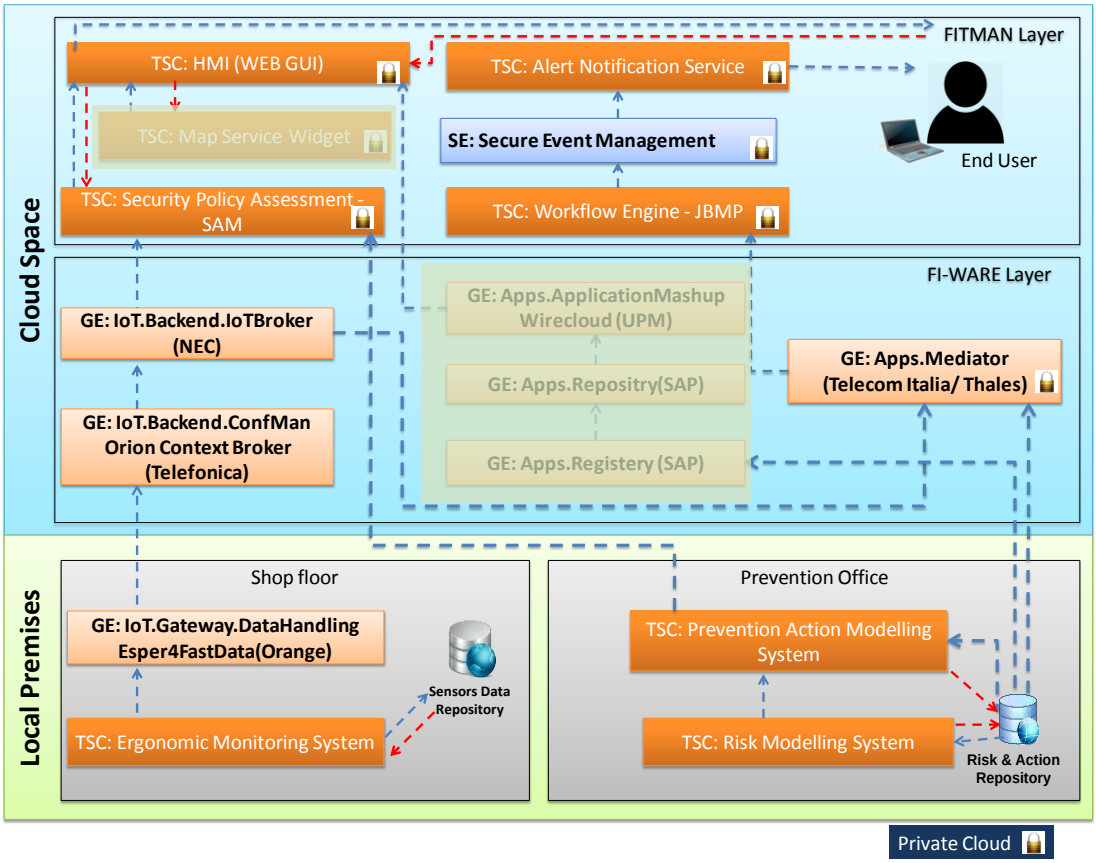


Figure 27 Architecture of phase II implementation in TRW trial

c) Final phase of implementation: fully completed version of the TRW system with all the components will be achieved, enhancing the functionalities and providing a deeper analysis and more accurate results in the prevention of ergonomic risks. See the final architecture in the next figure.

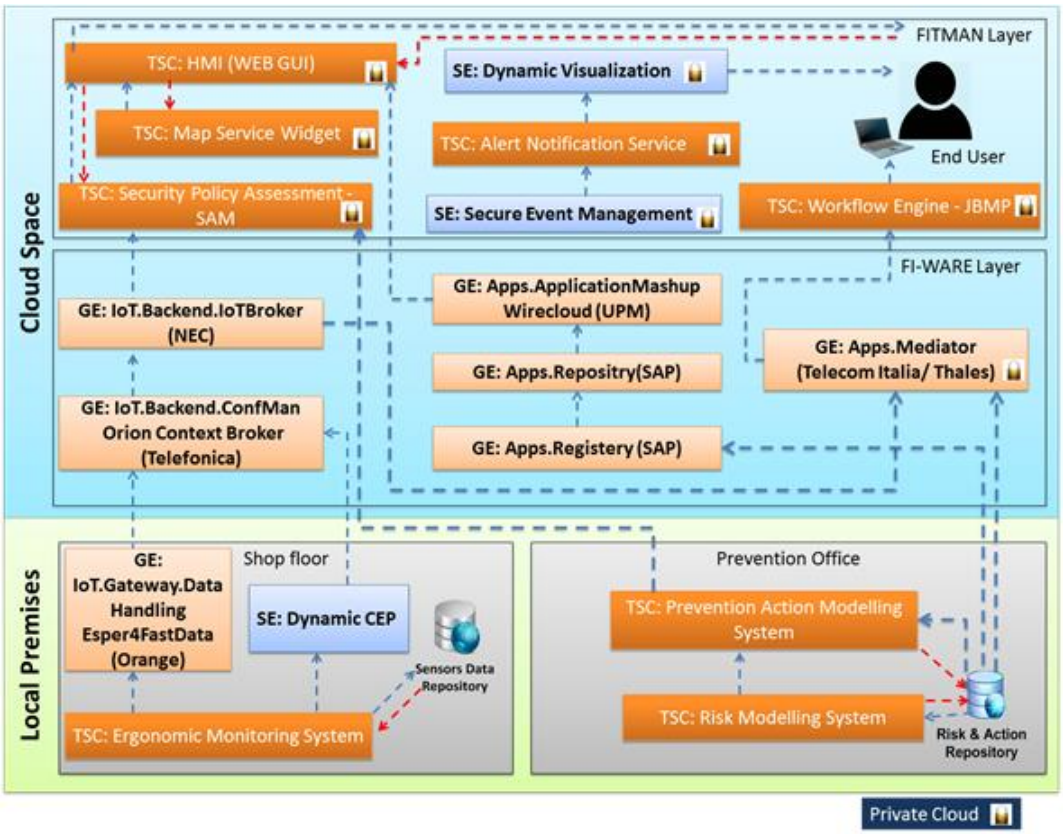


Figure 28 Final architecture of the TRW trial

Regarding the business perspective, the identification of the business scenarios, business processes and its requirements have been the basic activity to get the objectives and results to be achieved at the end of the trial. Once the business aspects were described, the definition of the Key Performance Indicators that will measure the impact of the technology in the business area was performed, obtaining the following list of KPIs.

- **BS1PI 1: Number of standards and regulations (added) in the repository** after/before the DV/AV implementation during a period
- **BS1PI 2- BS2PI 1: Number of accidents and incidents in the factory** after / before the DV/AV implementation during a period
- **BS1PI 3: Number of risks that has been defined using the new system** after / before the DV/AV implementation during a period
- **BS1PI 4: Number of preventive actions using the new systems** after /before the DV/AV implementation during a period
- **BS1PI 5: Number of human errors in the design of prevention strategy planning** after /before the DV/AV implementation during a period
- **BS2PI 2: Number of deployed monitoring systems** after / before the DV/AV implementation during a period
- **BS2PI 3: Number of risk detections, alarms and warnings set up** after / before the DV/AV implementation during a period
- **BS2PI 4: Number of training sessions regarding safety** after /before the DV/AV implementation during a period

Regarding the extraction of the information needed for the calculation of the indicators, most of the data will be directly provided by the prevention technician due to the relation with its

daily activities. Additionally, some of the information will be directly provided by the FITMAN system implemented. See D4.6 deliverable for deeper information about the data to be collected.

5.2.4 People, Infrastructures, Processes

Regarding the human resources, the TRW factory of Pamplona is actively involved in the TRW trial implementation. First of all, a special mention has to be done to the close cooperation and periodic meetings between TRW (trial owner) and Innovalia (IT provider) representatives in order to plan and organize the whole trial implementation.

On the other hand, due to the monitoring of the workers, concrete activities and procedures have been performed related to the ethical issues. After addressing the procedures for selecting the participant in the TRW trial and performing the information and training sessions, the final group of participants in the TRW trial are the following:

- ✓ Ignacio Arconada Chavaque: IT Manager
- ✓ Juan Carlos Manresa González: Manufacturing, Human Resources and Health & Safety Manager
- ✓ Fernando Azcona García: manufacturing engineering manager
- ✓ Iñigo Aperribay Echeverria: Human Resources coordinator
- ✓ Blanca Orbaiz Azpillaga: doctor & safety coordinator
- ✓ Fernando Goñi Foncillas: prevention technician
- ✓ Jose Maria Osta Ustarroz: blue collar worker
- ✓ Javier Iglesias Herrero: blue collar worker
- ✓ Francisco Vidart Botella: blue collar worker

The final participants in the TRW trial has signed a form for informed consent to become part of TRW trial user group and to allow personal data collection and processing. Each participant has signed the document in which different questions about the received knowledge and free consent given are detailed. As previously explained, the document complies with the restrictive Spanish Law for Data Protection (LOPD 15/1999)[6].

Finally, the local premises and processes of TRW in Pamplona are not intended to be modified since the business processes implemented are an enrichment of daily duties of the people involved.

5.2.5 Results at M18 and Future Expectations

TRW trial will use percentages of improvement and decrease of the business performance indicator as measuring unit, avoiding the usage of absolute values. The main reason for this choice is the misuse that external users can do with current data of TRW, getting them out of context and creating non-desirable image for a worldwide leader branch in the automotive sector. Due to this unfortunate and possible situation, TRW will use percentages comparing current and future values of each indicator.
Additionally, the most important target of TRW due to business performance indicator is not only to assess the impact of the FITMAN system instantiation, but also report and communicate this impact in the manufacturing and production activities thanks to FI technologies deployment. In order to reach these objectives of assessment and communication,

[6] See FITMAN D4.5 TRW Trials Ethical Issues

percentage values of TRW indicators are as useful as absolute values, since they are able to reflect the evolution of the business processes in the factory.

In the section "Trial structure and Implementation Strategy" for TRW trial of this document the list of the Business Indicators to be measured is shown. Additionally, in the deliverable D4.6 the target values to be achieved are also included for this trial.

Unfortunately, significant results are expected not before October 2014.

5.2.6 Enabling Conditions and Obstacles

One of the major obstacles that can be followed is the implementation of a trial in large company of the automotive sector, where the confidentiality and privacy issues are very restricted. Many internal authorizations, guidelines and policies are needed, especially with the activities related to the shopfloor infrastructures and personnel. Additionally, the usage and integration of IT systems are also complex since the impossibility to stop the production lines can hinder the implementation of the solution in the shopfloor.

However, until the deployment of the phase II implementation n the TRW shopfloor, we cannot obtain any final detail or conclusion about the trial.

5.2.7 Consolidated Trial Experience

To implement the FITMAN platform in the industry sector some points have to be considered:

- Make sure all goals/objectives of the planned usage and all needed functionalities are clarified.
- Check the needed functionalities with the provided platform components whether they fit or not. Maybe additional components like SEs or TSCs are required.
- Make sure your infrastructure complies with the component's requirements (Hardware, Software, OS).
- Clarify existing guidelines and policies and check if they interfere with the FITMAN platform components.
- Develop an implementation roadmap and experimentation plan. Maybe it's advisable to test each component on its own and implement the components step-by-step.
- If problems or questions are occurring contact the owner or developer of the component. They can provide help or needed adaptions.

More concretely, and due to concrete aspects of the TRW trial, some other important factors has to be taken into account. These differential aspects are the location of the trial in the shopfloor (in the production line) and the importance of workers safety and security in the trial. The first important activity to be achieved is the **calibration of the sensors deployed in the shopfloor**. The point is that depending on different aspects such as the light, vibrations, location, etc. the results provided by the sensors cannot be reliable. Therefore, some tests and calibrations have to be performed in the concrete location where the devices will be deployed in the shopfloor, to ensure their accuracy.
The second advice is related to the **selection of the personnel involved in the trial**. As mentioned before, the TRW trial monitors and processes information about the production line workers, adding some difficulties to the technical implementation. Therefore, the selection of the personnel participating in the trial has to be done very carefully, since those people will not only provide their data for the benefit of the trial, but also will give some feedback and

opinions about functionalities, usability and other important aspects of the solution. The TRW solution will be mainly used by the blue collar workers and prevention technicians, so **they should be the main source for developing an intuitive and easy-to-use solution** based on the FI technologies.

Scenario_Descr	PI_Desc	PI_Name	AS-IS	TO-BE1	Target	BIProgress
RISK DETECTION AND INFORMATION						
	ACC.INC.	NUMBER OF ACCIDENTS AND INCIDENTS		9	10	90,00%
	MONIT. SYST.	NUMBER OF DEPLOYED MONITORING SYSTEMS		50	55	90,91%
	RISK DET.	NUMBER OF RISK DETECTIONS, ALARMS AND WARNINGS SET UP		60	65	92,31%
	TRAIN. SESS.	NUMBER OF TRAINING SESSIONS		20	25	80,00%
					Average Progress of Scenario:	88,30%
RISK MODELLING						
	ACC.INC.	NUMBER OF ACCIDENTS AND INCIDENTS		9	10	90,00%
	HUM. ERR.	NUMBER OF HUMAN ERRORS		0	10	0,00%
	PREV. ACT.	NUMBER OF PREVENTIVE ACTIONS		18	30	60,00%
	RISKS	NUMBER OF RISKS		25	30	83,33%
	STD.REG.	NUMBER OF STANDARDS AND REGULATIONS		4	5	80,00%
					Average Progress of Scenario:	62,67%
					Average Progress of Trial:	74,06%

Figure 29 Current impact of FITMAN on TRW Trial

5.3. **AgustaWestland**

AgustaWestland is running the experimentation of SMART and DIGITAL trials. At the end of this phase it will be able to produce significant lesson learnt referring tio the collected results.

5.4. Whirlpool

5.4.1 Starting Point

The trial will take place in the context of the washing unit production line in Naples. The present scenario is characterized by an underutilization of the data gathered in the production line and thus an unexploited benefit in terms of speed of reaction and effectiveness of decision taken by the factory staff. The trail instantiation will be mainly focused on Quality operator and manager: the overall objective is to allow the factory to reduce defects due to operation going out of control by preventing as much as possible machine interruption. This can be achieved enabling the decision maker with a mobile device and a system able to gather all the basic events happening along the production line, filtering them applying a selective algorithm and deliver enriched information about the event through the mobile device.

In the following schema there are the single events that will be addressed by the trial implementation together with the expected user:

#	Station	Potential event generated	Potential Recepient	Business benefit	Measu	Feasibility	Current Frequency
4	Station 4A and 4B Bearing Insertion	Sequence of Defects; Process Drifting (SPC)	Team Leader; Quality Process Manager	Anticipate problem resolution (e.g. Maintenance intervention): avoid productions stop and reduce defects.	OEE, FOR	Medium	
6	Station 5 Seal Insertion	Sequence of Defects; Process Drifting (SPC)	Team Leader; Quality Process Manager	Anticipate problem resolution (e.g. Maintenance intervention): avoid productions stop and reduce defects.	OEE, FOR	High	0,055%
11	Station 10 Tub Welding (Branson)	Product Defect; Machine stop; SPC (Process Drifting)	Quality Manager; IE, Maintenance	Anticipate problem resolution (e.g. Maintenance intervention): avoid productions stop and reduce defects.	OEE	High	0,01%
23	Functional test (100%)	Pattern or sequence of defects	Quality process	Direct feedack to operators causing defects lead to improvement of their operation	FOR	Low	
24	Normative Electrical Test	Sequence of multiple faults	Quality Process; Quality Manager	Unsolicited verification process: problem prevention (e.g.epidemic problems)	FPY	Medium	
26	ZHQ (3%)	"A" defect (data from DCS)	RDC Manager; Quality Manager; Factory Director	Block potential faulty batch	SIR	Medium	
27	ZHQ (3%)	"B", "C" defects (data from DCS)	Quality Process;	Unsolicited verification process: problem prevention (e.g.epidemic problems)	FPY	High	

Figure 30 Trials Stations Involved

5.4.2 Trial Plan and Roadmap

The Trial is using FITMAN's Smart Factory (SF) Platform, which perfectly fits the requirements of the Use Case. The SF Platform is focused on the acquisition, real-time processing and dispatching of events originating from *Internet of Things* (IoT) sensors. The Use Case under discussion is only leveraging a subset of SF Platform's capabilities. In particular, sensor devices are not directly involved in the experimentation, as their output is captured by pulling the relevant events from out of an existing data flow in legacy systems. This means, for instance, that the Protocol Adapter GE, which is part of the stock SF Platform and is responsible for IoT sensor integration, is not included in this deployment.

In brief, the SF Platform instance deployed in the Trial is composed by the following elements:

- GE – IoT.Gateway.DataHandling: executes the custom event processing logic, evaluates conditions based on event payload, generates new events when conditions are met
- GE – IoT.Backend.ConfMan: coordinates multiple event producers on the shop floor
- GE – IoT.Backend.IoTBroker: coordinates multiple event consumers
- SE – Secure Event Management: enables flexible and secure management of event distribution lists

The trial is foreseen to use intensively the cloud: all GEs and SEs will be implemented in a cloud, public cloud as first choice and private cloud as a backup option.

TSC will be implemented partly in the cloud (NotificationManager) and partly in the local premises (EventGenerator)

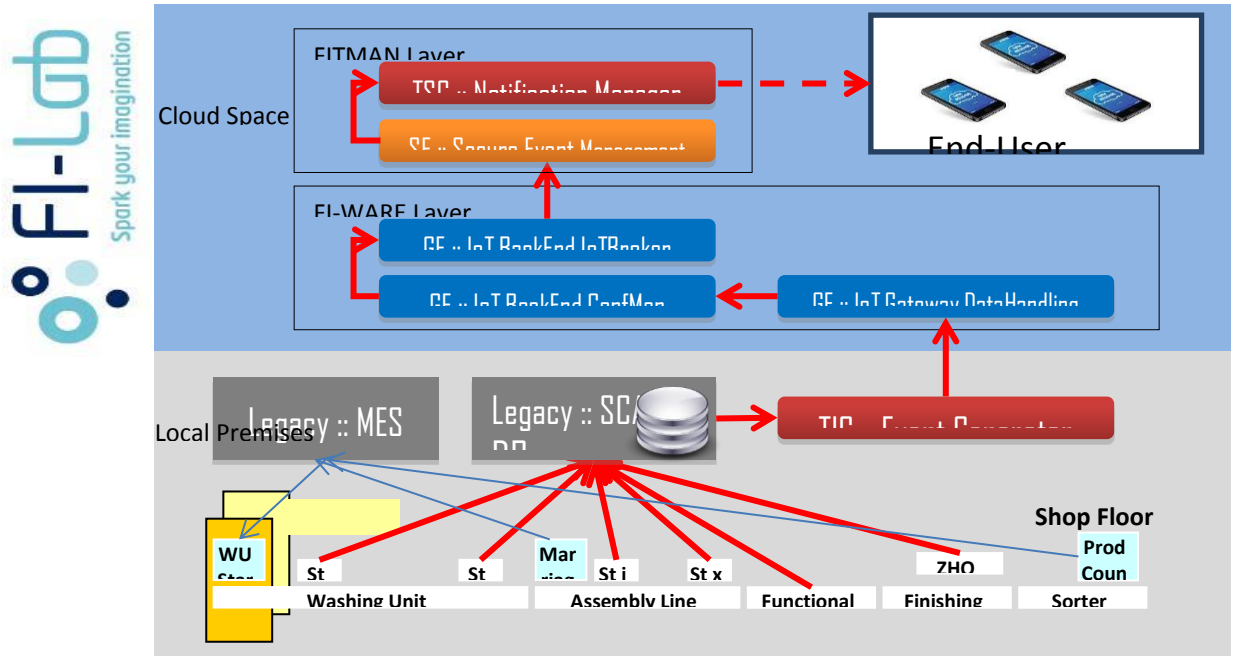


Figure 31 Whirlpool Trial Structure

5.4.3 Trial structure and Implementation Strategy

Whirlpool trial aims at identifying possible events from a big amount of data collected, and correlating them with the shop floor, in order to better manage and support the decision processes. The starting point is to identify a list of events that can be generated and measured at process level and, in particular, for each station of the line. These events have been listed and described within the **Error! Reference source not found.**, including the following information:

- STATION and STATION CODE, related to the considered event.
- RECEIPIENT, who receives the communication of the event through the device and has to perform the decisions.
- MEASURE, which is the indicator to monitor on that station
- FEASIBILITY, which means the difficulty in finding data needed for measure and can be low, medium or high.
- BUSINESS BENEFIT, which potentially can be generated by the implementation.
- CURRENT FREQUENCY, which refers to the frequency of the event occurrence; this kind of information is not always available and there are some events which have never been occurred.
- Reference SCENARIO for each event.

The first list defined contains 26 potential cases, but from a more detailed analysis has emerged that 14 of them should be discarded because of station unavailability or for unreliable event generation. The other ones represent potential events to measure and for that reason has been ranked from 1 (less) to 4 (most) according to their relevance.
The events and the relative stations that are more significant for that process monitoring (with rank equal to 4) are listed in the **Error! Reference source not found.**:

#	Station CODE	Station	Potential event generated	Potential Recepient	Business benefit	Measu	Feasibility	Current Frequency	Selected for TRIA	BS
4	WUBI	Station 4A and 4B Bearing Insertion	Sequence of Defects; Process Drifting (SPC)	Team Leader; Quality Process Manager	Anticipate problem resolution (e.g. Maintenance intervention): avoid productions stop and reduce defects.	OEE , FOR	Medium		4	BigData
6	WUSI	Station 5 Seal Insertion	Sequence of Defects; Process Drifting (SPC)	Team Leader; Quality Process Manager	Anticipate problem resolution (e.g. Maintenance intervention): avoid productions stop and reduce defects.	OEE, FOR	High	0,055%	4	BigData
11	WUBR	Station 10 Tub Welding (Branson)	Product Defect; Machine stop; SPC (Process Drifting)	Quality Manager; IE, Maintenance	Anticipate problem resolution (e.g. Maintenance intervention): avoid productions stop and reduce defects.	OEE, FOR	High	0,01%	4	Event
23	ASFT	Functional test (100%)	Pattern or sequence of defects	Quality process	Direct feedack to operators causing defects lead to improvement of their operation	FOR	Low		4	BigData
24	ASNT	Normative Electrical Test	Sequence of multiple faults	Quality Process; Quality Manager	Unsolicited verification process: problem prevention (e.g.epidemic problems)	FOR	Medium		4	BigData
26	ASZHA	ZHQ (3%)	"A" defect (data from DCS)	RDC Manager; Quality Manager; Factory Director	Block potential faulty batch	SIR	Medium		4	Event
27	ASZHBC	ZHQ (3%)	"B", "C" defects (data from DCS)	Quality Process;	Unsolicited verification process: problem prevention (e.g.epidemic problems)	FOR	High		4	Event

Figure 32 Whirlpool relevant events

Events just identified in these stations can be classified in the three typologies following listed:

- Daily statistical analysis and process deterioration (events 4,6 e 11);
- Multiple faults events on functional and normative test (events 23 e 24);
- Communication of defects A, B and C on ZHQ station (events 26 e 27).

As emerged from the previous table, starting from the stations and the related potential events, **three main indicators** have been identified at process level:

- **Overall Equipment Effectiveness** (OEE): is the total amount of time used to produce good product versus the total available time.
- **Fall Off Rate** (FOR): measured as percentage, represents the internal defectiveness; is the ratio between the number of defects detected along the production line and the total production volume in a specified period (shift; day; month; YTD)
- **Service Incident Rate** (SIR): measured in parts per million [ppm], is the percentage of how many calls received from the Customer Service on the overall production in a time period.

These indicators monitored on each stations will lead to business benefits. In order to measure these benefits, is necessary to link them with higher level measures.

Phase 1 : in that phase, the trial is described identifying the elements, the process and the objectives of the company.

Elements of the system	Functions (Static) and Processes (Dynamic)	Whirlpool Objectives
• Production, assembly, delivery • Two identical parallel production lines • Washing Unit Line, Assembly Line, Testing and Final Assembly • Shopfloor workers, supervisors, managers	To produce different models of washing machines (Production, assembly, delivery)	• Obj.1: Improve the communication effectiveness along the help chain organization • Obj.2: Improve the effectiveness of decision makers, their role, along the help chain

In order to make the objectives more detailed and more coherent to the ECOGRAI definition, a further decomposition is represented within the following table.

Phase 2: the AV/DC identified is to use the Whirlpool platform in order to reach the pre-defined objectives.

Phase 3: as previously said, the Whirlpool performance indicators identified at process level have been mapped to the ECOGRAI objectives and listed in the following table.**Error! Reference source not found.**

The entire process of ECOGRAI methodology implementation for defining the Business Performance Indicators, results in the following table, which reports the objectives (both trial and ECOGRAI-based ones), the actions and the relative Business Performance Indicators:

Whirlpool Objective	FITMAN Relative Objectives	Decision /Action Variables (DV/AC)	Performance Indicators
Obj1: To improve the communication effectiveness along the help chain organization	Obj1.1. To improve the product quality	To use Whirlpool trial platform	PI 1.1.1: Ratio: FOR after/before the DV/AV implementation during a period*

			PI 1.1.2: Ratio: Service Incidence Rate (SIR) after / before the DV/AV implementation during a period*
	Obj1.2. To increase the productivity	To use Whirlpool trial platform	PI 1.2: Ratio: Overall Equipment Efficiency (OEE) after / before the DV/AV implementation during a period*
Obj2: To improve the effectiveness of decision makers along their role in help chain	Obj2.1. To improve the effectiveness of equipment preventive maintenance	To use Whirlpool trial platform	PI 2.1.1: Ratio: Number of breakdown between two planned maintenances (BBPM) after /before the DV/AV implementation during a period* PI 2.1.2: Ratio: % of defective parts to rework (DEFP) after /before the DV/AV implementation during a period*
	Obj2.2To reduce the production cost	To use Whirlpool trial platform	PI 2.2: Ratio: Conversion cost per unit (CCPU) after /before the DV/AV implementation during a period*
	Obj2.4.To reduce the Total Cost of Quality	To use Whirlpool trial platform	PI: 2.4: Ratio: Total cost of products scrapped (PSC) after /before the DV/AV implementation during a period*

In order to reduce the effect of the "Background noise", that means avoiding that elements not considered in the assessment may affect the business results from the FITMAN solution implementation, it has been decided to associate each business indicator to the related stations. Therefore, in doing this few main assumptions have been considered:

- Business Performance Indicators which aim at measuring costs (in particular, Conversion cost per unit and Total cost of products scrapped) are not linked to stations nor business scenarios, but are related to whole solution; for that reason, they will be measured at trial level but, for convenience, reported in the "Big Data Scenario" (which is the most sizeable);
- The new further indicators coming from the ECOGRAI implemented are allocated as following:

    - Number of breakdown between two planned maintenances is linked to the OEE, therefore associated to the stations in which OEE is measured (i.e. WUBI, WUSI, WUBR).
    - Percentage of defective parts to rework is linked to the FOR, therefore, as in the previous case, is associated to the station in which FOR is measured (i.e. WUBI, WUSI, WUBR, ASFT, ASNT, ASZHBC).

The output of the above analysis results in the following table, which reports the Business Performance Indicators, with their AS-IS and TARGET values. It has to be noted that the identified indicators shown in the following table represent PIs for the identified Business

Scenarios. They are then instantiated on the physical configuration of the system and events identified in. As a result we can see in Table 58 Whirlpool Business Performance Indicators AS-IS and Target values the complete list of the PIs to actually collect on the field.
Whirlpool identified 2 distinct Business Scenarios to monitor separately with an ad-hoc set of PIs:

- BS 1 – Big Data Scenario
- BS 2 – Event Management Scenario

Table 58 Whirlpool Business Performance Indicators AS-IS and Target values

BS 1 – Big Data Scenario			
Business Performance Indicator	*AS-IS Value*	*Target Value*	*Comments*
WUBI – OEE	na	na	Data are not available[7]
WUSI – OEE	na	na	Data are not available
WUBI – BBPM	na	na	Data are not available
WUSI – BBPM	na	na	Data are not available
WUBI – FOR	0,24	0,22 no peaks	FOR measured at WUBI station in %. AS-IS value is the yearly value of 2013. Target is to reduce the number of peaks (i.e. Weekly rates exceeding 2sigma of the normal distribution)
WUSI – FOR	0,2	0,2 no peaks	FOR measured at WUSI station in %. AS-IS value is the yearly value of 2013. Target is to reduce the number of peaks (i.e. Weekly rates exceeding 2sigma of the normal distribution)
ASFT – FOR	4,49	4	Overall factory FOR measured in %. AS-IS value is the yearly value of 2013. The improvement of decision making process should allow a meaningful (10%) reduction of the average Fall-off-rate and defective parts
ASNT – FOR	4,49	4	Overall factory FOR measured in %. AS-IS value is the yearly value of 2013. The improvement of decision making process should allow a meaningful (10%) reduction of the average Fall-off-rate and defective parts
ASFT – DEFP	31181	28000	Total number of defective parts recorded. AS-IS value is the yearly value of 2013. The improvement of decision making process should allow a meaningful (10%) reduction of the average Fall-off-rate and defective parts

[7] Please consider that for some indicators, it is not specified neither AS-IS values not Target Values, that is due to the fact that, at the date, in Whirlpool such values are not measured and there is not a clear expectation of possible improvement, nevertheless management intends to take the opportunity of FITMAN trial adoption to start measuring and monitoring them as they are perceived as critical production performance parameters.

ASNT – DEFP	31181	28000	Total number of defective parts recorded. AS-IS value is the yearly value of 2013. The improvement of decision making process should allow a meaningful (10%) reduction of the average Fall-off-rate and defective parts
CCPU	9,67	9	Variable conversion cost as percentage of average industrial cost. In the long run the improvement of efficiency in decision making can lead to a reduction of variable conversion cost from 9.67% to 9%.
PSC	na	na	Data are not available

BS 2 – Event Management Scenario			
Business Performance Indicator	*AS-IS Value*	*Target Value*	*Comments*
WUBR – OEE	na	na	Data are not available
WUBR – BBPM	na	na	Data are not available
WUBR – FOR	0,03	0,03 no peaks	FOR measured at WUBR station in %. AS-IS value is the yearly value of 2013. Target is to reduce the number of peaks (i.e. Weekly rates exceeding 2sigma of the normal distribution)
ASZHBC – FOR	4,49	4	Overall factory FOR measured in %. AS-IS value is the yearly value of 2013. The improvement of decision making process should allow a meaningful (10%) reduction of the average Fall-off-rate and defective parts
ASZHBC – DEFP	31181	28000	Total number of defective parts recorded. AS-IS value is the yearly value of 2013. The improvement of decision making process should allow a meaningful (10%) reduction of the average Fall-off-rate and defective parts
ASZHA – SIR	50000	47500	Overall factory Service Incidence Rate measured in ppm. AS-IS value is the 1st month in service yearly value of 2013. The improved capability of sharing detection of severe defect can lead in the long period (1 year) a reduction of 5% of present Service Incidence Rate measure on 12 months on service.

Overall comment on TO-BE value: the impact of FITMAN trial on the performance indicator will be strongly biased by others external factors which are commonly and usually evolving along the day-by-day activity of the factory. Among common activities to reduce FOR and SIR we can list: product design changes, change in supplied goods, new measuring system

introduced in the factory, learning curve of operators, new organizational assets. As said FITMAN WHR trial is expecting to influence only one aspect of this complex situation which is the prompt awareness of some decision makers about the real status of part of the production process. In forecasting the impact of FITMAN on TO-BE value, the experience of factory Quality expert has been used in order to make some hypothesis on how the decision process can be improved and thus how this could be reflected on the actual business indicators. Another thing which is not helping is the time factor: we are impacting on people behavior using a novel way to communicate and interact with employee: presently there are no certainty on how much time we need to change their approach and really got to positive influence the decision process.

5.4.4 People, Infrastructures, Processes

Naples Factory will participate the trial with the direct involvement of two Quality supervisors, namely Luciano Zeni and Raffaele Di Micco. In the initial phase they will be equipped with an Android based industrial mobile device (Motorola ET1 and Motorola T55) onto which the TSC NotificationClient.apk will run.
The trail will use local wireless capability.
The main cloud, hosted by FiLab in Trento, will be backed up for redundancy by a local installation based on a server located in Whirlpool premises of Biandronno (VA) Italy.
The local processes is not intended to be modified since the BSs implemented are an enrichment of daily duties of the people involved.

5.4.5 Results at M18 and Future Expectations

Significant results are expected not before October 2014.
Following is the list of BI as gathered at M18

Name of the PI	Relevance of PI for Business Process	As-Is	M18	Comment	Target
WUBI – FOR	H	0,24	0,121	September (W37-W41)	0,22 no peaks
WUSI – FOR	H	0,2	0,118	September (W37-W41)	0,2 no peaks
ASFT – FOR	H	4,49	2,8	September	4
ASNT – FOR	H	4,49	2,8	September	4
ASFT – DEFP	H	31181	16764	September projection	28000
ASNT – DEFP	H	31181	16764	September projection	28000
CCPU	M	9,67	not yet available		9

Although better than target, the to-be values as gathered in M18 are not yet reflecting FITMAN impact. This is due to an expected latency between introduction of FITMAN system and a structured modification of the behavior of the users. As already stated, the cause and effect chain that link the events generated and BI impact is quite complex and involving more an organizational / behavioral problem than a mere technical issue. Here is an example of the overall cause effect diagram that can help understand the topic:

Step	Example	TypicalTimeline
Event communicated to User	A process drift on Bearing insertion is communicated	T0
User acknowledge the event.	That specific process drift is recognized as important and an action is needed	10’
User decide to act based on the event	After a further analysis a problem is detected and a modification of the bearing is proposed	20 days
Organization put in place the proposed solution	The bearing insertion is modified and tested	30 days
Impact	A statistical meaning amount of production is carried out	1 month
Evaluation of impact	The proposed modification has produced impact and it’s confirmed as positive	10 days

The fact that the BI recorded at M18 are better than expected can be explained by the volatile nature of the indicator chosen. FOR represent a percentage os failures recorded over the total production during a specified period of time. Being it a crucial factory KPI all the organization is constantly working actively to reduce it through several initiatives such as product redesign, process improvement etc.
The projection of the BI made during WP4 definition was probably too much conservative and didn’t take into account the extra effort delivered by the factory to improve its Quality.
It’s worthwhile now to review the FITMAN target BI.
In future months, the more the people will be trusting the system the more they will be changing their behavior and thus improve the reaction time and the effectiveness of their decision and thus impacting more on the business indicators.

5.4.6 Enabling Conditions and Obstacles

The main hurdle has been related to connectivity issues with the FILab Cloud. After many attempts to make the connection more robust, it has been decided to build an additional installation based on Whirlpool premises in Varese headquarters.
A second factors influencing the full implementation has been constituted by the need of fine tuning the algorithm and the mechanism of alarm generation according to the need of the final user. In short it turned out that the amount of events generated by the system and based on a

pure logic, was actually overwhelming the user with a lot of unmanageable events. Using the final user feedback the system has been finally tuned.
A very interesting feedback from the user is the request of enlarging the base of event manageable to capture new data which were not foreseen at the previous stage.

5.4.7 Consolidated Trial Experience

1) Usage of GE and SE is very straightforward and really shorten the additional development time, providing a good baseline toward standardization of application and reducing time-to-market
2) Carefully plan cloud strategy in order to verify performances and availability very early in the project
3) Stay on standard OS for mobile device (Android) and prefer HTML-5 development for quick experimentation while upgrade to app as soon as you need to exploit mobile device hardware (e.g. barcode reader, camera, GPS positioning etc.)
4) In case of loose security issues, try to leverage as much as possible the existing base of own devices user will be happy to work with instead of forcing usage of safe but expensive industrial tablet, which in turn can provide a more robust and safe approach but at a more expensive configuration expenses

The fact that the BI recorded at M18 are better than expected can be explained by the volatile nature of the indicator chosen. FOR represent a percentage of failures recorded over the total production during a specified period of time. Being it a crucial factory KPI all the organization is constantly working actively to reduce it through several initiatives such as product redesign, process improvement etc.
The projection of the BI made during WP4 definition was probably too much conservative and didn't take into account the extra effort delivered by the factory to improve its Quality.
It's worthwhile now to consider a possible review the FITMAN target for BPIs.

Scenario_Descr	PI_Desc	PI_Name	AS-IS	TO-BE1	Target	BIProgress
BIG DATA SCENARIO						
	ASZHA_SIR	SERVICE INCIDENCE RATE	50000	NA	47500	
	ASZHBC_DEFP	DEFECTIVE PARTS TO REWORK	31181	16764	28000	453,22%
	ASZHBC_FOR	FALL OFF RATE	4,49	2,8	4	344,90%
	WUBR_FOR	FALL OFF RATE	0,03	5	0,03	0,00%
		Average Progress of Scenario:				266,04%
EVENT SCENARIO						
	ASFT_DEFP	DEFECTIVE PARTS TO REWORK	31181	16764	28000	453,22%
	ASFT_FOR	FALL OFF RATE	4,49	2,8	4	344,90%
	ASNT_DEFP	DEFECTIVE PARTS TO REWORK	31181	16764	28000	453,22%
	ASNT_FOR	FALL OFF RATE	4,49	2,8	4	344,90%
	CCPU	CONVERSION COST PER UNIT	9,67	NA	9	
	WUBI_FOR	FALL OFF RATE	0,24	0,121	0,22	595,00%
	WUSI_FOR	FALL OFF RATE	0,2	0,118	0,2	0,00%
		Average Progress of Scenario:				365,21%
		Average Progress of Trial:				332,15%

Figure 33 Current impact of FITMAN on WHIRLPOOL Trial

5.5. Piacenza

5.5.1 Starting Point

Textile and clothing sector is one of the most fragmented and challenging sectors in EU 27 manufacturing industry: with 267.000 companies, 3 millions of employees, a total turnover of 235 billion Euros of turnover it represents 4% of the European Gross Product (source E-Biz TCF – 2005). With 11.2 average employees per company it is mainly based on SMEs (about 90% of the total).

Even if it is considered a typical traditional sector it is characterized by some very challenging peculiarities: more than 70 production steps (some very specialized), extremely wide variety of raw materials, very short product life cycle (6 months), pro cyclic and seasonable fashion demand. Because of these characteristics it is not convenient (and hardly impossible) to organize a fully integrated company from raw materials to finished product and the business ecosystem is based on a sub-supplying organization, where some large subject (fabric, clothing producers and retailers) collect orders, take care of designs and sales and carry on some central steps of production, delegating the other ones to smaller and more specialized sub-suppliers.

These peculiarities explain why t/c is centered in industrial cluster, where all these subjects interacts very frequently and share the same common industrial culture. Being pro cyclic, in these last years t/c sector has faced a strong increase of competitive pressure and a hardly predictable demand, with a reduction of production lots and of production structure exploitation. It may often happen that periods of calm are followed by peaks of demand which the internal production resources are not structured to face respecting the very short (and increasingly shorter) delivery request. These peaks are not equally distributed over all companies and it may happen that in the same moment a company is overloaded by orders while another one is underexploited. The business ecosystem is starting to create agreements between competitors to share production facilities but they are informal and not structured. This could be the first core of what we could call a “cloud manufacturing”, which could become reality using IoT to trace the products and the machinery availability and new FI services to share production information and support interoperability.

The time to create this “cloud production” is becoming mature, also considering the availability of communication standards (developed in the Moda-ML and e-Biz EU funded projects), semantic and ontologies to define the vast variety of materials and machineries (Trame Italian project, TexWin EU-funded one) and state of the art ICT.

To make a specific example two competing companies may have each one its own yarn dyeing machineries, which may not be fully exploited because of typical fluctuations of seasonal textile production. Because order acquisition may not take place at the same time for both of them and they may be specialized in a specific season (winter or summer fabrics), when the production of one is over exploited, the production of the other may be under exploited. Considering the small average dimension of textile accompanies and their focus on specific niches of the market, this case is very common and leads to a general under exploitation of the production facilities. Both enterprises could take a consistent cost advantage from the proposed reciprocal sharing of production capacity, being reciprocal suppliers and competitors at the same time. Considering the strong pressure on production times, the variety of textile productions and quality standards, information share and communication is critical and need the support of state of the art technologies to make this business model widely effective and concretely working.

The objective of the pilot is to demonstrate that, on the basis of FI technologies, textile and clothing “cloud production” can become reality.

T/c production steps can be grouped into 3 main ones: spinning (from raw materials to yarn), fabric production (from yarn to fabric) and clothing production (from fabric to finished product).
Fitman trial will focus on yarn dyeing, weaving (warping, weaving and raw control) and finishing (wet finishing, raising and dry finishing). Each of the phases can be object of the trial by itself or as a part of a group (for example raising or wet finishing + raising or the complete finishing process).
Ontologies and semantics of the process has been already prepared in Frame project, funded by the Italian state, and are ready to support Fitman trial implementation.
Company infrastructure is still subject to under or over exploitation in relation with the erratic fluctuations and of demand. Piacenza objective is to improve the exploitation of the production machineries, labor force and infrastructures involved in the project up to a potential 30% improvement in off peak production periods, with a related decrease of fixed costs per meter produced by the implementation of cloud manufacturing, with a proportional extension to all the subjects of the business ecosystem.
As we have seen Fitman textile trial will be implemented into dyeing, weaving (warping, weaving and raw control) and finishing (wet finishing, raising and dry finishing).
Prerequisite to implement cloud computing in real time is to able to have real time monitoring of Piacenza production in these phases in order to provide updated data to feed cloud computing by adequate monitoring and capacity estimation instruments, supported by the application of RF-ID enabling technology.
While warping and weaving departments are already ready for Fitman trial implementation because their MES and ERP software are state of the art and RF-ID technology is not needed (in fact at this stage a real fabric is not existing yet, but only its components and warp), wet finishing, dyeing and raising and dry finishing are still far away to be able to provide updated information. Monitoring is sufficient but not in real time, capacity monitoring and forecast systems have not been implemented and ERP is not able to see detailed production situation at machine level. The implementation of RF-ID technology will enable the direct interaction of pieces and machineries and the geo location of the pieces will provide the information to operators to trace them effectively. The joint application of these technologies will allow to settle down an effective real time monitoring and capacity estimation legacy systems. Research must also take into consideration the peculiar conditions of textile production : Tag selection will require a specific effort to select those devices which can survive to the peculiar physical and chemical stresses of textile finishing and dyeing while geolocation system must be able to work in adverse conditions caused by magnetic interference of the several electrical engines installed aboard of machineries.

5.5.2 Trial Plan and Roadmap

The trial roadmap has been split in three phases, each one focused on some GEs or SEs integration into the system.

5.5.2.1 First phase of implementation

The first phase starts with the integration of the **FI-WARE IoT** level at shop floor.
Any events coming from the legacy MES, are managed by a special TSC, called **DB trigger**, that translates and sends them to the IoT Gateway DataHandling GE. Basically these events are:

- New incoming order: new order has been added to scheduler for production.
- Start production: from the scheduler and for any machinery this event is sent when a piece starts a process into a machinery.

- Finish production: from the scheduler and for any machinery this event is sent when a piece has completed the process into a machinery.
- Break or Stopped: a machinery is broken or has been stopped by operator.
- Repair or Restart: a machinery has been restarted.

These events are then managed at FI-ware level by **IoT BackEnd ConfMan/PubSub** GE and **IoT BackEnd IoTBroker** GE. At FITMAN layer a NGSI10 subscription is performed to manage the legacy events, this task will be performed by Secure Event Management SE in a later phase. In this first phase a **WireCloud** GE widget at application level is implemented to show events coming from the shop floor. The first phase ended with the second Project Review (M12).

5.5.2.2 Second phase of implementation

The second phase starts with the integration of the **Shop Floor Data Collection** and the **Supply Chain & Business and Ecosystem Apps** SEs.
The use of **Mediator** GE could be added if the legacy ERP is not able to send requests by using the **MODA-ML** language.
RFID antennas are set on test machineries to get events such as "Start production" and "Finish production" whenever is possible. RFIDs continuous reading is used if last event is not available.
Events coming out from the Shop Floor Data Collection SE are going to be managed by the Secure Event Management SE in a further step, a WireCloud GE widget at application layer could show them in this phase.
At Virtual Factory level, a TSC, called **Order Management**, is in charge to get information from the Legacy ERP such as production capabilities or orders that cannot be scheduled for production, that can be exposed to Marketplace. That means that the TSC also interacts with the SCApp SE to make them available there.
The production manager logs into the SCApp SE and publishes production capabilities or orders if needed, alternatively, he/she can look for external capabilities or orders to have a better machinery exploitation. Most of the features planned in the second phase will be ready for the third Project Review (M18).

5.5.2.3 Final implementation

This phase represents the final system integration and implementation. In this phase the Secure Event Management SE is integrated in the system and a TSC, called Event Management, is added to manage all the events from the FITMAN layer (SEM SE), and if needed, to send some events to the Virtual Factory such as new orders and production scheduling.
The TSC, called Order Management, adds some new events, such as new orders and sold production capability, to Secure Event Management so that the Event Management TSC can add them to the production scheduler. The final implementation will be ready for the final Project Review.

5.5.2.4 Deviations envisaged from the original roadmap

At the current time of writing we envisage the following deviations from the roadmap:

- The SEM SE will not be used due to the limited number of involved nodes (event sources) and the limited number of components that handles messages (all confined in the organization premises) that makes irrelevant all the security features provided by the SE
- The manufacturing cloud will be organized as specific services on top of the WireCloud GE: currently the trial is focused on exchanging production capacity, not

selling tangible assets, therefore most of the features of the SCapp SE meet only partially trial goals.

5.5.3 Trial structure and Implementation Strategy

The following picture depicts the current trial architecture:

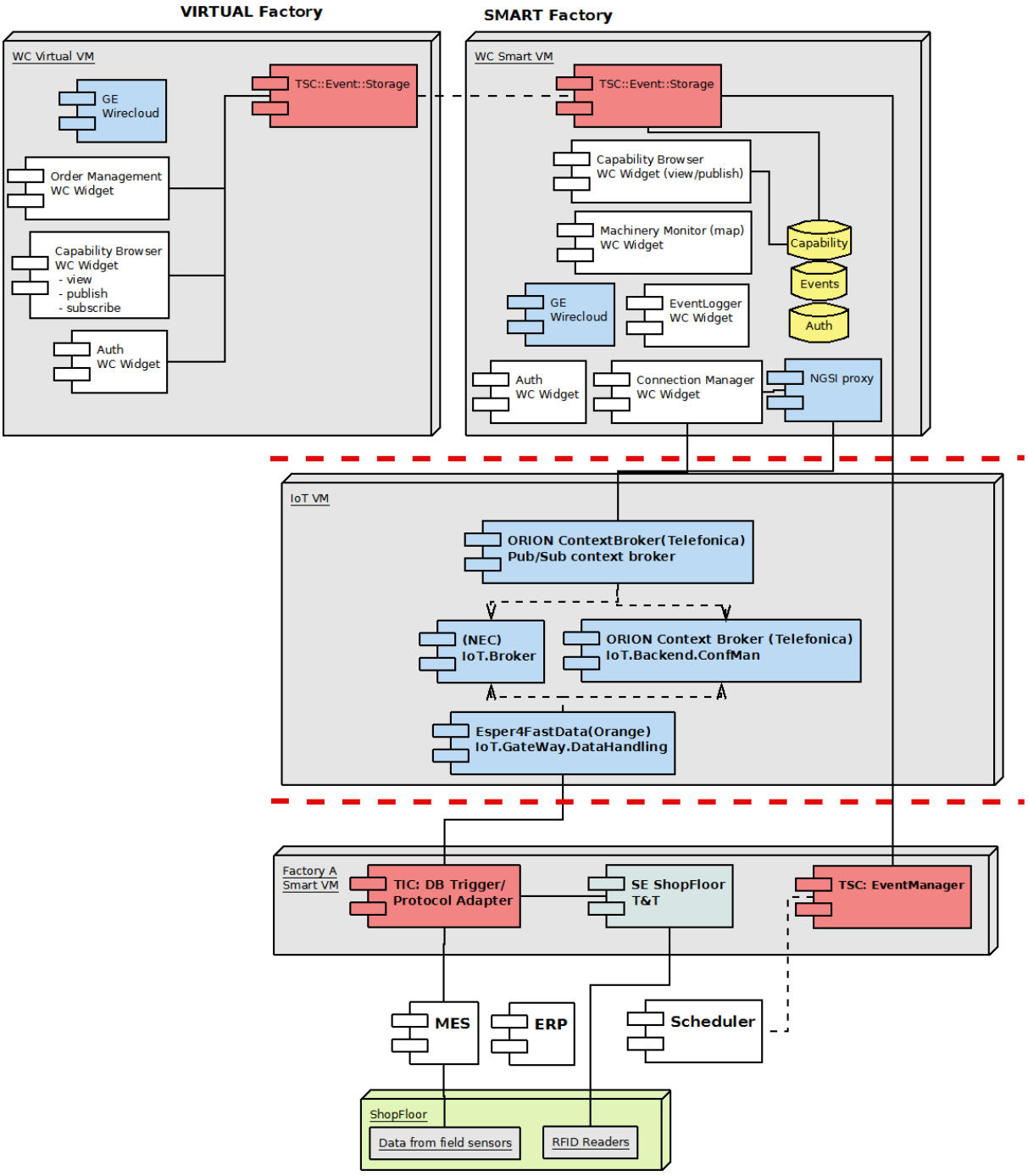


Figure 34 Piacenza Trial Structure

Regarding the implementation strategy, we started from the Smart Factory side, implementing all TSCs that will be installed at the organization premises. The following is a list of major tasks we were involved at in this phase:

T1 – Test and setup the environment between the RFID reader and the Shopfloor Data Collection (T&T GE)
T2 – Interfacing the SDC to the DBtrigger in order to acquire the events
T3 – Installation of the hardware reader on the Piacenza machine, reading test and verification of the infrastructure.
T4 – Analysis and implementation of the TSC EventManagement.
T4.1 – New planning of the finishing production process
T4.2 – Reading from IoT Broker the incoming event from RFID monitoring
T4.3 – Asset capability computation and sending to the EventStorage TSC
T4.4 – Management of the incoming published, booked and confirmed Asset capabilities
T5 – collect and store events and capability data on proper data store layers (TSC EventStorage)
T6 – present acquired monitoring data at shopfloor level (FactoryMap and CapabilityBrowser Wirecloud widgets)

T3 will be performed at the end user plant and under the vision of the specialized operators from the end user.
The main Indicator that impacts this task is the improvement of the monitoring the machine in the finishing department, absent before.
The main risks arose from the tests are the short tags life due to harsh work conditions or a missing reading or an erroneous reading, for this reason specific software rules ensure a presence of one order into the machine and not a nearest outside and a precise evaluation of the process time.

T4 is on the way as well. The company MES system does not cover all departments, but only in Dyeing and Weaving departments (historically with more complexities), due to this reason the finishing department follow the production only on the process level (and not on the machine level) and don't make a detailed planning per machines.
With the introduction of the new RFID monitoring system a more detailed planning is needed in order to compute a right prevision of free capability, that is the target of the T4.1.

In order to evaluate the busy time of a machine into the wet finishing, raising, dry finishing and dyeing we start filtering all orders that have pass through the raw control. For each order of these list we consider the timing, that could be different per each article, for each process step present in the own workflow and the current position, thus for having a date for each next processes.
All these provisional information are applied to the calendar department, in order to be sure that an order is processed in a working time and not in holidays. The last check that we need to finalize the planning is the daily capability of the machine, at this point in fact on each machine we have a list of orders to be processed, if the sum of the time exceeds the daily working time of the machine, a set of orders will moved in the next available day.
T5 is near its end. We used traditional DBMS and no-sql solutions depending on the kind of data to store.
Some of the presentation layer WC widgets have already been implemented, others will be ready for the M18 review.

5.5.4 People, Infrastructures, Processes

The operators involved in the final usage of the tool developed in the Piacenza Pilot include production, sales and administration:

ACTOR *(Blue Collar Workers, Manager, Coordinator, clients, provider, etc.)*	**BUSINESS AREA**	**ROLE OF THE ACTOR**	**DESCRIPTION OF THE TASKS OF THE ACTOR** *Detail the tasks and actions that each actor do in the living lab scenario*
Production manager	production	High level: increased flexibility of production capacity	Management of internal and "a facon" production (received or delegated to the ecosystem)
Production operator	production	Medium Level: increased flexibility of production capacity	The use of external a facon" production (delegated to the ecosystem) gives access to enlarged production sources
Sales manager	sales	High Level: new product to sale: production service	A new area of business is set up
Controller	administration	Medium-Low Level: fixed costs must be distributed to internal and "a facon" production (sold)	A new area of business is set up
Sales operator	sales	Medium level: updated information is available from production	Accuracy of information can improve the quality of service to customers, their satisfaction and the image of the company
Sales operator	sales	Medium Level: external production resources use can support shorter deliveries and improved service	Shorter deliveries can improve the quality of service to customers, their satisfaction and the image of the company

As stated in the technical description the implementation of Piacenza pilot has focused on SF factory part for first, to collect the data needed to feed VF module.

Therefore, apart from IT office which is involved in all operations related to Fitman trial, only production and administration operators have been involved, in relation with their direct involvement into SF area, data generation and management.

5.5.5 Results at M18 and Future Expectations

On the basis of Fitman plan of activities the finalization of Piacenza pilot will be released at M21. At M18 the coordinated implementation of SF and VF parts of the trial is still ongoing.

To proceed to a more detailed description we will make reference to the objective listed in D4.4:

Piacenza – Output from ECOGRAI

Piacenza Objective	FITMAN Relative Objectives	Decision /Action Variables (DV/AC)	Performance Indicators
Obj1: Better exploitation of internal and external production infrastructure	Obj1.1 To reduce the fixed costs per machinery	To use the PIACENZA trial platform	PI 1.1: Ratio: Machine fixed costs per produced unit after / before the DV/AV implementation during a period* A better exploitation of machineries by the offer to third parties of the unexploited production capacity
	Obj1.2 To reduce the production time from order to delivery	To use the PIACENZA trial platform	PI 1.2: Ratio: Average production lead time per meter produced from order to delivery after / before the DV/AV implementation during a period* . this result can be achieved by the purchase of external production quality shared by third parties in order to overcome production shortage capacity and bottlenecks
	Obj1.3 To reduce the quantity of energy for supporting systems for production	To use the PIACENZA trial platform	PI 1.3: Ratio: The quantity of energy spent per meter produced after / before the DV/AV implementation during a period* , Energy cost of supporting system can be reduced by increasing production (obj.1.1)
Obj2: Improve the monitoring of the production capacity		To use the PIACENZA trial platform	PI 2.1: This is a qualitative indicator. The use of RF-ID devices can provide the effective indication of the entry and exit time of fabric into and out of machines and the specific machine identification number. Ratio: the number of production records DA/AV, including

			machine identification. P 2.2 A second indicator is the reduction of the margin of error in delivery forecast, Ratio: Percentage of forecast error before/after DV/AV implementation

Obj1is directly related to the joint implementation of SF and VF pilots.
SF trial, which has been given the precedence since the availability of data is necessary to support VF one, has already demonstrated clear results.
More in particular Tags and RF-IDE readers test are ongoing and the first outcomes has proven that Obj.2 PIs can be fully obtained:
PI 2.1 has already proven to be reached potentially for all the process, with the only exception of fulling, where tags have revealed a low percentage of survival due to the mechanical stress of the process. New tags and added protection systems are under evaluation.
PI 2.1 is a necessary for PI 2.2 achievement, therefore preconditions to this objective have been put in place. In relation with the short time elapsed from the availability of data provided by SF trial it and the long production cycle of fabrics, which can exceed 15 weeks, an effective set of data to evaluate the achievements of To Be results is still too limited and evaluation is, in conservative way, postponed, even if preconditions and first evidences are positive and promising.

VF pilot depends on SF one and one has not been completely implemented and is not available yet for third parties. Since the effective achievement of Obj.1 is related the sharing of capacity production to third parties and that a version of the trial near to commercial release is still not available, it is premature to provide an evaluation of VF Piacenza pilot at M18.

5.5.6 Enabling Conditions and Obstacles

To integrate the GEs into trial 5 system was necessary to install them into internal virtual machines, so during the GE integration phase the main problem was installing GEs on new system, documentation sometime was not up to date, and some bugs rose but interaction with developers and maintainers helped to fix them all promptly.

5.5.7 Consolidated Trial Experience

On the industrial point of view the first advice is to make a check of the production structure and of its level of exploitation to verify the potential impact of production capacity sharing process implementation (see D4.6). If the over or under exploitation are significant there could be an interest to evaluate the implementation of SF part of the pilot. The first step is to evaluate if the level of accuracy of available data is able to support production sharing process, In negative case the second step is the screening of the production process and the definition of the number of machineries and of the support infrastructures needed to implement RF-ID technology.
On the IT side the chance to host services on remote nodes is challenging and represents a big innovation with respect to current practices. A common service platform leads to better service exploitation and integration. Data integrity and security is an issue that needs to be addressed

carefully and should be inherently tackled by the platform. Tools to integrate legacy products to the FIWARE infrastructure could also boost the transition of IT services.
The software quality of FIWARE GEs implementations available in the catalogue is still not homogeneous, most are very well maintained and documented while others, still fully featured, lacks valuable support and documentation. On average quality of GEs is anyhow more than acceptable.

Scenario_Descr	PI_Desc	PI_Name	AS-IS	TO-BE1	Target	BIProgress
PRODUCTION CAPACITY PURCHASER						
	AV.LT	AVERAGE PRODUCTION LEAD TIME PER METER	19	NA	15	
PRODUCTION CAPACITY SELLER						
	EPM	ENERGY PER METER PRODUCED		NA	30	
	FOR.ERR.	PERCENTAGE OF FORECAST ERROR	4	NA	0	
	MFC	MACHINE FIXED COSTS PER PRODUCED UNIT		NA	30	
	PROD.REC.	NUMBER OF PRODUCTION RECORDS	1	3	3	100%

Figure 35 Current impact of FITMAN on Piacenza Trial

5.6. A.P.R.

5.6.1 Starting Point

For its business development, APR defines a strategic Programme called "CAP 2020" aiming to enhance the relation with customers and suppliers. This Programme covers some resolutions about the development of the IT strategy and the extension of business processes capabilities. The quality of information was defined as the main challenge and the formalization of collaborative business processes was identified as the best opportunity to upgrade APR activity.

Within the ARP ecosystem, we mainly identify the following services and their interactions with the targeted collaborative business processes (BP).

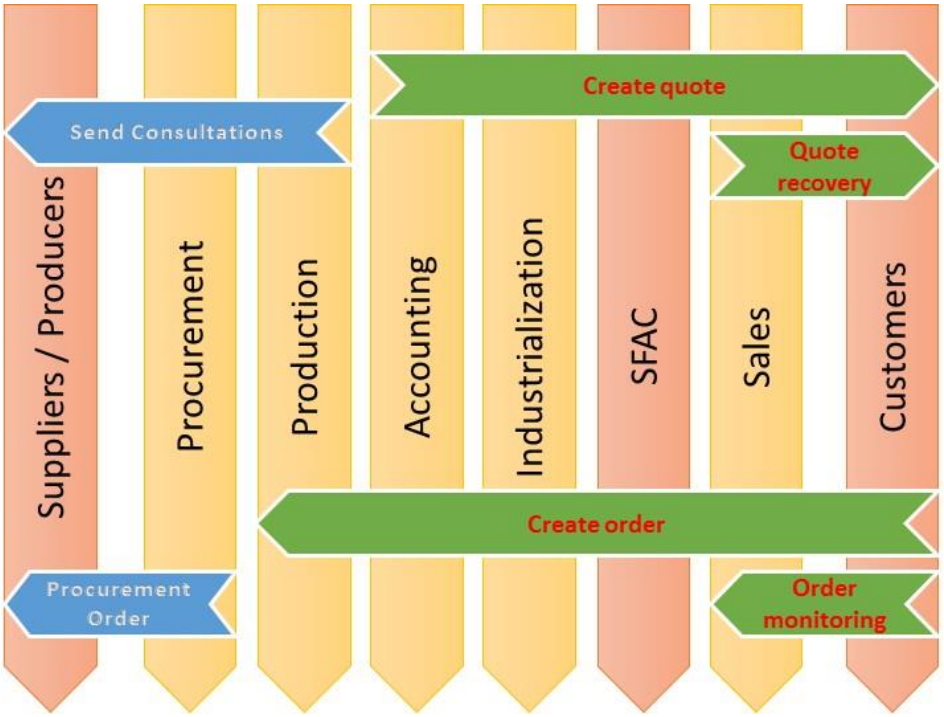


Figure 36 APR Processes

The analysis of current collaborative BP allows to identify some lacks:

- Quote definition: the current quote process allows to validate via some customers' criteria (reference and quantity) the type of treatment to be applied to the quote. We need to validate quickly these information to define the quote.
- Quote recovery: we need to select the relevant quote/customer quotes to recovery.
- Order definition: the order process is constituted through the collection of information coming from customers, their history in APR information systems and defined quotes if there are.
- Order monitoring: according to customer profile, we are producing an adapted information to track product evolution through the production process. Many

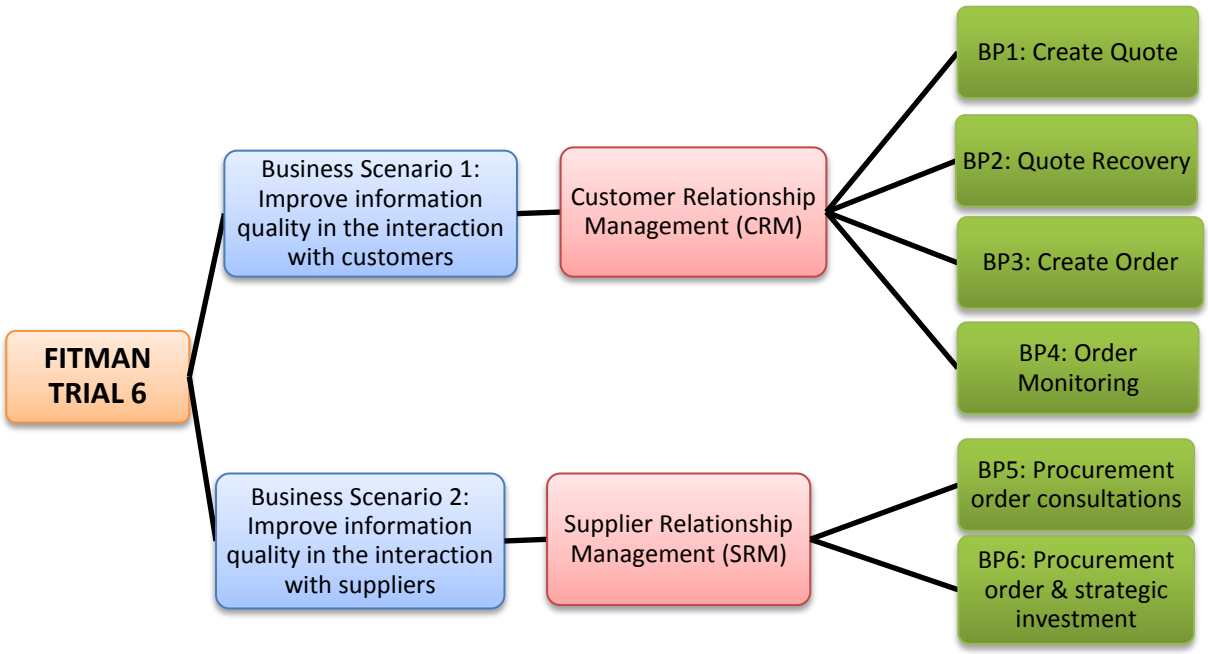
parameters should be compared outside the ERP system in order to consolidate the communication package according to the contracted sales models with customers.

- Procurement and investment management: due to the particularity of raw material pricing in plastic industry, we are producing consultation orders for the majority of procurement order. For some specific product, this process requires many interaction steps to clarify the evolution of raw material cost.

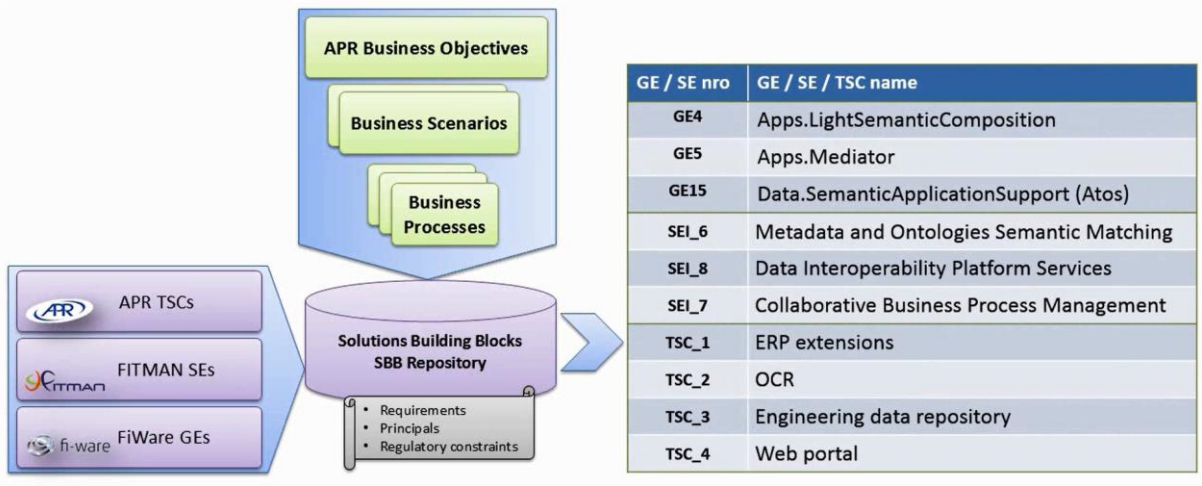
Today, interaction is done based mainly on paper documents (quote, customer order, purchasing). The current situation don't allows information analysis and generates many additional delays in our global product cycle. The resulting treatment delay is penalizing APR comparing to its competitors. Also, when these documents are introduced manually in our information systems, we need to generate some balanced scorecards, aggregate information in order to make decision (i.e. propose product delay in the quote, etc.).

5.6.2 Trial Plan and Roadmap

Within the APR trial, we defined two business scenarios (BS) impacting CRM and SRM as well. As we can see the figure below, 6 BP are directly arising from the two BS.



In order to develop and integrate the proposed BP, we start by analyzing the solution building blocks proposed by Fi-Ware (GE), by the FITMAN project (SE) and the exiting APR solutions with necessary additional components (TSC).
The following figure proposes the list of components selected to support the new collaborative BP. Lyon 2, as the technical partner of APR, will be in charge to analyze these components and develops the required trial integration components (TIC).



GE / SE nro	GE / SE / TSC name
GE4	Apps.LightSemanticComposition
GE5	Apps.Mediator
GE15	Data.SemanticApplicationSupport (Atos)
SEI_6	Metadata and Ontologies Semantic Matching
SEI_8	Data Interoperability Platform Services
SEI_7	Collaborative Business Process Management
TSC_1	ERP extensions
TSC_2	OCR
TSC_3	Engineering data repository
TSC_4	Web portal

Within the APR ecosystem, we decompose the implementation work in three phases according to the availability of the ecosystem components and the APR business priorities. The resulting phase 1 and 2 are related to customer relationship management (CRM) while phase 3 is about SRM. The following table illustrates the connection between components and phases.

		Phase_1		Phase_2		Phase_3	
		BP1	BP2	BP3	BP4	BP5	BP6
GE_5	Apps.Mediator	X	X	X	X	X	X
GE_4	Apps.LightSemanticComposition	X	X	X	X	X	X
GE_15	Data.SemanticApplicationSupport			X			
SE_6	Metadata and Ontologies Semantic Matching			X			
SE_7	Collaborative Business Process Management	X	X	X	X	X	X
SE_8	Data Interoperability Plateform Services	X		X		X	
TSC_4	Web Portal	X	X	X	X	X	X
TSC_2	OCR	X		X		X	
TSC_1	ERP extensions	X		X		X	
TSC_3	Data Repository	X				X	X

5.6.3 Trial structure and Implementation Strategy

The Implementation strategy of the new BPs was analyzed at three perspectives:

- Business perspective: from the business perspective, the main goal is to smooth the implementation in order to respect the current commitments. Also, the new processes should be validated by pilot selected customer and supplier.
- Organization perspective: we are defining some quality procedures for the formalization of the new solution functionalities and also clarify collaborator's roles in the experimentation. Actors are going to be trained on the new solution, supported by the IT service.
- Technical perspective: from a technical point of view, the main difficulty is to take in account the technologies and constraints provided by the selected components and their evolution in coherence with APR IT strategy. It is also essential to plan a progressive deployment in order to ensure efficiency in each step of the implementation (tests, gathering feedbacks, etc.)

Associated to the implementation strategy, some business indicators are defined in order to evaluation the quality of implemented business processes. The following table gives a detailed picture about indicators definition and measurement for the 6 collaborative business processes.

.

TRIAL 6 APR	Name of the BPI	Why this PI's is important (comment 4)in comparison with market and competitors	Why this AS IS	Why this AS IS	Plan of measurement	Organization of the measurement	What measures can be done automatically and what manually? How automatically	Which data are you going to collect and how? How manually
BP_1	Time limit for responding to quotes demand (current/new product) **after / before the DV/AV implementation during a period***	The reactivity of the quotation process allows to validate with customer the criticality of the demand.	**Current (2 days) New (4 days)**	**Current (1 day) new (2 day)**	Treatment of the information flows is automatically with the traceability of answers	Definition of the tasks of everyone	BPI is evaluated from the payload	Time between the date of reception confirmed by the customer and the date of customer quotation request (automatically)
	% of the unsuccessful quotes due to high price after / before the **DV/AV** implementation during a period*	The reactivity of the quotation response validates with the customer the best transformation solution to meet his requirement	**60%**	**30%**	Treatment of the information flows is automatically with the traceability of answers	Definition of the tasks of everyone	BI is evaluated from the customer answer	% Number of unsuccessful quotes due to high price/Total number of quotes processed (automatically)
BP_2	% of time for analysis and control of customer recovery after / before the **DV/AV** implementation during a period*	The analysis of customer information allows a better understanding of his needs.	10%	40%	Automation of the seized tasks	Replacement of the task of seizure by a task of analysis	BI is evaluated at the level of analysis and discussion with customer	% Total time for analysis and control of customer recovery / Total processing time of customer recovery (automatically)

	Average time of customer recovery after / before the **DV/AV** implementation during a period*	When the time of customer recovery is short, we can know quickly customer needs.	7-14 days	7 days	Treatment of the information flows is automatically with the traceability of answers	Definition of the tasks of everyone	BI is evaluated from the time of customer recovery	Time between the date of customer recovery and the Sending date of commercial proposal (automatically)
BP_3	Average time to confirm the order with acknowledgement of receipt (with/ without quote) after / before the **DV/AV** implementation during a period*	Customer delivery time is becoming more and more short. Therefore, the time of administrative treatment should be shorten in order to respect committed production delay.	4 days	48 h	Treatment of the information flows is automatically with the traceability of answers	Definition of the tasks of everyone	BI is evaluated at customer delivery time	Time between the date order acknowledgment to the client (client confirmation) and date of sending the order confirmation (automatically)
	% of time for analysis and control of orders after / before the **DV/AV** implementation during a period*	The analysis of customer orders should allow a good quality of treatment, and anticipate administrative gaps.	20%	50%	Automation of the seized tasks	Replacement of the task of seizure by a task of analysis	BI is evaluated from the verification and discussion with customer about order information	% Total time for analysis and control of orders / Total processing time of customer orders (automatically)
BP_4	% Customer service rate after / before the **DV/AV** implementation during a period*	Quality of service allows us to maintain our margins compared to the competitors.	93%	96%	Treatment of the information flows is automatically with the traceability of answers	Steering of production data	BI is evaluated at the time of delivery orders	% Number of orders not delivered out delay/Total number of orders delivered (automatically)

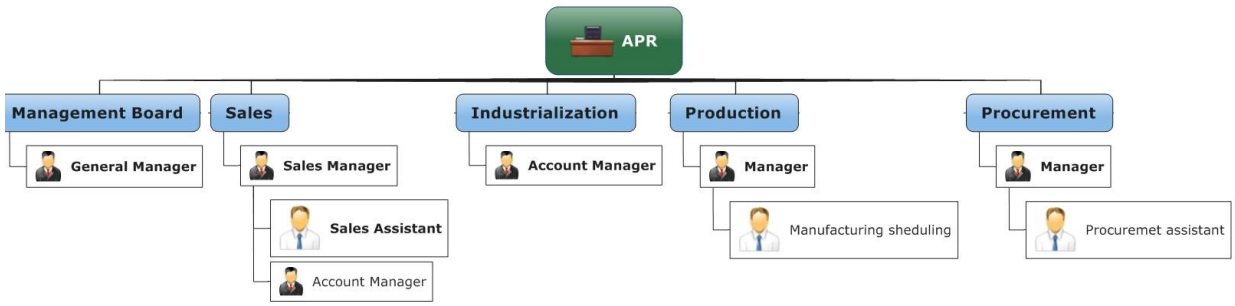
	Number of products received back due to faults after / before the **DV/AV** implementation during a period*	we lose market opportunities when producing non-quality products.	10	7	Automation of the seized tasks	Replacement of the task of seizure by a task of analysis	BI is evaluated at the reception time of the order	Number of products received back due to faults (automatically)
BP_5	% Internal Stockout rate after / before the **DV/AV** implementation during a period*	Customer delivery time is becoming more and more short, so we must have the best material at the right time.	20%	5%	Automation of the seized tasks of consultations	Analysis of consultations	Bi is evaluated before sending a consultation to supplier	number of disruptions of internal stock per year (automatically)
	% External Stockout rate after / before the **DV/AV** implementation during a period*	Development of partnership with our suppliers must allow a good partnership to optimize the material supply.	5%	1%	gathering of needs	Replacement of orders tasks by tasks of managements delivery	Bi is evaluated from supplier answer	number of disruptions of external stock per year (automatically)
BP_6	Value of stock at the end of last period after / before the DV/AV implementation during a period*	The cost of stock directly impact our cost, so the less it is important the more we will be competitive.	230 K euros	180 K euros	Define more precisely the need of material	analysis of consultations and grouped orders	BI is evaluated from the analysis of investment	Value of stock at the end of last period in terms of material costs only (automatically)

As support for the implementation and tests steps, we defined a quality recovery mechanisms helping to preserve APR and customer data.

- Data backup: within the trial platform, we integrate 3 sources of data: (i) customer project, (ii) procurement data, and (iii) customer/supplier consultation history. We implement a new data repository (TSC) as buffer container for these data.
- Risk mitigation: two categories of risks are identified. The first category is related to APR capability to formalize all specific collaboration details. A resulting risk can appears as new kind of support documents to complete the functionalities of the collaboration platform (Excel Sheet). To avoid this human risk, we classify customers in order to target first those fitting perfectly with the platform capabilities. We extend progressively the platform capabilities after. The second category concerns customers and suppliers ability to join the new platform in coherence with their collaboration policy or ability. Again, customers / suppliers are classified to be invited progressively to join the platform. APR develops a 2 years transition programme.
- Roll-back: we propose some recovery mechanisms through a buffer database. We develops procedures and triggers for data replication as well as save-points procedures to be able to make roll-backs.

5.6.4 People, Infrastructures, Processes

In order to support the collaborative business processes, APR stakeholders and partners are identified with their access and functionalities profiles. The following figure provides an overview of the impacted business divisions.



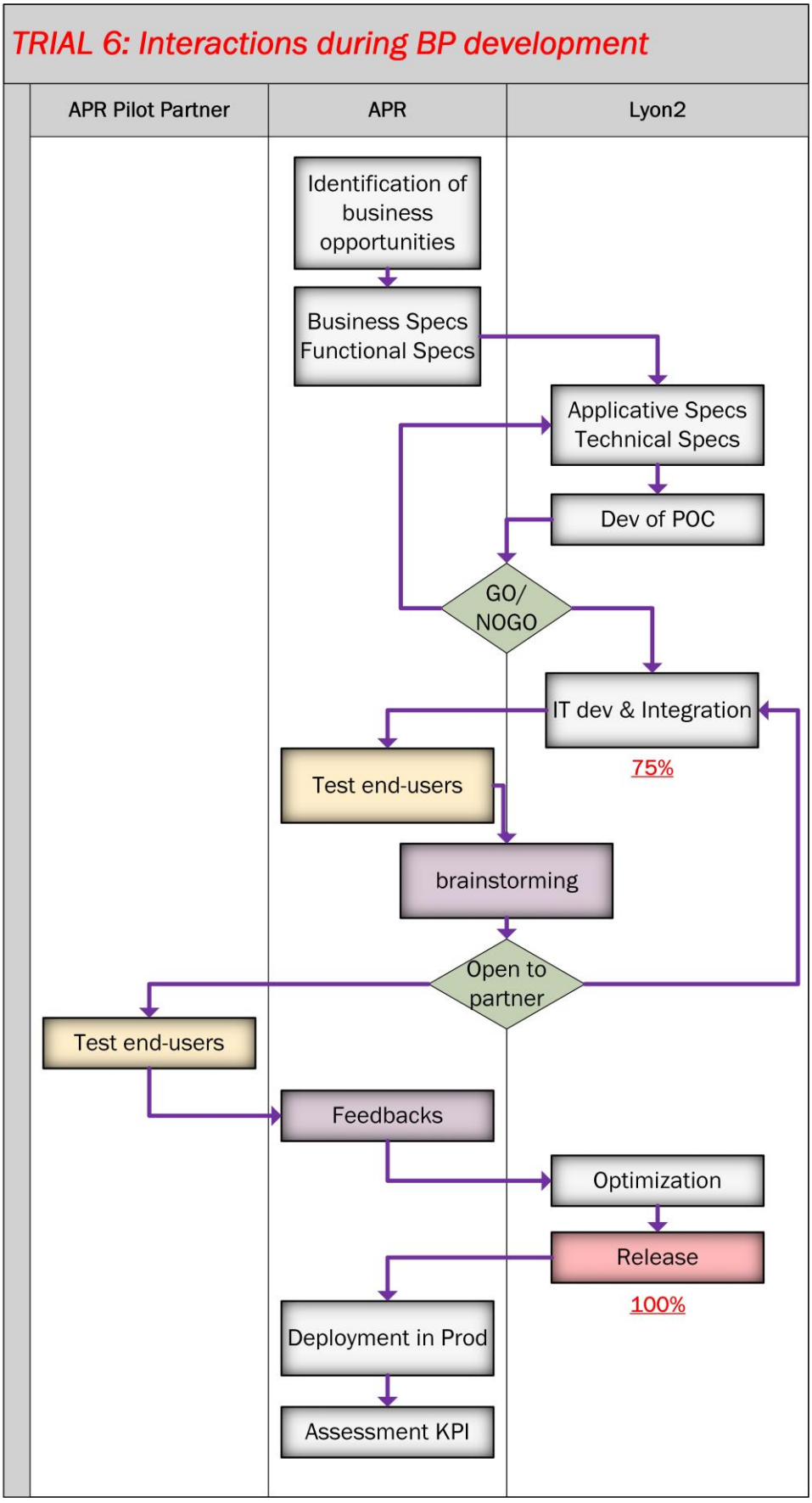
People involved within BP1-2-3-4 implementation:

- Account management (2 people)
- Sales management (2 people)
- IT Service (2 people)

People involved within BP5-6 implementation:

- Procurement management (4 people)
- IT Service (2 people)

In order to ensure an optimal integration of the new business processes, we converge towards the following implementation steps (figure below).


TRIAL 6: Interactions during BP development
APR Pilot Partner
APR
Lyon2
Identification of business opportunities
Business Specs Functional Specs
Applicative Specs Technical Specs
Dev of POC
GO/ NOGO
IT dev & Integration
75%
Test end-users
brainstorming
Open to partner
Test end-users
Feedbacks
Optimization
Release
100%
Deployment in Prod
Assessment KPI

5.6.5 Results at M18 and Future Expectations

At M18 we plan to achieve 83% of development, integration and test of the 6 BPs

- BP1: over-achievement. The BP is under release. Tests are done with pilot partner.
- BP2: achievement. We are optimizing the BP after collecting feedbacks
- BP3: achievement. We are collecting feedbacks
- BP4: achievement. We are collecting feedbacks
- BP5: under-achievement. We are finalizing development of the BP
- BP6: under-achievement. We are finalizing development of the BP

The results of the first extracted data are reported in the table below:

TRIAL 6 APR	Name of the BPI	AS-IS	Target	To-Be at M18
BP_1	Time limit for responding to quotes demand (current/new product)	Current (2 days) New (4 days)	Current (1 day) new (2 day)	**Current : 1 day New : 2 days**
	% of the unsuccessful quotes due to high price	60%	30%	**36%**

At M18, we are able only to evaluate the first results of the BP_1. First results are convincing for the moment. This is largely due to the strong involvement of partners and business initiatives employed during the tests.

5.6.6 Enabling Conditions and Obstacles

Steps	Facilitating	Interfering
Definition	• Audit • Evaluation of existing BP • Brainstorming	• The capacity to cover all the specificities of all the collaborative BPs
Implementation	• Integration & validation of the 6 BP specs with the enterprise architecture principals of APR	• The gap between the existing IT solutions and the ones provided by the FITMAN project
Deployment	• Planning of deployment slots in coherence with ongoing development project	• The maturity of the released GE and SE as support for collaborative BPs at the production level
Going live	• Training of end users • Strong collaboration with partners (Netshape and LM) • Off-peak period allows us to spend more time with users • Motivated partners and actors	• Not evaluated yet

The implementation of BP which incorporates user tasks, business tasks and business logic is highly prone to logical and design errors and very often leads to runtime errors that crash the whole application. Such Business processes in XML (file .bpmn20.xml) achieve high level of complexity and without visual capability for all the tasks within the business process.

5.6.7 Consolidated Trial Experience

For Plastic industry, enhancing collaboration capabilities remains an essential issue in order to improve business plan.
The integration of new IT capabilities can be seen as accelerator to formalize and offer new business services.
From the organization viewpoint, workers take benefits from a clear assignment of their tasks.
From the technical viewpoint, we provide a better integration of IT resources and reduce requested data collection efforts at the front-end.
The appropriation of the new collaboration platform should be planned progressively according the capabilities of customers and suppliers to join the new collaboration platform. A classification of partners should be done and an adapted integration process should be established.
From the IT point of view, some issues still vague at this moment regarding the governance of the integrated enablers and their capabilities and constraints to be upgraded.

Scenario_Descr	PI_Desc	PI_Name	AS-IS	TO-BE1	Target	BIProgress
IMPROVE INFORMATION QUALITY IN THE INTERACTION WITH CUSTOMERS						
	ACKN.REC.	AVERAGE TIME TO CONFIRM THE ORDER WITH ACKNOWLEDGEMENT OF RECEIPT	4	NA	2	
	AN.CTRL.	CUSTOMER RECOVERY ANALYSIS AND CONTROL TIME	10	NA	40	
	AN.CTRL.ORD.	TIME FOR ANALYSIS AND CONTROL OF ORDERS	20	NA	50	
	CSR	CUSTOMER SERVICE RATE	93	NA	96	
	CUST.REC.	AVERAGE TIME OF CUSTOMER RECOVERY	14	NA	7	
	RESP.TIME	QUOTES DEMAND RESPOND TIME	4	2	2	100,00%
	RET.PR.	RETURNED FAULTY PRODUCTS	10	NA	7	
	UNSUCC.QUOT.	UNSUCCESSFUL QUOTE	60	36	30	80,00%
		Average Progress of Scenario:				90,00%
IMPROVE INFORMATION QUALITY IN THE INTERACTION WITH SUPPLIERS						

	EXT.ST.OUT	% EXTERNAL STOCKOUT RATE	5	NA	1	
	INT.ST.OUT	% INTERNAL STOCKOUT RATE	20	NA	5	
	VOS	VALUE OF STOCK	230	NA	180	
		Average Progress of Trial:				90,00%

Figure 37 Current impact of FITMAN on APR Trial

5.7. Consulgal

5.7.1 Starting Point

The way the supervision is performed by using modern technologies will affect customer, employee, supplier, and partners' way of interacting. The use of a collaborative web platform will redefine communication and interactions with emerging collaborating methodology. The injection of new technologies in the business scenarios, will affect the way information is generated, achieved, retrieved and disseminated.

One of the main outcomes of the trial is to have a closer relationship with all the stakeholders through enabling active, real-time participation. Monitoring and tracking this involvement can lead to better insight into their activities. By allowing everyone to have adequate and timely participation in the project, project supervisors can help generate new ideas and improve current scenarios and provide better actions. Increased levels of activity can make all the stakeholders feel more involved and committed to the company and the project as a whole, and be more responsive to problems that inevitably arise in any construction project.

The major focus for the trial is the automation of the concrete handling procedure with a well defined information management system, which is an important part of the overall construction supervision task. The work flow remains the same and the information generated at various phases remains the same, but there will be a significant change in the way the generated information is stored, retrieved, processed and distributed. A common web platform has been developed for all the stakeholders to store and retrieve information and documents generated at different stages of the work flow. Thus a collaborative workspace has been created using standard web and storage technologies. Concerned authorities have access to the results through platform based on their access rights.

The Concrete Control Process is applicable not only to the Consulgal trial but to the construction industry in general. The Consulgal Trial has subdivided this process in three business scenarios: Identification of concrete characteristics and Concreting Plan (Business Scenario 1), Samples collection and testing (Business Scenario 2) and Test results treatment and evaluation (Business Scenario 3).

For each Business Scenario Consulgal has identified Business Process and business Performance Indicators that allow determining the benefits of the FITMAN platform:

BS1: Identification of Concrete characteristics and concreting plan.

Processes:
BP1. Identification of concrete class and concrete composition process
BP2. Concreting plan process
BP3. Identification, collection and classification of concrete samples process

Measurement:
PI1: Ratio: Average lead time to access the information relating to concrete characteristics and concreting plan after/before the DV/AV implementation during the concrete control process.
PI5: Ratio: Time for data exchange between stakeholders after/before the DV/AV implementation during the concrete control process.

BS2: Samples collection and testing.

Processes:
BP4. Slump tests results for each concreting operation
BP5. Testing and test results of samples

Measurement:
PI2: Ratio: Average number of pages used in the test results recording, archival, after/before the DV/AV implementation during one concrete operation.
PI3: Ratio: Average lead time needed to perform and record the test results after/before the DV/AV implementation during one concrete operation.
PI5: Ratio: Time for data exchange between stakeholders after/before the DV/AV implementation during the concrete control process.

BS3: Test results treatment and evaluation.

Processes:
BP6. Test results treatment
BP7. 2. Test results evaluation

Measurement:
PI4: Ratio: Average lead time needed to analyze the test results after/before the DV/AV implementation during one concrete operation.
PI5: Ratio: Time for data exchange between stakeholders after/before the DV/AV implementation during the concrete control process.

5.7.2 Trial Plan and Roadmap

Trial platform experimentation for the Phase I (M12)
In Phase I we were more focused in BP1 and BP2, and testing the better way to use RFIDs for BP4. Designer/Contractor/Supervisor were trained to use the new platform. Regarding BP1 and BP2, preliminary and simple tests with real data were performed. RFID tags are tested on site for the identification of samples.
Quantitative measurement: In Phase I no measurements were made.

Trial platform experimentation for the Phase II (M18)
Tests for BP1, BP2, BP3, BP4 and BP5 are being performed during Phase II. Process BP1, BP2 and BP3 are tested in the Dam offices and BP4 is tested in other work sites.
Quantitative measurement: Measurements will be made relating to the following indicators: PI1, PI2, PI3 and PI5.

Trial platform experimentation for the Phase III (M21)
In Phase III we are planning to test BP6, BP7 and the integration of the trial with the new functions provided by Elite.
Quantitative measurement: Measurements will be made relating to the following indicators: PI4 and PI5.

5.7.3 Trial structure and Implementation Strategy

For M18 we did the tests corresponding to BS1 and BS2. The Performance Indicators that we had measured were: PI1, PI2, PI3, PI5 and PI6.

PI1: Ratio: Average lead time to access the information relating to concrete characteristics and concreting plan after/before the DV/AV implementation during the concrete control process.

This performance indicator is to provide information on the time saved by the elimination of waiting time in the process. For collection purposes we have measured:

- The time between the emission of the document by Contractor/Designer and the reception of the document by the person responsible for the analysis.
- The time between the action taken by the Supervisor (rejected/approved), and the reception of the response received by Contractor/Designer.

PI2: Ratio: Average number of pages used in the test results recording, archival, after/before the DV/AV implementation during one concrete operation.

This performance indicator provides information about the average number of pages used for recording the test results during one concrete operation.

No formal measurements were made concerning this indicator. However, during the simulations, all the information was handled via the application and no paper was used. It may be necessary to print specific reports concerning the information of a Concrete Operation, including samples collected, but this will not be more than 2 pages per concreting operation.

PI3: Average lead time needed to perform and record the test results after/before the DV/AV implementation during one concrete operation.

This performance indicator is to provide information about the time saved due to automation of the process. For the purposes of the collection we have measured:

- The time to identify samples (6 samples).
- The time to record the slump test and the samples information.
- The time to register the samples on arrival at the lab.
- The time to record test results.

PI5: Ratio: Time for data exchange between stakeholders after/before the DV/AV implementation during the concrete control process.

This performance indicator is to provide information about the time expected to be saved by improving the actual exchange information between stakeholders. This performance indicator will be measured in all our business scenarios. For the purposes of the collection we have measured:

- The time for data exchange between the designer, the Contractor and the Supervisor.

PI6: Ratio: Average cost needed to perform and record the test result after/before the DV/AV implementation during one concrete operation.

This performance indicator is to provide information about the average cost of human resources involved in the process. For the purposes of the collection we have measured:

- Time needed to perform and record the test results during one concrete operation (results of PI3).
- The time was associated to the profile of human resources involved,
- The cost was be calculated based on salary of human resources involved in the process. The salary of the resources involved was collected through statistical information available for Portugal.

5.7.4 People, Infrastructures, Processes

The following table show the people involved in FITMAN trial platform:

Company/ RoI	Number of persons using the system of the FITMAN experimentation	A short description of how they will use the system
Vice President of the Executive Board and Executive Director, and International Director	3	Consulgal representatives
Projects Coordinator	1	FITMAN Coordinator (LEAR)
Hydraulic Works Department Director	1	Project Director for Baixo Sabor Dam
Civil Engineer	1	Responsible for the dam works supervision team
Quality Engineers	3	Responsible for Quality at the dam. Handles Designer requirements, verifies sampling plan and sample identification plan, monitors sample collection, identification and testing, analyses and records concrete testing results
Quality technicians	5	Quality technician at the dam. Handles Designer requirements, verifies sampling plan and sample identification plan, monitors sample collection, identification and testing, analyses and records concrete testing results
Civil Engineers	6	Production engineers for upstream and downstream dam and for complementary works. Responsible for handling Designer requirements, verify and use the concreting plan, to approve the concreting plan
Works supervisors	14	Collection, identification and sample testing
IT responsible	1	Defines and ensures the setting up of IT infrastructure for the works supervision
IT Technicians	5	Provides IT infrastructure installation and set up and provides IT technical assistance
IT Consultants	2	Responsible for adapting the IT solution developed by the IT partner to the trial
Responsible for the Concrete and Soils Control Lab	1	Prospective user in extending the system to other business cases.

In terms of business infrastructure, the tests take place in different locations, permissions for executes tests will be addressed by designers and contractor of the different locations:

- BP1, BP2, BP3 are tested in in the Dam offices.
- All the concreting operations in the Dam are already concluded. For this reason, BP4 and BP5 will be tested in other work sites: Construction of Pumping Stations for SIMARSUL (located at Charneca da Caparica) or in the Construction of a Wastewater Treatment Plant for Águas Públicas do Alentejo (located at Ourique). The selection of the work site depends on the maturity of the construction project at the time the tests will take place.
- Tests for BP6 and BP7 will be performed in the offices of the work site selected for BP4 and BP5.

5.7.5 Results at M18 and Future Expectations

Performance indicators are measures that describe how well a program is achieving its objectives. Following, we describe what the data show for each of the indicators measured until M18:

PI1: Ratio: Average lead time to access the information relating to concrete characteristics and concreting plan after/before the DV/AV implementation during the concrete control process.
AS-IS : 4 hours
Target Value: 98% of reduction.

This performance indicator is to provide information on the time saved by the elimination of waiting time in the process.

What the data show?

- In the first measurement we register the values for 3 tests, and calculated the average. The first value was 10.20 seconds, the second value was 3 seconds and the third value was 9.30 seconds. The average was 7.50”
- In the second measurement we register the values for 3 tests, and calculated again the average. The first value was 5.8 seconds, the second value was 2 seconds and the third value was 8.38 seconds. The average value obtained was 5.39”
- This represented a 97.31% of reduction in time. This value is very close to the expected value for this PI.

PI2: Ratio: Average number of pages used in the test results recording, archival, after/before the DV/AV implementation during one concrete operation.
AS IS : 5 pages
TO BE: reduce by 40%

This performance indicator provides information about the average number of pages used for recording the test results during one concrete operation.

What the data show?

- In the simulations made we did not print information but this will not be more than 2 pages per concreting operation.
- This represents 60% of reduction.

PI3: Average lead time needed to perform and record the test results after/before the DV/AV implementation during one concrete operation.
AS-IS : 27.5 minutes
Target Value: 30% of reduction.

This performance indicator is to provide information about the time saved due to automation of the process.

What the data show?

- In the first measurement we registered the following values: Time to identify samples: 108 sec. Time to record the slump test and the samples information: 4min 45 sec. The time to register the samples on arrival at the lab: 11 sec. Time to record test results: 20 seconds. This represents for the first measurement a value of 7min 4 sec.
- In the second measurement we registered the following values: Time to identify samples: 84 sec. Time to record the slump test and the samples information: 4min 03 sec. The time to register the samples on arrival at the lab: 8 sec. Time to record test results: 23 seconds. This represents for the first measurement a value of 5min 58 sec.
- In the third measurement we registered the following values: Time to identify samples: 102 sec. Time to record the slump test and the samples information: 5min 08 sec. The time to register the samples on arrival at the lab: 8 sec. Time to record test results: 18 seconds. This represents for the first measurement a value of 7min 16 sec.
- This represented a 75.85% of reduction in time. This value definitely exceeds the expected value for this PI.

PI5: Ratio: Time for data exchange between stakeholders after/before the DV/AV implementation during the concrete control process.
AS-IS: 8 hours
Target Value: 98% of reduction.

This performance indicator is to provide information about the time expected to be saved by improving the actual exchange information between stakeholders.

What the data show?

- In the first measurement we registered the values for 2 tests, and calculated the average. The first value was 7.30 seconds and the second value was 3 seconds. The average was 5.15"
- In the second measurement we registered the values for 5 tests, and calculated again the average. The first value was 5.34 seconds, the second value was 8.38 seconds, the third value was 7 seconds, the fourth value was 9.21 seconds and the fifth value was 2 seconds. The average value obtained was 6.39"
- In business scenario 2, we made two measurements more. The first value was 8.20secons, and the second value was 5.10 seconds.
- This represented a 99.97% of reduction in time. This value exceeds the expected value for this PI.

PI6: Ratio: Average cost needed to perform and record the test result after/before the DV/AV implementation during one concrete operation.
AS IS : 2.04€
TO BE: reduce by 30%

This performance indicator is to provide information about the average cost of human resources involved in the process.

What the data show?

- After the calculations, in the first measurement we have a value of 0.55€;
- In the second measurement we registered a value of 0.47€; and
- In the third measurement we registered a value of 0.57€.
- This represented a 74.01% of reduction in cost. This value exceeds the expected value for this PI.

In general, we can say that the application performed better than expected. Nevertheless, there is room for improvements on what the user interfaces are concerned and on the functionality of some of the features.

5.7.6 Enabling Conditions and Obstacles

The FITMAN platform represents a significant change in the way the generated information is stored, retrieved, processed and distributed. The involvement of the stakeholders that take part in the activities is the biggest challenge, because this is not a project of one company, but a project that integrates activities of different companies like designers, contractors, supervisors and external laboratories, all of them with different ways to work, different internal processes implemented and of course several IT applications in place.

This kind of projects has an increase in complexity related to the integration of the worked performed, communication between stakeholders and the size of the project.

In our case study the trial platform has been designed specifically for the dam, and needs to be adapted to small projects where, for example an external laboratory (new entity), will be part of the team. The external laboratory accomplishes important tasks like: tag the RFIDs in the concrete samples and record the test results information. These activities in the dam are performed by the

internal lab, which is part of the contractor structure; these tasks are already high importance that represents the heart of the concrete control process.

On the other hand the designer is one of the most important stakeholders. The designer has the power to promote the use of new systems around construction projects. In the dam, our designer has an open attitude, likes projects with certain characteristics of innovation. But the involvement of the designer in other projects definitely may be more difficult.

5.7.7 Consolidated Trial Experience

Construction industry is complex and has been seen as the most problematic industry such as cost overrun, delay, intensive labor as well as still using old technology. The complexity of the construction industry is not only because the process of construction is complex but also because involves many stakeholders. Therefore, there is the need for managing the information properly to ensure all parties in the construction projects receive the right information in a timely way. In the case of the Consulgal Trial FITMAN is the platform that meet this objective in one of the most important process in the Construction industry: the Concrete Control Process.

There are benefits from the utilization of FITMAN platform that enhance the construction process because FITMAN represents a significant change in the way the generated information is stored, retrieved, processed and distributed.

However there are some challenges that we need taken into account in new implementations:

- Early involvement of the designer. The designer is the most important stakeholder; he has the power to promote the use of new systems around construction projects.

- Flexibility of the platform. We need a more flexible platform that can be adapted to both small and large projects, at the same time can be adapted to different types of projects in construction: dams, bridges, highways etc.

Scenario_Descr	PI_Desc	PI_Name	AS-IS	TO-BE1	Target	BIProgress
IDENTIFICATION OF CONCRETE CHARACTERISTICS AND CONCRETING PLAN						
	EXCH.TIME	TIME FOR DATA EXCHANGE	8	5,15	98	36,35%
	LT Char.&Plan	AVERAGE LT TO ACCESS INFORMATION	4	7,5	98	-89,29%
		Average Progress of Scenario:				-26,47%
SAMPLES COLLECTION AND TESTING						
	COST RES.	AVERAGE COST TO PERFORM AND RECORD RESULT	2,04	0,55	30	243,46%
	EXCH.TIME	TIME FOR DATA EXCHANGE	8	8,2	98	-2,55%
	LT RES.	AVERAGE LT TO PERFORM AND RECORD RESULTS	27,5	7,04	30	248,00%
	NUM.PAG.	AVERAGE NUMBER OF PAGES	5	2	40	150,00%
		Average Progress of Scenario:				159,73%
TEST RESULTS TREATMENT AND EVALUATION						
	COST AN.RES.	AVERAGE COST TO ANALYZE RESULT	1,41	NA	65	
	EXCH.TIME	TIME FOR DATA EXCHANGE	8	NA	98	

	LT AN.RES.	AVERAGE LT TO ANALYZE RESULTS	27,5	NA	30	
		Average Progress of Trial:				97,66%

Figure 38 Current impact of FITMAN on CONSULGAL Trial

5.8. TANet

5.8.1 Starting Point

SMECluster is a privately owned network cluster of like-minded SME companies (referred to as member companies or just members) that want to share resource and ideas to reduce costs and increase profits. The business model enables the member companies to bring together the skills and capacity of the smaller businesses in the UK which, when clustered, can tender for larger contracts.

SMECluster enables the member companies to inter-trade and share products at special partner rates so that there are benefits of lowered costs for the members and gives motivation to join the SMECluster. There is a wide portfolio of services as follows:

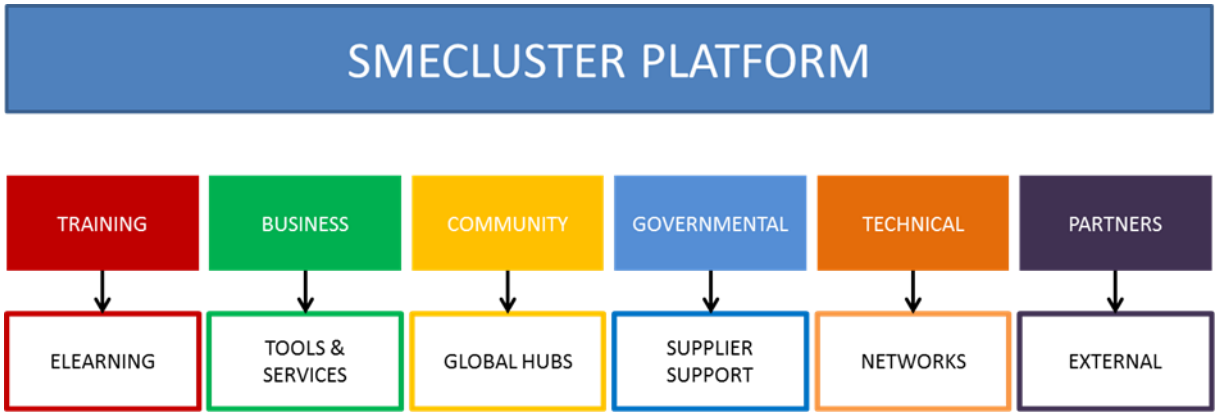


Figure 39 TANET Services Portfolio

Although SMECluster exists and is active, it is still not performing the role that it was set up to do. It is meant to enable the member SME's to concentrate on their core offerings without worrying about the bureaucratic nightmare of filling in numerous repetitive forms and business to meet the criteria that larger private companies and public bodies demand from business today. Since there are no automated services available currently, members are no better off by joining SMECluster as they are still required to do repetitive paperwork.

The aim of the Trial is to leave the ways in which the IT appears to and is used by end-users and Sematronix unchanged, as far as is possible, whilst re-structuring the underlying system architecture as depicted below to exploit the FI-WARE architecture in general, and selected GEs in particular.

5.8.2 Trial Plan and Roadmap

5.8.2.1 VF Scenario (Call for Tender Opportunities)

The aim of the trial is to establish systems which support streamlining of data aggregation, and provide functionality to match suppliers to tender opportunities. Our implementation roadmap focused first on delivery of core systems, followed by key functionality, and finalizing with supporting features.

Phase 1: Delivery of core systems

- SE 4 – Collaborative Assets Management
- SE 5 – Supply Chain and Business Ecosystem Apps (SCAPP)
- TSC – SMECluster Platform
- Allow manual addition of suppliers and opportunities to the system

- Allow adding of keywords to opportunities

CAM provides a data store which, combined with SCAPP, allows supplier data to be handled in a format which is easily integrated with SCAPP's functions. SCAPP was chosen for its collaboration support between supplier and facilitator.

Phase 2: Implementation of functionality

- SE 3 – Anlzer
- SE 7 – Collaborative Business Process Management
- TSC – Synergy
- Allow adding of keywords to suppliers
- Cluster searching – match appropriate groups of suppliers to tenders

CBPM is used by the facilitator to aid in selecting supplier clusters suitable for an opportunity. Synergy is required to provide cluster options to facilitators.

Phase 3: Supporting features

- AK 3 – MoVA
- AK 24 – GeToVA
- Trend identification amongst tenders
- Automate input of tenders and suppliers

MoVA and GeToVA will be used to complement the functionality of CAM, and further support the ability to automate input of data into SMECluster.

5.8.2.2 SF Scenario (Industeweb PoC Platform)

The Industreweb PoC Platform is used to demonstrate Industreweb software and win business. The implementation focused on first collection, then analysis of data from the platform.

Phase 1: Data collection

- SE 1 – Shopfloor Data Collection (SDC)

SDC allows simplified communication between RFID sensors and the Industreweb platform.

Phase 2: Data analysis

- IoT.Gateway.ProtocolAdapter – Zigbee Protocol Adapter (ZPA)
- IoT.Gateway.DataHandling – Complex Event Processing (CEP)

ZPA simplifies communication between the wireless networks connecting the drilling rig and sensors, and the server hosting Industreweb, while CEP filters out non-event data.

5.8.3 Trial structure and Implementation Strategy

5.8.3.1 Virtual Factory

Complete list of SE's/GE's to implement:
SEI_3 – Unstructured and Social Data
SEI_4 – Collaborative Assets Management
SEI_5 – Supply Chain and Business Ecosystem Apps
SEI_7 – Collaborative Business Process Management

SEI_8 – Data Interoperability Platform Services

Complete list of actors:
Facilitator
Service Provider(s)

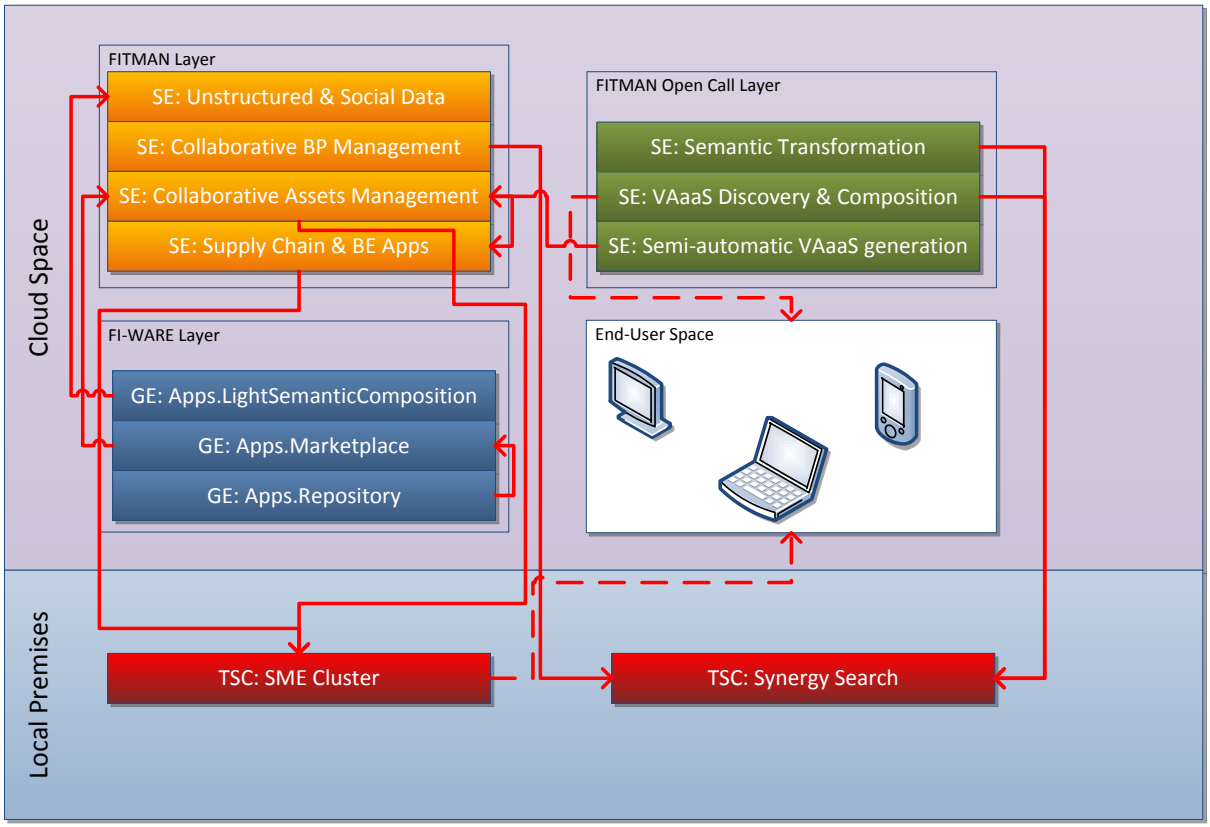


Figure 40 TANET Virtual Factory Trial

Once a facilitator has created an account with SMECluster, they will be able to register suppliers, adding some basic information about their company and detailed information relating to their production, adding assets which represent the services a supplier offers, which will be gathered into SEI 4: Collaborative Assets Management. They may also design a workflow diagram for the supplier to support future decisions, which will be created using SEI 7: Collaborative Business Process Management.

Facilitators will be able to enter tenders into the system. Facilitators will also be able to identify trends in tenders using SEI 3: Unstructured and Social Data Analytics, such as quantity of tenders in a particular industry area, or rate at which tenders become available over time.

Once opportunities and assets exist within the system, the facilitator can choose an opportunity they wish to fulfil. This will use SEI 5: Supply Chain and Business Ecosystem Apps, consuming data in SEI 4: Collaborative Asset Management. TSC: Synergy will be used to create a number of asset clusters capable of fulfilling the opportunity. The facilitator will then use their experience and business domain knowledge to select the most appropriate cluster formed by the system.

5.8.3.1.1 First phase of implementation

Include:

- SEI_4 (Collaborative Assets Management) - CAM
- SEI_5 (Supply Chain and Business Ecosystem Apps) - SCApp

- Facilitator
- Service Provider(s)

First phase will include use of CAM and SCApp to capture services provided and tenders entered into the system.

Implementation will allow:

- Manual addition of a service to the system (Service Provider; CAM)
- Manual addition of an opportunity to the system (Facilitator)
- Manual semantic annotation of opportunities (Facilitator)
- Manual semantic annotation of services (Facilitator/Service Provider)
- Manual creation of 'rooms' to negotiate contracts between opportunities and service providers (SCApp)

5.8.3.1.2 Second phase of implementation

Additionally include:

- SEI_7 (Collaborative Business Process Management) – CBPM
- SEI_8 (Data Interoperability Platform Services) - DIPS
- Proprietary Synergy system - Synergy

Second phase will use CBPM to automate semantic annotation of assets, and aim to automate the process of matching tender opportunities to services.

Implementation will allow:

- Automated semantic annotation of opportunities and services added to system (CBPM) Automated matching of services to tenders (SCApp; Synergy)
- Automated clustering of matches to fulfil tenders (Synergy)
- Manual selection of best cluster (Facilitator)
- Automated creation of 'rooms' for service providers to agree to cluster (SCApp)
- Manual confirmation of acceptance by service providers

In addition, addressing feedback arising from experimentation.

5.8.3.1.3 Final implementation

Additionally include:

- SEI_3 (Unstructured and Social Data) – Anlzer

Final phase will use Anlzer to automate contract acquisition, and expand the facilitator's role by allowing them to edit suggestions by the Synergy engine, as well as looking to work with more complex opportunities effectively.

Implementation will allow:

- Automated capture of opportunities (Anlzer)
- Ability to edit/create more complex clusters (Facilitator)

In addition, address feedback arising from experimentation, and consider further exploiting SE functionality.

5.8.3.2 **Smart Factory**

Complete list of SE's/GE's to implement:

SEI_1 (Shopfloor Data Collection)

IoT.Gateway.ProtocolAdapter (Telecom Italia)
IoT.Gateway.DataHandling (Orange)

Complete list of actors:
Operator
Maintenance Engineer
Quality Manager

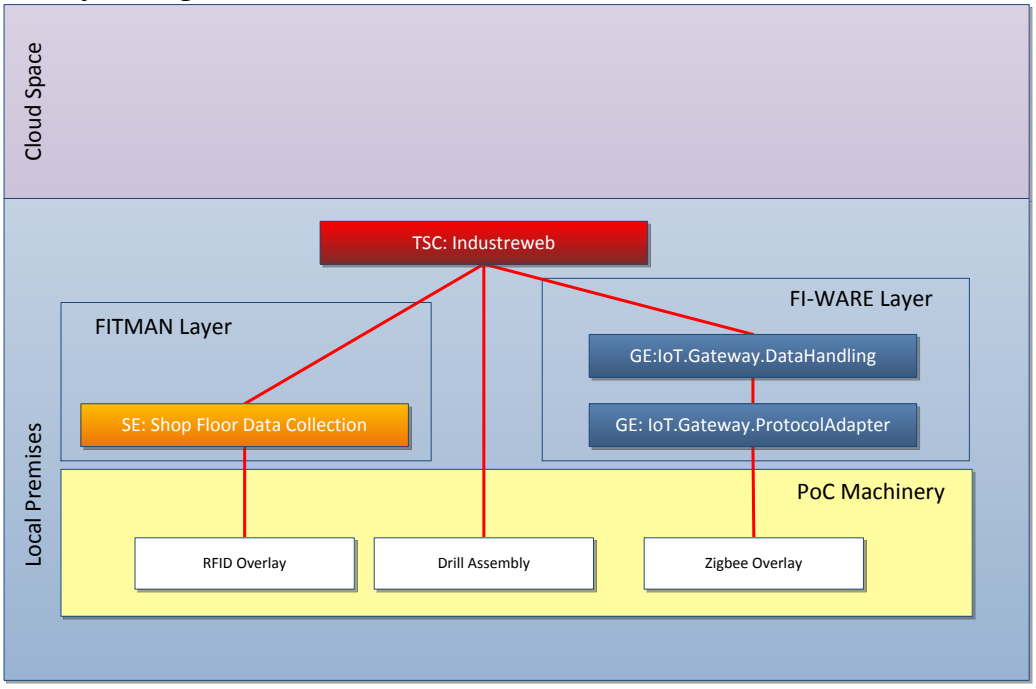


Figure 41 TANET Smart Factory Trial

Once a facilitator has created an account with SMECluster, they will be able to register suppliers, adding some basic information about their company and detailed information relating to their production. SE_AK 24: Semi-automatic VAaaS generation will assist by allowing supplier profiles to be generated from unstructured data. The facilitator will also add assets which represent the services a supplier offers, which will be designed using SE_AK3: VAaaS Discovery and Composition, and gathered into SEI 4: Collaborative Assets Management. They may also design a workflow diagram for the supplier to support future decisions, which will be created using SEI 7: Collaborative Business Process Management.

Facilitators will be able to enter tenders into the system. Facilitators will also be able to identify trends in tenders using SEI 3: Unstructured and Social Data Analytics, such as quantity of tenders in a particular industry area, or rate at which tenders become available over time.

Once opportunities and assets exist within the system, the facilitator can choose an opportunity they wish to fulfil. This will use SEI 5: Supply Chain and Business Ecosystem Apps and SE_AK 24: Semantic Transformation, consuming data in SEI 4: Collaborative Asset Management. TSC: Synergy will be used to create a number of asset clusters capable of fulfilling the opportunity. The facilitator will then use their experience and business domain knowledge to select the most appropriate cluster formed by the system.

5.8.3.2.1 First phase of implementation

Include:

- SEI_1 (Shopfloor Data Collection) – SDC

The first stage of implementation will be used to test the ability of SDC to simplify communication between RFID sensors and the Industreweb platform. Additionally, components will, at this stage, be installed on a rig, but used simply to test the setup of the system, and the ability to track the movement of an RFID tag.

Implementation will allow:

- RFID Reader to locate and read RFID tag
- RFID sensor to communicate with SDC (SDC)
- SDC to communicate with Industreweb with only identification information (SDC)

5.8.3.2.2 Second phase of implementation

Additionally include:

- IoT.Gateway.ProtocolAdapter – ZPA
- IoT.Gateway.DataHandling – CEP

The second phase will concentrate on the capture of data from the drill assembly over a Zigbee network, and the use of data returned via the SDC to make predictions regarding tool wear, and for locating the source of defects in machined parts.

Implementation will allow:

- Wireless transfer of sensor data via Zigbee network (ZPA)
- Translation of data into events (CEP)
- Prediction of tool wear, requiring replacement (Industreweb, Operator)

5.8.3.2.3 Final implementation

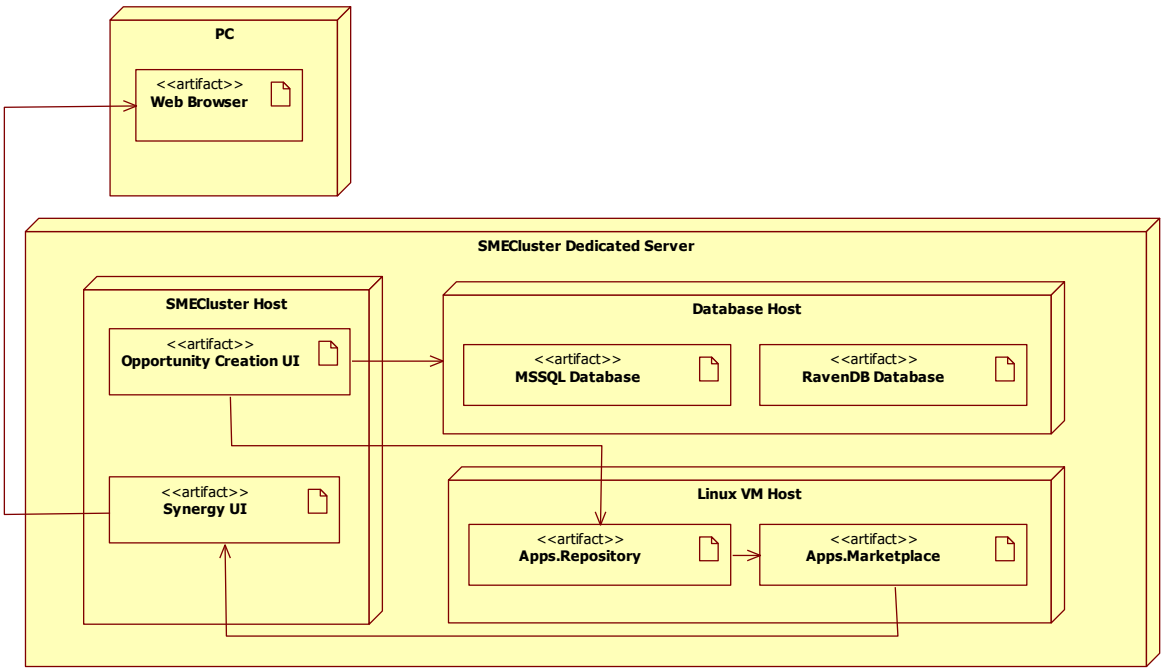
The final stage will focus on improving the usability of the final software by implementing an advanced interface to the GE/SEs and pulling the data in to understandable screens for use with shop floor staff.

- Industreweb using events to flag issues to shop floor (Maintenance Engineer, Industreweb)
- Tracing of defective machined parts to source (Quality Manager; SDC, Industreweb)

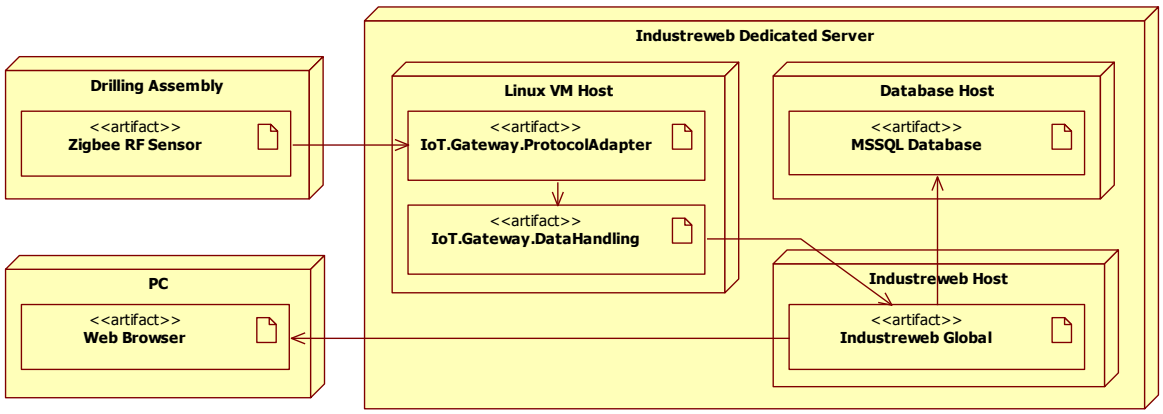
5.8.4 **People, Infrastructures, Processes**

Company	People allocated to implementation and instantiation	A short description of how they will interact with the trial	Owner
Sematronix	3	Administration of platform	Gash Bhullar
WAF	4	Gathering tenders, creation of opportunities and approval of clusters	Tim Williams
Control 2K	3	Developing the platform	Simon Osborne

Coventry	2	Providing technical assistance	Keith Popplewell



The network infrastructure is based on two development servers configured on a 100Mbps network located at the Control 2K headquarters at Waterton Centre. The network is TCP/IP based on IPv4 addressing using Dynamic Host Configuration Protocol. Server one will run SMECluster which will interface with the Server two hosting the underlying database for the platform. Server one will interface mainly to the FITMAN platform.



SMECluster which will interface with the Server two hosting the underlying database for the platform. Server one will interface mainly to the FITMAN platform.

In addition to the servers a PC connected via 100Mbps switch will run the ZPA GE run on a PC located in Systems Development room where a production test machine will be modelling a production environment. Control systems on this production test machine are both PC & PLC based and will be connected via a 100Mbps switch to the same network to enable production related data to be retrieved in real-time.

The IT infrastructure that will be used will be minimally invasive in respect of the normal production. The main point of interface will be via the Zigbee Smart Object sensor network, which is recording relevant events coming from production test machine.

5.8.5 Results at M18 and Future Expectations

Number	**Indicators** *List the indicators that will help measuring the results of the living lab*	**DESCRIPTION** *Give a detailed description of the indicators*	Unit*	Current value	Future expected value
1	Tenders accrued monthly	Quantity of tenders entered into system	Qty	3-10	15-20
2	Active facilitators	Number of facilitators logging on monthly	People	2	3
3	Registered service providers	Number of providers offering services on platform	Organis-ations	102	80-115
4	End-to-end clustering	Reducing man-hours involved in creating and managing clusters	Hours per tender	5	2
5	Automation of tender input	Collection of tenders by automated systems	Minutes per tender input	30	<1

- **Tenders accrued monthly**: Tenders accrued monthly have increased due to increased number of facilitators and increased engagement of facilitators. Platform redesign may also have affected its usage.
- **Active facilitators**: An additional facilitator has registered on the SMECluster Tendering Platform. Tim Williams of the Welsh Automotive Forum is utilizing the platform and providing user feedback.
- **Registered service providers:** The Welsh Automotive Forum has a directory of suppliers who are their members. These suppliers have been imported onto the platform allowing them to fulfil their service provider role.
- **End to end clustering**: A small reduction in overall end-to-end clustering time has been achieved using SCAPP to handle negotiation. However, our desired benefit of automating data input could not be achieved without the inclusion of the Open Call SE's.
- **Automation of tender input**: As above, we have not yet implemented Open Call SE's and therefore have not affected this KPI.

Number	**Indicators** *List the indicators that will help measuring the results of the living lab*	**DESCRIPTION** *Give a detailed description of the indicators*	Unit*	Current value	Future expected value	Expected date of achievement**
1	Reduced downtime	Amount of time lost due to breakdown in system	Hours per month per line	6	1	Before 24 months after implementation
2	Reduced waste of	Damage caused to material by	% per month	0.15	0.04	Before 24 months after

	material due to failures	broken or worn tools	per line			implementation
3	Root cause analysis	Use of track and trace to identify root cause of defect in batch	Hours	30	12	After 24 months after implementation

Results will be available after disseminating the proof of concept platform to industrial partners within SMECluster. This will occur after the second development Sprint.

5.8.6 Enabling Conditions and Obstacles

5.8.6.1 Misunderstanding in the intended functionality of GE/SEs

While we have had some experience with varied generic enablers we have not had the opportunity to explore the functionality of all Generic Enablers and Specific Enablers. This could be a potential bottleneck as a misunderstanding could affect all layers of the implementation from hardware to application layer.

5.8.6.2 Open sourced requirement

The open source nature of the FI-WARE enablers allowed us to derive functionality and intended use from GE/SEs even where a clear explanation was not provided.

5.8.6.3 Hardware incompatibility with GE/SE

Although the generic enablers support open standards the existing hardware which exists on the legacy PoC Machinery may not support these standards. This could have delayed trial implementation.

5.8.6.4 GE uses industrial standards

Our selected generic enablers used hardware standards which were widely supported by many OEMs such as Zigbee Gateway Device and LLRP. Despite our existing hardware being incompatible with some of these standards, it was easy to procure new hardware which matched these standards due to them being widely adopted.

5.8.6.5 Real tender data availability at time of instantiation.

The throughput of tendering of work can be an unpredictable business, with seasonal changes and business fluctuations real tender data could not be available at the time of testing. This could therefore have halted the operation of the trial. However, plenty of data was available at the time of trial experimentation, which helped support the business case for the trial, showing that our expectations of available data were lower than actually existed.

5.8.6.6 ZPA issue

When initially trying to use the ZPA, we encountered problems with retrieving data from the GE, as it did not support the querying of data. After contacting the GE owner, an updated version was released.

5.8.7 Consolidated Trial Experience

5.8.7.1 Benefits

The IoT smart factory platform is well-conceived and uses the NGSI protocol to easily integrate several disparate components from several vendors without the complexities of separately integrating each component.

Each SE and GE are open source by definition. This means it is possible to get an in-depth understanding of the software, and it is also possible to make modifications to suit your specific scenario without needing to contact the vendor.

5.8.7.2 Pitfalls

Be aware that many of the implementations lack API support; invisible integration into existing systems is not always possible. Enablers without APIs tend to have well-designed user interfaces which can be directly integrated; however this means several user interfaces being directed at users which could be confusing for potential customers.

Many of the implementations of the GE's are future-facing; support for legacy hardware is less prevalent. While it is simple enough to find hardware which will integrate with them, this is an additional cost which needs to be offset against potential savings from integrating FI-WARE technology.

It is quite difficult to set up many of the SE's/GE's from scratch, technical experience is a must. This should be a consideration for when planning, as we tended to find our timescales were extended by setup requirements.

5.8.7.3 Observations

Many SE's and GE's were provided pre-installed on a VM. This made getting up and running easier in most situations, but in some situations made customization of the running of an SE/GE more difficult.

Many of the SE's act as wrappers for existing open source software, while integrating GE's. Therefore there is usually documentation available online for these tools; however, utilizing the SE's in this manner is complicated by accumulating a learning debt.

Scenario_Descr	PI_Desc	PI_Name	AS-IS	TO-BE1	Target	BIProgress
IMPORT OF TENDER OPPORTUNITIES						
	FAC.NUM.	NUMBER OF ACTIVE FACILITATORS	1	2	3	50,00%
	SERV.PR.NUM.	NUMBER OF REGISTERED SERVICES PROVIDERS	23	23	115	0,00%
	TEND.	TENDERS ACCRUED MONTHLY	3	3	20	0,00%
		Average Progress of Scenario:				16,67%
IMPROVEMENT OF FACILITATOR ROLE						
	CLUST.	END-TO-END CLUSTERING	6	5	2	25,00%
	TEND.AUT.	AUTOMATED TENDER INPUT TIME	30	30	1	0,00%
		Average Progress of Scenario:				12,50%
		Average Progress of Trial:				15,00%

Figure 42 Current impact of FITMAN on TANET Trial

5.9. COMPlus

5.9.1 Starting Point

The objective of this Trial is to develop the concept and the platform for a collaborative Front-Loading, for a network of SMEs for production of special LED Lights and LED Lighting Systems. In such networks, the decision about the economic and production feasibility needs to be made on the fly based on a variety of configurations during the early design and configuration phase. Herewith, the existing solutions are challenged by this task beyond the single SME considering the information from the networked SMEs. The expectation is to reduce the time in the early phase of the engineering and product design project by 50%.

The main aspect of the future scenario is to enable the networked companies to access a collaborative environment in order to share knowledge about technological capabilities and best practices in an early design phase. The figure bellow shows a preliminary concept of a "common entry point" to a platform which will give the possibility to exchange information about the network configuration, best practices for the use if IT Tools and business processes.

At the present moment, the communication between the network partner is done mainly verbally based on the knowledge and previous experience of the partner. At a first glance, this seems to be sufficient mainly due to the small number of companies. However, due to the expectations for growth, it is envisaged that this way of communication will be inefficient for the network.
The FITMAN LED Lighting User Trial focuses on two aspects of the Front-End Loading:

The target is to reduction of the time in the early phase of the engineering project by 50 %. Economic and production feasibility during the early design and configuration phase. Reducing the number of reworks and changes. Decrease of communication time between design changes and decisions.

Network Transparency for a more efficient Supplier Network Configuration

The process of decision making in supply networks gains on complexity as the number of enterprises, enterprises' capabilities, and the relations between them grows. Furthermore, the distributed nature, the dynamic of the supply networks and the requirements for a holistic approach are challenging the management of the supply networks. In order to support this process it is important to bring all related aspects into one common model that can be deployed for the network visualization. Moreover, visualizing the network will also enable a better understanding of the relations between its members. As a result, this will support the decision making process within the network enabling to establish supply networks with enhanced responsiveness in order to better streamline the logistics and operative processes, to increase efficiency, to minimize transportation cost, to efficiently manage risk and to improve customer service.

Communication Platform for a an improved transparency of used IT Tools and best practices business processes.

A SME network like the LED Lightning Network requires supporting the change of members even in a running project. With the approach it can provide information of tools and processes in the network to simplify the change of members and especially the extension of the network. By this way the network can share knowledge about:

- Best practises in terms of covering development, project management, implementation/ deployment process, etc.

- Descriptions of tools used within the network together with ranking information.

A portal provides mechanisms to work with the provided knowledge in a specific company environment. For example, if a company of the SME network finds within the ORM a tool which is very common in the network and it wants to put the tool into its own IT landscape, then the company can just copy the tool description into its own enterprise area. Now, the network can support the standards in between the members of the network.

5.9.2 Trial Plan and Roadmap

GE Semantic Application Support[89]

The Semantic Application Support GE will be tested under the Business Scenario for "Network Transparency for more efficient Supply Network Configuration". Based on the existing ontology for Supply Networks, this GE will mainly test the ability to manage multiple ontologies.
This GE supports the semantic applications with the infrastructure to develop, storage and use of ontologies, which helps the users to efficiently manage their knowledge base. The Semantic Application Support GE is a set of tools to facilitate the development of Semantic Web Applications, composed of:

- User Interface (NeON Toolkit)
- Semantic Workspaces- a component that facilitates the management of semantic repositories SWAS
- Ontology Registry – used for ontology storage, versioning and publication of ontologies SESAME
- Semantic query protocol SPRQL linked with end points to the Semantic Workspaces

At the present moment, additional releases (R3) include a further development on the User Interface for the ontology designer component (NeOn) or a Web UI, which would be of a great interest to this Trial.

GE – Marketplace

One feature of the trail is the "Best Practice Service" which is expected to have in a cloud based infrastructure and accessible from a common entry point for SCM network services. This will be instantiated by the LED production network. The "Best Practice Service" is specific for the trail (TSC) but can also be useful for other trails (SE). Therefore, a distinction between TSC and SE is not done for the "Best Practice Service".

The service already exists and was described and developed in the FACIT-SME project. In the FITMAN it is planned to realise the service via the Marketplace-GE combined with the Mash-up-GE for the user interface and the common entry point. It is expected to use the XML or JSON of both GEs for realising the interface. It is planned to use the following functionalities of the Marketplace-GE:

- Registry & Directory
- Offering & Demand
- Discovery & Matching

[8] FI-PPP Webinars: FI-WARE. Semantic Application Support Generic Enabler; Ivan Martinez, Mauricio Ciprian
[9] http://forge.fi-ware.eu/plugins/mediawiki/wiki/fiware/index.php/FIWARE.ArchitectureDescription.Data.SemanticSupport

- Recommendation
- Review & Rating

If these functions are sufficiently available in the application of the Marketplace-GE most of the IT-requirements of the "Best Practice Service" can be fulfilled. An exception is the user interface and the usability aspects. Therefore, the Mash-up-GE will be included. To show also "Best Practice Processes" a free viewer will be used (MO²GO Viewer).

Further required components are the SQL database for the Marketplace-GE to store the application data which needs to be configured related to the data requirements of the "Best Practice Service" and the Apache Tomcat Application server to run the GE. However, related to the trail these services have to run in a cloud environment (private cloud)

Through a common entry point, the user will be able to access the applications implemented in the cloud environment. Using the GE- Mash up, the user should be able to define their own page and make the selection about the functionalities.
The service for sharing the best practices, will be implemented through the Marketplace-GE combined with the Mash-up-GE for the user interface and the common entry point. It is expected to use the XML or JSON of both GEs for realising the interface. The data storage is MySQL. The MO²GO Viewer will be connected via http(s) link. A MO²GO Viewer will be connected via http(s) link, in order to visualize the shared best practice services and business processes.
The service for sharing the best practices, will be implemented through the Marketplace-GE combined with the Mash-up-GE for the user interface and the common entry point. It is expected to use the XML or JSON of both GEs for realising the interface. The data storage is MySQL. The MO²GO Viewer will be connected via http(s) link. A MO²GO Viewer will be connected via http(s) link, in order to visualize the shared best practice services and business processes.

It is envisaged, that this living lab will require the following:

- Database Manager - MySQL (5.5) Server - mandatory
- MySQL Client - mandatory
- Java 1.6.x – mandatory, during the trail it will be checked if a higher version is feasible to run the GE
- Application Server, Apache Tomcat 6.x - mandatory
- Luke – optional, development and diagnostic tool, which can access the Fi-Ware Marketplace search index which will be tested related to the IT requirements of the "Best Practice Service" in terms of search and evaluation of "Best Practice"
- Marketplace GE Software
- Mash-up GE Software
- Private Cloud environment
- MO²GO Viewer

5.9.3 Trial structure and Implementation Strategy

The trial is based on several functionalities and actions as following:

Maintenance of the Supply Network Knowledge Base

- The implementation will allow for testing procedures and technical based on FI-WARE tools to improve the efficiency of the Supply Network

Transparency of the Supply Network:
Visualization of the Supply Network

- The Implementation will allow for testing procedures and technical based on FI-WARE tools to improve the efficiency of the Supply Network

Standard processes: Evaluation procedure.
Implement standard processes for the evaluation procedure, highly supported by web-services.

- The Implementation will allow for testing standard procedures for the network management based on FI-WARE tools and web-services.

Check: GEs and FI-WARE concept.
Check capability of GEs and applicability of FI-WARE concept for Supply Netoworks

- The Implementation will be the framework to test GEs and other FI-WARE concepts.

Implementation: allows for efficient development and testing.

- The Implementation will be also used for other supply Networks.

Reduce effort for Supply Network management:

- The Implementation will be the means to test and check whether FI-WARE tools & concepts are capable to reduce the effort currently required for Supply Network management..

Reduce effort to create reliable evaluations:

- The Implementation will be the means to test and check whether FI-WARE tools & concepts are capable to reduce the effort and time currently required to create a visualize a supply network

Transparency of the ICT Tools and Documents in Supply Network:
The Implementation will allow for testing procedures and technical based on FI-WARE tools to improve the efficiency of the Supply Network

Evaluation and rating of the best practices ICT Tools and Documents
The Implementation will allow for testing procedures and technical based on FI-WARE tools to improve the efficiency of the Supply Network

Standard processes: Choosing a Document format or ICT Tools
The Implementation will allow for testing standard procedures for the network management based on FI-WARE tools and web-services.

Check: GEs and FI-WARE concept.
Check capability of GEs and applicability of FI-WARE concept for Supply Networks
The Implementation will be the framework to test GEs and other FI-WARE concepts.

Implementation: allows for efficient development and testing.
The Implementation will also be used for other supply Networks.

Reduce effort for Supply Network management:
The Implementation will be the means to test and check whether FI-WARE tools & concepts are capable to reduce the effort currently required for Supply Network management..

Reduce effort to create reliable evaluations:

The Implementation will be the means to test and check whether FI-WARE tools & concepts are capable to reduce the effort and time currently required to share, evaluate and select a best practice ICT or a document in a supply network

5.9.4 Results at M18 and Future Expectations First phase of implementation

The first phase is the foundation phase to provide functionalities needed by the business scenario of the supply network visualisation and supplier search, as well as a set of SEIs needed to support the collaborative work and interoperability within the supply network.

In this implementation phase, the LED - Trial uses the GE- Semantic Application Support, presenting a set of tools for creating, importing, publishing of ontologies, as well as creation and management of user workplaces, in this case the workplace of the Supply Network Manager.

The Semantic Application Support GE will be used to support the under the Business Scenario for "Network Transparency for more efficient Supply Network Configuration". Based on the existing ontology for Supply Networks, this GE will mainly test the ability to manage multiple ontologies. This GE supports the semantic applications with the infrastructure to develop storage and use of ontologies, which helps the users to efficiently manage their knowledge base. The Semantic Application Support GE is a set of tools to facilitate the development of Semantic Web Applications, composed of:

- Creating and Import of Ontologies using the NeON Toolkit
- Ontology Registry – used for ontology storage, versioning and publication of ontologies SESAME
- Using of the TSC VisNAv – Visualisation and Navigation of Supply Networks

The initial creation, modification and import of ontologies are performed using the baseline asset NeOn Toolkit. The NeOn Toolkit is a state-of-the-art, eclipse based, open source multi-platform ontology engineering environment, which provides comprehensive support for the ontology engineering life-cycle. The NeON Toolkit also enables the visualising of the LED Supply Netowrk Ontology. For this Demonstration, we have developed the LEDNetwrok Ontology (LEDSupplyNetwork.owl) based on the generic SupplyNetworkSchema, a generic ontology for creation of customized ontologies describing concrete supply networks.

The Colaborative work within the Supply Network will be supported using the following SEIs:

- SEI_7 Collaboration Platform BP Mgmt
  - Collaborative business processes calling transformation services
- SEI_6 Metadata Ontologies Semantic Matching
  - Generation of the XSLT starting from Transformation generation
  - Automatic registration in SEI_8
- SEI_8 Data Interoperability Platform Services
  - Store transformation services

During the first implementation phase, there are substantial improvements in the transparency and configuration of the Supplier Network. Starting with no practical tool showing the supporting the dynamic of the network, the implementation has resulted with a transparency to the 3rd Tier supplier level and the relations to the product, competencies etc.

5.10. AIDIMA

5.10.1 Starting Point

Refer to Chapter 1, and slightly adapted to current time.
The Furniture Trial rationale derives from the need to improve the response capability of the furniture manufacturers to the needs of the customers. In order to detect these needs, detecting and analyzing the trends inside the furniture sector getting the necessary information from reliable sources is highly desired. The achievement of this general objective impacts on the benefits for the end furniture users and manufacturers. The furniture consumers can benefit from products better adapted to their needs while the producers are able to save time and effort in adapting to the market needs while satisfying their customers.
In this regard, the Furniture Trial is addressing 3 different aspects all related to the product development which were separated into three different business scenarios:

- BS1: Furniture Trends Forecasting for Product Development.
- BS2: Opinion Mining in Furniture Products.
- BS3: Collaborative Work for Product Design

All scenarios are aimed to achieve the goals specified above.

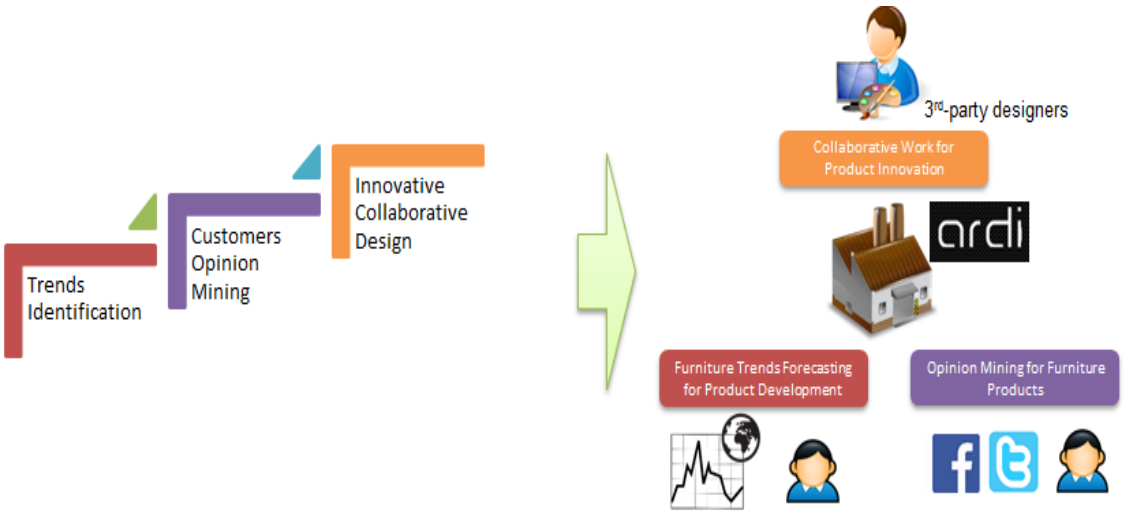


Figure 43 AIDIMA Business Scenario

5.10.2 Trial Plan and Roadmap

The first phase will release a first version of the opinion mining in furniture products that is the base platform for the BS2. The current version will be based on the functionality provided by the Unstructured and Social Data Analytics SE provided by the NTUA.
The process to be supported is the conceptualization of new pieces of furniture where product designers after having an idea start to generate sketches and validate their sketches and final designs against customer needs and market trends, through searches on specific sources of information.
The system will use the management screen from the Unstructured and **Social Data Analytics SE** and will develop a set of widgets creating a mashup for building the main workspace. Widgets will follow the **Wirecloud GE** premises. The final mashup (**Furniture opinion analyzer TSC**) is composed of (i) a Search opinions widget, (ii) Opinions viewer widget, (iii) Statistic widget and (iv) Images slider widget. All four widget will be wired on the final solutions allowing the extensibility of the platform with new widget components addressing complementary functionality.

The second phase aims the development on the platform for future trends forecasting for product development, where the main focused is not the opinion mining and sentiment analysis of stakeholders, but the detection of weak signals on unstructured data sources. The functionality or work units to be released on this second phase are:

- Administer module for managing sources of RSS information where identification of weak signals will run.
- Obtain a pondered list of weak signals according to recurrence on sources.
- Allow customization of software to include stop words with high recurrence but low value.
- Permit the generation of a report with all the references and the possibility to print it
- Permit the creation of index cards (weak signals that can evolve to trends).
- Management and communication of index cards.

The system will be built as a set of widgets on top of **Wirecloud GE**. The resulting mashups will call on the **Unstructured Data Analysis GE** provided by ATOS, and will permit the notification of new Index Cards using the **PubSub GE** delivered by TELECOM. A **TIC new weak signals** component that will migrate existing information will be integrated in the solution (this component was developed on M6).
Finally, it is the phase where the platform for collaborative work for product design will be developed and released. The platform will base on the Wirecloud GE and on a selection of already existing application for project management such mind mapping web applications or calendar applications. On top of that a set of widgets will be developed that will permit to designers, manufacturers and other groups of interest the successful launch of new prototypes to be manufactured. For this, Open call SE's are selected being iObeya from Holonix and Collaborative 3D Web viewer SE from DFKI.

5.10.3 Trial structure and Implementation Strategy

The structure of the trial is that of its 3 business scenarios.

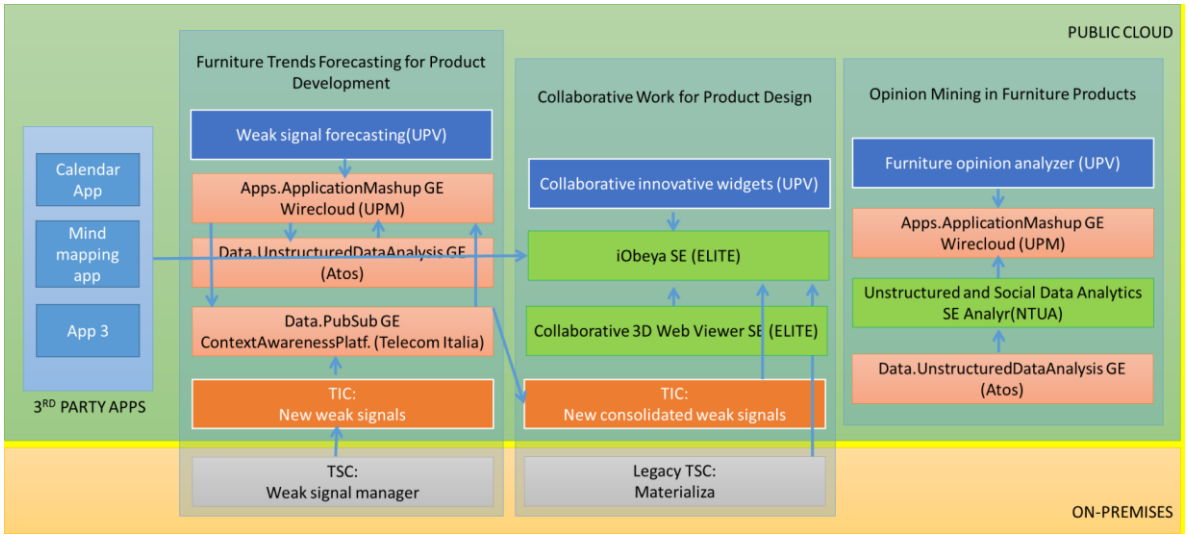


Figure 44 AIDIMA Trial Structure

Being Opinion mining in furniture products the first module that was released on M12, furniture trends forecasting that is in deployment phase and Collaborative Work for M23 that will be available after the interaction and refinement with the new software components (iObeya and ELITE). Interaction with a new component called iLike is under study.
The client-side components of the opinion mining in furniture products have been deployed in on the public cloud offered by FITMAN and on-premises servers in AIDIMA. Both machines are holding the client/interfaces. The server components of this module are nowadays in the NTUA facilities, though professional installation on amazon cloud, on the test-bed on even in AIDIMA facilities thinking on a backup plan is under consideration.
Furniture trends forecasting for product development is on the final stages of deploying and refinement cycle. Though, client and server parts will be allocated in the cloud, both are now on examination on-premises. Server-side components storing information on projects, saved reports, queries, terms and index cards are developed on .net technology, though released as open source software, they required an iis server solution. Currently are running on an IIS8 server using an SQLServer Express database. However, the database can be modified to use any of the open source solution, such as MySQL.

The Performance Indicators were categorized according to their type. Since most of the solution to be adopted are totally new, current AS-IS values were determined in base to possible values. Only BS1 PIs have been measured more accurately for the weak signal detection manual process. The others are considered to be estimate values.
It is still early to calculate TO-BE values and compare these to the estimate values. For BS1, all values are the result of the manual process that has been done so far by AIDIMA's trend market analysts. BS2 shows lots of 0 AS-IS values since nothing of that sort has been implemented so far, thus we are talking about a new tool and a new way to analyze and collect data. BS3 is a little bit both BS1 and BS2 since the process is manual but nothing of that sort has been proposed so far in the furniture area. The values for BS3 are calculated in base of current manual processes such as the design process time saving, number of sketches coming from the technical office and so forth.
Only when the solutions will be implemented, we will be able to compare and analyze the TO-BE values.

Back up plans adopted so far are the duplication of machines, keeping local and online machines and doing backups of data every week of the databases (raw data, preprocessed data, reports, etc.).

Migrating the system will require a change of culture on the organization. That means, training on the new way to do the processes, and training on the new tools that are being deployed.
Risk-mitigation on GEs/SEs support and availability is being proved even now. Some GEs are supposed to be discontinued, though the fact that they are open source allows us to adapt our API (REST web services) to connect to other privative or open source solutions. Other options that could be taken will be the mastery / outsourcing of the architecture of the GE/SE discontinued, and build up the functionality that is not provided by the out of the box opensource component that usually is under the hook of any GE/SE.

5.10.4 People, Infrastructures, Processes

AIDIMA infrastructure for the back-up plan are three virtualized servers, that will be holding the three software components with the software required by the different components. AIDIMA IT staff will be one IT administrator with linux and windows knowledge and one programmer capable to interpret errors and contact UPV staff or third party providers (GEs/SEs/etc).

UPV infrastructures hardware infrastructure are a powerful server capable of virtualize machines, where the development versions of the software are running nowadays. UPV has 5 programmers and a business analyst.

The start-up will consist on the following steps:

- Deploying of opinion mining in furniture modules products by UPV on the cloud and on-premises with assistance of AIDIMA staff.
- Establish a training of staff and a back-up and administrative plan so that AIDIMA can run it.
- Testing the solution during one month in the real environment until the results are satisfactory.
- Refinement and validation
- Deploying of furniture trends forecasting product in furniture modules products by UPV on the cloud and on-premises with assistance of AIDIMA staff.
- Establish a training of staff and a back-up and administrative plan so that AIDIMA can run it.
- Testing the solution during one month in the real environment until the results are satisfactory.
- Refinement and validation
- Deploying of opinion mining in furniture modules products by UPV on the cloud and on-premises with assistance of AIDIMA staff.
- Establish a training of staff and a back-up and administrative plan so that AIDIMA can run it.
- Testing the solution during one month in the real environment until the results are satisfactory.
- Refinement and validation
- Establish a ticketing system for the three systems.

5.10.5 Results at M18 and Future Expectations

It is still early to comment on results, under/over-achievements. As mentioned before, there are a series of indicators specified by type that cover the three business scenarios. For BS1, the TO-BE values are forecasted in base to how the solution can help analysts to automatize the current manual solution. For instance, the current indicator for searching time of a source in order to obtain weak signals is about 8 hours approximately. With FITMAN, i.e. TO-BE, this time can be reduced 2

hours. This is just an estimate, so only when we have the solution in place, we will be able to know the accuracy of this estimate value. This applies to all business scenarios. Some are less accurate since there is no current solution in place like it was mentioned before.
As far as under and over achievements, and without the solution in place, it is hard to determine if we fell short or exceeded in our expectations. We have been quite conservative when coming up with the TO-BE values so we want to be positive and have great TO-BE values.
Once the solution is in place and all actors feel confident on its daily use, we will be able to see a good evolution on the indicators. Initially, we expect to fall short of expectation since the learning curve to adopt and be familiar with the solution will mask the results achieved. This is always true every time a new solution is implemented, especially one that is rather new and to a sector like wood manufacturing. This can be considered the main factor that can impact their values. Other can be the skepticism to adopt a new solution since lots of people are reluctant to change, and prefer something that already works. This is a problem that can be solved convincing them that the new solution will drastically help and improve their daily routines.
Still, we expect improvements as the time passes, and sooner than later obtain better values for the indicators.

5.10.6 Enabling Conditions and Obstacles

FITMAN is a projects that has two main points:

- What wants the final customer (AIDIMA, ARDI, Circulo Mobiliario)
- And what is provided by the GEs and SEs that can be useful for the final enterprises, even though that functionality was not identified in the gathering of requirements.

When developing a software that is intended for specific customers but it is intended for the general public, and also when there are many people involved in the development and design of interfaces, the process is really complex, please a lot of modifications arises, and in software development is not so easy to change what is already developed.

Limitations of current GEs and SEs functionality have been also an obstacle to provide solutions. Descriptions / specifications of FI-WARE look promising but reality is more limiting. Additionally there is not a professional Support of issues by some of the GE providers and documentation sometimes is very few. There is no roadmap on the GEs and SEs sites to know how they will evolved if any.

GEs and SEs should consider well explained instructions of installations, running procedures, and videos showing how they work. Architecture of the GE sometimes is also lacking.

A good practice is always analyses first the components, their API, their restrictions, their dependencies, and the hardware required to see compatibility.

Another concern in the licensing model of the GEs/SEs.

An obstacle interfering the development has been picking GEs that were maturing or in development while FITMAN was running. It is not easy to interface or design that system that will depend on a software that is not finished yet, because communication with the GEs/SEs developments is not always possible and it is complex to develop against a living target.

5.10.7 **Consolidated Trial Experience**

At this point in the process, the experience is still taking place.
Implementers must address:

- Lack of support from the pieces that make up the solutions, that is, the GE and SE.
- Complexity of the deployment of SE and GE. More documentation is needed.
- Difficulty mapping the business scenario and the software needed to satisfy such scenario.
- Furniture sector is extremely traditional and it is very hard to convince these people to believe and adapt the suggested solutions.
- Very rudimentary sector, they don't quite trust technology and are "afraid" of it.

Scenario_Descr	PI_Desc	PI_Name	AS-IS	TO-BE1	Target	BIProgress
OPINION MINING IN FURNITURE PRODUCTS						
	COMPANIES	COMPANIES	0	1	3	33,33%
	COMPL. RESP.	COMPLAINT RESPONSE	75	80	100	20,00%
	COMPL. TIME PROCESS	COMPLAINTS RESOLUTION TIME PROCESS	1	1	1	0,00%
	NON-REP. DISS.	IDENTIFICATION OF NON-REPORTED DISSATISFACTION	0	20	100	20,00%
	OP. LEADERS	OPINION LEADERS	0	1	5	20,00%
	OP. RETRIEVAL	OPINION RETRIEVAL	0	30	100	30,00%
	OP. SPAM	OPINION SPAM	0	NA	100	
	W-O-M	POSITIVE ONLINE WOM (WORD-OF-MOUTH)		NA	10	
		Average Progress of Scenario:				20,56%

Figure 45 Current impact of FITMAN on AIDIMA Trial

5.11. Consolidated Trials Experience

After few months, the FITMAN trials can share their first experiences, give some returns on the definition, implementation, integration and deployment of their trial and provide advice to a potential new implementation of the concerned FITMAN platform in their industry sector. At this stage of project, all the FITMAN trials are under development yet.

The goal of this section is to compile all these first trials experiences.

At this day, Augusta Westland and Complus did not give their feedback.

The structure of this compilation follows the plan of the previous sections follow-up by the trials (we have add a new point: trial Technologies)

- Starting Point
- Trial Technologies
- Trial plan and Roadmap
- Trial structure and implementation strategy
- People, Infrastructure, Processes
- Results at M18 and Future Expectations
- Enabling Conditions and Obstacles
- Consolidated Trial Experience

5.11.1 Starting Point

For the majority of the FITMAN trials, their objective is to improve their production line either:

- In making a Machinery Repository which references detailed production equipment information, available to all engineers/managers, in order to assess of new products in existing production lines. (Volkswagen trial)
- In improving the prevention plans on the production lines level and in improving the risk detection and information transmission in order to reduce the work accidents and incidents. (TRW trial)
- In improving the utilization of the data gathered in the production line in order to exploit them in terms of speed of reaction and effectiveness of decision taken by the factory staff. (Whirlpool trial)
- In creating agreements between competitors to share production facilities: “cloud manufacturing” in order to face to a strong increase of competitive pressure and a hardly predictable demand. (Piacenza trial)
- In improving the interactions between stakeholders (customers and suppliers) by exchanged information quality and a formalization of the collaborative business processes, in order to enhance the relation with customers and suppliers. (APR trial)
- In improving relationship with all the stakeholders through enabling active, real-time participation in order to improve the supervision of the work. (Consulgal trial)
- In improve the detection of the needs of the customers, to analyse of the trends inside the furniture sector in order to impact the furniture users and manufacturers. (AIDIMA trial)

An exception is the TANet trial for which the objective is to improve their service by sharing resources and ideas in privately network cluster in order to reduce costs and increase profits.

5.11.2 Trial technologies

As expected, **the smart trials** exploit mainly Internet of Things (IoT) technology:

- To achieve the expected performance level in terms of risk condition identification and contextualised reaction. (TRW trial)
- To better manage and support the decision processes (Whirpool trial)
- To monitor the production capacity estimation (Piacenza trial)

The digital trials allow to make easier the cooperation between the different information systems along the life cycle of the project (Pub/sub, Mashup,Design, Manufacturing):

- To improve reliability of estimated figures of in-house production costs at early phases of the product development process (Volkswagen trial)
- To obtain the opinion mining in furniture products from different resources and to provide future trends forecasting for product development (AIDIMA trial)
- To improve the automation of the concrete handling procedure with a well-defined information management system (Consulgal trial)

The virtual trials are mainly based on an efficient use of the resources between various enterprises (mediator, collaborative solutions, data interoperability):

- To improve information quality to support the collaboration with customers and suppliers (APR trial)
- To provide a trustworthy portal providing information, links, useful tools and services for small businesses, communities and individuals at a local or global (TANet trial)

5.11.3 Trial plan and Roadmap

The majority of the trials roadmaps have been split in three phases corresponding generally to the M12, M18 and M24. Some correspond to a progressive integration of the enablers (GEs, SEs, open call SEs, TICs) as for Volkswagen trial, TRW trial and Piacenza trial, others to a progressive development of their business processes as for APR trial, Consulgal trial and AIDIMA trial and other again, especially those which cover two factory domain, couple the two possibilities as for TANET trial.

5.11.4 Trial structure and implementation strategy

The implementation strategy is different following the trials:

- Some are divided in several stages like the experimentation setup, following by the content setup and finally the experimentation in the trial. (Volkswagen trial)
- Other like Whirlpool trial has identified a list of events from a big amount of data collected, and correlating them with the shop floor, in order to better manage and support the decision processes
- Others have worked by business scenario as Piacenza trial and TANet trial
- For the trials which use cloud service, the implementation is shared between a public cloud, private cloud and in local premises (TRW trial, Whirpool trial) or to implement all in a private cloud (Volkswagen trial) in order to store all the data in a secure environment and to guarantee the confidentiality.
- For the trials which need IoT technology, generally they began to integrate it in their system at the beginning (TRW trial, Whirpool trial)

5.11.5 People, Infrastructure, Processes

The implementation of the trial platforms has required generally a lot of communication and preparation between the trial owners and the IT providers.
In terms of locations infrastructure the development has been performed in the IT provider or research partner site. The test have been executed either by the owner site of the trial or by on IT provider/ research partner site.

Some of trials have given an explanation of their IT infrastructure (AIDIMA trial, TANet trial), but we suppose that they have described their IT infrastructure in other deliverable.

The implementation has required an involvement of the personnel of trial environment (production, sales, administration…). All these actors have been identified with their access and functionalities profiles, for each trial.

On the other hand, due to the monitoring of the workers, concrete activities and procedures have been performed related to the ethical issues. (TRW trial)

5.11.6 Results at M18 and Future Expectations

For the majority of the trial, they have no yet obtained results (Volkswagen, TRW, Whirpool, Consulgal, AIDIMA) or only partially (Piacenza, APR, TANet) because the implementation of the solutions are on-going. It seems premature to provide an evaluation for the M18. However, the first results are promising.
Some of the trials explain their expectations, they are positive and they are confident.

For some trial as TRW, the most important target is not only to assess the impact of the FITMAN system instantiation, but also report and communicate this impact in the manufacturing and production activities thanks to FI technologies deployment.

In Section 8.2.1 Report: % Improvement of Business Performance per Trial and per Scenario a preliminary consolidation of data is inserted, displaying progress by Business scenario and by Trial, but as stated above, significance of results is not assured.

5.11.7 Enabling Conditions and Obstacles

For the majority of the trials, the obstacles come from the technical side. On the implementation point of view, the majority of the SME trials have meet some difficulties which have required a supplementary time in the implementation and/or a technical experience:

- the maturity, the software quality, the architecture document, the support of the Fi-Ware GE are not homogeneous
- there is some hardware incompatibility with some standards of the selected GEs and SEs
- Many of the SEs are linked to existing open source software. There is usually a documentation available online for these tools; however, utilising the SEs require a minimum of knowledge of all the system.

For different reasons Large Enterprise and SMEs declared that they have met obstacles, but they have solved. For large enterprise, it was a consequence of internal authorisations, guidelines and policies (Volkswagen trial, TRW trial). For SMEs, it was a consequence of the lack of technical competences. The problem has solved with the support of IT providers and/or scientific partners.

Some FITMAN platforms introduce change in the way to generate store, retrieve, process and distribute information. The involvement of the outside stakeholders needs to supply some explanation from the trial. (Consulgal trial)

An interesting feedback from the user of Whirpool platform is the request of enlarging the base of event manageable to capture new data which were not foreseen previously.

5.11.8 Consolidated Trial Experience

To implement a platform in the industry sector, FITMAN trials advises to consider the following points:

- On a description point of view:
  - Make sure all objectives of the planned usage and all needed functionalities are clarified and check the needed functionalities with the provided components.
  - Clarify existing guidelines and policies and check if they interfere with the platform components.(Volkswagen trial, TRW trial)
  - Select the personnel involved in the solution. Those people will not only provide their data for the benefit of the system, but also will give some feedback and opinions about functionalities, usability and other important aspects of the solution. (TRW trial)
  - Clarify the data integrity and security which are involved by the platform. (Piacenza trial)
  - Convince some sectors which are perhaps more traditional to believe and adapt the suggested solutions. (AIDIMA trial)
  - Plan progressively to join the new collaboration platform, according the capabilities of stakeholders. (APR trial)
  - Try to define a flexible platform that can be adapted to both small and large projects, at the same time can be adapted to different types of projects in construction: dams, bridges, highways etc. (Consulgal trial)
- On an implementation point of view:
  - Develop an implementation roadmap and experimentation plan. Maybe it's advisable to test each component and implement the components step-by-step.
  - Calibrate the sensors deployed in the shop floor for the platforms which use IoT technology. (TRW trial)
  - Carefully plan cloud strategy in order to verify performances and availability very early in the project. (Whirpool trial)
- On a technical point of view:
  - Each SE and GE are open source by definition. So it is possible to make modifications to suit your specific scenarios.
  - The complexity of the deployment of SE and GE requires sometimes a technical experience.
  - If problems or questions are occurring about the enablers (GEs, SEs) contact the owner or developer of the component. They can provide help or needed adaptions

5.11.9 Trials Experience Conclusion

The FITMAN trials are sharing their first experiences. This experience will be used to provide advices to a potential new implementers of the FITMAN platform in their industrial sector.

The majority of the trial implementations are on–going, so their returns concern mainly the definition, implementation, integration and deployment of their trial instead of their results.

The stakeholders of the trials recommend mainly to:

- Define precisely the target system in terms of objectives, functionalities, needed components and environment of the solution;
- Develop their solution progressively in taking into account the components one by one;
- Contact the owner of the components if they want some help.

6. Conclusions and next steps

This deliverable D7.1 is the first release of a document consolidating the experiences of these first 6 months of experimentation by the Trials on the FITMAN platform.
A general comment by the trials (please refer section 8.2.4 Trial Journals) is that the technical issues were actually absorbing the attention during the first months of implementation, including the definition of how the cloud environment would be able to support the operation of the trials and more over the next phases of implementation.

To such respect outcomes form section 3 Technology Lesson learnt address the main lesson learnt under the technical perspective. Based on the data collected and analysed in the context of Section 3 of the document at hand ("Technology Lesson Learnt"), the FITMAN V&V Methodology (namely steps P-1 to P-4 for the product-specific perspective and step T-1 for the trial-specific perspective) has been adopted without difficulty by the corresponding stakeholders, either Specific Enablers developers or trials. Almost all of them (with the exception of the AgustaWestland Trial) have successfully implemented the anticipated steps and have reported the respective results. A number of interesting conclusions have been derived regarding the technological perspective of the up-to-date experiences of the 10 FITMAN Trials:

- From the developers' point of view, all 8 FITMAN Specific Enablers have successfully applied the necessary V&V steps, signifying the V&V contribution to "building the right software in a correct way". Alpha Testing has been applied in the Release Verification step (P-4) to test all software features in relation to the requirements and has helped to detect and correct malfunctions and bugs. For step P-4, an average of 19 test cases was defined per Specific Enabler, including approximately 4 test cases per Specific Enabler that failed and have been corrected. User Acceptance Testing is ongoing in the Product Validation step (P-5) and aims to act as a direct online feedback mechanism with all developers who reuse each Specific Enabler. Developer Acceptance Surveys with an average of 11 questions per Specific Enabler have been prepared and uploaded in SurveyMonkey.
- The technical indicators provide direct and simple feedback by the trials teams to complement the Product Validation step (P-5) for the Specific Enablers and the Generic Enablers and to apply the Trial Solution Validation step (T-1) for the overall trial solutions.
- The Smart Factory trials assessed the utilised Enablers, as well as the developed solutions, higher than the Digital and Virtual Factory trials; this is verified in all possible cases; in the case of the SEs, in the case of the GEs and in the case of the integrated solutions.
- The FITMAN Specific Enablers are generally considered to be more open than the adopted GEs; Openness is the highest valued indicator in the case of the SEs, while it is the lowest valued indicator in the case of the GEs.
- Both the SEs developed and the GEs adopted have been assessed with almost the same average value across all technical indicators (1.96 and 1.83 respectively).
- As far as the integrated solutions are concerned, the overwhelming majority of the FITMAN Trials agreed that the solutions developed successfully meet their requirements (Strongly Agree: 24%; Agree: 56%), can be deployed in a reasonable and cost-effective manner (Strongly Agree: 12%; Agree: 76%), are easily learnable (with 92 % agreement), are easily understandable (100% agreed or strongly agreed), and are attractive to the end user (92% agreed or strongly agreed).

From a technical perspective, the next steps include:
(a) Constant contributions of the trial teams to the Community surveys that capture the essence of the FI-PPP experience and the Technical Trial Journals,
(b) Application of the V&V activities to the 7 Specific Enablers that originate from the open calls,
(c) Consolidation of the developers' experience (within the FITMAN trials and beyond in FI-PPP Phase III) in using the FITMAN Specific Enablers through the Developer Acceptance Surveys.

A first result from the assessment of SW components of the FITMAN platform, elicited by the Technology section of the Survey, allow us to evaluate them, based on identified performance indicators in the V&V Methodology:

- Openess
- Interoperability Maturity
- Ease of application

and for each of these indicators the possible ranks were:

Openess	Level 0: ”no applicability in our environment without extra applying actions or means”.
	Level 1: ”applicable with significant amount of work”.
	Level 2: “applicable with limited amount of work”.
	Level 3: “Easily applicable in our environment”.
Interoperability Maturity	Level 0: Isolated Approach: No API exposing the GE / SE functionalities is available.
	Level 1: Baseline Unified Approach (International Standards exists): Offering an API exposing main part of the GE / SE functionalities, in its own format.
	Level 2: Open Unified Approach (No International Standards exists): Offering an API exposing main part of the GE / SE functionalities, in its own format.
	Level 3: Standardized Integrated Approach (International Standards exists): Offering an API exposing main part of the GE / SE functionalities, following international standards.
Ease of application	Level 0: no applicability in our environment without extra applying actions or means.
	Level 1: Enablers as a Service – Developers can utilize software provided as a service through open interfaces.
	Level 2: Releasing code as open source - Developers can inspect, download, run and improve the open source code according to their needs.
	Level 3: Consulting with the use cases about their needs and collaboratively contributing to the source repository, design documents, and bug reports.

Table 59 V&V Ranking for GEs and SEs

In Section 8.2.2 Report : Ranking of the SW Components (GEs and SEs) per Technical Performance Indicator it is reported the detail of the Technical Survey, while in the following table is reported a ranking from 0 to 3 (consistent with Table 59 V&V Ranking for GEs and SEs) for all GEs and SEs.

GE	Apps.ApplicationMashup	2,1
GE	Apps.LightSemanticCompos	1,2
GE	Apps.Marketplace	1,4
GE	Apps.Mediator	2
GE	Apps.Repository	1,9
GE	Data.BigData	2,2
GE	Data.PubSubCAPContext	2
GE	Data.PubSubOrionContext	1,3
GE	Data.SemanticApplicationS	2
GE	Data.UDA	1,5
GE	IoT.Backend.ConfMan	2,9

GE	IoT.Backend.DeviceManage	2
GE	IoT.Backend.IoTBroker	2,9
GE	IoT.Gateway.DataHandling	2,6
GE	IoT.Gateway.ProtocolAdapt	1
GE	Security.IdentityManageme	2
SE	Collaboration Platf. BP	1,2
SE	Collaborative Assets	1,5
SE	Data Interoperabil. Platform	1
SE	Metadata and Ontologies	1,3
SE	Secure Event Management	2,5
SE	Shopfloor Data Collection	2,1
SE	Supply Chain & Business	2
SE	Unstructured and Social	1,7

Table 60 Evaluation of GEs and SEs

The V&V methodology also allowed to access the overall perception from users (for each trial it has been identified a panel composed by users and technicians) and we asked them to access the overall features of the trial according different attributes in a scale from 1 to 4.
In the

Trial Evaluation	Average Rate
Efficiency	3,00
Fulfillment of requirements	3,23
Learnability	3,23
Understandability	3,14
User's attraction level	3,27

Table 61 Community Survey results

In section 4 Business Lesson Learnt are analyzed the behavior of the Trials under the Business Performance perspective.
The first conclusion on this point is that the maturity of the trials is not yet enough to allow real conclusions. This can be also elicited by the following condition we can extract by report represented in section 8.2 Reports :

- Out of 86 BPIs expected to be collected by the 10 Trials only 41 were available
- Apparently the performances of the new implemented system (only the implemented) where well beyond any optimistic expectation. In fact (see report below) for many Trials the value of BPIs inserted in the repository are ON AVERAGE very high

Trial	Trial_Name	Average Progress of Trial	# Answers	Out of expected values
1	VOLKSWAGEN	37,83%	4	6
2	TRW	74,06%	8	9
3	AGUSTA WESTLAND	NA	0	5
4	WHIRLPOOL	332,15%	9	11

5	PIACENZA	100,00%	1	4
6	APR	90,00%	2	11
7	CONSULGAL	97,66%	6	9
8	TANET	15,00%	5	5
9	COMPLUS	NA	0	5
11	AIDIMA	20,56%	6	21

Figure 46 Trial impact and entered answers

In a case WHIRLPOOL, the values are well beyond the target : 332,15 %, please refer to Section 5.4.7 Consolidated Trial Experience, where WHIRLPOOL Explains the reason for this data.

In the next 2 months, as stated by many Trials (see section 8.2.4 Trial Journals) they will have the clear perception that value of indicators will reflect in a much more stable and realistic way the behavior of the Business Processes.

Another interesting perspective derivate for the analysis of BPIs clustered by class. Each performance indicator of the Trials has been associated with one of the following 4 categories :

- Cost : It represents measures impacting Cost Reduction and increase of Efficiency
- Time : It represents measures impacting the duration of the processes
- Productivity : It represents measures impacting on the more efficient utilization of assets
- Quality: It represent measures impacting the overall quality of the product

Based on the data inserted by trials it results the following impact in the 4 categories for the BPIs (see Table 62 Impact per BPI category per Trial) . It is important to remark that in all trials there is a significant improvement. The highest is in the CO Cost Savings category. In the case of Consulgal for Costs and Whirlpool for Quality, please refer to section 5.7 and 5.4 for justification.

Cost (CO)	APR	80,00%
	CONSULGAL	243,46%
	VOLKSWAGEN	22,50%
	92,12%	
Time (LT)	AIDIMA	0,00%
	APR	100,00%
	CONSULGAL	32,51%
	TANET	12,50%
	VOLKSWAGEN	53,17%
	35,10%	
Productivity (P)	AIDIMA	24,67%
	COMPLUS	33,33%
	CONSULGAL	150,00%
	PIACENZA	100,00%
	TANET	16,67%
	TRW	84,66%
	62,57%	
Quality (Q)	WHIRLPOOL	**332,15%**

Table 62 Impact per BPI category per Trial

To summarize we can say that to the time of writing (beginning of October), results from trials are still mostly provisional, as example:

- Trial 01: Volkswagen: measured BPI for one scenario, values have not reached the targets;

- Trial 02: TRW: measured BPI for both scenarios, values are better than targets;
- Trial 03: AgustaWestland: no BPI measurements reported yet;
- Trial 04: Whirlpool: measured some BPI in each scenario, values are better than targets, but it is not clear now much improvement is due to FITMAN innovations;
- Trial 05: Piacenza: no BPI measurements reported yet;
- Trial 06: APR: only two BPI measured in one scenario, only one has reached the target level at this stage;
- Trial 07: Consulgal: measured BPI for two out of three scenarios, but not all measured values have reached the target level at this stage;
- Trial 08: TANET: measured BPI for both scenarios, but still well short of target values;
- Trial 09: COMPLUS: no BPI measurements reported yet;
- Trial 11: AIDIMA: measured some BPI for one out of two scenarios, some values are still short of the targets.

It is clear that in many cases, technical issues had to be overcome before any measurement of BPI could be attempted, and for a few trials this prevented any meaningful BPI measurements up to the end of September 2014. Furthermore, where measurements were possible, they are based on a first deployment and integration of FI-WARE GE and FITMAN SE, prior to any efforts to fine-tune the solutions and optimise their use from a business perspective.

It is also clear that in some cases, the values of BPI depend on the scale of adoption, as well as the technical capabilities of FI-WARE and FITMAN technical solutions. A good example of this is Trial 08 (TANET), where many of the BPI specified are defined in terms of the number of organisations using the technology. This depends on dissemination and outreach as well as solution of the technical challenges.

Because BPI measurements are unlikely to be representative until well after establishment of a technical viable solution, it is not considered appropriate to attempt to derive lessons learned regarding social and economic aspects at this stage. We envisage that this will become possible over the next two months.

T7.1 will carry on monitoring activity of trials and a second release of the document is expected (According Amendment #3) for M27.
Nevertheless a continuous feeding of information will be provided to other tasks, in fact, it is not objective of this deliverable (see section 1.2 Contribution to Other WPs) to make comparison among the behavior of the Trials or generate recommendations, but constitute a consistent information base for next tasks. (namely T7.[2-6] and T8.1 and WP9).

7. Reviewed Business Performance Indicators for Smart, Digital and Virtual Factory

Deliverables D4.4, D5.4 and D6.4 - FITMAN Technical / Business Indicators for Smart/Digital/Virtual Factory, was originally due at M8. Considering the maturity of the trials with Amendment #1 it was proposed to move the collecting of BPI and TPI actual values to D7.1, at the same time the actual delivery date of the 3 deliverables has been moved to M12 to really incorporate the last status of the maturity of the Performance Indicators. Mainly we refer to BPI as TPI was defined at the very beginning in the V&V Methodology.
At the same time as a recommendation (#3) at M12 Review Meeting, it was requested to anticipate the D7.1 to M18. In such way also the values collection of BPI has been anticipated. For this reason we decided to incorporate, for consistency, in this deliverable D7.1 the refinement of BPI originally planned in version 2 D4.4 → D4.6, D5.4 → D5.6 and D6.4 → D6.5.

In the following sections, it is presented the results of the incremental analysis on the structure of Business Performance Indicators for each Industry Domain and for each Trial.

Namely, it has been investigated for all the trials, first what have been the evolution and the implementation path (if there were significant changes with respect to Dx.4):

1. New components from OC (Open Calls)
2. How the new components impact Business Scenarios functionalities
3. (If significant) new architecture of the trials (with identification of new components)

, and second for each BPI, it has been requested to specify:

a. Why the indicator is relevant to the business Scenario objectives ?
b. How and why AS-IS and Target values has been selected ?
c. How the organization is moving to measure the values ?
d. What are the impacts if expected values are not achieved ?
e. How the success in implementation is related to the actual achievement of target values ?

7.1. Smart Factory

7.1.1 TRW

The TRW trial implementation plan is divided into 3 phases:

d) Phase I implemented at M6: first version of the system deploying the IoT GEs, developing a monitoring system that provides feedback to the workers and prevention technicians about the level of the risk achieved during the production activities.

e) Phase II implemented at M18: fully functional version of the risk detection and communication system, including most of the GEs, SEs and TSCs. In the following architecture the components already deployed are shown, but the new SEs from the Open Calls are not included.

f) Final phase of implementation: fully completed version of the TRW system with all the components will be achieved, enhancing the functionalities and providing a deeper analysis and more accurate results in the prevention of ergonomic risks. See the final architecture in the next figure.

No new Performance indicator has been defined due the adoption of new SEs from Open Calls..

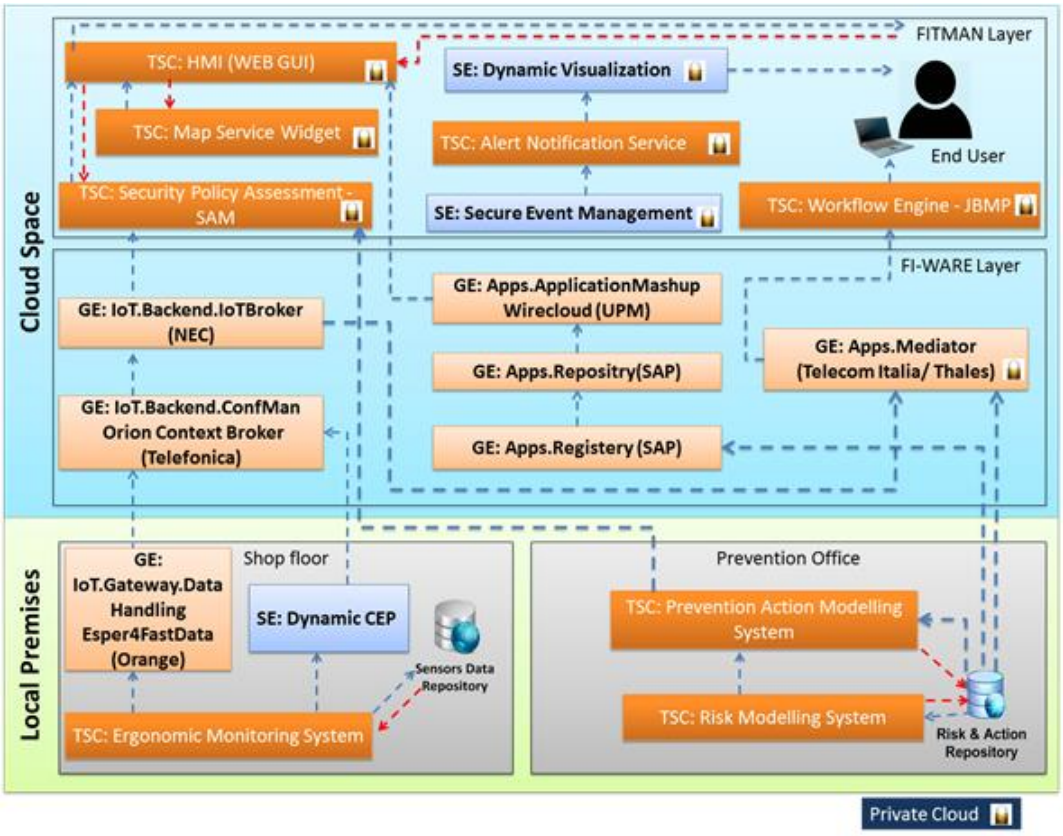


Figure 47 Final architecture of the TRW trial

In the following table a more in depth analysis of performance indicators has been carried out.
No new indicator has been introduced due to adoption of new Components as the business case is not changed.

Name of the PI	**BS1PI 1:** Number of standards and regulations (added) in the repository after/before the DV/AV implementation during a period
Relevance of PI for Business Process	It measures the time invested and the reduction of inefficiencies (time) in the broad application of current regulations and standards
As-Is	No reference value before FITMAN
Target	Increase of 5%: Good Increase of 7%: Very good Increase of 15%: Excellent
Plan of the measurements (frequency)	M18 (1 full day), M21 (few days), M24 (1week)
The organization of the measurement - details	Organization of training sessions for the prevention technicians: - Related to Ethical Aspects - About the trial content and objectives - About the functioning of the new FITMAN system
Measurement method (automatic/manual)	Manual
Data to be Collected	Data: New time, current time. The new time will be directly provided by the prevention technician, regarding the average time he spends doing this task
People Involved in measurement	Prevention technician
People involved in Interpretation	Prevention technician
What are the impacts on business if expected values are not achieved ?	TRW is currently using REBA, NIOSH and OCRA standards, which are the most important ones. With the new system, the time invested in the full application of these standards and the range of information controlled (parameters controlled) will be optimized, not changing the costs. If the target values are not achieved, the setting up process of the standards has to me redesigned.

How the success in technical implementation is related to the actual achievement of target values ?	The achievement of the target value is related not only to the technical implementation (50%) but also to the human resources' skills and management (50% impact). Furthermore, if 75% of the technical implementation is performed, the target value classified as "good" will be achieved.

Name of the PI	**BS1PI 2/ BS2PI 1:** Number of accidents and incidents in the factory after / before the DV/AV implementation during a period
Relevance of PI for Business Process	It ensures that the system is able to reduce the number of injured workers and reduce the lost days in the production line
As-Is	No reference value before FITMAN
Target	Reduction of 10%: Good Reduction of 15%: Very good Reduction of 20%: Excellent
Plan of the measurements (frequency)	M18 (1 full day), M21 (few days), M24 (1week)
The organization of the measurement - details	Organization of training sessions for the workers and prevention technicians: - Related to Ethical Aspects - About the trial content and objectives - About the functioning of the new FITMAN system
Measurement method (automatic/manual)	Manual
Data to be Collected	Data: Number of employees with lost days, number of lost days, total number of hours worked by employees. The data needed will be provided by H&S coordinator, due to TRW daily activity recording on this issues
People Involved in measurement	H&S coordinator Prevention technician Blue collar worker

People involved in Interpretation	H&S coordinator Prevention technician
What are the impacts on business if expected values are not achieved ?	If the expected values are not achieved, the whole system should be redesign; i.e. changing the configuration of the warning messages receivers or the location of the ergonomic monitoring systems
How the success in technical implementation is related to the actual achievement of target values ?	The achievement of the target value is related not only to the technical implementation (75%) but also to the human resources' skills and management (25% impact). Furthermore, if 75% of the technical implementation is performed, the target value classified as "good" will be achieved.

Name of the PI	**BS1PI 3:** Number of risks that has been defined using the new system after / before the DV/AV implementation during a period
Relevance of PI for Business Process	The system will allow setting up risks that can happen in the factory, specifying concrete parameters and thresholds to detect them. The number of risks will be the same, but the detailed configuration of the risks will be the key for a better prevention.
As-Is	No reference value before FITMAN
Target	Increase of 30%: Good Increase of 45%: Very good Increase of 60%: Excellent
Plan of the measurements (frequency)	M18 (1 full day), M21 (few days), M24 (1week)
The organization of the measurement - details	Organization of training sessions for the workers and prevention technicians: - Related to Ethical Aspects - About the trial content and objectives - About the functioning of the new FITMAN system
Measurement method (automatic/manual)	Automatic

Data to be Collected	Data: new nº risks, current nº risks The new FITMAN system will show it in its interface the new number of risks defined
People Involved in measurement	Prevention technician Blue collar worker
People involved in Interpretation	Prevention technician
What are the impacts on business if expected values are not achieved ?	If the expected values are not achieved, the risk modelling TSC should be redesign to allow easier risk definition
How the success in technical implementation is related to the actual achievement of target values ?	The achievement of the target value is related not only to the technical implementation (75%) but also to the human resources' skills and management (25% impact). Furthermore, if 85% of the technical implementation is performed, the target value classified as "good" will be achieved.

Name of the PI	**BS1PI 4:** Number of preventive actions using the new systems after /before the DV/AV implementation during a period
Relevance of PI for Business Process	The system will allow setting up preventive actions, linked to the risks detected. More preventive actions, more probability of risks prevention
As-Is	No reference value before FITMAN
Target	Increase of 30%: Good Increase of 50%: Very good Increase of 70%: Excellent
Plan of the measurements (frequency)	M18 (1 full day), M21 (few days), M24 (1week)
The organization of the measurement - details	Organization of training sessions for the workers and prevention technicians: - Related to Ethical Aspects - About the trial content and objectives - About the functioning of the new FITMAN system
Measurement method (automatic/manual)	Automatic

Data to be Collected	Data: new nº actions, current nº actions The new FITMAN system will show it in its interface the new number of preventive actions defined
People Involved in measurement	Prevention technician Blue collar worker
People involved in Interpretation	Prevention technician
What are the impacts on business if expected values are not achieved ?	If the expected values are not achieved, the preventive action modelling TSC should be redesign to allow easier action definition and risks prevention.
How the success in technical implementation is related to the actual achievement of target values ?	The achievement of the target value is related not only to the technical implementation (75%) but also to the human resources' skills and management (25% impact). Furthermore, if 85% of the technical implementation is performed, the target value classified as "good" will be achieved.

Name of the PI	**BS1PI 5:** Number of human errors in the design of prevention strategy planning after /before the DV/AV implementation during a period
Relevance of PI for Business Process	It checks that the human errors are reduced, which is one of the main problem of current systems
As-Is	No reference value before FITMAN
Target	Reduction of 10%: Good Reduction of 20%: Very good Reduction of 30%: Excellent
Plan of the measurements (frequency)	M18 (1 full day), M21 (few days), M24 (1week)
The organization of the measurement - details	Organization of training sessions for the prevention technicians: - Related to Ethical Aspects - About the trial content and objectives - About the functioning of the new FITMAN system

Measurement method (automatic/manual)	Manual
Data to be Collected	Data: nº variations of the formula of the risks The new FITMAN system will have a registry to storage the modifications in the system. Thus, the number of variations in the values of the formulas and parameters of the risks will be shown there.
People Involved in measurement	Prevention technician
People involved in Interpretation	Prevention technician
What are the impacts on business if expected values are not achieved ?	If the expected values are not achieved, the formulas associated to the risks should be redefined, detecting more level of risks
How the success in technical implementation is related to the actual achievement of target values ?	The achievement of the target value is related not only to the technical implementation (50%) but also to the human resources' skills and management (50% impact). Furthermore, if 85% of the technical implementation is performed, the target value classified as "good" will be achieved.

Name of the PI	**BS2PI 2:** Number of deployed monitoring systems after / before the DV/AV implementation during a period
Relevance of PI for Business Process	It provides an overview of the new IT equipments and infrastructures deployed in the selected types of production lines
As-Is	No reference value before FITMAN
Target	Increase of 55%: Good Increase of 75%: Very good Increase of 95%: Excellent
Plan of the measurements (frequency)	M18 (1 full day), M21 (few days), M24 (1week)

The organization of the measurement - details	Organization of training sessions for the prevention technicians: - Related to Ethical Aspects - About the trial content and objectives - About the functioning of the new FITMAN system
Measurement method (automatic/manual)	Automatic
Data to be Collected	Data: new nº systems, current nº systems Direct information get when the systems are deployed in the selected types of production lines
People Involved in measurement	Prevention technician
People involved in Interpretation	Prevention technician
What are the impacts on business if expected values are not achieved ?	The systems will provide the innovative aspect of the trial, but more sensors do not mean more detection, so the results should be carefully studied
How the success in technical implementation is related to the actual achievement of target values ?	The achievement of the target value is directly related to the technical implementation. Furthermore, if 75% of the technical implementation is performed, the target value classified as "good" will be achieved.

Name of the PI	**BS2PI 3:** Number of risk detections, alarms and warnings set up after / before the DV/AV implementation during a period
Relevance of PI for Business Process	It is the main PI. It determines the effectiveness of the systems to risk detection and preventive actions deployment
As-Is	No reference value before FITMAN
Target	Increase of 65%: Good Increase of 85%: Very good Increase of 100%: Excellent
Plan of the measurements (frequency)	M18 (1 full day), M21 (few days), M24 (1week)

The organization of the measurement - details	Organization of training sessions for the workers and prevention technicians: - Related to Ethical Aspects - About the trial content and objectives - About the functioning of the new FITMAN system
Measurement method (automatic/manual)	Automatic
Data to be Collected	Data: new nº detections, current nº detections The new FITMAN system will show it in its interface the new number of detections
People Involved in measurement	Prevention technician Blue collar worker
People involved in Interpretation	Prevention technician
What are the impacts on business if expected values are not achieved ?	If the expected values are not achieved, the whole system should be redesigned; i.e. changing the configuration of the warning messages receivers or the location of the ergonomic monitoring systems
How the success in technical implementation is related to the actual achievement of target values ?	The achievement of the target value is related not only to the technical implementation (85%) but also to the human resources' skills and management (15% impact). Furthermore, if 75% of the technical implementation is performed, the target value classified as "good" will be achieved.

Name of the PI	**BS2PI 4:** Number of training sessions regarding safety after /before the DV/AV implementation during a period
Relevance of PI for Business Process	It probes the increase in the awareness of the importance of H&S adoption in the TRW factory
As-Is	No reference value before FITMAN
Target	Increase of 25%: Good Increase of 40%: Very good Increase of 50%: Excellent

Plan of the measurements (frequency)	M18 (1 full day), M21 (few days), M24 (1week)
The organization of the measurement - details	Organization of training sessions for the workers and prevention technicians: - Related to Ethical Aspects - About the trial content and objectives - About the functioning of the new FITMAN system
Measurement method (automatic/manual)	Manual
Data to be Collected	Data: new nº training, current nº training The new number of training sessions will be directly provided by the prevention technician & safety manager
People Involved in measurement	H&S coordinator Prevention technician Blue collar worker
People involved in Interpretation	H&S coordinator Prevention technician
What are the impacts on business if expected values are not achieved ?	Workers should receive training as a consequence of prevention actions. If the values are not achieved, the preventive actions design should be redefined.
How the success in technical implementation is related to the actual achievement of target values ?	The achievement of the target value is not related to the technical implementation. Furthermore, if 85% of the technical implementation is performed, the target value classified as "good" will be achieved.

Table 63 TRW Reviewed BPI

7.1.2 Whirlpool

Whirlpool will implement the new component provided by MagniFI in a new instantiation of the Business processes on a different plant and on a different production unit.
The new experimentation will be based on a 3D scan system provided by Datapixel which will be used to measure some critical parts used in the production of microwaves. The measure consist in a cloud of point representing a spatial (3D) representation of the part. This pointCloud will be then analyzed by DyCEP component: in case of defect an alarm will be generated through the same mechanism implemented in main trial.

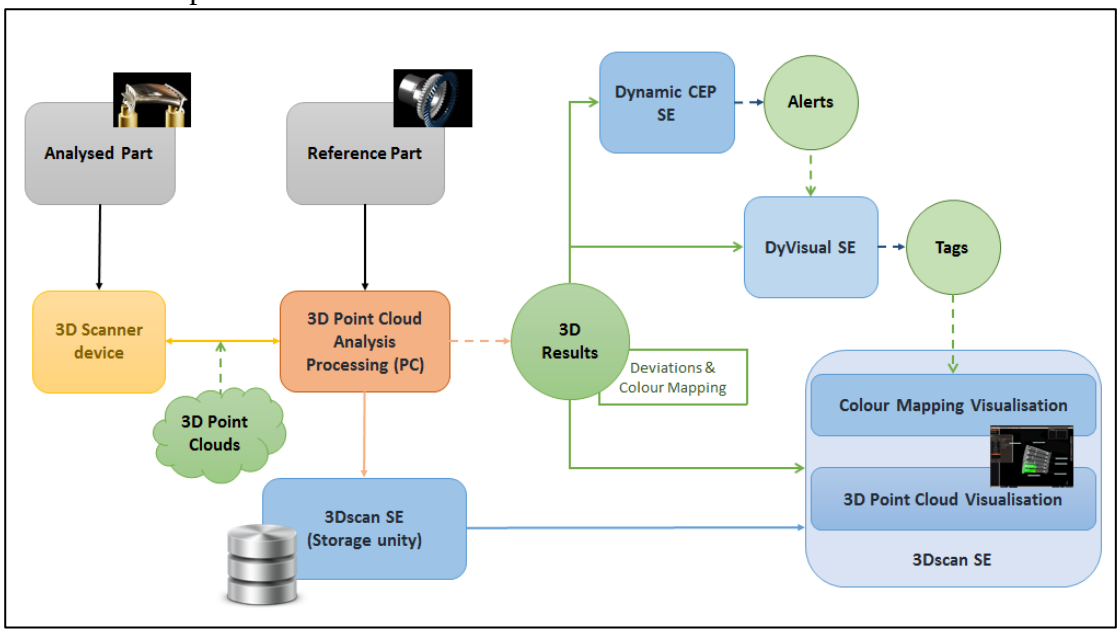


Figure 48 Whirlpool trial structure

The measuring system will not be integrated into the existing information structure and will be considered mainly an offline mechanism. The experimentation will be fine tuned according to the success of the following intermediate step:

1) Performances of the scanning system: the time required to scan the part will be compared with the current takt time of the microwave assembly line (ca. 60 sec).
2) Accuracy of the scanning system: the information provided by the 3D scan system has to provide relevant information for the generation of events
3) Performances of DyCEP in analyzing the cloud point received by the scan system
4) Capability of DyCEP in generating reliable (usable) outcomes from the data analysis
5) Capability of the DyVisualSE to be used by industrial mobile device

The business process impacted by this trial are the same as main trial but instantiated in a new factory, new business owners, new value for main indicators, new target value. The definition of which indicators will be really impacted is mainly driven by the outcomes of the aforementioned five steps.

In the following table (Table 64 Whirlpool Reviewed Indicators) a more in depth analysis of performance indicators has been carried out.
No new indicator has been introduced due to adoption of new Components as the business case is not changed.

Name of the PI	Relevance of PI for Business Process	As-Is	Target	Measurement Approach						What are the impacts on business if expected values are not achieved ?	How the success in technical implementation is related to the actual achievement of target values ?
				Plan of the measurements (frequency)	The organization of the measurement - details	Measurement method (automatic/ manual)	Data to be Collected	People Involved in measurement	People involved in Interpretation		
WUBI – FOR	H	0,24	0,22 no peaks	Monthly	Factory Quality	Automatic	Indicator already available	Luciano Zeni	Zeni - Petrali	Each indicator represents Quality Performance of the process. Their values impact on Unit cost of products and hence on the Margin.	The expected values of Business Indicators are not depending only by FITMAN implementation. Many other factors can influence them in a positive or negative ways. FITMAN system is expected to improve awareness of Quality Manager, who should change his behavior accordingly (i.e. Using the information to act
WUSI – FOR	H	0,2	0,2 no peaks	Monthly		Automatic		Luciano Zeni	Zeni - Petrali		
ASFT – FOR	H	4,49	4	Monthly		Automatic		Luciano Zeni	Zeni - Petrali		
ASNT – FOR	H	4,49	4	Monthly		Automatic		Luciano Zeni	Zeni - Petrali		
ASFT – DEFP	H	31181	28000	Monthly	Factory Quality	Automatic		Luciano Zeni	Zeni - Petrali		
ASNT – DEFP	H	31181	28000	Monthly	Factory Quality	Automatic		Luciano Zeni	Zeni - Petrali		
CCPU	M	9,67	9	End Project	Factory IE	Automatic		Luciano Zeni	Zeni - Petrali	It represent the final	

				Currently the product is evolving and only in 6 moths it could make sense to monitor it						consequences of the above listed Indicators.	and to take decision). Then the action could lead to short term, or medium term, or long term impact. For WHR a recording coming for TRIAL journal documenting a positive change in the habits of Quality manager can be considered a success.
WUBR-FOR	H			Monthly	Factory Quality	Automatic		Luciano Zeni	Zeni - Petrali	Each indicator represents Quality Performance of the process. Their values impact on Unit cost of products and hence on the Margin	
ASZHBC-FOR	H			Monthly	Factory Quality	Automatic		Luciano Zeni	Zeni - Petrali		
ASZHA-SIR	H			Monthly	Factory Quality	Manual		Luciano Zeni	Zeni - Petrali		
ASZHBC-DEFP	H			Monthly	Factory Quality	Manual		Luciano Zeni	Zeni - Petrali		

Table 64 Whirlpool Reviewed Indicators

7.1.3 Piacenza

The trial roadmap has been split in three phases, each one focused on some GEs or SEs integration into the system.

a) First phase of implementation

The first phase starts with the integration of the FI-WARE IoT level at shop floor.
Any events coming from the legacy MES, are managed by a special TSC, called DB trigger, that translates and sends them to the IoT Gateway DataHandling GE. Basically these events are:

- New incoming order: new order has been added to scheduler for production.
- Start production: from the scheduler and for any machinery this event is sent when a piece starts a process into a machinery.
- Finish production: from the scheduler and for any machinery this event is sent when a piece has completed the process into a machinery.
- Break or Stopped: a machinery is broken or has been stopped by operator.
- Repair or Restart: a machinery has been restarted.

These events are then managed at FI-ware level by IoT BackEnd ConfMan/PubSub GE and IoT BackEnd IoTBroker GE. At FITMAN layer a NGSI10 subscription is performed to manage the legacy events, this task will be performed by Secure Event Management SE in a later phase. In this first phase a WireCloud GE widget at application level (FactoryMap) is implemented to show events coming from the shop floor. The first phase ended with the second Project Review (M12).

b) Second phase of implementation

As a second step RFID and SE shop floor data collection has been integrated to manage events such as start and end of a process linked to the RFID. Currently the operator loads the production order into the machine, if in this machine is already present a monitoring system that is sufficient to the evaluation of the working time of the machine, the information of processing is acquired in this way, otherwise the data are captured by the new RFID system.
A collector receives all data, where you'll find the number of production order, the number of the reader that acquired this last one and the timestamp of the reading, and aggregates them.
An enhancement already foreseen will be the integration of the SE shop floor data collection and the SE Secure event management.
RFID antennas are set on test machineries to get events such as "Start production" and "Finish production" whenever is possible. RFIDs continuous reading is used if last event is not available.
At Virtual Factory level, a TSC, called Order Management, is in charge to get information from the Legacy ERP such as production capabilities or orders that cannot be scheduled for production, that can be exposed to Marketplace. In this second phase application logic at virtual level will be implemented by Wirecloud GE widgets.
The production manager logs into the Wirecloud application at cloud level, browse the production capabilities and publishes production capabilities or orders if needed, alternatively, he/she can look for external capabilities or orders to have a better machinery exploitation. Most of the features planned in the second phase will be ready for the third Project Review (M18).

c) Final implementation

This phase represents the final system integration and implementation. In this phase the Secure Event Management SE is integrated in the system and a TSC, called Event Management, is added to manage all the events from the FITMAN layer (SEM SE), and if needed, to send some events to the Virtual Factory such as new orders and production scheduling.

The TSC, called Order Management, adds some new events, such as new orders and sold production capability, to Secure Event Management so that the Event Management TSC can add them to the production scheduler. The final implementation will be ready for the final Project Review.

Here following the table with originally defined BPI

BS 1 – Production Capacity Seller			
Business Performance Indicator	*AS-IS Value*	*Target Value*	*Comments*
Machine fixed costs per produced unit	Under exploitation up to 31% (see fig.3)	- 30 %	sharing unexploited production to third parties
The quantity of energy spent per meter produced for support system	Actually 20% of the total energy is spent for fixed energy costs for supporting systems	- 30 %	sharing significant energy consumption with third parties
Percentage of delivery forecast errors	It reaches 23% or more and up to 4 weeks delay in peak periods.	0 errors in reading of tracing data	Information will be improved in quantity (3 times than now: entry, production, exit), quality (specific fabric in the specific machine) and timing (contextual to production)
BS 2 – Production Capacity Purchaser			
Business Performance Indicator	*AS-IS Value*	*Target Value*	*Comments*
Average production LT per meter produced from order to delivery		max 4 weeks reduction	shortening (Obj.1.2) of delivery times up to 4 weeks (27-33%) in peak period of April-May and November-December
Common to both business scenarios			
Number of production records including machine identification	None	Many	Qualitative indicator indicating the number of production records DA/AV, including machine identification

Table 65 Piacenza Business Performance Indicators

In the following tables a more in depth analysis of performance indicators has been carried out.

No new indicator has been introduced due to adoption of new Components as the business case is not changed.

Name of the PI	Relevance of PI for Business Process	As-Is	Target	What are the impacts on business if expected values are not achieved ?	How the success in technical implementation is related to the actual achievement of target values ?
PI 1.1: Ratio: Machine fixed costs per produced unit after / before the DV/AV implementation during a period*	H	Exploitation of machineries is very variable in relation with the department. It is : • Weaving: from -27% to +10% • Dyeing: from -31% to +15% • Humid Finishing: from -14% to 14% • Raising: from -24% to +13% • Dry finishing: from -27% to +6%	The targetis is to reduce underxploitaion of 30%, with the final as is:• Weaving: from -18% to +10% • Dyeing: from -20% to +15% • Humid Finishing: from -9% to 14% • Raising: from -16% to +13% • Dry finishing: from -18% to +6%	Proporitionl increase of fixed costs per produced unit	At present no structure to share production is available. Technical implementation is critical for the success
PI 1.2: Ratio: Average production lead time per meter produced from order to delivery after / before the DV/AV implementation	H	16-19 weeks delivery in peak time	12-15 weeks delivery in peak time	Range delay of delivery in peak remains as is	Technical implementation is critical for the success

during a period*					
PI 1.3: Ratio: The quantity of energy spent per meter produced after / before the DV/AV implementation during a period*	M	20% of total energy spent for supporting systems	16% of total energy spent for supporting systems	Proporitionl increase of fixed costs per energy per produced unit	At present energy metering measure structure is available but technical implementation of Fitman is critical to obtain the success
PI 2.1: Ratio: Number of production records including machine identification after/before the DV/AV implementation during a period*	H	generic information about production phases conclusion collected by barcode (no specific machine, not entry and exit time per machine)	specific data per each machine and per each piece of fabric serial number of entry, exit and production time	Less accuracy in data to support VF part of the trial (i.e. production capacity sharing or purchase)	At present data to monitor production is partial and inaccurate. Technical implementation is critical to reach the object
P 2.2: Ratio: Percentage of delivery forecast errors after/before the DV/AV implementation during a period*	H	Variable, reaching 23%	near zero	no improvement in comparison with actual accuracy of delivery expected date indication	It can radically enhance the level of accuracy in delivery date indication and the service towards clothing companies (whose production scheduling depends on fabric delivery data precision)

Table 66 Piacenza Reviewed Indicators - 1

	Measurement Approach					
	Plan of the measurements (frequency)	**The organization of the measurement - details**	**Measurement method (automatic/manulal)**	**Data to be Collected**	**People Involved in measurement**	**People involved in Interpretation**
PI 1.1: Ratio: Machine fixed costs per produced unit after / before the DV/AV implementation during a period*	monthly	number of worked hours per department/machine	manual	number of worked hours per department/machine	Dept.manger, production manager, administration, IT	Dept.manger, production manager, administration, IT
PI 1.2: Ratio: Average production lead time per meter produced from order to delivery after / before the DV/AV implementation	monthly	delivery time per pridcution order to customer and per department/machine	mixed	delivery time per pridcution order to customer and per	Dept.manger, production manager, administration, IT, commercial	Dept.manger, production manager, administration, IT, commercial

during a period*				department/machine		
PI 1.3: Ratio: The quantity of energy spent per meter produced after / before the DV/AV implementation during a period*	monthly	number of kw/h per department/machine	mixed	number of kw/h per department/machine	Dept.manger, production manager, administration, IT, maintenance	Dept.manger, production manager, administration, IT, maintenance
PI 2.1: Ratio: Number of production records including machine identification after/before the DV/AV implementation during a period*	hourly	MES and RF-ID readers, tag per each piece	automatic	entry, exit and production time per each machine and per each piece of fabric serial number	Dept.manger, production manager, IT	Dept.manger, production manager, IT
P 2.2: Ratio: Percentage of delivery forecast errors after/before the DV/AV implementation during a period*	monthly	difference between expected and realised date of delivey in days per each order	automatic	per all produced pieces	Dept.manger, production manager, commercial	Dept.manger, production manager, commercial

Table 67 Piacenza Reviewed Indicators 2

7.2. Digital Factory

7.2.1 AIDIMA

.Name of the PI	Importance of PI in comparison with market	As-Is	To-Be	Plan of the measurements (frequency)	The organization of the measurement - details	Measurement method (automatic/manual)	Data to be Collected	1 - Which people are you going to involved 2- Communication process - details 3 - People involved in Interpretation
Search time process per source	Affects directly to the productivity of the research activity: as number of electronic sources increases over time (blogs, forums, comments on social webs…) the ability of traditional (manually) scanning for weak signals diminishes. Hence, it's crucial to develop applications for automatic scanning of weak signals on web. Main impact is that researchers may focus on the selection of electronic sources, instead of focusing on weak signals searching time (that is automated by means of the FITMAN application).	At present, browsing electronic sources in order of getting weak signals is done "manually" by a researcher, what means in some cases many hours dedicated to only know what is published by the electronic source.	Reduction of search time of weak signals will increase the capability of the researcher for finding and including new electronic sources (new platforms, specialized sources such as retail interiors, hotels decoration, etc.), hence producing more index cards	Biannual.	The researcher himself/herself will scan each electronic source for detecting new weak signals.	Two measures: 1) number of electronic sources that are scanned by the researcher [automatically: application counts total number of sources], 2) number of identified weak signals per source [automatically: application counts total number of weak signals found].	Numeric: number of selected weak signals that will be shown on index cards that may be printed out.	The researcher will work with other researchers and will discuss about the number of weak signals to be finally printed out and the inclusion of new appropriate sources for research objectives.
Sources	As number of electronic sources increases over time it's necessary to work with automated search applications for analyzing the amount of available online information.	At present, researchers focus only on a small selection of main electronic sources related to home trends.	As variety and alternative sources are born, researchers need to include more sources in the analysis of home trends.	Biannual.	The researcher himself/herself will scan each electronic source for detecting new weak signals.	Number of electronic sources that are scanned by the researcher [automatically: application counts total number of sources included in the FITMAN	Numeric: number of sources included in the automatic analysis.	The researcher will work with other researchers and will discuss about the inclusion of new appropriate sources for the research objectives.

						application].		
Weak Signals	Weak signals identification is the objective of the home trends research.	At present, identification of weak signals is limited by the number of sources analyzed.	Number of weak signals is expected to increase sigificatively as automation is implemented.	Biannual.	The researcher himself/herself will select new weak signals for creating index cards.	Number of identified weak signals per source [automatically: application counts total number of weak signals found].	Numeric: number of weak signals found through the automatic search.	The researcher will work with other researchers and will discuss about the number of weak signals to be finally selected.
Index cards	The index card is the digital format in which home trends weak signals may be finally delivered to the researcher. Furthermore, home trends will be interpreted through the common analysis of index cards.	At present, weak signal index cards are done manually by the researcher and without pictures.	Index cards will be created automatically, with possibility of adding pictures and printing option.	Biannual.	The researcher himself/herself will decide which index cards are to be printed.	Number of index cards created [automatically: application counts total number of weak signals found].	Numeric: number of final index cards created to print.	The researcher will work with other researchers and will discuss about the number and kind of index cards to be created and printed out.
Complaints resolution time process	Crucial for service quality improvement when identifying and addressing customer dissatisfaction about brands or products.	Resolution time may be delayed if there is no automatic mean for collecting and addressing customer complaints.	Companies / brands will be able to contact customers for offering appropriate responses in the same day.	Daily.	Post-sales Department.	All measures may be done automatically by the FITMAN application.	Numeric and text: number of detected dissatisfaction signs and motivation for negative word of mouth.	Post-sales Department for solutions.
Opinion retrieval	It is important in order to know the positive, neutral or negative sentiment of the customers community towards a company, brand or product.	At present, Internet sentiment analysis is not a common process in the furniture industry.	Companies/ brands will be able to easily interpret the inclination of customers towards the company's value proposal.	Daily.	Marketing Department of the company.	All measures may be done automatically by the FITMAN application.	Numeric: total amount of negative, neutral and positive comments and opinions	Marketing Department for interpreting sentiments. Rest of corporate department accordingly to improve/ maintain value proposal.

							(to be shown graphically by the FTIMAN application).	
Identification of non-reported dissatisfaction	Crucial for service quality improvement when identifying and addressing customer dissatisfaction about brands or products, especially in non-official peer-to-peer conversations (social webs, comments on blogs, etc.).	At present, most of online customers dissatisfaction signs are unnoticed by the company/brand.	Companies/ brands will be able to easily identify dissatisfaction in order to contact customers for offering appropriate responses in the same day.	Daily.	Marketing Department of the company.	All measures may be done automatically by the FITMAN application.	Text: kind and nature of the dissatisfaction.	Marketing Department for proposing solutions in order to reduce customer dissatisfaction. Rest of corporate department accordingly to improve/ maintain value proposal.
Opinion leaders	Personal recommendation (positive or negative) and brand advocacy is an increasing phenomenon between customers in online conversations. Detecting active customers the create opinion about a brand/products in several Internet platforms is important in order to improve the company's value proposal and create adequate marketing strategies.	At present, opinion leaders for furniture products are not taken into account by companies.	Companies/ brands will be able to easily identify online opinion leaders in order to a better understanding of the sentiment origin towards a brand or product.	Daily.	Marketing Department of the company.	All measures may be done automatically by the FITMAN application.	Text and numeric: kind and nature of opinion leaders sentiment and number of opinion leader hits (comments, "I like" signs, etc.).	Marketing Department for proposing solutions to reduce customer dissatisfaction. Rest of corporate department accordingly to improve/ maintain value proposal.

Time saving for the design process in the technical office	In order to keep market pace, the design process must be increasingly faster. For this purpose, the creative stage may be supported with tools so the designers can have a better understanding about current home trends.	At present, furniture design follows market massive trends, but it doesn't take into account weak signals and emerging trends that could give chances for differentiation in New Product Development process.	Inspiration and selection of product guidelines will be faster and easier with automated home trends analysis tools.	Per project (a company may have several new design projects along one year).	Technical/Design office of the company.	Manually, by the designer.	Numeric: days for proposing new product designs.	Technical/Design office of the company.
Number of design sketches per piece of furniture	Important for widening the designer ability to propose different design options.	In a first stage, design projects need to start with some alternative possibilities.	As more inspiration information is available, designers may offer more alternatives for a new product/ collection.	Per project (a company may have several new design projects along one year).	Technical/Design office of the company.	Manually, as sketches are done by the designer.	Numeric: number of sketches created for a specific project.	Technical/Design office of the company.
Number of players taking part in the design	Enrichment of the design project with more players interacting with the designer. New players may be from complementary backgrounds (production, financial, etc.).	Designers starting point is the design brief given by the client or the company's management.	Inclusion of different perspectives in the design process may complement the vision of the brief document.	Per project (a company may have several new design projects along one year).	Technical/Design office of the company.	Manually, as the interaction is promoted by the designer.	Numeric: number of people consulted about design sketches.	Technical/Design office of the company. Rest of departments of the company (management, production, logistics, sales…).

Table 68- Business Performance Indicators for Aidima Trial – Nature and usage of the Indicators

Business Scenario 1: Furniture Trends Forecasting for Product Development

Business Scenario	**Furniture Trends Forecasting for Product Development**			
Objectives	To reduce the time in searching for weak signals		To increase the productivity	
Decision Variables	To use AIDIMA trial platform		To use AIDIMA trial platform	
Performance Indicators	PI1.1: Average lead time in searching for weak signal after / before the DV/AV implementation during a period		PI1.2: Average lead time to create the different index cards after / before the DV/AV implementation during a period	
	AS-IS	Target Value	AS-IS	Target Value
	8h/source	6h/source	100	300
Justification on BPI Target Values	Process done manually, without automated tools for online search and analysis.	Automating searches of weak signals in selected online sources will highly improve the time needed to perform such tasks, thus, making possible to analyze more in less time. Trends report can be ready is less time, therefore, time to market of the information product is reduced as a direct consequence. Working hours saving: Weak signals identification and classification tasks could be reduced in 25%.	Increasing number of specialized online sources on home trends. Volume of data for analysis grows each year.	Number of electronic sources: expected to incorporate new ones in the process (between 150 and 200 more electronic sources at least due to automatic of the search process). Number of weak signals: expected to double as minimum (from 200 approx. to 400 eventually). Production of index cards: expected to triple as minimum (from 100 approx. to 300 eventually).

Table 69 – Aidima Trial - Business Scenario 1

Business Scenario and Obj2: Opinion Mining in Furniture Products

Business Scenario	**Opinion Mining in Furniture Products**		
Objectives	To increase the number of reliable opinions gathered	To increase the opinions gathered from different sources	To reduce the time to collect opinions

Decision Variables	To use AIDIMA trial platform		To use AIDIMA trial platform		To use AIDIMA trial platform	
Performance Indicators	PI2.1: Number of opinions taken in account (to be implemented) after / before the DV/AV implementation during a period		PI2.2: Number of opinions gathered after / before the DV/AV implementation during a period		PI 2.3: : Ratio: Average lead time to collect opinions after / before the DV/AV implementation during a period	
	AS-IS	Target Value	AS-IS	Target Value	AS-IS	Target Value
	0%	100%	0%	100%	>1 day	<1 day
Justification on BPI Target Values	Furniture firms rarely have chance to "hear" what customers think about their products.	Increase rate of 100% as firms will be able to detect automated customer complaints.	Furniture firms are not used to conduct sentiment analysis amongst customers due to lack of tools and marketing orientation.	Increase rate of 100% as firms will be able to detect and consider all online customer input.	Opinions may reach the firm if the customer reports a formal complaint, but complaining behavior not always happen even if the customer is upset.	Customers opinions may be detected in anticipation in the same day, as online comments usually are faster than formal complaints and richer in conveying customer insights.

Table 70 – Aidima Trial - Business Scenario 2

BS3: Collaborative Work for Product Design

Business Scenario	**Collaborative Work for Product Design**			
Objectives	To reduce the time to develop new ideas to be put into production		To increase the sale of the number of pieces of a new furniture	
Decision Variables	To use AIDIMA trial platform		To use AIDIMA trial platform	
Performance Indicators	PI3.1: To reduce the time to develop new ideas to be put into production		PI3.2: To increase the sale of the number of pieces of a new furniture	
	AS-IS	Target Value	AS-IS	Target Value
	Up to 120	[80-100]	-	-
Justification on BPI Target	Depending on the firm, but new collections may	By reducing the time for sketching and	New collections are usually launched to market once a year.	Improving design tools and capabilities will

Values	be created yearly, where design process takes some months from sketches to technical design.	idea development, as an automated tool for product search may be used for designer inspiration.	However, exclusivity of designs is normally addressed to contract projects (such as hotels, auditoriums, etc.), and it does not depend on collection, but on projects.	contribute to better and more exclusive design offering by the manufacturer, especially for contract projects where sales volumes are higher.

Table 71 – Aidima Trial - Business Scenario 3

7.2.2 Consulgal

Name of the PI	Importance of PI in comparison with market	As-Is	To-Be	Plan of the measurements (frequency)	The organization of the measurement - details	Measurement method (automatic/manual)	Data to be Collected	1 - Which people are you going to involved 2- Communication process - details 3 - People involved in Interpretation
PI1: Ratio: Average lead time to access the information relating to concrete characteristics and concreting plan after/before the DV/AV implementation during the concrete control process.	to reduce the time for decision making.	This is the average time between the emission of the document by Contractor/Designer and the reception of the document by the person responsible for the analyzing.	It is the time we hope to save by the elimination of waiting time in the process.	Values will be measured after every completed action.	The measurement is planned to be done by Consulgal.	The measurement will be done manually.	Timestamps.	The involved people are the trial owner and the responsible person, who will provide the data. Communication will be done face-to-face.
PI2: Ratio: Average number of pages used in the test results recording, archival, after/before the DV/AV implementation during one concrete operation.	to reduce paperwork.	This is the average number of pages used for recording the test results during one concrete operation.	It is the average of pages we hope to reduce after introducing an automated solution.	Values will be measured per concrete operation. An average will be calculated at the end of the Trial testing process.	The measurement is planned to be done by Consulgal.	The measurement will be done manually.	Number of pages.	The involved people are the trial owner and the responsible person, who will provide the data. Communication will be done face-to-face.
PI3: Ratio: Average lead time needed to perform and record the test	to reduce the time for decision making.	This is the average time between the manual identification of samples and the time	It is the time we hope to save due to automation of	Values will be measured concrete operation.	The measurement is planned to	The measurement will be done	Timestamps.	The involved people are the trial owner and the responsible person, who will

results after/before the DV/AV implementation during one concrete operation.		needed to fulfill the forms with tests results.	the process.	An average will be calculated at the end of the Trial testing process.	be done by Consulgal.	manually.		provide the data. Communication will be done face-to-face.
PI4: Ratio: Average lead time needed to analyze the test results after/before the DV/AV implementation during one concrete operation.	to reduce the time for decision making.	This is the average time from recording the test results in the forms and the analysis being made by the responsible.	It is the time we hope to save by the elimination of waiting time in the process.	Values will be measured per concrete operation. An average will be calculated at the end of the Trial testing process.	The measurement is planned to be done by Consulgal.	The measurement will be done manually.	Timestamps.	Communication will be done face-to-face.
PI5: Ratio: Time for data exchange between stakeholders after/before the DV/AV implementation during the concrete control process.	to make information available immediately after the events that generated it. to improve efficiency in the process.	This is the average time for data exchange between the designer, the contractor and the supervisor.	It is the time expected to be saved by improving the actual exchange information between stakeholders.	Values will be measured after every completed action. An average will be calculated at the end of the Trial testing process.	The measurement is planned to be done by Consulgal.	The measurement will be done manually.	Timestamps.	The involved people are the trial owner and the responsible person, who will provide the data. Communication will be done face-to-face.

PI6: Ratio: Average cost needed to perform and record the test result after/before the DV/AV implementation during one concrete operation.	to reduce the cost of operations.	This is the average cost of human resources involved in the process.	It is the cost we hope to save due to automation of the process	The value will be calculated with results of PI3, at the end of the Trial testing process.	The measurement is planned to be done by Consulgal.	The measurement will be done manually. The cost will be calculated based on the needed effort & the profile of human resources involved.	The salary of the resources involved is collected through statistical information available for Portugal.	The involved people are the trial owner and the responsible person, who will provide the data. Communication will be done face-to-face.
PI7: Ratio: Average cost needed to analyze the test result after/before the DV/AV implementation during one concrete operation.	to reduce the cost of operations.	This is the average cost of human resources involved in the process.	It is the cost we hope to save due to automation of the process	The value will be calculated with results of PI4 (only operation time), at the end of the Trial testing process.	The measurement is planned to be done by Consulgal.	The measurement will be done manually. the cost will be calculated based on the needed effort & the profile of human resources involved.	The salary of the resources involved is collected through statistical information available for Portugal.	The involved people are the trial owner and the responsible person, who will provide the data. Communication will be done face-to-face.

Table 72 - Business Performance Indicators for Consulgal Trial – Nature and usage of the Indicators

BS 1 – Identification of Concrete characteristics and concreting plan.

This is not coherent with the table above and Obj1, 1.1, 1.2 and 1.3

Business Scenario	**Identification of Concrete characteristics and concreting plan**			
Objectives	To reduce the time to access information relating to concrete characteristics and concreting plan		To reduce the time for exchange of information between stakeholders	
Decision Variables	To use the Consulgal Trial Platform		To use the Consulgal Trial Platform	
Performance Indicators	PI1 Ratio: Average lead time to access the information relating to concrete characteristics and concreting plan after/before the DV/AV implementation during the concrete control process.		PI5: Ratio: Time for data exchange between stakeholders after/before the DV/AV implementation during the concrete control process	
	AS-IS	Target Value	AS-IS	Target Value
	4 hours	*98%	8 hours	*98%
Justification on BPI Target Values		It is the time we hope to save by the elimination of waiting time in the process.		It is the time expected to be saved by improving the actual exchange information between stakeholders.

*Reduce by

Table 73 - Consulgal Trial - Business Scenario 1

BS 2 – Samples collection and testing.

Business Scenario	**Samples collection and testing**			
Objectives	Reduction in the use of paper	To reduce the time to perform, record and analyze the test results.	To reduce the time for exchange of information between stakeholders	To reduce the cost to perform, record and analyze the test results
Decision Variables	To use the Consulgal Trial Platform	To use the Consulgal Trial Platform	To use the Consulgal Trial Platform	To use the Consulgal Trial Platform
Performance Indicators	PI2: Ratio: Average number of pages used in the test results recording, archival, after/before the DV/AV implementation	PI3: Ratio: Average lead time needed to perform and record the test results after/before the DV/AV implementation during	PI5: Ratio: Time for data exchange between stakeholders after/before the DV/AV implementation during the concrete control process	PI6: % : Average cost needed to perform and record the test result after/before the DV/AV implementation during one concrete

	during one concrete operation		one concrete operation				operation.	
	AS-IS	Target Value	AS-IS	Target Value	AS-IS	Target Value	AS-IS	Target Value
	5 Pages	*40%	27,5Min	*30%	8 Hours	98%	2,04€	*30%
Justification on BPI Target Values		It is the average of pages we hope to reduce after introducing an automated solution.		It is the time we hope to save due to automation of the process.		It is the time expected to be saved by improving the actual exchange information between stakeholders.		It is the cost we hope to save due to automation of the process.

*Reduce by

Table 74 - Consulgal Trial - Business Scenario 2

BS 3 - Test results treatment and evaluation.

Business Scenario	**Test results treatment and evaluation**					
Objectives	To reduce the time to perform, record and analyze the test results.		To reduce the time for exchange of information between stakeholders		To reduce the cost to perform, record and analyze the test results	
Decision Variables	To use the Consulgal Trial Platform		To use the Consulgal Trial Platform		To use the Consulgal Trial Platform	
Performance Indicators	PI4: Ratio: Average lead time needed to perform and record the test results after/before the DV/AV implementation during one concrete operation		PI5: Ratio: Time for data exchange between stakeholders after/before the DV/AV implementation during the concrete control process		PI7: % : Average cost needed to analyze the test result after/before the DV/AV implementation during one concrete operation.	
	AS-IS	Target Value	AS-IS	Target Value	AS-IS	Target Value
	39 days	*98%	8 hours	*98%	1,41€	*65%
Justification on BPI Target Values		It is the time we hope to save by the elimination of waiting time in the process.		It is the time expected to be saved by improving the actual exchange information between stakeholders.		It is the cost we hope to save due to automation of the process

*Reduce by

Table 75 - Consulgal Trial - Business Scenario 3

7.2.3 Volkswagen

Main differences in configuration/components for VW compared to first implementation:

- "SE BPM" added: providing the functionality of modelling the Logo Layout
- "SE CAM" added: providing functionalities for calculations
- "SE c3DWV" added: providing 3D visualization for BP "Show production module"
- "SE SEMed" added: providing the functionality to extract module specifications from PLM system

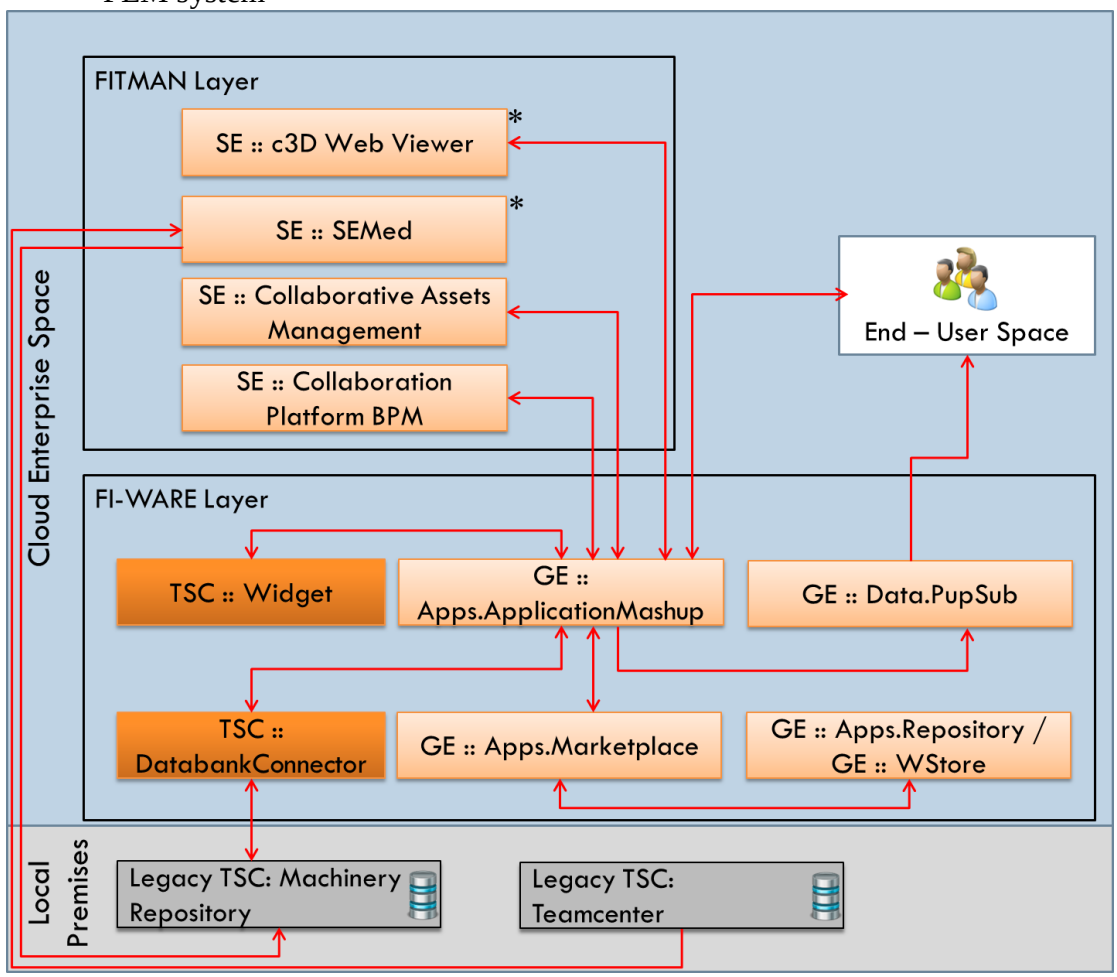


Figure 49 Volkswagen Trial Structure

The next table provides explanations about the nature of the PIs as provided by the Trial Owner.

Name of the PI	Importance of PI in comparison with market	As-Is	To-Be	Plan of the measurements (frequency)	The organization of the measurement - details	Measurement method (automatic/manual)	Data to be Collected	1 - Which people are you going to involved 2- Communication process - details 3 - People involved in Interpretation
PI1: Ratio: Inquiry respond time after / before the DV/AV implementation during a period	To reduced inquiry respond time is expected to reduce time to market	This is the actual value with regard to the actual processes 100%	This value is expected by improving the bottleneck in the actual processes using the FITMAN trial solution 80%	- values will be measured after every completed action (e.g. finish inquiry respond, MR Update, etc.) - values will be accumulated and average will be calculated every implementation phase	The measurement is planned to be done by the trial owner	The measurement will be based and calculated on user reports	Time reports from user	1 - The involved people are the trial owner and the responsible person who will provide the data 2 - Communication will be done by mail or face-to-face 3 - Interpretation will be done by the expert in collaboration with the trial owner
PI2: Ratio: Inquiry respond cost after / before the DV/AV implementation during a period	To reduced respond cost is expected to affect product development cost	This is the actual value with regard to the actual processes 100%	This value is expected by improving the bottleneck in the actual processes using the FITMAN trial solution 90%	- values will be measured after every completed action (e.g. finish inquiry respond, MR Update, etc.) - values will be accumulated and average will be calculated every implementation phase	The measurement is planned to be done by the trial owner	The measurement will be based and calculated on user reports	Effort report from user	1 - The involved people are the trial owner and the responsible person who will provide the data 2 - Communication will be done by mail or face-to-face 3 - Interpretation will be done by the expert in collaboration with the trial owner
PI3: Ratio: MR Update cost after / before the DV/AV implementation during a period	To reduced update cost is expected to affect product development cost	This is the actual value with regard to the actual processes 100%	This value is expected by improving the bottleneck in the actual processes using the FITMAN trial solution 50%	- values will be measured after every completed action (e.g. finish inquiry respond, MR Update, etc.) - values will be accumulated and average will be calculated every implementation phase	The measurement is planned to be done by the trial owner	The measurement will be based and calculated on user reports	Effort report from user	1 - The involved people are the trial owner and the responsible person who will provide the data 2 - Communication will be done by mail or face-to-face 3 - Interpretation will be done by the expert in

								collaboration with the trial owner
PI4: Ratio: Average lead time to access experts knowledge about production equipment after / before the DV/AV implementation during a period	To reduced lead time to access experts knowledge is expected to reduce time to market	This is the actual value with regard to the actual processes 100%	This value is expected by improving the bottleneck in the actual processes using the FITMAN trial solution 29%	- values will be measured after every completed action (e.g. finish inquiry respond, MR Update, etc.) - values will be accumulated and average will be calculated every implementation phase	The measurement is planned to be done by the trial owner	The measurement will be based and calculated on user reports	Time report from user	1 - The involved people are the trial owner and the responsible person who will provide the data 2 - Communication will be done by mail or face-to-face 3 - Interpretation will be done by the expert in collaboration with the trial owner
PI5: Ratio: MR Update time after / before the DV/AV implementation during a period	To reduced MR update time is expected to accelerate the time to market	This is the actual value with regard to the actual processes 100%	This value is expected by improving the bottleneck in the actual processes using the FITMAN trial solution 56%	- values will be measured after every completed action (e.g. finish inquiry respond, MR Update, etc.) - values will be accumulated and average will be calculated every implementation phase	The measurement is planned to be done by the trial owner	The measurement will be based and calculated on user reports	Time report from user	1 - The involved people are the trial owner and the responsible person who will provide the data 2 - Communication will be done by mail or face-to-face 3 - Interpretation will be done by the expert in collaboration with the trial owner
PI6: Ratio: Evaluation accuracy before/after the DV/AV implementation during a period	To have an increased evaluation accuracy is expected to reduce miscalculation	This is the actual value with regard to the actual processes 100%	This value is expected by improving the bottleneck in the actual processes using the FITMAN trial solution 50%	- values will be measured after every completed action (e.g. finish inquiry respond, MR Update, etc.) - values will be accumulated and average will be calculated every implementation phase	The measurement is planned to be done by the trial owner	The values will be compared manually	Evaluated value, real value.	1 - The involved people are the trial owner and the responsible person who will provide the data 2 - Communication will be done by mail or face-to-face 3 - Interpretation will be done by the expert in collaboration with the trial owner

Table 76 - Business Performance Indicators for Volkswagen Trial – Nature and usage of the Indicators

Business Scenario 1: Inquiry Service

Business Scenario	**Inquiry Service**							
Objectives	Reduction of time needed for the assessment of product related inquiries		Reduction of costs, spend for the assessment of product related inquiries		Reduction of the lead time to access experts knowledge about production equipment		Improvement of evaluation accuracy	
Decision Variables	To use the Volkswagen Trial Platform		To use the Volkswagen Trial Platform		To use the Volkswagen Trial Platform		To use the Volkswagen Trial Platform	
Performance Indicators	PI 1 : Ratio : Inquiry respond time after / before the DV/AC implementation during a period		PI 2: Ratio : Inquiry respond cost after / before the DV/AC implementation during a period		PI 4: Ratio : Average lead time to access experts knowledge about production equipment after / before the DV/AC implementation during a period		PI6: Ratio: Evaluation accuracy before/after the DV/AV implementation during a period	
	AS-IS	Target Value	AS-IS	Target Value	AS-IS	Target Value	AS-IS	Target Value
	100%	80%	100%	90%	100%	29%	100 %	50%
Justification on BPI Target Values		Possible improvement by using the FITMAN solution (web service, communication, etc) based on experts experience		Possible improvement by using the FITMAN solution (web service, communication, etc) based on experts experience		Possible improvement by using the FITMAN solution (web service, communication, etc) based on experts experience		Possible improvement by using the FITMAN solution (web service, communication, etc) based on experts experience

Table 77 - VW Trial - Business Scenario 1

Business Scenario 2: Management the MR

Business Scenario	**Management the MR**	
Objectives	Reduction of costs, spend for the management of the Machinery Repository	Reduction of the time for updating a production module within in MR
Decision Variables	To use the Volkswagen Trial Platform	To use the Volkswagen Trial Platform

Performance Indicators	PI 3: Ratio : MR Update cost after / before the DV/AV implementation during a period		PI 5: Ratio : Reduction of the time for updating a production module within in MR	
	AS-IS	Target Value	AS-IS	Target Value
	100%	50%	100%	56%
Justification on BPI Target Values		Possible improvement by using the FITMAN solution (web service, communication, etc) based on experts experience		Possible improvement by using the FITMAN solution (web service, communication, etc) based on experts experience

Table 78 - VW Trial - Business Scenario 2

7.2.4 AGUSTA

Agusta didn't report any specific change with what specified in deliverable 5.4 FITMAN Technical / Business Indicators for Digital Factory as described in the following tables.

Business Indicator 1- AW DIGITAL TRIAL	
Indicator Name	**PI1:** Reduction of avg time to make data available in a digital format to different departments after/before the DV/AV implementation during the period
Purpose:	Make the search of data easier and faster **Obj1.** To reduce the time to access information relating to concrete characteristics and concreting plan.
Format :	%.
Information needed (Source of data)	**Source of data:** new db and AW internal sources **Before trial implementation**: Team information. **After trial implementation**: AW Trial platform.
Calculation Processing (Formula)	Time needed to access the information during period. (after / before).
Required evolution (Target)	- 20% (we expected the reduction of time after the trial implementation)
The owner (Who measures)	AW
Period	6 month
Actions to react depending on the value of the PI	Preparation of digital document and db search for search and use of data, use of AW trial platform
Description mode	To be defined – under construction

Business Indicator 2- AW SMART TRIAL	
Indicator Name	**PI6:** More tailored training materials linked to the results of new tracking tools approach
Purpose:	**Obj1.** Support for monitoring and management of tools tracking for training purpose
Format :	Document
Information needed (Source of data)	**Source of data:** db of tools tracking with dummied data **Before trial implementation**: Team information. After trial implementation: Team Information and AW Trial platform.
Calculation Processing (Formula)	There is no mathematical formula applicable, as the indicator is a qualitative one.
Required evolution (Target)	Qualitative
The owner (Who measures)	AW
Period	6 months
Actions to react depending on the value of the PI	Use of smart platform linked to Snapon- toolbox db and system of tools tracking linked to training issue
Description mode	Under construction

7.3. Virtual Factory

This short part aims to update the work done in the deliverable D6.4 and during the last months in the task 6.4. It aims at presenting the final list of Business Performance Indicators (BPI's) that are defined and validated by the three virtual trials: APR, TANET and COMPLUS and to justify these BPI's in conjunction with the trial strategy and with the WP2 methodology. This part aims also to answer to review recommendations, to demonstrate that BPI's are really adopted by trials with giving the information to understand their relevancy for each trial, and to understand better how technical indicators are related to objectives and quantitative measures.

However, this part contents only the addition text from D6.4 and not the whole work that have been done in the T6.4. The final BPI's are reminded but their specifications not.

The objective was to collect, for each BPI, the following information:

- Why this PI's is important (comment 4 of the RR) in comparison with market and competitors
- Why this value of AS IS
- Why this value of TO BE
- How do you plan to organize the measurement in order to be sure that the obtained values are realistic
- What measures can be done automatically and what manually? How automatically
- Which data are you going to collect and how? How manually?
- Which people are you going to involve and why?
    - How to interview them?
    - How to reconcile opposite opinions?

- How to solve conflicts?
- In any case, also in the case of automatic measures they MUST be interpreted by experts.
- What does it mean PI xyz 22 when the target was 25 and the as-is 21?
- Who is going to interpret it?

This document is organized in three sections related to the three virtual factory trials.

7.3.1 APR

Within FITMAN, the Trial APR is a part of Virtual factory with the aim of enhancing the relation with its customers, suppliers and producers.
We remind that the main objectives of APR in FITMAN are to improve the relationships and reactivity with suppliers and customers and to set up an approach to analyses the reasons of non-successes in the quotes.

The following table describes the adoption information for the BPI's corresponding to the various Business Processes and the details for the adopted BPI's.

Business process 1: *To create a Quote*.

- To improve the lead time to answer to a quote
- To decrease the number of unsuccessful quotes due to high price

Business Process 2: *Quote recovery*

- To optimize the time for analysis and control of customer recovery
- To reduce the customer recovery lead time

Business process 3: *To create an order*.

- To reduce the lead time of the acknowledgement of receipt
- To increase the time part for analysis and control of orders

Business process4: *Order tracking*.

- To optimize the production time
- To decrease the number of products received bock due to faults

Business process 5: *Procurement order consultation*.

- To decrease the internal stock out rate
- To decrease the external stock out rate

Business process 6: *Procurement order and strategic investment*.

- To increase the part of orders realized in a negotiated market

TRIAL 6 APR	*Name of the BPI*	*Why this PI's is important (comment 4)in comparison with market and competitors*	*Why this AS IS*	*Why this TO BE*	*Plan of the measurements,*	*Organization of the measurement*	*What measures can be done automatically and what manually? How automatically*	*Which data are you going to collect and how? How manually*	*Which people are you going to involve and why? How to interview them? How to reconcile opposite opinions? How to solve conflicts? In any case, also in the case of automatic measures they MUST be interpreted by experts.*
BP_1	Time limit for responding to quotes demand (current/new product) **after / before the DV/AV implementation during a period***	The reactivity of the quotation process allows to validate with customer the criticality of the demand.	**Current (4 days) because of a lack of IT tool**	**2 days because of the platform**	Treatment of the information flows is automatically with the traceability of answers	Definition of the tasks of everyone	BPI is evaluated from the payload	Time between the date of reception confirmed by the customer and the date of customer quotation request (automatically)	The account manager validates customer needs. Purchase management validates material needs. Methods validates production time, The information must follow the established process. Each information is treated by an expert, he is the guarantor of his answer so others person cannot return to that. If the results are worse than the AS IS, then we will revise this BP functional specifications in order to improve it.The attributed resources will be spent for the Commercial service enhancement. For the same results as the

									AS-IS the BP will be kept for traceability
	% of the unsuccessful quotes due to high price after / before the **DV/AV** implementation during a period*	The reactivity of the quotation response validates with the customer the best transformation solution to meet his requirement	**60%**	**30%**	Treatment of the information flows is automatically with the traceability of answers	Definition of the tasks of everyone	BI is evaluated from the customer answer	% Number of unsuccessful quotes due to high price/Total number of quotes processed (automatically)	The account manager validates customer needs. Purchase management validates material needs. Methods validates production lead-time. The information must follow the established process. each information is treated by an expert, he is the guarantor of his answer so others person cannot return to all that. If the results are worse than the AS IS, then we will revise this BP functional specification in order to improve it. The attributed resources will be spent for the Commercial service enhancements.
BP_2	% of time for analysis and control of customer recovery after / before the **DV/AV** implementati	The analysis of customer information allows a better understanding of his needs.	10%	40%	Automation of the seized tasks	Replacement of the task of seizure by a task of analysis	BI is evaluated at the level of analysis and discussion with customer	% Total time for analysis and control of customer recovery / Total processing time of customer recovery	The account manager analyzes customer requirement. Sales managers validates tender. The information of the validation of the encryption must be interpreted by the

	on during a period*							(automatically)	two services via a flow of validation of commercial coefficient. If the results are worse than the AS IS, then we will revise this BP functional specification in order to improve it. The attributed resources will be spent for the Commercial service enhancements. For the same results as the AS-IS the BP will be keep for traceability
	Average time of customer recovery after / before the **DV/AV** implementation during a period*	When the time of customer recovery is short, we can know quickly customer needs.	7-14 days	7 days	Treatment of the information flows is automatically with the traceability of answers	Definition of the tasks of everyone	BI is evaluated from the time of customer recovery	Time between the date of customer recovery and the Sending date of commercial proposal (automatically)	Sales management reminds customer and gives him explications, they must give details to the client. If the result is more than 20 days we will stop this BP. If it's minus than 20 days we will keep it for the organization improvement
BP_3	Average time to confirm the order with acknowledge	Customer delivery time is becoming more and more short.	4 days	48 h	Treatment of the information flows is	Definition of the tasks of everyone	BI is evaluated at customer delivery time	Time between the date order acknowledgment to the client (client	The launch department controls and creates needs / orders. Manufacturing department plans machines.

	ment of receipt (with/ without quote) after / before the **DV/AV** implementation during a period*	Therefore, the time of administrative treatment should be shorten in order to respect committed production delay.			automatically with the traceability of answers			confirmation) and date of sending the order confirmation (automatically)	Purchase management plans material. Conflicts are handled in order of priority (client delay / Prod delay / Purchasing delay) ,if responsible cannot hold the required delay, they must provide the best solution. If the results are worse than the AS IS, then we will revise this BP functional specification in order to improve it. The attributed resources will be spent for the Commercial service enhancements. For the same results as the AS-IS the BP will be keep for traceability
	% of time for analysis and control of orders after / before the **DV/AV** implementation during a period*	The analysis of customer orders should allow a good quality of treatment, and anticipate administrative gaps.	20%	50%	Automation of the seized tasks	Replacement of the task of seizure by a task of analysis	BI is evaluated from the verification and discussion with customer about order information	% Total time for analysis and control of orders / Total processing time of customer orders (automatically)	The launch department controls and creates needs / orders. The account manager validates customers needs. Gaps are detected by launch department and are normalized by the account manager in agreement with the customer. It should not be any conflict

									on this phase because it presents the basis of the contract between us and our clients.
BP_4	% Customer service rate after / before the **DV/AV** implementation during a period*	Quality of service allows us to maintain our margins compared to the competitors.	93%	96%	Treatment of the information flows is automatically with the traceability of answers	Steering of production data	BI is evaluated at the time of delivery orders	% Number of orders not delivered out delay/Total number of orders delivered (automatically)	During the planning, production department manages the Security percentage in order to answer to hazards. If the results are worse than 95% then we will stop this BP. The attributed resources will be spent for the Planning service enhancements.
	Number of products received back due to faults after / before the **DV/AV** implementation during a period*	we lose market opportunities when producing non-quality products.	10	7	Automation of the seized tasks	Replacement of the task of seizure by a task of analysis	BI is evaluated at the reception time of the order	Number of products received back due to faults (automatically)	Launch department checks and creates needs / norms of clients. Manufacturing department products items according to customer norms . Quality department checks items according to the customer norms . Conflicts are managed by quality according to the customer (derogation). If the results are worse than 9/month then we will stop this BP. The attributed resources will be spent for the

									Quality service enhancements.
BP_5	% Internal Stockout rate after / before the **DV/AV** implementation during a period*	Customer delivery time is becoming more and more short, so we must have the best material at the right time.	20%	5%	Automation of the seized tasks of consultations	Analysis of consultations	Bi is evaluated before sending a consultation to supplier	number of disruptions of internal stock per year (automatically)	Purchase management manage the supply. Conflicts are managed by purchase management which may cancel the order at the supplier to fall back on a second supplier to respect deadlines. If the results are worse than the AS IS, then we will revise this BP functional specification in order to improve it.
	% External Stockout rate after / before the **DV/AV** implementation during a period*	Development of partnership with our suppliers must allow a good partnership to optimize the material supply.	5%	1%	gathering of needs	Replacement of orders tasks by tasks of managements delivery	Bi is evaluated from supplier answer	number of disruptions of external stock per year (automatically)	Purchase management manage the supply. Conflicts are managed upstream in order to anticipate stockouts. If the results are worse than the AS IS, then we will revise this BP functional

									specification in order to improve it.
BP_6	Value of stock at the end of last period after / before the DV/AV implementation during a period*	The cost of stock directly impact our cost, so the less it is important the more we will be competitive.	230 K euros	180 K euros	Define more precisely the need of material	analysis of consultations and grouped orders	BI is evaluated from the analysis of investment	Value of stock at the end of last period in terms of material costs only (automatically)	Purchase management manage the supply. Conflicts are managed by the general management in order to validate the increase or not of stocks. The results impact will be in correlation with the stockouts indicators : 250k€ + no stockouts or great results on BP5 indicators = OK From 200 to 250k€ + less stockouts (Between the AS-IS and the TO BE of the stockouts indicators) = OK From 180 to 200K€ + Same results on stockouts as is before implementation = OK

Table 79 Reviewed list of Performance Indicators for APR

7.3.2 **TANET**

SMECluster is a service provided by Sematronix which facilitates the clustering of companies to fulfil tender opportunities
By utilizing the services of SMECluster, member companies are able to access more frequent business opportunities, and those that are more accurately matched to their capabilities.
Within FITMAN the trial TANET/SMEcluster aims to improve the reactivity of SME's in answering to the calls and to create new opportunities.

The following table describes the adoption information for the three first BPI's corresponding to the various Business Scenarios

Business Scenario 1: *Import of Tender Opportunities*

- To increase the number of Business Opportunities
- To decrease the time to integrate a the new business opportunity source
- To increase the number of services offered for a tender matching on the platform

Business Scenario 2: *Improvement of facilitator role*

- To reduce the time taken in an end to end clustering operation
- To decrease the time taken to enter a new tender in the system

Business Scenario	*Name of the BPI*	*Why this PI's is important (comment 4)in comparison with market and competitors*	*Why this AS IS*	*Why this TO BE*	*Plan of the measurements,*	*The organization of the measurement*	*What measures can be done automatically and what manually? How automatically*	*Which data are you going to collect and how? How manually*	*Which people are you going to involve and why? How to interview them? How to reconcile opposite opinions? How to solve conflicts? In any case, also in the case of automatic measures they MUST be interpreted by experts.*
BS1	**Tenders accrued monthly**	The more tenders that are accumulated, the more clusters can be created and bring in greater revenue. The more easily we can accumulate clusters, the greater an advantage we have in the market.	From data gathered, we can see that the SMECluster platform as-is has become largely inactive. Due to this, facilitators no longer seek out new tenders to enter into the system, instead bypassing it altogether.	Tenders need to be accrued at a rate that can be managed, ensuring that only suitable tenders are selected for completion, while ensuring a variety of choice for provider members.	Gather information from opportunity database.	Sematronix	Automatically gathered, monthly report generated based on database.	None.	A Sematronix administrator will interpret the automated reports produced by SMECluster. Failing to achieve the expected range of values will indicate there are flaws in the data-entry process which will need to be evaluated.

	Active facilitators	The more facilitators using the system, the wider the level of experience brought by individual facilitators, and the greater their coverage of cluster-forming expertise.	Our facilitator login system shows that facilitators rarely use the existing platform. This is unacceptable for the future SMECluster system.	Predicted numbers of active facilitators are based on polls of interested parties. The more facilitators the better; however, the role requires expert knowledge and experience of the sector.	Gather information from login database.	Sematronix	Automatically gathered, monthly report generated based on database.	None.	A Sematronix administrator will receive a monthly logins report, which will give grouped values for provider and facilitator logins. Lower than expected facilitator numbers may indicate a facilitator is struggling to use the platform.
	Registered service providers	The more providers registered on the system, the more tenders can be completed; the wider the variety of tenders that can be considered, and the more attractive the system becomes to new members.	The current SMECluster system has a number of existing local businesses registered on its database; however, we are unaware of their level of interactivity with SMECluster.	From business forums, SMECluster will have opportunity to forge relationships with up to 1000 local businesses. However, given predicted enrolment rates, our estimate was based on a 8-12% conversion rate.	Gather information from CAM and login database.	Sematronix	Automatically gathered, monthly report generated based on database.	None.	A Sematronix administrator will receive a monthly report of registered service providers. Underachieving the predicted value may indicate a slower than expected uptake rate, or a weakness in the marketing strategy. However, it may also indicate a sluggish market.

BS2	**End-to-end clustering time**	Rapid turnaround of clusters means facilitators can perform more operations in the same time frame, which is better for the service's members.	Interviews with the current facilitator of SMECluster suggested a wide range of times taken to complete a cluster; the stated value was based on a median estimate.	This is a prediction, estimating the amount of time which can be eliminated by using automated communication and collaboration processes. Rapid turnaround of a cluster gives confidence to cluster members and ensures their continued involvement in the clustering process.	Combination of database metrics and facilitator interviews.	Sematronix	Collect start and end times for each stage of cluster management.	Compile a manual report aggregating time taken to complete tendering stages. Interview facilitators for their impressions of how rapidly a cluster can be processed. Perform once, at end of implementation (M21).	A Sematronix administrator will receive an automated report of cluster process times. Excessive times may indicate a failure of the facilitator to engage provider parties. Interviews will be conducted with facilitators by a Sematronix manager. Negative feedback from facilitators may suggest a need to review the user experience.

	Automation of tender input	Automating tender aggregation improves our user experience, thereby making the platform more attractive to new and existing members.	Interviews with the current facilitator of SMECluster gave an average manual input time, as stated.	The most rapid tender input can be achieved by automating all stages of the process; from acquisition to data entry to clustering. Automated processes are capable of performing all of these processes in seconds. The value to SMECluster is based on the number of tenders which can be clustered with minimal facilitator involvement, freeing the facilitator for other activities such as confirming clusters.	Data gathered from QA and load test servers.	Control 2K	Collect start and end time of data entry stage.	None.	A Control 2K administrator will analyses system data such as automated tender input time. An excessive time will most likely be indicative of system stress or failure.

Table 80 Reviewed list of Performance Indicators for TANET

7.3.3 COMPLUS

This Trial aims to improve the control components of light systems for locations and plants in terms of software and hardware with the aim of developing the concept and the platform for a collaborative Front-Loading, for a network of SMEs for production of special LED Lights and LED Lighting Systems.

So, their main objectives in FITMAN project are to improve the reactivity of the network and to secure and improve their information system.

The following table describes the adoption information for the BPI corresponding to the two Business Scenarios:

Business Scenario 1: *Transparency and consistency of ITs and documents*

This Scenario includes two business processes with the following BPI's:

- Document Sharing
  - To provide a platform for document sharing
  - To provide a platform for sharing best practices in reference processes and ITs
- Sharing best Practices in reference processes and IT where the BPIs are reported in the following table.

Business Scenario 2: *Network Transparency for more efficient Suppler Search*.

This Scenario includes two business processes with the following BPI's:

- Information Entry for Network Configuration
  - To provide a service that allows transparent and visual Network configuration

- Supplier Search
  - To provide a service that allows more efficient supplier search

TRIAL 9 COM+	*Name of the BPI*	*Why this PI's is important (comment 4)in comparison with market and competitors*	*Why this AS IS*	*Why this AS IS*	*plan of the measurements,*	*the organization of the measurement*	*What measures can be done automatically and what manually? How automatically*	*Which data are you going to collect and how? How manually*	*Which people are you going to involve and why? How to interview them? How to reconcile opposite opinions? How to solve conflicts? In any case, also in the case of automatic measures they MUST be interpreted by experts.*
BP_1	Decrease of mistakes and errors after / before the implementation during a period	This indicator should provide a mean to measure the impact of implementing a solution for document sharing	30%	10%	Continuously and every time when there is a need for document sharing and versioning control	No additional organizational effort is needed	BPI is evaluated from the network manager	Information for this indicator will be collected during the use of the solution for a period of time.	The measurements will be given from the Network Manager as a main user. Conflicts and opposite decisions will be solved through repeatable experiments and interviews.
BP_2	Average Time for configuration and data entry of LED Network before and after the solution during per occurrence	This indicator a mean to measure the impact of the solution to transparently configure the supply network including stakeholders, products and dependencies	1Month in average Currently there is not a formalized solution or docume	1 hour. This improvement will have an impact to the decrease the time-to-market in	Every time there is a new stakeholder or a product in the network	No additional organizational effort is needed	BPI is evaluated from the network manager	This indicator will be determined by the Network Manager as a main user	Based on new customer requirements and needs, the Network Manager on going to use the solution to configure the supply network. The measurements will be given from the Network Manager as a main user. Conflicts and opposite decisions will be solved

			ntation of the network	the early design phase of the product					through repeatable experiments and interviews.
	Level of transparency of the network according to the trial requirements	This indicator should provide a mean to measure the impact of the solution to achieve transparency beyond the 1st tier supplier. Values from 1 (total transparency) to 5(no transparency)	**1**	4 – this value shows an significant improvement of the network transparency	Continuously and every time there is a new stakeholder or a product in the network	No additional organizational effort is needed	BPI is evaluated from the network manager	Effort and tools for achieving the transparency of LED Network. This information will be collected from the Network Manager	The measurements will be given from the Network Manager as a main user. Conflicts and opposite decisions will be solved through repeatable experiments and interviews.
	Average time for searching of the supplier in the LED Network before and after the solution	This indicator should provide a mean to measure the impact of the solution to search for suppliers within the network beyond the tier 1 suppliers	1Month in average Currently there is not a formalized solution or documentation of the	1 hour. This improvement will have an impact to the decrease the time-to-market in the early design	Every time there is a need for information about the supplier within the network	No additional organizational effort is needed	BPI is evaluated from the network manager	Effort and tools for documenting the supplier information within the LED Network. This information will be collected from the Network Manager	The measurements will be given from the Network Manager as a main user. Conflicts and opposite decisions will be solved through repeatable experiments and interviews.

			network	phase of the product					

Table 81 Reviewed list of Performance Indicators for COMPLUS

8. Annex

8.1. MS Access Database

Information gathered from the surveys (see Section 2.4 Tools) are available to the stakeholders in a relational database in the FITMAN Intranet.
The MS Access db file is not part of this deliverable, but is available to the reviewers.
Here following it is depicted the key information regarding the DB structure.

8.1.1 Tables

Table :	PI_Survey – Data From General Survey
ID	Main Key
Trial	Trial ID
Scenario	Scenario ID
Component	SW Component ID
PI_ID	Performance Indicator Unique ID
PI_Desc	Performance Indicator Short Description
AS-IS	AS-IS Value Before Implementation
Target	Expected Target Value After Implementation
TO-BE1	First Value of the indicator collected after Implementation
TO-BE1Date	Date when the First Value is collected
TO-BE2	Second Value of the indicator collected after Implementation [Optional]
TO-BE2Date	Date when the Second Value is collected
TO-BE3	Third Value of the indicator collected after Implementation [Optional]
TO-BE3Date	Date when the Third Value is collected
Comments	Comments about the Indicator entered by the user in the survey
Journal	This Field is utilized in case a Journal is Stored
Table :	PI_Community – Data from Community Surveys
Trial	Trial ID the Value of the Community Survey indicator is collected from
Mail	Mail of the Answer
Role	Role of the Answer
Role_comment	Comment to the Role of the Answer
PI_ID	ID of PErformance Indicator (only Technical for Community Based)
PI_Desc	Description of Indicator
PI_Value	Value
PI_Comments	Comment collected from the Survey
Table :	PI
PI_ID	Unique identified of the Performance Indicator
PI_Descr	Short Name of the PI
PI_Name	Long Description of the PI
PI_Type	Type of the PI (technical or business)
PI_Trial	Trial the PI indicator refer to (valid only for Business Indicators)
PI_Scenario	Scenario the Indicator refer to (valid only for Business Indicators)
PI_Classe	Class of the Indicator (only Business). It can be Cost, Productivity and

	Quality
UM	Unit of Measure
Table :	Scenario
Scenario_Trial	Trial to whom the Scenario belong to
Scenario_ID	# of the scenario in the trial
Scenario_Descr	Description of the Scenario
Table :	Trials
Trial_ID	ID of the Trial
Trial_Name	Name of the Trial
Table :	SW_Components
SW_ID	Unique identified of the SW Component
SW_TYPE	Specify if the Component is a GE a SE or a TSC/TIC
SW_Descr	Description of the Component
SW_Active	Take into account some component could be obsolete

8.2. Reports

A preliminary set of reports has been implemented to highlight key elements regarding BPI and TPI. They have been also utilized for monitoring the loading process of information by Trials.
Just as example the main ones are reported here following.
The first one represent the BPI entered by Trial and by Scenario, highlighting where TO-BE values have been entered and with a calculation of how these values are close to the target defined for each indicator.

8.2.1 Report: % Improvement of Business Performance per Trial and per Scenario

Trial # Trial_Name
Scenario_Descr

1 VOLKSWAGEN
INQUIRY SERVICE
Average Progress of Scenario **37,83%**
MANAGEMENT OF THE MACHINE REPOSITORY
Average Progress of Scenario
Average Progress of Trial **37,83%**

2 TRW
RISK DETECTION AND INFORMATION
Average Progress of Scenario **88,30%**
RISK MODELLING
Average Progress of Scenario **62,67%**
Average Progress of Trial **74,06%**

3 AGUSTA WESTLAND
Support for management of documentation
Average Progress of Scenario
Support for monitoring and management of tools' tracking linked to training purpose
Average Progress of Scenario
Average Progress of Trial

4 WHIRLPOOL
BIG DATA SCENARIO
Average Progress of Scenario **266,04%**
EVENT SCENARIO
Average Progress of Scenario **365,21%**
Average Progress of Trial **332,15%**

5 PIACENZA
PRODUCTION CAPACITY PURCHASER
Average Progress of Scenario
PRODUCTION CAPACITY SELLER
Average Progress of Scenario **100,00%**

Average Progress of Trial **100,00%**

6 APR

IMPROVE INFORMATION QUALITY IN THE INTERACTION WITH CUSTOMERS

Average Progress of Scenario **90,00%**

IMPROVE INFORMATION QUALITY IN THE INTERACTION WITH SUPPLIERS

Average Progress of Scenario

Average Progress of Trial **90,00%**

7 CONSULGAL

IDENTIFICATION OF CONCRETE CHARACTERISTICS AND CONCRETING PLAN

Average Progress of Scenario **102,01%**

SAMPLES COLLECTION AND TESTING

Average Progress of Scenario **206,85%**

TEST RESULTS TREATMENT AND EVALUATION

Average Progress of Scenario

Average Progress of Trial **171,90%**

8 TANET

IMPORT OF TENDER OPPORTUNITIES

Average Progress of Scenario **16,67%**

IMPROVEMENT OF FACILITATOR ROLE

Average Progress of Scenario **12,50%**

Average Progress of Trial **15,00%**

9 COMPLUS

NETWORK TRANSPARENCY FOR MORE EFFICIENT SUPPLIER SEARCH

Average Progress of Scenario

TRANSPARENCY AND CONSISTENCY OF ITs AND DOCUMENTS

Average Progress of Scenario **29,17%**

Average Progress of Trial **29,17%**

11 AIDIMA

COLLABORATIVE WORK FOR PRODUCT DESIGN

Average Progress of Scenario

FURNITURE TRENDS FORECASTING FOR PRODUCT DEVELOPMENT

Average Progress of Scenario

OPINION MINING IN FURNITURE PRODUCTS

Average Progress of Scenario **20,56%**

Average Progress of Trial **20,56%**

8.2.2 Report : Ranking of the SW Components (GEs and SEs) per Technical Performance Indicator

The following report represent the score achieved by various SW components (both GEs and SEs) in the assessment by the Trials according the V&V methodology (see [1])

GE	Apps.ApplicationMashup			
	Ease of application			
			Level 1	2
			Level 2	2
			Level 3	2
			Ease of application Average Score	2
	Interoperability Maturity			
			Level 1	3
			Level 2	1
			Level 3	2
			Interoperability Maturity Average Score	1,8
	Openness			
			Level 2	4
			Level 3	2
			Openness Average Score	2,3
		Global Score of Component	**Apps.ApplicationMashup**	**2,1**
GE	Apps.LightSemanticComposition			
	Ease of application			
			Level 0	1
			Level 1	1
			Level 2	1
			Ease of application Average Score	1
	Interoperability Maturity			
			Level 1	2
			Level 2	1
			Interoperability Maturity Average Score	1,3
	Openness			
			Level 1	2
			Level 2	1
			Openness Average Score	1,3
		Global Score of Component	**Apps.LightSemanticCompos**	**1,2**
GE	Apps.Marketplace			
	Ease of application			
			Level 0	2
			Level 3	1
			Ease of application Average Score	1
	Interoperability Maturity			
			Level 1	2
			Level 2	1

		Interoperability Maturity Average Score	1,3
	Openness		
		Level 2	3
		Openness Average Score	2
		Global Score of Component **Apps.Marketplace**	**1,4**
GE	Apps.Mediator		
	Ease of application		
		Level 1	1
		Level 3	1
		Ease of application Average Score	2
	Interoperability Maturity		
		Level 3	2
		Interoperability Maturity Average Score	3
	Openness		
		Level 1	2
		Openness Average Score	1
		Global Score of Component **Apps.Mediator**	**2**
GE	Apps.Repository		
	Ease of application		
		Level 2	2
		Level 3	1
		Ease of application Average Score	2,3
	Interoperability Maturity		
		Level 1	2
		Level 2	1
		Interoperability Maturity Average Score	1,3
	Openness		
		Level 2	3
		Openness Average Score	2
		Global Score of Component **Apps.Repository**	**1,9**
GE	Data.BigData		
	Ease of application		
		Level 1	1
		Level 3	1
		Ease of application Average Score	2
	Interoperability Maturity		
		Level 2	1
		Level 3	1
		Interoperability Maturity Average Score	2,5
	Openness		
		Level 1	1
		Level 3	1
		Openness Average Score	2
		Global Score of Component **Data.BigData**	**2,2**

GE Data.PubSubCAPContext
Ease of application
Level 1 1
Level 2 1
Ease of application Average Score 1,5
Interoperability Maturity
Level 3 2
Interoperability Maturity Average Score 3
Openness
Level 1 1
Level 2 1
Openness Average Score 1,5
Global Score of Component **Data.PubSubCAPContext** **2**

GE Data.PubSubOrionContext
Ease of application
Level 1 1
Ease of application Average Score 1
Interoperability Maturity
Level 1 1
Interoperability Maturity Average Score 1
Openness
Level 2 1
Openness Average Score 2
Global Score of Component **Data.PubSubOrionContext** **1,3**

GE Data.SemanticApplicationSupport
Ease of application
Level 2 1
Level 3 1
Ease of application Average Score 2,5
Interoperability Maturity
Level 0 1
Level 3 1
Interoperability Maturity Average Score 1,5
Openness
Level 2 2
Openness Average Score 2
Global Score of Component **Data.SemanticApplicationS** **2**

GE Data.UDA
Ease of application
Level 2 2
Ease of application Average Score 2
Interoperability Maturity
Level 1 1

		Level 2	1
		Interoperability Maturity Average Score	1,5
	Openness		
		Level 1	2
		Openness Average Score	1
		Global Score of Component **Data.UDA**	**1,5**
GE	IoT.Backend.ConfMan		
	Ease of application		
		Level 3	3
		Ease of application Average Score	3
	Interoperability Maturity		
		Level 3	3
		Interoperability Maturity Average Score	3
	Openness		
		Level 2	1
		Level 3	2
		Openness Average Score	2,7
		Global Score of Component **IoT.Backend.ConfMan**	**2,9**
GE	IoT.Backend.DeviceManagement		
	Ease of application		
		Level 2	1
		Ease of application Average Score	2
	Interoperability Maturity		
		Level 2	1
		Interoperability Maturity Average Score	2
	Openness		
		Level 2	1
		Openness Average Score	2
		Global Score of Component **IoT.Backend.DeviceManage**	**2**
GE	IoT.Backend.IoTBroker		
	Ease of application		
		Level 3	3
		Ease of application Average Score	3
	Interoperability Maturity		
		Level 3	3
		Interoperability Maturity Average Score	3
	Openness		
		Level 2	1
		Level 3	2
		Openness Average Score	2,7
		Global Score of Component **IoT.Backend.IoTBroker**	**2,9**
GE	IoT.Gateway.DataHandling		
	Ease of application		
		Level 2	1

			Level 3	3
			Ease of application Average Score	2,8
		Interoperability Maturity		
			Level 3	4
			Interoperability Maturity Average Score	3
		Openness		
			Level 1	1
			Level 2	2
			Level 3	1
			Openness Average Score	2
			Global Score of Component **IoT.Gateway.DataHandling**	**2,6**
GE	IoT.Gateway.ProtocolAdapter			
		Ease of application		
			Level 1	1
			Ease of application Average Score	1
		Interoperability Maturity		
			Level 1	1
			Interoperability Maturity Average Score	1
		Openness		
			Level 1	1
			Openness Average Score	1
			Global Score of Component **IoT.Gateway.ProtocolAdapt**	**1**
GE	Security.IdentityManagement			
		Ease of application		
			Level 2	1
			Ease of application Average Score	2
		Interoperability Maturity		
			Level 3	1
			Interoperability Maturity Average Score	3
		Openness		
			Level 1	1
			Openness Average Score	1
			Global Score of Component **Security.IdentityManageme**	**2**
SE	Collaboration Platf. BP Mgmt			
		Ease of application		
			Level 1	2
			Level 2	1
			Ease of application Average Score	1,3
		Interoperability Maturity		
			Level 1	3
			Interoperability Maturity Average Score	1
		Openness		
			Level 1	2

		Level 2	1
		Openness Average Score	1,3
		Global Score of Component **Collaboration Platf. BP**	**1,2**
SE	Collaborative Assets Management		
	Ease of application		
		Level 1	1
		Level 2	1
		Ease of application Average Score	1,5
	Interoperability Maturity		
		Level 1	2
		Interoperability Maturity Average Score	1
	Openness		
		Level 2	2
		Openness Average Score	2
		Global Score of Component **Collaborative Assets**	**1,5**
SE	Data Interoperabil. Platform Services		
	Ease of application		
		Level 1	1
		Level 2	1
		Ease of application Average Score	1,5
	Interoperability Maturity		
		Level 0	1
		Level 1	1
		Interoperability Maturity Average Score	0,5
	Openness		
		Level 1	2
		Openness Average Score	1
		Global Score of Component **Data Interoperabil. Platform**	**1**
SE	Metadata and Ontologies Semantic Matching		
	Ease of application		
		Level 2	2
		Ease of application Average Score	2
	Interoperability Maturity		
		Level 0	1
		Level 1	1
		Interoperability Maturity Average Score	0,5
	Openness		
		Level 1	1
		Level 2	1
		Openness Average Score	1,5
		Global Score of Component **Metadata and Ontologies**	**1,3**
SE	Secure Event Management		
	Ease of application		
		Level 2	1

			Level 3	1
			Ease of application Average Score	2,5
		Interoperability Maturity		
			Level 2	1
			Level 3	1
			Interoperability Maturity Average Score	2,5
		Openness		
			Level 2	1
			Level 3	1
			Openness Average Score	2,5
			Global Score of Component **Secure Event Management**	**2,5**
SE	Shopfloor Data Collection			
		Ease of application		
			Level 1	2
			Level 2	1
			Ease of application Average Score	1,3
		Interoperability Maturity		
			Level 2	1
			Level 3	2
			Interoperability Maturity Average Score	2,7
		Openness		
			Level 2	2
			Level 3	1
			Openness Average Score	2,3
			Global Score of Component **Shopfloor Data Collection**	**2,1**
SE	Supply Chain & Business Ecosystem Apps			
		Ease of application		
			Level 2	1
			Ease of application Average Score	2
		Interoperability Maturity		
			Level 2	1
			Interoperability Maturity Average Score	2
		Openness		
			Level 2	1
			Openness Average Score	2
			Global Score of Component **Supply Chain & Business**	**2**
SE	Unstructured and Social Data Analytics			
		Ease of application		
			Level 2	1
			Ease of application Average Score	2
		Interoperability Maturity		
			Level 1	1
			Interoperability Maturity Average Score	1

Openness

Level 2		1
Openness	Average Score	2
Global Score of Component	**Unstructured and Social**	**1,7**

8.2.3 Report : Aggregated results for all Trials – Community Survey

The complete panel is 57 people, at M18 answered 22 people to the survey.

	Votes	Average Rate
Efficiency		
2-I disagree	2	
3-I agree	20	
4-I strongly agree	3	
		2,88
Fulfillment of requirements		
2-I disagree	1	
3-I agree	17	
4-I strongly agree	7	
		3,16
Learnability		
3-I agree	18	
4-I strongly agree	7	
		3,23
Understandability		
3-I agree	21	
4-I strongly agree	4	
		3,14
User's attraction level		
2-I disagree	1	
3-I agree	16	
4-I strongly agree	8	
		3,27

Table 82 Community Surveys Results

8.2.4 Trial Journals

Here following an extraction of all trial journals, both Business and Technical.
These information have been utilized as further source of information for interpreting answers and behavior of the trials.

8.2.4.1 VOLKSWAGEN

Business Journal	Due to IT guidelines, open source components are difficult to deal with at Volkswagen. In order to solve this problem the Trial Solution was implemented at the Fraunhofer IPK site, using their IT infastructure. Actors of Volkswagen can access the Trial Solution via Internet. The new system must be published at Volkswagen at different levels to get the attention of the users. Because it is a new system, some users might have reservations and it is needed to convince them.
Technical Journal	On grounds of the high security policy of Volkswagen it was not allowed to use the public cloud. Instead, it was necessary to set up and host the private cloud infrastructure at IPK, according the FI-WARE platform. Access was restricted to VW and IPK only. With the WStore it is possible to publish services which then can be purchased either from the WStore or the ApplicationMashup. The description of these services then publish as an USDL file on the Repository. The Marketplace is used to connect the ApplicationMashup to the WStore, as well as enable reviewing and rating of the services as a means of feedback to the developers. The ApplicationMashup enables users to purchase services and combine purchased service to a mashup. Wirecloud Mashup - Problem: Not possible to upload new widgets - Workaround: Access rights to folders had to be adjusted - Problem: Not possible to access database externally (Problem only to our setting: our TSC accesses the email addresses stored in the Mashup) - Workaround: Database configuration had to be adjusted Marketplace - Problem: Connecting Marketplace and WStore not possible - Workaround: After analyzing the source code of the WStore we found out that in order to connect Marketplace and WStore, a specific user/ password needs to be present in the database of the marketplace and the marketplace application has to be renamed so that it is accessible under a specific name

	- Problem: Marketplace stores wrong IP address for WStore in its database - Workaround: After connecting WStore and Marketplace, we had to correct the database entry of the WStore to point to the right IP address WStore - Problem: WStore does not work with current software versions - Workaround: The WStore installation guide in the wiki doesn‘t state software version numbers. In order to get the WStore running, an old version of pylucene had to be installed - Problem: Wrong name of software package - Workaround: The WStore installation guide states that for installation, the „wkpdf2html“-package is required. In order to get the WStore running, „wkpdftohtml“ had to be installed - Problem: If the browser doesn‘t have an internet connection, the user interface of the WStore doesn‘t show the neccessary icons - Workaround: Let the browser access internet to download the icons/css from https://netdna.bootstrapcdn.com - Problem: Not possible to upload own USDL descriptions - Workaround: None – we had to type the description texts to every service offer again within WStore - Problem: User interface has issues - Workaround: It took some time to figure out when it was allowed to click where, when to wait for the software and what characters are allowed for description texts - Problem: Error messages not helpful, no log-files - Workaround: Getting no feedback why a certain operation fails other then „Error“. This can make work frustrating.
8.2.4.2 **TRW**	
Business Journal	The most important operational issues to be managed in the TRW trial has been the ethical aspects and the non-interference with the production activities of the factory. Regarding the ethical issues, TRW trial complies with relevant EU Directives on data protection (95/46/EC and 2006/24/EC) and with the more restrictive Spanish legislation (Ley Orgánica 15/1999 de Protección de Datos de Carácter Personal). Therefore, concrete activities and

	procedures have been performed in the TRW trial, including all the necessary certifications and documents by the competent legal local/national Ethics Boards and administrations. These issues revolve around the empowerment of workers using self-evaluation monitoring systems, and management of personal information related to their activities and habits. Consequently, specific procedures for the volunteers' selection and training has been prepared. We do some presentations to all the workers interested in the trial, and we get the final group of workers, prevention technicians, managers, IT supporters, etc. It takes huge efforts to prepare those presentations and do the final selection; but it has to be highlighted that people for the TRW factory were very cooperative. Additionally, an Ethical Board has been constituted to supervise all procedures and requirements for collecting and managing personal information. On the other hand, in the Technical Journal has been already mentioned one of the most challenging factor of the trial is not to interfere with the daily activity of the factory. Regarding the business aspect, this is also very relevant, since the organisation of measuring sessions should be aligned with the production line activity. Therefore, we have to wait to the proper moment and agree with the production and human resources department the concrete interval to carry out the measurement of the factors needed to calculate the Key Performance Indicators. Another important aspect related to the organisational issues is the need to connect the FITMAN system with the legacy systems. Current tools and solutions from the prevention office and the shopfloor cannot be modified in real time, so we should select the best way to achieve this guaranteeing the continuous functionality of the factory. Finally, the training of the personnel that will use the system can also be mentioned, even if it has not taken too effort until now. Some basic guidelines have been provided in order to ensure the correct use of the solution, and Innovalia has provide direct support for this purpose.
Technical Journal	The first important challenge in the implementation of TRW trial is not to interfere with the daily activity of the factory. Therefore, several testing of the Trial system cannot be performed, so Innovalia must ensure that the system is correctly working in a similar environment in our facilities. This barrier can be extrapolated to any manufacturing company, especially to the large ones. On the other hand, the definition of the trial architecture selecting the components for achieving the final target has took much effort, due to the lack of awareness regarding the FIWARE GEs and FITMAN SEs instantiation. An important lesson we learned is that the best way to check the functionality of each component is to deploy and use it, since sometimes the instructions and documents provided are not strictly true or they are missing some important information. Focusing on the deployment of the GEs, there are some significant incident to be reported: i) IoT Broker GE: we have some problems because the first version of the component we download from the catalogue was not working properly, due to some problems with the VM image. We write an email to the NEC people and we get a fast reply suggesting to download the newer version that they updated in the catalogue. We try this new version and it works. ii) DB Anonymizer GE: this component is not in our final architecture, but we try to use it in the first stages of implementation. The first version of the component we download from the catalogue was not working properly, due to some problems with the VM image. We contact the people from SAP to get some support, and they send us a new version of the component. This new version did not match with the user manual, so we get some more feedback from them, and finally we get a working component (that was also updated in the FIWARE

	catalogue). After all, the DB Anoymizer GE does not match our design to anonymize the database, so we remove it from the final architecture. iii) Identity Management GE: this component is not in our final architecture, but we try it in the first stages of implementation. The only problem with this component is that it was not completely open source, since you need to ask the certificate and key password to the owners of the GE. We get immediate support from UPM people and they provide the information and certificate needed to deploy the component. Additionally, TRW control system was not able to connect a large number of systems and devices at the beginning of the project. Therefore, we manage to develop the framework of information and communication networks to process the amount of data generated in the factory, in order to take advantage of all this useful information captured in the shopfloor with the new deployed systems. Finally, another important aspect in the trial definition has been the design and set up of the cloud strategy to be followed. Due to the management of workers data (even if they are stored and processed anonymously), most of the information handled in the trial cannot be in the public cloud provided by FIWARE. Moreover, the information captured by the sensors and devices deployed in the shopfloor cannot be located in the TRW private cloud either, so this information will be located in the TRW facilities. Thus, the three layers of the trial (public cloud, private cloud and local premises) has been set up in order to preserve the confidentiality and enforce the European and Spanish Directives related to the data protection..
8.2.4.3 **AGUSTAWESTLAND**	
Business Journal	From February to September 2014 • GE avalaibility and their analisys. • Collection of the data necessary for the system implementation (from internal processes stkaholders). From September 2014 • Test of the system and starting of the SMART trial experimentation. • Implememntation of environment and construction of dammy data sources for the DIGITAL trial experimentation.
Technical Journal	Technical indicators and relative comments were evaluated for each component inside the WP7 questionnaire for each BS.
8.2.4.4 **WHIRLPOOL**	
Business Journal	03/09/2014 Start working with real data coming from Naples shopfloor 04/09/2014 coherence check between stored event and delivered event 05/09/2014 Check for absence of drifting data and feedback to ENG about this absence 15/09/2014 stress test and preparation of user training 22/09/2014 Delivery of tested application to Naples first user (Luciano Zeni)

Technical Journal	18/09/2013 Start implementing the trial 23/09/2013 Development of the event generator. A CLR Store Procedure running on the database of an existing system already collecting shopfloor events. 25/09/2013 first installation and unit testing of DataHandling GE on windows machines 27/09/2013 first installation and unit testing of IoTBroker GE on windows machines 04/10/2013 due to lack of compatibility between ContextBroker GE and windows, deployment of the GEs on linux virtual machines. 07/10/2013 development of a simulator to validate trial setup and events flow 11/10/2013 production of a video showing trial workings 13/01/2014 kick-off meeting for next steps of the trial 28/01/2014 evaluation of SecureEventManager GE as output interface. Temporary discarded due to lack of compatibility with the linux environment chosen for the trial. 24/02/2014 development of a user-interactive web interface to simulate shopfloor events 28/03/2014 deployment of the trial environment virtual machines on a laptop 31/03/2014 development of user interface for event output and notification on android devices 01/04/2014 Added all our VM images to the FI-LAB catalogue (Trento node), as private items of the FITMAN-DEMO project: direct support from FI-LAB admins was required as this is not currently supported by the Cloud Portal 0 8/04/2014 Deployed all our VM on FI-LAB. We were given a single public IP, so we needed to configure one VM instance as a gateway. 08/04/2014 Saved a snapshot of clean virtual machines on FI-LAB as backup. 29/04/2014 The FI-LAB Cloud Portal is not working. Our running VM instances are not reachable 30/04/2014 deployment of the trial environment virtual machines on another laptop as backup for reviews 07/05/2014 Our running VM instances in FI-LAB are back online 08/05/2014 Start of the events stream from the shopfloor to the VM running on the cloud 13/05/2014 FI-LAB admins requested that we update all our running VM instances in order to fix the Heartbleed vulnerability 21/05/2014 Reinstanced DataHandling VM in FI-LAB from the snapshot due to data corruption 31/07/2014 Reinstanced all VM in FI-LAB due to corruption and suspect network hacking. Hardening of configuration with strict firewall rules. 06/08/2014 We tried to save a snapshot of our running VM instances, but the resulting images do not work. We were told by FI-LAB admins that this is due to our instances being created from "obsolete" images - i.e., images created before May 2014, when a not-backward-compatible change was introduced in the FI-LAB infrastructure 27/08/2014 development of a data flow to receive shopfloor events measurements and prepare source files for BigData analysis 02/09/2014 deployment of the trial environment virtual machines on a local server to simulate a private cloud

	10/09/2014 extended DataHandling logic to detect drifting in measurements related to events. 03/10/2014 FI-LAB admins created a new copy of each of our private VM images, updating them to the new format which should allow saving snapshots of running instances 09/10/2014 Implemented a Hadoop process on Cosmos instance to decode events from the shopfloor and enable its analysis with BigData algorithms.

8.2.4.5 **PIACENZA**

Business Journal	NA
Technical Journal	9/4/2014 Testing IoT Chapter we found some issues on mongo db start-up. Sometimes mongo does not start in time and contextBroker fails to start at all. We added a max 10 seconds delay for testing if mongo is already started in contextbroker initd script. Suggested patch to context Broker developer. They will probably use a different approach, but got the evidence of the problem. 10/4/2014 Tring to get 4 GEs into the same virtual machine to avoid a lack of memory and cpu, this would allow a single laptop for a demo. Since ContextBroker is released as centos-6 RPM, the choice is to make all working on a Centos 6 x86_64. IotBroker needs java 7, we tried the official openjdk 1..0.7 package and to use it we changed the iot broker start-up script. All worked correctly. 11/4/2014 During integration tests i got a failure on context registration, sent to Data Handling GE developers a report: W@09:22:48 httpHeaderGet[107]: connection 'keep-alive' - currently not supported, sorry ... W@09:22:48 xmlParse[227]: ERROR: 'Unknown XML field: 'registrationMetaData", PATH: '/registerContextRequest/contextRegistrationList/contextRegistration' Trying to remove registrationMetaData from registerContext. 16/4/2014 After some days of tests and mails with the DH GE developers, i got a fixing. Tests are again blocked by a missing value into contex registration message. 22/4/2014 mail to GEs IoT developers

	At the FITMAN layer we are going to add the FITMAN-SEM SE as soon as it is ready. This architecture shows that we have not planned to use the context broker also but just the confMan, I don't know if that is correct or no, but reading contex broker documentation at least for very first tests i preferred to work using the configuration shown at Orion GE integration. So i configured a VirtualBox CentOS-6 x86_64 VM with two Ethernet cards (one host only and IP 192.168.56.5, and latter configured as NAT) in which i run all the GEs. My aim now is to have a basic configuration and message set to start the real integration as soon as we have the official test bed. So let's see IP and port configurations: (Orange) IoT Gateway Data Handling 3.3.3: 192.168.56.5:8080 (tomcat 6 and java6 from oracle JDK) (1). (Orion) IoT BackEnd ConfMan 0.11.0-1: 192.168.56.5:1027 run as normal user from command line (2). (NEC) IoT BackEnd IoTBroker FIWARE_3.3.3: 192.168.56.5:8090 run as normal user using open jdk 7 atm (3). (Orion) IoT ContextBroker 0.11.0-1: 192.168.56.5:1028 run as a daemon (normal rpm installation). (1) Data Handling has been fixed by upstream developers after our integration feed backs (2) contextBroker -port 1027 -ngsi9 -fwdHost 192.168.56.5 -fwdPort 1026 -db orion2 -logDir /home/demo/tmp -fg (3) cat my_unix_start-IoTBroker.sh #!/bin/bash export JAVA_HOME=/usr/lib/jvm/jre-1.7.0-openjdk.x86_64/ /usr/lib/jvm/jre-1.7.0-openjdk.x86_64/bin/java -jar org.eclipse.osgi.jar -console The message flow is sent by using SoapUi and the test case is in attachment, what we just perform is: reset Data Handling reset DH CEP register a context example get event type from CEP (inserted data check) create the EPL statement for the above context get statements (inserted data check) set the event synk URL get inserted event sync URL (inserted data check) get event sink URLs (inserted data check) update the context

	With last step, i also got some wireshark tcp dump to see sent and received messages by GEs. After my first tests and your help we discovered some issues on DH that should be fixed now, but my result at the end point (context broker subscription or query context request) is always the same e.g. 404 No context element found Order-001Filtered But context has been discovered in ngsi9. I also involved NEC developers and we didn't found any odd behaviors: From the IoT Broker prospective I don't see any error because the request from the DataHandling is correctly processed and also forwarded correctly to the Context Broker. If you need help on the discussion feel free to add me in cc with Telefonica and Orange. 28/4/2014 A fixing from DH developers released. 9/5/2014 Started working on wirecloud GE. We chose to use an already set up Centos 6 VM for this GE. 14/5/2014 Some errors on WC documentation have been reported upstream and fixed, some installation problems have been resolved. We can start testing our WC GE widgets. 19/5/2014 A Trial 5 prototype for IoT chapeter and shopfloor monitoring (WC widgets) has been released. Video for the project review has been uploaded on fitman portal.

8.2.4.6 **APR**	
Business Journal	-Common Remarks - The ownership of the new system interfaces by end-users - Change management process BP1: Create quote - Difficulty of identifying the full necessary documents and information of all customer's patterns. - Difficulty of fixing production requirements (MP, tools, consumable,..) according to quote type. - Apply the same classification rules to customers and quotes in coherence with the history of previous collaborations. The platform implements some classification rules and APR end-users apply the most appropriated choice. BP2: Recovery quote - When negotiating the delivery delay with customer, it is difficulty to get automatically the updated production delay from the ERP before creating the manufacturing and purchasing orders. - Manage the lifecycle of quotes instances where customer ask for several updates (pricing, raw material requirements, etc.). BP3: Create Order - Classify customer orders according to APR standards (order with quote or without) and the correlation between order data and time necessary for its validation. BP4: Order monitoring - For VIP customer, the order delivery date is very close to the production one. Before notifying coming problems at the monitoring interfaces, we need some analytics mechanisms helping to detect delay problems with adapted solutions from the production environment. BP5: Send consultation - Define the threshold from which we need to lock for new suppliers not only those in the ERP catalogue BP6: Procurement order and strategic investment - For some purchased components, the available history is not enough to decide about an investment. - The coherence between optimization rules in inventory management (stock mini, stock maxi, security stock) and the investment proposals coming from data mining.

Technical Journal	- Compel GE - CBPM SE : call services via WSDL in service task Implementation of BP which incorporates user tasks, business tasks and business logic is highly prone to logical and design errors and very often leads to runtime errors that crash the whole application. Such Business processes in XML (file .bpmn20.xml) achieve high level of complexity and without visual capability for all the tasks within the business process - Automatic integration of DIPS and OntoMatching SEs For the manipulation of DIPS at runtime, at the time being it is a black box due to its inherent complexity and hidden implementation details. It is complex to know its DB structuring and to know how it stores its instances of web services. It is difficult to understand its integration within the web portal
8.2.4.7 **CONSULGAL**	
Business Journal	09th October: No testes and no measurements were made relating to the BS3 because the functionality will be ready for the M21. 9th September: Tests for BS2 was performed. In this BS we made tests for BP4 and BP5 processes. We made measurements related with PI2, PI3, PI5 and PI6. 9th September. PI2 measurement. No formal measurements were made concerning this indicator. However, during the simulations, all the information was handled via the application and no paper was used. It may be necessary to print specific reports concerning the information of a Concrete Operation, including samples collected, but this will not be more than 2 pages per concreting operation. This estimated a value of 60% of reduction (at least). 9th September. PI3, For this indicator we measure the time for the following actions: Time to identify 6 samples; Time to record the slump test and the sample information; Time to register the samples on arrival at the lab; Time to record test results; Time to record results in an Excel file. With the new platform the Time to record results in an Excel file is 0 seconds,this step is not necessary because the information is already recorded in the application. The values obtained with these measurements were: 7.4 seconds, 5,58 seconds and 7.16 seconds. 9th September. PI5. We made two measurements and obtained similar values to those obtained in BS1: 8.20 seconds and 5.10 seconds. 9th September. PI6. Values for PI6 are measurement taken into account the values obtained for PI3 (time) and the costs related to the equipment and human resources involved in these activities. The values obtained were: 0.55€, 0.47€ and 0.57€. this represents a reduction of over 73%.

	9th September. In general the application is working and we can obtain the values for the PIs. However some problems remain such as: contractor/supervisor/designer are no able to edit the information; we have to re-enter information that is available on the system; there is not field validation; 4th September. The problems encountered on the 29th of August were solved. However, it is still not possible to edit values after being saved. Most options on BS1 were working and it was possible to remeasure PI1 and PI5 that confirmed the values measured on the 29th of August. We record the following values for PI5: 9.30 seconds and 3.40 seconds. The average for this measurement is 6.35 seconds. 4th September. Tests were also done with the RFIDs and RFIDs Reader. It was possible to insert and to access information in the RFIDs through the Reader. The information was summarised and accessible through another screen that still needs to be integrated with the main application. This worked only with Google Chrome, it did not work with Internet Explorer. 4th September. Forms concerning BS2 are already available in the application, but they still need to be interlinked to allow the information to flow between all the stakeholders. 29th October. The first values of the indicators were measured. For PI1 the first value was 10.20 seconds , the second value: 3 seconds, the third value 9.30 seconds. These values represent a 99,95% of reduction. We made a second set of measurements for PI1, and obtained the following results: 7.30 seconds and 3 seconds. We made some measurements for PI5, and the values measured were: 7.30 seconds and 3 seconds . These values represent a 99.98% of reduction. 29th October. The Business Scenario tests were performed. The tests were performed in different locations of the country simulating the real environment of the Designer/Contractor and Supervisor in the Dam project. Some problems were identified and discussed with Uninova. 27th of August: the application was tested using a laptop computer at Aveiro and a TAB in Lisbon, using Internet connections independent from Consulgal's service provider. A first PI 1 measurement was made as 7,3 seconds (time for the contractor to receive a notification of submission of the concreting plan by the designer). However, a series of errors were detected concerning information that was submitted (as Designer), notified (to the Contractor) but the notification was empty, various software error messages when saving or submitting information. The information was passed to Uninova for correction. 27th of August: an unexplicable problem was detected with Consulgal's internet connection that cause systematic failure in connecting to

	Uninova server. Specifically, fixed Internet connection and WiFi connections via Consulgal's internet service provider failed systematically, whereas WiFi connections via other service providers were successful. The problem is being solved by Consulgal's IT Department. 22nd of August: the BS1 tests that were scheduled to start today couldn't be made because Uninova's server was unavailable. According to Uninova's information, this may be temporary or may result from the recente migration to a new server, in which case this can only be fixed in September, after the university's holiday closing period. As it is, the only tests that can be made are limited tests with the RFID reader (read-write only). 13th of August: the RFID reader was installed in a computer at Consulgal for simulations of BS2. Uninova will prepare a protocol for installation of similar readers in other computers at other locations. 29th of July: an operating mode to use the application in a work site was defined. This will serve as the basis for the simulations off site and tests on site. 28th of July: It needs to be clarified if the app creates in the hard drive (or in the cloud) a duplicate of the information recorded in the RFID. The reason for this is related to how the test result is recorded: the test result cannot be recorded in the RFID again; on the other hand it makes no sense that all the information concerning the sample is reinserted in the app, together with the test results, to be stored in the hard drive or the cloud. It is important to clarify where is the information concerning the sample being stored. this needs to be tested through simulations off site and through tests on site. 24th of June: Cube identification is NOT easily accessible just by looking at the cube. However, the placing of cubes in the water bath follows a predefined scheme that allows the operator to know in which area of the water bath are the cubes collected in a certain day and to be tested in a specific day. Therefore, it is not essential to visually identify the cubes, because there is no need to test the cubes in a specific order; they just need to be tested on a specific day. 23rd of June: Sample identification seems to be much easier than the current method. Sample ID is inserted in the RFID at the office. The operator inserts, on each RFID and using the app, the usual information and an identification number. The workers collecting the samples just need to put the RFIDs inside the mold or on top of the concrete in the mold. Therefore, the usual painting of the molds with a number is replaced by putting an RFID inside or on top of the mold, which seems to represent a simplification. What needs to be carefully assessed are the time savings between the traditional method of recording the information of a load on paper and inserting that same information on several RFIDs.

	20th of June: RFIDs seem to be physically resistant to the concrete, both when the concrete is put into the molds and when it solidifies. The RFID can be put either at the bottom of the mold (it is not affected by the falling concrete or solidification) or on the top of the concrete after it is in the mold (the RFID is not affected by concrete's solidification). Additionally, the RFID don't seem to interfere with the tests. During the resistance test, compression is applied on the side faces of the cube and not on the top or bottom face, where the RFID is. 16th of June 2014: RFIDs left in water for one week retained the information previously inserted. RFIDs seem to resist to immersion in water for several days, i.e., they seem to be resistant to concrete curing conditions;
Technical Journal	9th of September: Final round of tests, all went well. 4th of September: 2nd round of tests, with corrected bugs. No new bugs to report, but some workability problems, some connections missing in the DB. 29th of August: Went to Consulgal for their tests, we understood that our application lacks robustness on the user side, there wore many cases where reported bugs wore in fact bad usage of the application which we didn't predicted. Some bugs and faults wore found and discussed with Consulgal for the best way to correct them. We planned another round of test with the bug fixes for the 4th of September. 28th of August: Got a reply from the University saying that the DNS server of the campus has been having some problems and it is turned down since the 26th of August. We provided Consulgal with the IP address of the server and changed all the program calls within the application to IP also so they can perform all the necessary tests. 27th of August: Consulgal continues to be unable to connect with the server. 25th of August: Got a IT guy to come here but everything is working today, rebooted the server to check if there was some problem and all went fine. 22nd of August: Consulgal reported some problem with the access to the project server, they are not able to connect. We tried it and got the same result. Because its August everybody is on holydays, and we don't have access to the server rooms, I will try to connect with the IT personnel and try to get someone to come here tomorrow. 13th of August: BP4 and 5 ready for operational testing, we are going to Consulgal to install and explain how to work with the RFID reader.

	28th of July: BP4 in-house test revealed a problem with the save feature of the app, we backtracked it to BS1, which presented the same problem. This was related to the saving just the last submission and not creating a history of the submissions as required. As for BP5 work is finished, in-house testing went well and it is ready for operational testing. 21st of July: BP4 development finished, starting the in-house testing program today. BP5 is going well, we expect to finalize it by the end of the week. 14th of July: Started developing BP5, we are creating an application to connect the RFID reader to the server. As for BP4 implementation, no major problems occurred, just lots of changes to be made in the design of the database. 30th of June: Implementation of BP4 presenting some problems regarding the logic of the process and the requirements that we need to implement. Maybe it will be necessary to change the requirements in order to make the application more user friendly. 23rd of June: Great Feedback from everybody in the Dam, from workers to office personnel, they all showed great interest in what the application can do and the will to help in the development of the solution giving us precious feedback regarding its evolution, making it more user friendly in the future. We collected information on the procedures that are being implemented, giving us a more clear vision of the work yet to be done. Also, we conducted tests for the positioning of the RFID tags in the samples, experimented several positions and several ways to insert the RFID card in the sample, these cubes were collected, treated as normal samples and will be sent to us for evaluation as soon as possible. 20th of June: Visit to the Baixo Sabor Dam for testing and evaluation of the application in the field, as well as user feedback of the interface and interactions needed from the workers on site. As for the server migration there was some small compatibility issues but everything is working fine for the visit to the dam. 16th of June: Server changed to a more powerful machine; migration went well, testing services in the next few days.
8.2.4.8 **TANET**	
Business Journal	While the inclusion of SMECluster members are an integral part to this trial there were difficulties finding an initial partner for feedback and experimentation data. This is due to the fact that the platform is still in redevelopment and many organizations within SMECluster are unable to risk resources on using new technology which has not been tried by another party. We finally came to an agreement with the

	Welsh Automotive forum who are close partners of TANET and Sematronix to commit to becoming a facilitator.
Technical Journal	In large part, we feel trial users were left to discover the functionality of SE's and GE's due to a lack of documentation. While this may have allowed greater exploration and exploitation of the systems in the long run, it would have been beneficial to receive some form of "Getting Started" documentation. The lack of APIs for many functions, or lack of (again) documentation for APIs, meant that true integration of many of the GE's and SE's was impossible or extremely time-consuming. For a trial partner seeking to implement the enablers in order for end users to test their functionality, it is essential that integration is possible. Aside from these criticisms, the enablers we have selected have performed their functionality as promised, and the enabler owners have provided support where possible. In addition, new versions of SE's have been released where blocking or high-impact bugs were discovered.

8.2.4.9 **COMPLUS**

Business Journal	
Technical Journal	Implementation of the GEs Rom the Cloud Chapter The core cloud solutions is OpenStack with its 7 components compute, object storage, identity, dashboard, block storage, network and image. Object Store allows to store or retrieve files (but not mount directories like a fileserver) Image provides a catalog and repository for virtual disk images Compute provides virtual servers upon demand Dashboard provides a modular web-based user interface for all the OpenStackservices. But in this case it will be replaced by the GE SelfService Interface Identity provides authentication and authorization for all the OpenStack services Network provides "network connectivity as a service" between interface devices managed by other OpenStack service Block Storage provides persistent block storage to guest VMs Actions failed Back-end communication / authorization beetween required module and native openstack solve authorization issue with CSSI (in touch with GE developer UPM but no further help received until today) Installation of the Cloud GEs (require CSSI, no own user interfaces)

	Compare Cloud GE functionalities to standard Open Stack functionalities 1. node server.js ERROR Caught exception: Error: listen EADDRINUSE There is no other node process running, only apache2 on port 80, package nodejs is version v0.10.20. 2. jstack-client -u admin -p *** -l http://10.1.16.90:5000/v2.0/ -t 516fa1f9ca7f49d88ab23468f97fb897 server-list ERROR /usr/local/lib/node_modules/jstack-client/lib/jstack.js:28 n.id;f!==c&&f(a)},function(a){g.currentstate=j.AUTHENTICATION_ERROR;i(a)})},ge ^ TypeError: undefined is not a function at /usr/local/lib/node_modules/jstack-client/lib/jstack.js:28:140 at i.onreadystatechange (/usr/local/lib/node_modules/jstack-client/lib/jstack.js:24:496) at setState (/usr/local/lib/node_modules/jstack-client/vendor/xmlhttprequest.js:368:12) at IncomingMessage. (/usr/local/lib/node_modules/jstack-client/vendor/xmlhttprequest.js:255:13) at IncomingMessage.EventEmitter.emit (events.js:117:20) at _stream_readable.js:920:16 at process._tickCallback (node.js:415:13)
8.2.4.10 **AIDIMA**	
Business Journal	08-OCT-14: --> UC1 TOBE data cannot be fully tested at this point since the GE from ATOS, the engine that collects the data from the web sources, i.e.: Unstructure Data Analysis, is not yet ready and fully supported. This was reported in Bremen to the DF Coordinator. --> UC3 TOBE data not available since all development is to be done by Open Call winners. --> It is important to notice that in UC1 and UC2, the BPIs are categorized depending on how long they can be measured: their priority.

	That is, some are less than 6 months, others more than 6 months. Initially, only the ones less than 6 months are contemplated. This categorization was reported back in March when the word doc was
Technical Journal	12-OCT-14: --> UC1: the lack of support of the UDA GE is generating a delay on the total development, deploy and test of this use case. There are inconsistencies between real APIs and documentation. A stronger support from ATOS and a quicker answer are needed. Better documentation on installation is also needed. An access to the sourcecode of the GE would be helpful. The UPV components have been developed waiting for the component to be put in place. --> UC3 Open Call winners have not provided a specification on the private components or a real access to the apps. An intensive work is expected to be done on the final months of the project, though the actual work on data analysis, information provision and testing has been satisfying so far. --> UC2 is already develop and in-place. Minor tweaks appear everytime the SE provider generates new versions of the component. A better documentation on production installation and set up could be helpful for future scenarios where no so much support will be provided.

8.3. Specific Enablers Self Accessment

8.3.1 SEI_1 Shop Floor Data Collection

8.3.1.1 Step P-4 for FITMAN-SFDC

8.3.1.1.1 Test Case 1

TEST CASE ID	TC_1	**PRODUCT VERSION**	1.0
TITLE	ALE Server configuration	**TESTER**	Jbenedicto
DESCRIPTION	Configure the ALE Server		
COMPONENTS INVOLVED	ALE Server, ALE web-based client, event Sink	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	TC_1.1	**DATE**	Jun-14
TITLE	Setup GUI for incoming HTTP ALE notifications		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**

1. In order to display the reports with the aggregated data sent by the filtering and collection server, we need to start a Fosstrak tool that displays incoming HTTP requests. java -cp <READER_RP_CLIENT_VERSION>.jar \ org.fosstrak.reader.rp.client.EventSinkUI <PORT> example: java -cp reader-rp-client-0.3.1.jar \ org.fosstrak.reader.rp.client.EventSinkUI 9999 Or click on the shortcut "run-reader-rp-client.bat" located in the "fitmantt_test_client" folder	The application loads and displays the window where received messages will be reflected. The screen will remain empty until the configuration of the filtering and collection server is complete.	The application loads and displays the window where received messages will be reflected. The screen will remain empty until the configuration of the filtering and collection server is complete.	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.2	**DATE**	Jun-14
TITLE	Configure ALE Server through the ALE web-based client		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAI**

			L
1. Go to "http://domain:8080/fc-webclient-1.2.0/services/ALEWebClient.jsp"	Page Loads	Page Loads	PASS
2. Inform the endpoint where the ALE server is deployed:			
Click on the link "setEndpoint(String endPointName)" located in the section Filtering & Collecting API.	A win popup is displayed to inform the endpoint	A win popup is displayed to inform the endpoint	PASS
Inform with the URL - i.e: http://localhost:8080/fc-server-1.2.0/services/ALEService and Click "Invoke" to execute the command	In the Result windows nothing appears	In the Result windows nothing appears	PASS
Check if the operation was correct clicking on the link "getEndpoint()"	In the Result windows appears the following message: EndPointAddress: http://localhost:8080/fc-server-1.2.0/services/ALEService EndpointName: {urn:epcglobal:ale:wsdl:1}ALEServicePortTypePort	In the Result windows appears the following message: EndPointAddress: http://localhost:8080/fc-server-1.2.0/services/ALEService EndpointName: {urn:epcglobal:ale:wsdl:1}ALEServicePortTypePort	PASS
3. Verify that a connection between the web-based client and the server can be established by clicking	Result windows displays the version number [1.2.0]	Result windows displays the version number [1.2.0]	PASS

"getVendorVersion()"			
4. Inform the endpoint where the filtering and collection server's Logical Reader API (ALE service for LLRP) is deployed:			
Click on the link "setEndpoint(String endPointName)" located in the section LogicalReader API.	A win popup is displayed to inform the endpoint	A win popup is displayed to inform the endpoint	PASS
Inform with the URL - i.e: http://localhost:8080/fc-server-1.2.0/services/ALELRService and Click "Invoke" to execute the command	In the Result windows nothing appears	In the Result windows nothing appears	PASS
Check if the operation was correct clicking on the link "getEndpoint()"	In the result windows appears the following message: EndPointAddress: http://localhost:8080/fc-server-1.2.0/services/ALELRService EndpointName: {urn:epcglobal:alelr:wsdl:1}ALELRServicePortTypePort	In the Result windows appears the following message: EndPointAddress: http://localhost:8080/fc-server-1.2.0/services/ALELRService EndpointName: {urn:epcglobal:alelr:wsdl:1}ALELRServicePortTypePort	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.3	**DATE**	Jun-14

TITLE	Define adapters in order to connect the RFID tags with the ALE Middleware (Logical readers) via the ALE Logical Reader API		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Click on the link "define(String readerName, LRSpec spec)" located in the section in LogicalReader API. It is mandatory to connect the RFID tag before define the adapter. readerName: <READERNAME> specFilePath: <PATH_TO_SPEC>\<SPEC_NAME>.xml example: readerName: Logical1 specFilePath: c:\epc\LLRPReader.xml	A win popup is displayed to inform two parameters, the readerName and the specFilePath i.e Inform with"Logical1" and use the LLRPReader.xml as LRSpec (in comments) After click "invoke" appears "null" in the result windows	A win popup is displayed to inform two parameters, the readerName and the specFilePath i.e Inform with"LogicalReader1" and use the LLRPReader.xml as LRSpec After click "invoke" appears "null" in the result windows	PASS
2. Verify that the reader has been created by clicking on "getLogicalReaderNames()"	In the Result windows appears a list of logical readers in brackets. [Logical1]	In the Result windows appears a list of logical readers in brackets. [Logical1]	PASS
3. Check the Rifidi emulator	In the Rifidi emulator we can see the message exchange with the Fosstrak ALE middleware.	In the Rifidi emulator we can see the message exchange with the Fosstrak ALE middleware.	PASS

4. Inspect the logical reader specification LRSpec by the method "getLRSpec(String readerName)" informing the Logical reader name "logical1"	The Result windows shows the logical reader spec. Logical1 isComposite: false LogicalReaders: [[]] LRProperties: name value ReaderType org.fosstrak.ale.server.readers.llrp.LLRPAdaptor Description LLRP reader PhysicalReaderName Logical1 ip localhost port 5084 clientInitiated true	The Result windows shows the logical reader spec. Logical1 isComposite: false LogicalReaders: [[]] LRProperties: name value ReaderType org.fosstrak.ale.server.readers.llrp.LLRPAdaptor Description LLRP reader PhysicalReaderName Logical1 ip localhost port 5084 clientInitiated true	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.4	**DATE**	Jun-14
TITLE	Define the Filtering and Collection Behavior via the ALE Filtering and Collection API		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Once we have defined the adapter, we need to specify additional features for this reader indicating the time periods or intervals defining an			

ALE ECSpec. This tells the ALE Middleware how the RFID tag reads ariving from the Rifidi Emulator should be filtered and aggregated.			
Click on the link "define(String specName, String specFilePath)" located in the section Filtering and Collection API. specName: <SPEC_NAME> specFilePath: <PATH_TO_SPEC>\<SPEC_NAME>.xml example: specName: specCURRENT specFilePath: c:\epc\ECSpec_current.xml	A page is displayed to inform two parameters, the specName and the specFilePath i.e Inform with"specCURRENT" and use the ECSpec_current.xml as ECSpec (in comments) After click "invoke" should appear a literal like this "org.fosstrak.ale.wsdl.ale.epcglobal.VoidHolder@aa275e" in the result windows	A page is displayed to inform two parameters, the specName and the specFilePath i.e Inform with"specCURRENT" and use the ECSpec_current.xml as ECSpec (in comments) After click "invoke" appears a literal like this "org.fosstrak.ale.wsdl.ale.epcglobal.VoidHolder@aa275e" in the result windows	PASS
Verify the correct defintion of your ECSpec by invoking the method "getECSpecNames()"	You should get a list of ECSpec names currently defined in brackets.	You should get a list of ECSpec names currently defined in brackets.	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.5	**DATE**	Jun-14
TITLE	Specify the Event Consumer of the ALE Events Being Sent		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**

When there is no subscriber for an ECSpec, the ECSpec is not executed. We therefore need to specify a listener by subscribing our event sink to the ECSpec "specCURRENT" click on the link Invoking the operation "subscribe(String specName, String notificationUri)" and register the URL on which the event sink GUI is listening. notificationURI: http://<SERVER>:<PORT> specName: <SPEC_NAME> example: notificationURI: http://localhost:9999 specName: specCURRENT	A page is displayed to inform two parameters, the notificationURI and the specName i.e Inform with the URL where the event sink GUI is listening and the name of the "specCURRENT" in order to register it. After click "invoke" nothing appears in the result windows	A page is displayed to inform two parameters, the notificationURI and the specName i.e Inform with the URL where the event sink GUI is listening and the name of the "specCURRENT" in order to register it. After click "invoke" nothing appears in the result windows	PASS
The ALE will start sending empty ECReports to the event sink GUI as the Rifidi emulator is not configured to send EPC tag reads via the LLRP protocol yet	The event sink GUI is ready to receive reports	The event sink GUI is ready to receive reports	PASS
FAIL NOTES			
ACTION			

8.3.1.1.2 Test Case 2

TEST CASE ID	TC_2	PRODUCT VERSION	1.0
TITLE	Rifidi Emulator configuration	TESTER	Jbenedicto
DESCRIPTION	Configure the Rifidi Emulator to report Tags in "Range" and setup the LLRP Commander		
COMPONENTS INVOLVED	ALE Server, Rifidi, LLRP Commander	TYPE	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	TC_2.1	DATE	Jun-14
TITLE	Configure the Rifidi Emulator to Report Tags in "Range"		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Start the LLRP Commander (via Eclipse - click on the LLRP_Commander shortcut) and connect to the remote adapter instance running on the ALE.	LLRP Commander starts	LLRP Commander starts	PASS
Check, if the virtual LLRP reader is shown in the Adapters list	Logical1 is shown in the server adaptor list (connected)	Logical1 is shown in the server adaptor list (connected)	PASS
Check the capabilities of the virtual LLRP reader sending a GET_READER_CAPABILITIES message through the LLRP Commander.	The sent message appears on the LLRP messageBox window	The sent message appears on the LLRP messageBox window	PASS

Within the Commander right-click on the reader "Logical1", select Send Message and click on GET_READER_CAPABILITIES.			
Check the response, for this, click on the reader and double click on the GET_READER_CAPABILITIES_RESPONSE. Also we can browse through the LLRP message. In the Graphical Editor we can use the tree structure to browse and edit the message.	The message details appear on screen	The message details appear on screen	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_2.2	**DATE**	Jun-14
TITLE	Tag creation in the selected reader antenna		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Switch to the Rifidi reader emulator and create a tag (SGTIN96, GEN2).	The tag is created and is shown in the TagView screen	The tag is created and is shown in the TagView screen	PASS
Place the tag on the reader antenna (Drag & Drop). The tag reads will be reported to the Fosstrak ALE Middleware.	The Tag is shown within the antenna window on the right of the screen	The Tag is shown within the antenna window on the right of the screen	PASS

FAIL NOTES	
ACTION	

ITERATION ID	TC_2.3	**DATE**	Jun-14
TITLE	Send a LLRP message to the reader		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Create a new LLRP message and replace the content by the content from the LLRP RO_SPEC (in comments).	RO_SPEC message	RO_SPEC message	PASS
With the selected message click on the red icon LLRP in the eclipse task bar to send the message to the Rifid Emulator.	A dialog box pops up, where we can select the reader, where we would like to send the message to. The response message appears on the LLRP messageBox window	A dialog box pops up, where we can select the reader, where we would like to send the message to. The response message appears on the LLRP messageBox window	PASS
From the context menu (right-click on the Rifidi Emulator), select "Send ENABLE_RO_SPEC message" to instruct the reader to enable the ROspec just loaded.	The sent message appears on the LLRP messageBox window	The sent message appears on the LLRP messageBox window	PASS
After the tag reads are filtered and collected as specified in the ECSpec, they are delivered by the Fosstrak ALE middleware to the event sink GUI.	The event sink GUI shows the received messages	The event sink GUI shows the received messages	PASS

It is mandatory to connect the RFID tag before define the adapter.			
FAIL NOTES			
ACTION			

8.3.1.1.3 Test Case 3

TEST CASE ID	TC_3	**PRODUCT VERSION**	1.0
TITLE	ALE Server configuration through the standalone client app	**TESTER**	Jbenedicto
DESCRIPTION	Configure the ALE Server through the standalone client app		
COMPONENTS INVOLVED	ALE Server, ALE standalone client application	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	The Rifidi emulator must be up and running and one reader configurated		

ITERATION ID	TC_3.1	**DATE**	Jun-14
TITLE	Setup the standalone application for configure the ALE server		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**

In order to configure the ALE server and display the reports with the aggregated data sent by the filtering and collection server, we are going to use an standalone client application provided by Fosstrak. We can click on the shortcut provided in the folder "fitmantt_test_client" called "run-fc-client.bat" or call directly with the following sintaxis: java -jar .\fc-client-1.2.0\fc-client-1.2.0.jar	The application loads and displays the window where we can configure the ALE server	The application loads and displays the window where we can configure the ALE server	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.2	**DATE**	Jun-14
TITLE	Configure ALE Server through the ALE standalone client application - Define the Logical Reader		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Click on the Logical Reader tab and select the "define" option in the combobox	A form is displayed to inform two parameters, the readerName and the specFilePath	A form is displayed to inform two parameters, the readerName and the specFilePath	PASS

Inform the two parameters with the following values: readerName: <READERNAME> specFilePath: <PATH_TO_SPEC>\<SPEC_NAME>.xml example: readerName: Logical1 specFilePath: c:\epc\LLRPReader.xml	After click "invoke" appears a popup window indicating the endpoint address where the ALE server is installed i.e: http://localhost:8080/fc-server-1.2.0/services/ALELRService And in the result windows the following message should appear: "The reader is successfully defined."	After click "invoke" appears a popup window indicating the endpoint address where the ALE server is installed i.e: http://localhost:8080/fc-server-1.2.0/services/ALELRService And in the result windows the following message should appear: "The reader is successfully defined."	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.3	**DATE**	Jun-14
TITLE	Define the Filtering and Collection Behavior via the ALE Filtering and Collection API		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Click on the Event Sync tab and select the "define" option in the combobox	A form is displayed to inform two parameters, the specName and the specFilePath	A form is displayed to inform two parameters, the specName and the specFilePath	PASS

Inform the two parameters with the following values: specName: <SPEC_NAME> specFilePath: <PATH_TO_SPEC>\<SPEC_NAME>.xml example: specName: specCURRENT specFilePath: c:\epc\ECSpec_current.xml	Inform with"specCURRENT" and use the ECSpec_current.xml as ECSpec (in comments) After click "invoke" appears a popup window indicating the endpoint address where the ALE service is installed i.e: http://localhost:8080/fc-server-1.2.0/services/ALELRService And in the result windows the following message should appear: "The specification is successfully defined."	A page is displayed to inform two parameters, the specName and the specFilePath i.e Inform with"specCURRENT" and use the ECSpec_current.xml as ECSpec (in comments) After click "invoke" appears a popup window indicating the endpoint address where the ALE service is installed i.e: http://localhost:8080/fc-server-1.2.0/services/ALELRService And in the result windows the following message should appear: "The specification is successfully defined."	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.4	**DATE**	Jun-14
TITLE	Specify the Event Consumer of the ALE Events Being Sent		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Click on the Event Sync tab and select the "subscribe" option in the combobox	A form is displayed to inform two parameters, the specName and the Notification URI.	A form is displayed to inform two parameters, the specName and the Notification URI.	PASS

Inform the two parameters with the following values: for the Specification Name we need to select in the combobox our ECSpec - "specCURRENT" and the notification URI has the following sintaxis: URI: http://<SERVER>:<PORT> example: notificationURI: http://localhost:9999	Inform with the URL where the event sink GUI will be listening and the name of the "specCURRENT" in order to register it. Also check the option "Create event Sink" and click "Excute"	Inform with the URL where the event sink GUI will be listening and the name of the "specCURRENT" in order to register it. Also check the option "Create event Sink" and click "Excute"	PASS
A new tab with the name "http://localhost:9999" is created	The event sink GUI is ready to receive reports	The event sink GUI is ready to receive reports	PASS
FAIL NOTES			
ACTION			

8.3.1.1.4 Test Case 4

TEST CASE ID	TC_4	**PRODUCT VERSION**	1.0
TITLE	EPCIS Repository	**TESTER**	Jbenedicto
DESCRIPTION	Check the EPCIS Repository		
COMPONENTS INVOLVED	EPCIS Repository component	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	TC_4.1	**DATE**	Jun-14
TITLE	Check the EPCIS repository installation		

MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Invoke the web based client EPCIS Repository in order to capture data, create query, test and request queries to the EPCIS Repository Access to the EPCIS Capture client URL: http://localhost:8080/epcis-repository-0.5.0/capture	The navigator shows the EPCIS capture client web page	The navigator shows the EPCIS capture client web page	PASS
Invoke the Query services which is based on SOAP message over HTTP. The URL to request query service is: http://localhost:8080/epcis-repository-0.5.0/query	The navigator shows the EPCIS query web page	The navigator shows the EPCIS query web page	PASS
Check the WSDL files. Add the "?wsdl" at end of the url to view wsdl document as the following: http://localhost:8080/epcis-repository-0.5.0/query?wsdl	The WSDL is shown in the screen	The WSDL is shown in the screen	
FAIL NOTES			
ACTION			

8.3.1.1.5 Test Case 5

TEST CASE ID	TC_5	**PRODUCT VERSION**	1.0
TITLE	Web Adapter	**TESTER**	Jbenedicto
DESCRIPTION	Check the Web Adapter		
COMPONENTS INVOLVED	Web Adapter	**TYPE**	FUNCTIONAL

RELEVANT REQUIREMENTS		

ITERATION ID	TC_5.1	DATE	Jun-14
TITLE	Check the Web Adapter installation		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
The Fosstrak EPCIS Webadapter module adds a RESTful, fully Web-enabled, API to a standard EPCIS Repository. While the EPCIS Webadapter can be deployed on top of any standard compliant EPCIS Repository. This web interface integrates the corresponding API, interfaces and REST services and is accessible using the following URL: http://domain:8080/epcis-webadapter-0.1.0/rest/1/	The navigator loads the web page	The navigator loads the web page	PASS
Invoke the web interface which is entry point to demonstrate the set of services related to the EPCIS query and capture services.	The page with a link for all the services available is shown in the navigator	The page with a link for all the services available is shown in the navigator	PASS

Invoke the confuration link to specify and configure the URL of the EPCIS Repository defining the end point and the located of the EPCIS server	The navigaor displays the form to configure the EPCIS repository	The navigaor displays the form to configure the EPCIS repository	PASS
FAIL NOTES			
ACTION			

8.3.1.1.6 Test Case 6

TEST CASE ID	TC_6	**PRODUCT VERSION**	1.0
TITLE	Interaction with other GEs - SEs	**TESTER**	Jbenedicto
DESCRIPTION	Check the integration with the SEM SE		
COMPONENTS INVOLVED	ALE Server, EventSink, SEM SE	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	The SEM must be up and running and properly configured		

ITERATION ID	TC_6.1	**DATE**	Jun-14
TITLE	Check the Integration with the SEM SE		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
In order to configure the EventManager is needed to configure some parameters located in a specific properties file called event.properties under the folder /home/fitmantt.			

Edit this file and change the IP value using the IP of the Virtual Machine of SEM Test or the IP where is located SEM. Into the classpath of the project, in com.atos.rsc.EventManager.properties it's indicated the path of the fitman folder, with the label filePath.	Save the file with the new values	Save the file with the new values	PASS
Check the installation accesing the REST services thorugh the web browser	The Web browser displays the different RESTfull services	The Web browser displays the different RESTfull services	PASS
Check if the messages arrive at the SEM	The SEM recevives the notification messages	The SEM recevives the notification messages	PASS
FAIL NOTES			
ACTION			

8.3.1.2 **Step P-4 for FITMAN- SDC-SN**

8.3.1.2.1 Test Case 1

TEST CASE ID	TC_1	**PRODUCT VERSION**	1.0
TITLE	Addition of new Virtual Sensor (VS)	**TESTER**	Jsantos
DESCRIPTION	Checks the addition and execution of Virual Sensor. It is necessary that the processing class to be used for the VS are ready and available. The VS description file must follow the structure as provided in the FITMAN SN documentation		
COMPONENTS INVOLVED	FitmanSN Web application	**TYPE**	FUNCTIONAL

Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity) and also note that in the default installation and configuration of FITMAN-SDC-SN, authentication feature is turned off which can be easily configured to be activated.

ITERATION ID	TC_1.1	**DATE**	Ιουλ-14
TITLE	Load an existing VS description file		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Navigate to the home page	System presents the home page	System presents the home page	PASS
Select the button "Choose File" under the select VS file: --> choose the VS description file --->"Upload "	A win popup is displayed to select a file	A win popup is displayed to select a file	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.2	**DATE**	Ιουλ-14
TITLE	Check if the VS has been added and is working		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Navigate to the the home page. The first 10 sensors are displayed by default.	Outputs from the sensors	Outputs from he sensors	PASS

Click on "Close all" button to remove the reading of the sensor	Outputs from the sensors are not displayed in the main section	Outputs from the sensors are not displayed in the main section	PASS
Select the group from the "Virtual Sensors" menu in the left hand side and click on "+" icon	Displays the list of available VSs	Displays the list of available VSs	PASS
Click on the link with the "Name of the VS"	Displays the output from the selected sensor in the main section	Displays the output from the selected sensor in the main section	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.3	**DATE**	Ιουλ-14
TITLE	Details of the VS		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Follow all steps of TC_1.2, to get the details of the sensor in the main page	Output from the sensor with tabs for other operations	Output from the sensor with tabs for other operations	PASS
Select "Real-Time" tab (default selection)	Provides the real time reading from the sensor. The reading is auto refreshed every x time as selected from the drop-down option marked "Auto-refresh every:" or when the "refresh" button is clicked.	Provides the real time reading from the sensor. The reading is auto refreshed every x time as selected from the drop-down option marked "Auto-refresh every:" or when the "refresh" button is clicked.	PASS
Select "Addressing" tab	Provides the address details of the sensor	Provides the address details of the sensor	PASS

Select "Structure" tab	Provides the details of the output data structure	Provides the details of the output data structure	PASS
Select "Description" tab	Provides the description of the sensor as given in the VS description file.	Provides the description of the sensor as given in the VS description file.	PASS
Select "Download" tab -> "Data Output" link to specify the number or last results, sensors, aggregation over time and values from output data structure -> "Conditions" link to apply conditions over sensor reading like dates and data ranges -> "Results" link to select the type of data format o.e CSV, XML or PDF	Allows to select the fields from the output stream of the sensor, add various conditions and download the reading from the sesor in different formats i.e. CSV, XML and PDF report	Allows to select the fields from the output stream of the sensor, add various conditions and download the reading from the sesor in different formats i.e. CSV, XML and PDF report	
FAIL NOTES			
ACTION			

8.3.1.2.2 Test Case 2

TEST CASE ID	TC_2	**PRODUCT VERSION**	1.0
TITLE	Removal of Virtual Sensor	**TESTER**	Jsantos
DESCRIPTION	Allows to remove the VS from the Fitman SN server		
COMPONENTS INVOLVED	FitmanSN Web application	**TYPE**	FUNCTIONAL

Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity) and also note that in the default installation and configuration of FITMAN-SDC-SN, authentication feature is turned off which can be easily configured to be activated.

ITERATION ID	TC_1.1	**DATE**	Ιουλ-14
TITLE	Remove an existing VS description file		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Navigate to the home page	System presents the home page	System presents the home page	PASS
Click on the link "X" above the VS that you want to remove	Alert message for VS removal	Alert message for VS removal	PASS
VS is removed from the FitmanSN server	The removed VS is not listed in the available Virtual Sensors menu	The removed VS is not listed in the available Virtual Sensors menu	PASS
FAIL NOTES			
ACTION			

8.3.1.2.3 Test Case 3

TEST CASE ID	TC_3	**PRODUCT VERSION**	1.0
TITLE	REST services of FITMAN-SN	**TESTER**	Jsantos
DESCRIPTION	Checks the functionalities provided by the FITMAN-SN REST API		
COMPONENTS INVOLVED	FitmanSN REST API	**TYPE**	FUNCTIONAL

Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity) and also note that in the default installation and configuration of FITMAN-SDC-SN, authentication feature is turned off which can be easily configured to be activated.

ITERATION ID	TC_3.1	**DATE**	Ιουλ-14
TITLE	List all virtual Sensors		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Http request at "http://FitmanSN_URL:port/gsn"	XML with the list of all available virtual sensors	XML with the list of all available virtual sensors	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.2	**DATE**	Ιουλ-14
TITLE	List the output structure of a selected virtual sensors		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Http request at "http://FitmanSN_URL:port/gsn?REQUEST=113&name={VS_Name}"	Provides the structure of output stream for selected virtual sensor with the name	Provides the structure of output stream for selected virtual sensor with the name {VS_Name}	PASS

	{VS_Name}		
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.3	**DATE**	Ιουλ-14
TITLE	List the addressing details of a selected virtual sensors		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Http request at "http://FitmanSN_URL:port/gsn?REQUEST=115&name={VS_Name}"	provides the addressing predicates associated with selected virtual sensor with the name {VS_Name}	provides the addressing predicates associated with selected virtual sensor with the name {VS_Name}	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.4	**DATE**	Ιουλ-14
TITLE	List the addressing details of a selected virtual sensors		
MANUAL TESTING	YES		

PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Http request at "http://FitmanSN_URL:port/gsn?REQUEST=115&name={VS_Name}"	provides the addressing predicates associated with selected virtual sensor with the name {VS_Name}	provides the addressing predicates associated with selected virtual sensor with the name {VS_Name}	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.5	DATE	Ιουλ-14
TITLE	Query for data from the sensor		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Http request at "http://FitmanSN_URL:port/gsn?REQUEST=114&name={VS_Name}"	provides the data being read by the sensor associated with selected virtual sensor with the name {VS_Name}	provides the addressing predicates associated with selected virtual sensor with the name {VS_Name}	PASS
Http request at "http://FitmanSN_URL:port/gsn?REQUEST=114&name={VS_Name}&window={N}"	provides the data being read by the sensor associated with selected virtual sensor with	provides the data being read by the sensor associated with selected virtual sensor with the name {VS_Name} and N last values	PASS

	the name {VS_Name} and N last values		
Http request at "http://FitmanSN_URL:port/gsn?REQUEST=114&name={VS_Name}&window={N}&condition={CONDITON_OVER_STREAM}"	provides the data being read by the sensor associated with selected virtual sensor with the name {VS_Name}, N last values which satisfy the specified condition (e.g. TEMPERATURE>50)	provides the data being read by the sensor associated with selected virtual sensor with the name {VS_Name}, N last values which satisfy the specified condition (e.g. TEMPERATURE>50)	PASS
FAIL NOTES			
ACTION			

8.3.1.3 **Step P-5**

FITMAN-SFDC

1. I was able to set up a fully-functional FITMAN-SFDC instance in my working environment, using the provided Virtual Machine and installation instructions.
2. The FITMAN-SFDC instance, once correctly installed and configured in my environment, worked fast and smoothly, without any significant issue related with performance or software defects.
3. The usability of the both, the web-based user interface and the standalone client application is up to the expectations to configure and interact with the application. I was actually able to leverage the full capability of the software by following the manual provided and/or by receiving direct support.
4. I know the EPCglobal's ALE 1.1 specification and the LLRP that uses Fosstrack ALE Middleware to comunicate with RFID readers.

5. Using the ALE web-based client I was able to configure ALE Server.
6. Using the ALE client standalone application I was able to configure the ALE Server.
7. I was able to show received RO_SPEC reports with the aggregated data sent by the filtering and collection server, through the Even Sink tool provided by Fosstrak which displays incoming HTTP requests.
8. Using the Rifidi emulator application provided, I was able to send and receive reports and visualize them.
9. I was able to send reports to other components through the EventManager once this has been configured.

FITMAN-SDC-SN

1. It was easy to set up a fully-functional FITMAN-SDC-SN instance in my working environment, using the provided Virtual Machine and provided installation instructions were enough to keep the FITMAN-SDC-SN server up and running.
2. The FITMAN-SDC-SN instance deployed in my working environment worked fast and smoothly, without any significant issue related with performance or software defects.
3. The web application is simple and all features can be explored easily by following the manual provided.
4. Addition and deletion of Virtual sensor (VS) is easy. Creation of new VS is also quite easy based on the documentation provided and by following the DTD for VS. Any XML editor can be used for creation of VS.
    a. Editing of VS that has been added to the FITMAN-SDC-SN server is not provided by the current version of FITMAN-SDC-SN, but it's a suggestion that might be useful in other business scenarios (though was not within the scope of the test that we performed).
5. It was easy to understand the importance of VS in FITMAN-SDC-SN. Creation of VS by combining the inputs from multiple sensors was useful and important to model virtual sensors that can capture real-time situation at the shopfloor.
6. We could understand the difference between Virtual Sensor Description file, Wrappers and Processing Classes, which are used in combination for modelling and implementing the virtual sensors.
    a. New wrappers could be added to FITMAN-SDC-SN without having to rebuild or modify the FITMAN-SDC-SN server. The wrappers have to be registered in /conf/wrapper.properties file. Upon start-up FITMAN-SDC-SN locates the wrapper mappings by reading file and loads each wrapper whenever needed by the system.
7. REST API provided by FITMAN-SDC-SN provides enough functionality to access the details regarding VSs and perform queries over it. The HTTP requests are easy to compose and applicable conditions are easy to he used to query data with conditions over various parameters. All the functionalities could be easily tested based on the documentation provided.
8. REST API provided by FITMAN-SDC-SN provides enough functionality to access data from the sensor is CSV or XML format. It also allows accessing the series of data that has been recorded by the sensor and by providing necessary conditions where necessary. All the functionalities could be easily tested based on the documentation provided.

8.3.2 SEI_2 Secure Event Management

8.3.2.1 Step P-4

8.3.2.1.1 Test Case 1

TEST CASE ID	TC_1	**PRODUCT VERSION**	1.0.0 / 1.1.0
TITLE	SEM authorization "Positive" testing via the SEMAP (SEM Authorization Proxy) component	**TESTER**	Gabriele Cinelli
DESCRIPTION	Test the SEM authorization mechanism via the SEMAP component (see the "FITMAN Specific Enablers: Secure Event Management (SEM) Installation and Configuration Manual" for details) using a correct authorization capability token (i.e., a token actually granting the requested authorization - publish/subscribe - permission)		
COMPONENTS INVOLVED	SEMAP, SEM Authorization service, SEM PDP service	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	It is assumed that the SEM middleware has been properly installed and configured as described in the indicated manual. Additionally, it is assumed that a suitable namespace has been defined to which associate access token capability created using the SEM capability token generation wizard. To test the SEMAP component a tool like SOAP UI is used to submit HTTP REST requests and checks the results		

ITERATION ID	TC_1.1	DATE	February 2014
TITLE	Positive Test of the SEM authorization process via the SEMAP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	COMMENTS		PASS/FAIL
Create an access capability token using the ad hoc wizard	The token must grant an access right on the testing namespace subset in line with the REST request to be submitted to the SEMAP (i.e., a "subscribe" right on a namespace node - or namespace branch - or a "publish" right on a namespace leaf node)		PASS
Create a signed request	Using the Java code in the SEM demo client create a digitally signed access request (e.g., a SUBSCRIBE or PUBLISH request according to the type of access token in the previous step) using the access token created in the previous step. Save into an external file the created signed request		PASS
Start the SOAP UI tool			PASS
In SOAP UI create a suitable HTTP POST request	The POST must be to the URL "HTTP://<server-where-SEMAP-is-running>/semap/sessions and must include in the body the signed request created in the previous step		PASS
in SOAP UI get the HTTP POST Status Code	Receive Status Code: 500 (SEMAP Internal error)		FAIL
FAIL NOTES			
ACTION	Check the SEMAP and the SEM Authorization logs to check for the specific issue that forced the rejection of the request		

ITERATION ID	TC_1.2	DATE	February 2014
TITLE	Positive Test of the SEM authorization process via the SEMAP component		
MANUAL TESTING	Yes		

PRIORITY	High	
INPUT/STEPS	**COMMENTS**	**PASS/FAIL**
Reuse the access capability tokencreated in TC_1.1	See TC_1.1	PASS
Reuse the signed request created in TC_1.1	See TC_1.1	PASS
Start the SOAP UI tool		PASS
In SOAP UI create a suitable HTTP POST request	The POST must be to the URL "HTTP://<server-where-SEMAP-is-running>/semap/sessions and must include in the body the signed request created in the previous step	PASS
in SOAP UI get the HTTP POST Status Code	Receive Status Code: 500 (SEMAP Internal error)	FAIL
FAIL NOTES	In TC_1.1 the error was due to an error while checking the correctness of the received POST body	
ACTION	Check the SEMAP and the SEM Authorization logs to check for the specific issue that forced the rejection of the request	

ITERATION ID	TC_1.3	**DATE**	March 2014
TITLE	Positive Test of the SEM authorization process via the SEMAP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Reuse the access capability tokencreated in TC_1.1	See TC_1.1		PASS

Reuse the signed request created in TC_1.1	See TC_1.1	PASS
Start the SOAP UI tool		PASS
In SOAP UI create a suitable HTTP POST request	The POST must be to the URL "HTTP://<server-where-SEMAP-is-running>/semap/sessions and must include in the body the signed request created in the previous step	PASS
in SOAP UI get the HTTP POST Status Code	Receive Status Code: 201 (access request authorized)	PASS
in SOAP UI get the HTTP POST response headers and body	Check that the received headers and body complies with the expected values (as reported in the "FITMAN SECURE EVENT MANAGEMENT SPECIFIC ENABLER - REST API" document)	FAIL
FAIL NOTES	In TC_1.2 the error was due to an error while converting the received request from the REST API to the SEM native interface to forward the request to the SEM Authorization Service	
ACTION		

ITERATION ID	TC_1.4	**DATE**	March 2014
TITLE	Positive Test of the SEM authorization process via the SEMAP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Reuse the access capability tokencreated in TC_1.1	See TC_1.1		PASS
Reuse the signed request created in TC_1.1	See TC_1.1		PASS

Start the SOAP UI tool		PASS
In SOAP UI create a suitable HTTP POST request	The POST must be to the URL "HTTP://<server-where-SEMAP-is-running>/semap/sessions and must include in the body the signed request created in the previous step	PASS
in SOAP UI get the HTTP POST Status Code	Receive Status Code: 201 (access request authorized)	PASS
in SOAP UI get the HTTP POST response headers and body	Check that the received headers and body complies with the expected values (as reported in the "FITMAN SECURE EVENT MANAGEMENT SPECIFIC ENABLER - REST API" document)	PASS
in SOAP UI save the HTTP POST response headers and body	Save the received repsonse headers and body for the SEMP tests	PASS
FAIL NOTES	In TC_1.3 the headers were not correctly formatted	
ACTION		

ITERATION ID	TC_1.5	**DATE**	March 2014
TITLE	Check the system refuses to accept a replayed request (i.e., that a previously accepted access request is not reused by someone else)		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Reuse the access capability tokencreated in TC_1.1	See TC_1.1		PASS
Reuse the signed request created in TC_1.1	See TC_1.1		PASS
Start the SOAP UI tool			PASS

In SOAP UI resubmit the HTTP POST request used in TC_1.4	See TC_1.4	PASS
in SOAP UI get the HTTP POST Status Code	Receive Status Code: 201 (access request authorized) while we were expecting a 409 response code (request has been already submitted)	FAIL
FAIL NOTES		
ACTION	Check the SEMAP and the SEM Authorization logs to check for the specific issue that forced the rejection of the request	

ITERATION ID	TC_1.6	**DATE**	March 2014
TITLE	Check the system refuses to accept a replayed request (i.e., that a previously accepted access request is not reused by someone else)		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Reuse the access capability tokencreated in TC_1.1	See TC_1.1		PASS
Reuse the signed request created in TC_1.1	See TC_1.1		PASS
Start the SOAP UI tool			PASS

In SOAP UI resubmit the HTTP POST request used in TC_1.4	See TC_1.4	PASS
in SOAP UI get the HTTP POST Status Code	Receive Status Code: 409 (request has been already submitted)	PASS
FAIL NOTES	In TC_1.6 the problem was due to the SEMAP not correctly processing the response from the SEM Authorization Service	
ACTION		

8.3.2.1.2 Test Case 2

TEST CASE ID	TC_2	**PRODUCT VERSION**	1.1.0
TITLE	SEM authorization "Negative" testing via the SEMAP (SEM Authorization Proxy) component	**TESTER**	Gabriele Cinelli
DESCRIPTION	Test the SEM authorization mechanism via the SEMAP component (see the "FITMAN Specific Enablers: Secure Event Management (SEM) Installation and Configuration Manual" for details) using a wrong authorization capability token (i.e., a token granting an authorization - publish/subscribe - permission different from the one in the submitted access request: for example requesting a publish access using a subscribe permission token)		
COMPONENTS INVOLVED	SEMAP, SEM Authorization service, SEM PDP service	**TYPE**	FUNCTIONAL

RELEVANT REQUIREMENTS	It is assumed that the SEM middleware has been properly installed and configured as described in the indicated manual. Additionally, it is assumed that a suitable namespace has been defined to which associate access token capability created using the SEM capability token generation wizard. To test the SEMAP component a tool like SOAP UI is used to submit HTTP REST requests and checks the results	

ITERATION ID	TC_2.1	**DATE**	March 2014
TITLE	Negative Test of the SEM authorization process via the SEMAP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Create a "bad" access capability token using the ad hoc wizard	The access token must grant an access right on the testing namespace subset **not in line** with the REST request to be submitted to the SEMAP (i.e., a "subscribe" right for a publish request)		PASS
Create a signed request	Using the Java code in the SEM demo client create a digitally signed access request (e.g., a SUBSCRIBE or PUBLISH request according to the type of access token in the previous step) using the access token created in the previous step. Save into an external file the created signed request		PASS
Start the SOAP UI tool			PASS
In SOAP UI create a suitable HTTP POST request	The POST must be to the URL "HTTP://<server-where-SEMAP-is-running>/semap/sessions		PASS

	and must include in the body the signed request created in the previous step	
in SOAP UI get the HTTP POST Status Code	Receive Status Code: 201 (access request authorized) while we were expecting a 403 (request has been denied)	FAIL
FAIL NOTES		
ACTION	Check the SEMAP and the SEM Authorization logs to check for the specific issue that forced the rejection of the request	

ITERATION ID	TC_2.2	**DATE**	March 2014
TITLE	Negative Test of the SEM authorization process via the SEMAP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Reuse the access capability tokencreated in TC_1.1	See TC_2.1		PASS
Reuse the signed request created in TC_1.1	See TC_2.1		PASS
Start the SOAP UI tool			PASS
In SOAP UI create a suitable HTTP POST request	The POST must be to the URL "HTTP://<server-where-SEMAP-is-running>/semap/sessions and must include in the body the signed request created in the previous step		PASS
in SOAP UI get the HTTP POST Status Code	Receive Status Code: 403 (request has been denied)		PASS

FAIL NOTES	In TC_2.1 the problem was due to the SEMAP not correctly processing the response from the SEM Authorization Service	
ACTION		

8.3.2.1.3 Test Case 3

TEST CASE ID	TC_1	**PRODUCT VERSION**	1.0.0 / 1.1.0
TITLE	SEM publish testing via the SEMP (SEM Proxy) component	**TESTER**	Gabriele Cinelli
DESCRIPTION	Test the SEM publish feature via the SEMP component (see the "FITMAN Specific Enablers: Secure Event Management (SEM) Installation and Configuration Manual" for details) using the headers and POST response body received using the SEMAP access component		
COMPONENTS INVOLVED	SEMP, SEM broker (indirectly also the SEMAP/SEM Authorization and SEM PDP services because this SEMP test requires the access authorization information received using the SEMAP authorization proxy)	**TYPE**	FUNCTIONAL

RELEVANT REQUIREMENTS	It is assumed that the SEM middleware has been properly installed and configured as described in the indicated manual. Additionally, it is assumed that a suitable namespace has been defined to which associate access token capability created using the SEM capability token generation wizard. To test the SEMP component a tool like Google Chrome WebSocket Client is used to submit HTTP REST requests and Websocket usage and checks the results, as well as the SEM native demo client to check that the published events actually are correctly forwarded and dispatched via the SEM broker. The SEM native demo client must perform a suitable subscribe to the same namespace using for publishing	

ITERATION ID	TC_1.1	**DATE**	March 2014
TITLE	Test the publish process via the SEMP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**

Recover the POST response's headers and body saved while doing the SEMAP tests		PASS
Start the Google Chrome WebSocket Client tool		
In Google Chrome WebSocket Client create a suitable HTTP GET request	The GET must be to the URL "HTTP://<server-where-SEMP-is-running>/semp/<sempID>/sessions/<SessionID> (where <sempID> and <SessionsID> are the ones received in the SEMAP POST response headers) and must include the headers received in the SEMAP POST response	PASS
in Google Chrome WebSocket Client get the HTTP POST Status Code	Receive Status Code: 500 (SEMP Internal error)	FAIL
FAIL NOTES		
ACTION	Check the SEMP log to check for the specific issue that forced the rejection of the request	

ITERATION ID	TC_1.2	**DATE**	March 2014
TITLE	Test the publish process via the SEMP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Recover the POST response's headers and body saved while doing the SEMAP tests			PASS
Start the Google Chrome WebSocket Client tool			

In Google Chrome WebSocket Client create a suitable HTTP GET request	See TC_1.1	PASS
in Google Chrome WebSocket Client get the HTTP POST Status Code	Receive Status Code: 302 (SEM broker session established) Save the headers received in the HTTP GET response	PASS
in Google Chrome WebSocket Client submit a GET to open a Websocket	Submit a GET to ws://<location> (where <location> is the value received in the GET response in the previous step)	FAIL
FAIL NOTES	In TC_1.1 the error was due to bugs in the access parameters convertion between the received HTTP GET and the AMQP native connection setup	
ACTION	Check the SEMP log to check for the specific issue that forced the rejection of the request	

ITERATION ID	TC_1.3	**DATE**	March 2014
TITLE	Test the publish process via the SEMP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Recover the POST response's headers and body saved while doing the SEMAP tests			PASS
Start the Google Chrome WebSocket Client tool			
In Google Chrome WebSocket Client create a suitable HTTP GET request	See TC_1.1		PASS

in Google Chrome WebSocket Client get the HTTP POST Status Code	Receive Status Code: 302 (SEM broker session established) Save the headers received in the HTTP GET response	PASS
in Google Chrome WebSocket Client submit a GET to open a Websocket	Submit a GET to ws://<location> (where <location> is the value received in the GET response in the previous step)	PASS
in Google Chrome WebSocket Client check the Websocket setup response	Submit a GET to ws://<location> (where <location> is the value received in the GET response in the previous step)	PASS
in Google Chrome WebSocket Client create a JSON structure for publishing an event	The JSON structure must conform to the specs in the "FITMAN SECURE EVENT MANAGEMENT SPECIFIC ENABLER - REST API" document	
in Google Chrome WebSocket Client send the created JSON structure via the Websocket		FAIL
FAIL NOTES	In TC_1.2 the error was due to bugs in setting up the Websocket by the SEMP	
ACTION	Check the SEMP log to check for the specific issue that forced the rejection of the JSON event	

ITERATION ID	TC_1.4	**DATE**	March 2014
TITLE	Test the publish process via the SEMP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Recover the POST response's headers and body saved while doing the SEMAP tests			PASS
Start the Google Chrome WebSocket Client tool			

In Google Chrome WebSocket Client create a suitable HTTP GET request	See TC_1.1	PASS
in Google Chrome WebSocket Client get the HTTP POST Status Code	Receive Status Code: 302 (SEM broker session established) Save the headers received in the HTTP GET response	PASS
in Google Chrome WebSocket Client submit a GET to open a Websocket	Submit a GET to ws://<location> (where <location> is the value received in the GET response in the previous step)	PASS
in Google Chrome WebSocket Client check the Websocket setup response	Submit a GET to ws://<location> (where <location> is the value received in the GET response in the previous step)	PASS
in Google Chrome WebSocket Client create a JSON structure for publishing an event	The JSON structure must conform to the specs in the "FITMAN SECURE EVENT MANAGEMENT SPECIFIC ENABLER - REST API" document	
in Google Chrome WebSocket Client send the created JSON structure via the Websocket		PASS
in the SEM native demo client check the event is received	Look at the native demo client (which was started and which connected to the SEM broker before starting the test procedure) and check that all sent attributes (as specified in the JSON structure) have been correctly received and reported	FAIL (some attributes were not correctly converted)
FAIL NOTES	In TC_1.3 the error was due to a bug in the convertion code between the JSON and AMQP native formats	
ACTION		

ITERATION ID	TC_1.5	**DATE**	April 2014
TITLE	Test the publish process via the SEMP component		
MANUAL TESTING	Yes		
PRIORITY	High		

INPUT/STEPS	COMMENTS	PASS/FAIL
Recover the POST response's headers and body saved while doing the SEMAP tests		PASS
Start the Google Chrome WebSocket Client tool		
In Google Chrome WebSocket Client create a suitable HTTP GET request	See TC_1.1	PASS
in Google Chrome WebSocket Client get the HTTP POST Status Code	Receive Status Code: 302 (SEM broker session established) Save the headers received in the HTTP GET response	PASS
in Google Chrome WebSocket Client submit a GET to open a Websocket	Submit a GET to ws://<location> (where <location> is the value received in the GET response in the previous step)	PASS
in Google Chrome WebSocket Client check the Websocket setup response	Submit a GET to ws://<location> (where <location> is the value received in the GET response in the previous step)	PASS
[Action A] in Google Chrome WebSocket Client create a JSON structure for publishing an event	The JSON structure must conform to the specs in the "FITMAN SECURE EVENT MANAGEMENT SPECIFIC ENABLER - REST API" document	
[Action B] in Google Chrome WebSocket Client send the created JSON structure via the Websocket		PASS
[Action C] in the SEM native demo client check the event is received	Look at the native demo client (which was started and which connected to the SEM broker before starting the test procedure) and check that all sent attributes (as specified in the JSON structure) have been correctly received and reported	PASS
Repeat [Action A], [Action B] and [Action C]	Repeat the indicated actions chanching the attributes and their types so to extesnively check the correct convertion between the REST and native APIs	

FAIL NOTES	In TC_1.4 the convertion errors were due to further bugs in the convertion code between the JSON and AMQP native formats	
ACTION		

8.3.2.1.4 Test Case 4

TEST CASE ID	TC_2	**PRODUCT VERSION**	1.0.0 / 1.1.0
TITLE	SEM subscribe testing via the SEMP (SEM Proxy) component	**TESTER**	Gabriele Cinelli
DESCRIPTION	Test the SEM subscribe feature via the SEMP component (see the "FITMAN Specific Enablers: Secure Event Management (SEM) Installation and Configuration Manual" for details) using the headers and POST response body received using the SEMAP access component		
COMPONENTS INVOLVED	SEMP, SEM broker (indirectly also the SEMAP/SEM Authorization and SEM PDP services because this SEMP test requires the access authorization information received using the SEMAP authorization proxy)	**TYPE**	FUNCTIONAL

RELEVANT REQUIREMENTS	It is assumed that the SEM middleware has been properly installed and configured as described in the indicated manual. Additionally, it is assumed that a suitable namespace has been defined to which associate access token capability created using the SEM capability token generation wizard. To test the SEMP component a tool like Google Chrome WebSocket Client is used to submit HTTP REST requests and Websocket usage and checks the results, as well as the SEM native demo client to publish events to be received by the SEM REST API client. The SEM native demo client must perform a suitable publish to the same namespace the be used by the REST API client	

ITERATION ID	TC_2.1	**DATE**	April 2014
TITLE	Test the publish process via the SEMP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Recover the POST response's headers and body saved while doing the SEMAP tests			PASS

Start the SEM Native Client and lets it publish events		
Start the Google Chrome WebSocket Client tool		
In Google Chrome WebSocket Client create a suitable HTTP GET request	The GET must be to the URL "HTTP://<server-where-SEMP-is-running>/semp/<sempID>/sessions/<SessionID> (where <sempID> and <SessionsID> are the ones received in the SEMAP POST response headers) and must include the headers received in the SEMAP POST response	PASS
in Google Chrome WebSocket Client get the HTTP POST Status Code	Receive Status Code: 302 (SEM broker session established) Save the headers received in the HTTP GET response	PASS
in Google Chrome WebSocket Client submit a GET to open a Websocket	Submit a GET to ws://<location> (where <location> is the value received in the GET response in the previous step)	PASS
in Google Chrome WebSocket Client check the Websocket setup response	Submit a GET to ws://<location> (where <location> is the value received in the GET response in the previous step)	PASS
in Google Chrome WebSocket Client check published events are received	If the subscription process in the SEMP component is correctly implemented on the Google Chrome Client we must receive the events published by the SEM native demo client	FAIL
FAIL NOTES		
ACTION	Check the SEMP log	

ITERATION ID	TC_2.2	**DATE**	April 2014
TITLE	Test the publish process via the SEMP component		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**

Recover the POST response's headers and body saved while doing the SEMAP tests		PASS
Start the SEM Native Client and lets it publish events		
Start the Google Chrome WebSocket Client tool		
In Google Chrome WebSocket Client create a suitable HTTP GET request	See TC_2.1	PASS
in Google Chrome WebSocket Client get the HTTP POST Status Code	See TC_2.1	PASS
in Google Chrome WebSocket Client submit a GET to open a Websocket	See TC_2.1	PASS
in Google Chrome WebSocket Client check the Websocket setup response	See TC_2.1	PASS
in Google Chrome WebSocket Client check published events are received	See TC_2.1	PASS
FAIL NOTES	Convertion bugs between the SEM native and the JSON formats	
ACTION		

8.3.2.1.5 Test Case 5

TEST CASE ID	capability	**PRODUCT VERSION**	1
TITLE	Access Capability Tokens Generation	**TESTER**	Gabriele Cinelli
DESCRIPTION	Generate access tokens using the Token Generation Wizard		

COMPONENTS INVOLVED	Token Generation Wizard (standalone Java application)	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	1.1	**DATE**	Dec 13
TITLE	Generate a Root Access Capability Token		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Wizard start	Execute the run.bat/run.sh file in the Capability Token Wizard folder		PASS
Token Type Selection	Select the type of token to be generated (check the Root Access Capability radio button)		PASS
Root Capability Data Specification	Input the required data for a root capability token		PASS
Signing Certificate Selection	select the X509 certificates keystore and the X509 certificate to be used to sign the Root Capability token		PASS
Root Access Capability Token generation	check that the wizard completes the digital signature of the generated token		PASS
Root Access Capability Token XML file generation	check that the wizard is able to save the generated token into the file you specified		PASS
Root Access Capability Token interactive visualization (Tree + Source views)	check, using the viewers provided by the Wizard, that the token is structured as expected		PASS
FAIL NOTES			
ACTION	None		

ITERATION ID	_1.2	**DATE**	Feb-14
TITLE	Generate a child Access Capability Token		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Wizard start	Execute the run.bat/run.sh file in the Capability Token Wizard folder		PASS

Token Type Selection	Select the type of token to be generated (check the Access Capability radio button) and specify the Capability Token file path from which delegated rights must be granted (Delegation path field)	PASS
Root Capability Token selection and loading	Check that the specified parent capability token is loaded	PASS
Capability Token rights delegation specification	Input the required data for a capability token delegating rights from the selected Capability Token and check that the Wizard put constraints on the values (i.e., fileds like Revocation Service and Resource ID are read only, the listed Access Rights are the ones in the parent capability token that are flagged as delegable, the Validity Condition dates are not earlier and not later than the parent capability token dates)	PASS
Signing Certificate Selection	select the X509 certificates keystore and the X509 certificate to be used to sign the new Capability token (i.e., the X509 certificate of the owner of the specified parent capability token)	PASS
Access Capability Token generation	check that the wizard completes the digital signature of the generated token	PASS
Access Capability Token XML file generation	check that the wizard is able to save the generated token into the file you specified	PASS
Access Capability Token interactive visualization (Tree + Source views)	check, using the viewers provided by the Wizard, that the token is structured as expected	PASS
FAIL NOTES		
ACTION	None	

8.3.2.1.6 Test Case 6

TEST CASE ID	capability revocation	**PRODUCT VERSION**	1
TITLE	Access Capability Revocation Tokens Generation	**TESTER**	Gabriele Cinelli
DESCRIPTION	Use the Revocation Wizard to create a revocation request for an access tokens		
COMPONENTS INVOLVED	Token Revocation Request Generation Wizard (standalone Java application)	**TYPE**	FUNCTIONAL

RELEVANT REQUIREMENTS	

ITERATION ID	1.1	DATE	Dec 13
TITLE	Generate an access capability token revocation request for a specific access token		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Wizard start	Execute the run.bat/run.sh file in the Revocation Wizard folder		PASS
Authorizing Token Selection	Select the access token granting the rights to revoke an access capability token (i.e., specify the file path of a token that is an ancestor of the one to be revoked)		PASS
Capability Token to be revoked selection and revocation data specification	Input the required data		PASS
Revoke only the specified access token	in the Revoke area select the radio button "Seleted Capability only"		PASS
Signing Certificate Selection	select the X509 certificates keystore and the X509 certificate to be used to sign the revocation request token		PASS
Access Capability revocation Token generation	check that the wizard completes the digital signature of the generated revocation token		PASS
Access Capability Revocation Token XML file generation	check that the wizard is able to save the generated token into the file you specified		PASS
Access Capability Revocation Token interactive visualization (Tree + Source views)	check, using the viewers provided by the Wizard, that the token is structured as expected		PASS
FAIL NOTES			
ACTION	None		

ITERATION ID	1.2	DATE	Feb-14
TITLE	Generate an access capability token revocation request for all children of the specific access token		
MANUAL TESTING	Yes		

PRIORITY	High	
INPUT/STEPS	**COMMENTS**	**PASS/FAIL**
Wizard start	Execute the run.bat/run.sh file in the Revocation Wizard folder	PASS
Authorizing Token Selection	Select the access token granting the rights to revoke an access capability token (i.e., specify the file path of a token that is an ancestor of the one to be revoked)	PASS
Capability Token to be revoked selection and revocation data specification	Input the required data	PASS
Revoke all child tokens of the specified access token	in the Revoke area select the radio button "Children Capability only"	PASS
Signing Certificate Selection	select the X509 certificates keystore and the X509 certificate to be used to sign the revocation request token	PASS
Access Capability revocation Token generation	check that the wizard completes the digital signature of the generated revocation token	PASS
Access Capability Revocation Token XML file generation	check that the wizard is able to save the generated token into the file you specified	PASS
Access Capability Revocation Token interactive visualization (Tree + Source views)	check, using the viewers provided by the Wizard, that the token is structured as expected	PASS
FAIL NOTES		
ACTION	None	

ITERATION ID	1.3	**DATE**	June 14
TITLE	Generate an access capability token revocation request for both the specified access token as well as for all its children tokens		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
Wizard start	Execute the run.bat/run.sh file in the Revocation Wizard folder		PASS
Authorizing Token Selection	Select the access token granting the rights to revoke an access capability token (i.e., specify the file path of a token that is an ancestor of the one to		PASS

	be revoked)	
Capability Token to be revoked selection and revocation data specification	Input the required data	PASS
Revoke both the specified capability token as well as all its child ones	in the Revoke area select the radio button "Both"	PASS
Signing Certificate Selection	select the X509 certificates keystore and the X509 certificate to be used to sign the revocation request token	PASS
Access Capability revocation Token generation	check that the wizard completes the digital signature of the generated revocation token	PASS
Access Capability Revocation Token XML file generation	check that the wizard is able to save the generated token into the file you specified	PASS
Access Capability Revocation Token interactive visualization (Tree + Source views)	check, using the viewers provided by the Wizard, that the token is structured as expected	PASS
FAIL NOTES		
ACTION	None	

8.3.2.2 **Step P-5**

The FITMAN Secure Event Management SE provides asynchronous and fire-and-forget communication functions to collect event's related data, typically from the shop floor, and dispatch them in a controlled way to interested applications and services. This system makes use of a capability based access control mechanism able to meet the requirements to properly manage business-confidential and business-critical data as the ones coming from the shop floor and usual in Smart Factory environments.

The capability based SEM access control mechanism provides the following features: access right delegation, capability tokens revocation, fine-grained access rights. Token elements are based on the Security Assertion Markup Language (SAML) and eXtensible Access Control Markup Language (XACML) standards (with some extensions). Capabilities are communicable and unforgeable tokens of authority. By virtue of the possession of a capability token, a process/subject can access a resource/service exercising the rights that the capability token grants.

In order to manage the collected events, SEM uses the concept of "namespaces". A namespace is used to organize, normally in a hierarchical structure, related events (e.g., a production plant having production lines as children, each production line having production cells as children, each

production cell having its devices as children), so that the access control management can be easier (for example assigning a capability token to read all events in a production plant to the managing director, a capability token assigning the right to get all events related to a specific production cell to the cell supervisor, or a capability to publish events associated to a specific device node in the plant namespace to that device).

1. I'm able to create a capability
2. I'm able to create a capability with delegable rights
3. I'm able to revoke a capability
4. I'm able to configure the SEM functional components (e.g., SEMP, SEMAP, ENS broker)
5. I'm able to create a namespace
6. I'm able to assign a capability to an actor (e.g., a white or blue collar, a source of events, etc.)
7. The software is easy to understand and offers all the additional information needed to accomplish the work
8. The software gives error messages that clearly tell me what is happening in the tool, which problems occurred and how to manage them
9. The software generally reacts in an acceptable interval of time without long lags

8.3.3 SEI_3 Unstructured and Social Data Analytics

8.3.3.1 Step P-4

8.3.3.1.1 Test Case 1

TEST CASE ID	TC_1	**PRODUCT VERSION**	0.9
TITLE	Change project settings	**TESTER**	Evmorfia
DESCRIPTION	Test if changes in settings made from the UI update the settings used to gather data from social sources		
COMPONENTS INVOLVED	User Interface, Connection with database	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE12_A01,ITR_SE12_A02,ITR_SE12_A04,ITR_SE12_U04		

ITERATION ID	TC_1.1	**DATE**	Dec-2013
TITLE	Change keywords in project settings		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Go to “Project Setup” 2. Add keywords 3. Press save	Page Loads keywords are added as user writes	Page Loads keywords are added as user writes	PASS PASS
4. Go to another page and return to project setup	Keywords appear updated	Keywords appear updated	PASS
5. Check system database	Keywords are updated	Keywords are updated	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.2	**DATE**	Dec-2013
TITLE	Change twitter accounts in project settings		

MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Go to "Project Setup" 2. Add twitter accounts without deleting previous 3. Press save	Page Loads twitter accounts are added as user writes	Page Loads twitter accounts are added as user writes	PASS PASS
4. Go to another page and return to project setup	twitter accounts appear updated	twitter accounts appear updated	PASS
5. Check system database	twitter accounts are updated	twitter accounts are updated	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.3	**DATE**	Dec-2013
TITLE	Change facebook accounts in project settings		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Go to "Project Setup" 2. Add facebook accounts without deleting previous 3. Press save	Page Loads facebook accounts are added as user writes	Page Loads facebook accounts are added as user writes	PASS PASS
4. Go to another page and return to project setup	facebook accounts appear updated	facebook accounts appear updated	PASS
5. Check system database	facebook accounts are updated	facebook accounts are updated	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.4	**DATE**	Dec-2013

TITLE	Change facebook accounts in project settings		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Go to "Project Setup" 2. Delete facebook accounts 3. Press save	Page Loads	Page Loads	PASS PASS
4. Go to another page and return to project setup	facebook accounts appear updated	facebook accounts appear updated	PASS
5. Check system database	facebook accounts are updated	facebook accounts are updated	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.5	DATE	Dec-2013
TITLE	Change twitter accounts in project settings		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Go to "Project Setup" 2. Delete twitter accounts 3. Press save	Page Loads	Page Loads	PASS PASS
4. Go to another page and return to project setup	twitter accounts appear updated	twitter accounts appear updated	PASS
5. Check system database	twitter accounts are updated	twitter accounts are updated	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.6	DATE	Dec-2013
TITLE	Change keywords in project settings		

MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Go to "Project Setup" 2. Delete keywords 3. Press save	Page Loads	Page Loads	PASS PASS
4. Go to another page and return to project setup	Keywords appear updated	Keywords appear updated	PASS
5. Check system database	Keywords are updated	Keywords are updated	PASS
FAIL NOTES			
ACTION			

8.3.3.1.2 Test Case 2

TEST CASE ID	TC_2	**PRODUCT VERSION**	0.9
TITLE	Report creation	**TESTER**	Iosif
DESCRIPTION	Create reports to query and visualize collected data based on given search parameters		
COMPONENTS INVOLVED	User Interface, Connection with database,Connection to FI-WARE GE, Connection and queries to elasticsearch	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE12_A05-6, ITR_SE12_U01-2,ITR_SE12_D03		

ITERATION ID	TC_2.1	**DATE**	May-14
TITLE	Create report specifying only keywords,time frame and language		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
go to create report tab			

provide keywords in the corresponding field			PASS
select start and end date			PASS
select language “en” from dropdown list			PASS
press create report			PASS
press on the name of the new report	result page loads	result page loads	PASS
review message tab	messages are presented in an array together with creation date,source and identified sentiment	messages are presented in an array together with creation date,source and identified sentiment	PASS
	creation dates are within the specified range	creation dates are within the specified range	PASS
	messages contain specified keywords	messages contain specified keywords	PASS
	pressing column name sorts results accordingly	pressing column name sorts results accordingly	PASS
review sentiments tab	overall sentiment visualized in pie chart	overall sentiment visualized in pie chart	PASS
	more positive influencing keywords visualized in tree map	more positive influencing keywords visualized in tree map	PASS
	number of positive and negative accurences of keywords visualized in bubble chart	number of positive and negative accurences of keywords visualized in bubble chart	PASS
review categories tab	number of occurences per keyword visualized in pie chart	number of occurences per keyword visualized in pie chart	PASS
	sentiments per keyword visualized in histogram	sentiments per keyword visualized in histogram	PASS
review photo gallery tab	pictures from retrieved documents are presented in the form of an album	pictures from retrieved documents are presented in the	PASS

		form of an album	
	hovering over a picture shows the document it came from and the corresponding sentiment	hovering over a picture shows the document it came from and the corresponding sentiment	PASS
	selecting a picture opens makes it larger and shows the document it came from and the corresponding sentiment	selecting a picture opens makes it larger and shows the document it came from and the corresponding sentiment	PASS
review rss tab	documents retrieved from rss sources are presented in an array showing the text, date, source and link to source	documents retrieved from rss sources are presented in an array showing the text, date, source and link to source	PASS
FAIL NOTES	review chart sizes to provide better user experience		
ACTION			

ITERATION ID	TC_2.2	**DATE**	May-14
TITLE	Create report specifying keywords,twitter accounts, time frame and language		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
go to create report tab			
provide keywords in the corresponding field			PASS
provide twitter accounts			
select start and end date			PASS
select language “en” from dropdown list			PASS
press create report			PASS
press on the name of the new report	result page loads	result page loads	PASS

review message tab	messages are presented in an array together with creation date,source and identified sentiment	messages are presented in an array together with creation date,source and identified sentiment	PASS
	creation dates are within the specified range	creation dates are within the specified range	PASS
	messages contain specified keywords or come from the specified twitter accounts or mention these accounts	messages contain specified keywords or come from the specified twitter accounts or mention these accounts	PASS
	pressing column name sorts results accordingly	pressing column name sorts results accordingly	PASS
review sentiments tab	overall sentiment visualized in pie chart	overall sentiment visualized in pie chart	PASS
	more positive influencing keywords visualized in tree map	more positive influencing keywords visualized in tree map	PASS
	number of positive and negative accurences of keywords visualized in bubble chart	number of positive and negative accurences of keywords visualized in bubble chart	PASS
review categories tab	number of occurences per keyword visualized in pie chart	number of occurences per keyword visualized in pie chart	PASS
	sentiments per keyword visualized in histogram	sentiments per keyword visualized in histogram	PASS
review photo gallery tab	pictures from retrieved documents are presented in the form of an album	pictures from retrieved documents are presented in the form of an album	PASS
	hovering over a picture shows the document it came from and the corresponding sentiment	hovering over a picture shows the document it came from and the corresponding sentiment	PASS

	selecting a picture opens makes it larger and shows the document it came from and the corresponding sentiment	selecting a picture opens makes it larger and shows the document it came from and the corresponding sentiment	PASS
review rss tab	documents retrieved from rss sources are presented in an array showing the text, date, source and link to source	documents retrieved from rss sources are presented in an array showing the text, date, source and link to source	PASS
FAIL NOTES	review chart sizes to provide better user experience		
ACTION	Proposed test cases: what happens with rss if no keywords are specified?		

ITERATION ID	TC_2.3	**DATE**	May-14
TITLE	Create report specifying keywords,twitter accounts, facebook pages time frame and language		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
go to create report tab			
provide keywords in the corresponding field			PASS
provide twitter accounts			
select start and end date			PASS
select language “en” from dropdown list			PASS
press create report			PASS
press on the name of the new report	result page loads	result page loads	PASS
review message tab	messages are presented in an array together with creation date,source and identified sentiment	messages are presented in an array together with creation date,source and identified	PASS

		sentiment	
	creation dates are within the specified range	creation dates are within the specified range	PASS
	messages contain specified keywords or come from the specified twitter accounts or mention these accounts	messages contain specified keywords or come from the specified twitter accounts or mention these accounts	PASS
	pressing column name sorts results accordingly	pressing column name sorts results accordingly	PASS
review sentiments tab	overall sentiment visualized in pie chart	overall sentiment visualized in pie chart	PASS
	more positive influencing keywords visualized in tree map	more positive influencing keywords visualized in tree map	PASS
	number of positive and negative accurences of keywords visualized in bubble chart	number of positive and negative accurences of keywords visualized in bubble chart	PASS
review categories tab	number of occurences per keyword visualized in pie chart	number of occurences per keyword visualized in pie chart	PASS
	sentiments per keyword visualized in histogram	sentiments per keyword visualized in histogram	PASS
review photo gallery tab	pictures from retrieved documents are presented in the form of an album	pictures from retrieved documents are presented in the form of an album	PASS
	hovering over a picture shows the document it came from and the corresponding sentiment	hovering over a picture shows the document it came from and the corresponding sentiment	PASS

	selecting a picture opens makes it larger and shows the document it came from and the corresponding sentiment	selecting a picture opens makes it larger and shows the document it came from and the corresponding sentiment	PASS
review rss tab	documents retrieved from rss sources are presented in an array showing the text, date, source and link to source	documents retrieved from rss sources are presented in an array showing the text, date, source and link to source	PASS
FAIL NOTES	review chart sizes to provide better user experience, source names from fb pages are confusing		
ACTION			

8.3.3.1.3 Test Case 3

TEST CASE ID	TC_3	**PRODUCT VERSION**	0.9
TITLE	System training	**TESTER**	Evmorfia
DESCRIPTION	Provide initial data for the training of the supervised machine learning technique used for sentiment analysis		
COMPONENTS INVOLVED	User Interface, rapidminer sentiment analysis process, rapidanalytics training service	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE12_A07,ITR_SE12_U03		

ITERATION ID	TC_3.1	**DATE**	Dec-2013
TITLE	Train system with data retrieved from it		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Open Training tab Press Download csv	csv file is downloaded csv contains data relevant to the project settings	csv file is downloaded csv contains data relevant to the project	PASS PASS

		settings	
	csv format is as described in the training page	csv format is as described in the training page	PASS
After completing the downloaded files with sentiment tags, upload it to system for training	file is uploaded successfully	file is uploaded successfully	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.2	**DATE**	Dec-2013
TITLE	Train system with file not generated from the system		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Open Training tab			
Upload csv file in the required format	File is successfully uploaded	File is successfully uploaded	PASS
Wait for confirmation message	No feedback	Confirmation/Failure message	FAIL
FAIL NOTES	Should provide feedback and error messages when trying to upload inappropriate file		
ACTION			

8.3.3.1.4 Test Case 4

TEST CASE ID	TC_4	**PRODUCT VERSION**	0.9
TITLE	Free search functionality	**TESTER**	Evmorfia
DESCRIPTION	Free search functionality based on kibana dashboard		

COMPONENTS INVOLVED	User Interface, Connection with elasticsearch, Kibana	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE12_A05-6, ITR_SE12_U01-2,ITR_SE12_D03		

ITERATION ID	TC_4.1	**DATE**	Dec-13
TITLE	navigate to free search dashboard, search terms, change time frame, review statistics for collected data		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
go to free search tab			
change time frame	statistics are updated	statistics are updated	PASS
add search terms	corresponding results appear in preconfigured charts	corresponding results appear in preconfigured charts	PASS
select time frame in time histogram	results in charts adapt to new time frame	results in charts adapt to new time frame	PASS
save changed dashboard to file	json result is stored	json result is stored	PASS
load previously exported json dashboard	dashboard is configured by json file	dashboard is configured by json file	PASS
FAIL NOTES			
ACTION			

8.3.3.1.5 Test Case 5

TEST CASE ID	TC_5	**PRODUCT VERSION**	0.9
TITLE	Response time check	**TESTER**	Iosif
DESCRIPTION	Check report creation time		
COMPONENTS INVOLVED	elasticsearch, result processing, google charts	**TYPE**	PERFORMANCE

RELEVANT REQUIREMENTS	ITR_SE12_N02		

ITERATION ID	TC_5.1	**DATE**	May-14
TITLE	report creation time		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
create report with keywords:sofa,couch,living room, twitter accounts:ikealiving and facebook pages:IKEAUK, from:1/5/2014, to:15/5/2014			
enter report results and wait for the pages to load	process takes < 5 seconds	process takes < 5 seconds	PASS
FAIL NOTES			
ACTION			

8.3.3.1.6 Test Case 6

TEST CASE ID	TC_6	**PRODUCT VERSION**	0.9
TITLE	real time analysis	**TESTER**	Evmorfia
DESCRIPTION	Tweets are retrieved and processed within minutes of their creation		
COMPONENTS INVOLVED	Streaming scripts, sentiment analysis services from rapidanalytics	**TYPE**	FUNCTIONAL, PERFORMANCE
RELEVANT REQUIREMENTS	ITR_SE12_A01		

ITERATION ID	TC_6.1	**DATE**	May-14

TITLE	monitor twitter account and check how long it takes for a tweet to appear in the system	
MANUAL TESTING	YES	
PRIORITY	High	
INPUT/STEPS	**COMMENTS**	**PASS/FAIL**
monitor one twitter account from the project settings and wait for tweet	from twitter, not Anlzer	
when tweet is created, go to free Search		
check for specific tweet - no sentiment required	It takes less than 5minutes for the tweet to appear (check from admin's dashboard and couchbase panel)	PASS
check for specific tweet - sentiment required	It takes at most 45 minutes for tweet to be assigned sentiment	PASS
FAIL NOTES		
ACTION		

8.3.3.1.7 Test Case 7

TEST CASE ID	TC_8	**PRODUCT VERSION**	0.9
TITLE	elasticsearch indexing	**TESTER**	Evmorfia
DESCRIPTION	Documents are replicated from Couchbase to ES and are analyzed and indexed		
COMPONENTS INVOLVED	elasticsearch,couchbase	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	TC_8.1	**DATE**	Dec-13
TITLE	monitor twitter account and check how long it takes for a tweet to appear in the system		
MANUAL TESTING	YES		
PRIORITY	High		

INPUT/STEPS	COMMENTS	PASS/FAIL
monitor xdcr operations	from Couchbase panel to ensure the process is running	
monitor changes in number of documents		
check for specific tweet - no sentiment required	It takes less than 5minutes for the tweet to appear (couchbase web console)	PASS
	It takes less than 5minutes for the tweet to appear (admin's kibana dashboard)	
	It takes less than 5minutes for the tweet to appear (elasticsearch head plugin interface)	
check for specific tweet - sentiment required	It takes at most 45 minutes for tweet to be assigned sentiment	PASS
FAIL NOTES		
ACTION		

8.3.3.1.8 Test Case 8

TEST CASE ID	TC_9	**PRODUCT VERSION**	0.9
TITLE	Sentiment analysis visualization	**TESTER**	Evmorfia
DESCRIPTION	Check if sentiment analysis charts are correct and consistent with the results		
COMPONENTS INVOLVED	User interface, elasticsearch,google charts	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE12_U02		

ITERATION ID	TC_9.1	**DATE**	Mar-14
TITLE	sentiment analysis charts examination for keywords		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**DESIRED OUTCOME**		**PASS/FAIL**
create report specifying only simple words as keywords			

navigate treemap	size and colour of each rectangle represent positive effect on total positive (validate through admin dashboard)	PASS
examine pie chart	sentiment results are consistent with number of results	PASS
examine bubble chart	it is consistent with the treemap and pie chart	PASS
go to categories tab	review the sentiment histogram and check if consistent with other charts	PASS
FAIL NOTES		
ACTION		

ITERATION ID	TC_9.2	**DATE**	Mar-14
TITLE	sentiment analysis charts examination for keywords and phrases		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**DESIRED OUTCOME**		**PASS/FAIL**
create report specifying only keywords-words and phrases			
repeat steps from 9.1			PASS
examine how phrases are handled	phrases are correctly identified and treated as a whole		PASS
examine bubble chart	it is consistent with the treemap and pie chart		PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_9.3	**DATE**	Apr-14
TITLE	sentiment analysis charts examination for keywords, phrases and extra desined categories		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**DESIRED OUTCOME**		**PASS/FAIL**
create report specifying keywords,phrases and 2 extra categories			

repeat steps from 9.1		
repeat steps from 9.2		
examine how the values of the categories are handled	all values are included in corresponding diagrams	PASS
	sentiment charts per category per value are provided	PASS
FAIL NOTES		
ACTION		

8.3.3.1.9 Test Case 9

TEST CASE ID	TC_10	**PRODUCT VERSION**	0.9
TITLE	Project set up	**TESTER**	Evmorfia
DESCRIPTION	Test that every parameter of project set up is correctly processed		
COMPONENTS INVOLVED	User Interface, Connection with database,Connection to FI-WARE GE	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE12_A01-04, ITR_SE12_U04		

ITERATION ID	TC_10.1	**DATE**	Feb-14
TITLE	Keywords are propagated to twitter streaming script		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. provide keywords in the corresponding field 2. press save 3. check that database contains the right keywords			PASS PASS PASS
4. review collected data to ensure they are related to the project keywords			PASS

FAIL NOTES	
ACTION	

ITERATION ID	TC_10.2	**DATE**	Feb-14
TITLE	Twitter accounts are propagated to twitter streaming script		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. provide twitter accounts in the corresponding field 2. press save 3. check that database contains the right twitter accounts			PASS PASS PASS
4. review collected data to ensure they come from the specified accounts or are addressed to them			FAIL
FAIL NOTES	twitter accounts are processed as simple keywords		
ACTION	search in the user_screen_name field		FIXED

ITERATION ID	TC_10.3	**DATE**	Feb-14
TITLE	Facebook pages are propagated to facebook crawling script		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. provide facebook pages in the corresponding field 2. press save 3. check that database contains the right facebook pages			PASS PASS PASS

4. review collected facebook data to ensure they come from the specified facebook pages			FAIL
FAIL NOTES	the user_screen_name field is not analyzed and contains more information than the facebook page		
ACTION	change elasticsearch query to properly handle this type of search		FIXED

ITERATION ID	TC_10.4	**DATE**	May-14
TITLE	RSS sources are sent to the UDA VM and added to the UDA project		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. provide rss sources in the corresponding field 2. press save 3. call UDA REST service and ensure sources have been added to project			PASS PASS PASS
FAIL NOTES			
ACTION			

8.3.3.1.10 Test Case 10

TEST CASE ID	TC_11	**PRODUCT VERSION**	0.9
TITLE	Sentiment analysis process	**TESTER**	Evmorfia
DESCRIPTION	Check that implemented sentiment analysis flow is working		
COMPONENTS INVOLVED	Streaming scripts, services from rapidanalytics, rapidminer	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE12_A06, ITR_SE12_D02		

ITERATION ID	TC_11.1	DATE	Jan-14
TITLE	sentiment analysis procedures		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
text from every retrieved document is stored in a file in specified folder			PASS
file title corresponds to document id in database			PASS
files corresponding to english and spanish documents are stored in different folder			PASS
sentiment assignment processes (en and es) from rapidanalytics run every 20'	review inside rapidanalytics web console		PASS
update python scripts run every 20'	sentiments are changed inside database and corresponding files are deleted from folder with files in line for sentiment tagging		PASS
FAIL NOTES	In respect to ITR_SE12_D02, implementation has changed, but functionality is offered. Reason for change: improve performance		
ACTION			

8.3.3.1.11 Test Case 11

TEST CASE ID	TC_12	PRODUCT VERSION	0.9
TITLE	Manual Sentiment Assignment	TESTER	Iosif
DESCRIPTION	User should be able to change the sentiment of a document if she considers it falsely identified		

COMPONENTS INVOLVED		**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE12_A01-04, ITR_SE12_U04		

ITERATION ID	TC_12.1	**DATE**	May-14
TITLE	change sentiment of tweet from negative to positive		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
when inside report select dropdown sentiment list	list is responsive and allows the user to select negative/positive/neutral as sentiment	list is responsive and allows the user to select negative/positive/neutral as sentiment	PASS
select desired sentiment and press save	page does not load (request timeout)	page loading with changed result	FAIL
FAIL NOTES	database check shows sentiment has indeed changed, but page fails to load, consider providing notification of successful change		
ACTION			

8.3.3.1.12 Test Case 12

TEST CASE ID	TC_13	**PRODUCT VERSION**	0.9
TITLE	Trend analysis visualization	**TESTER**	Evmorfia
DESCRIPTION	Check if trend analysis charts are correct and consistent with the results		
COMPONENTS INVOLVED	User interface, elasticsearch,google charts	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE12_U01		

ITERATION ID	TC_13.1	**DATE**	Apr-14

TITLE	trend analysis charts examination for keywords	
MANUAL TESTING	YES	
PRIORITY	High	
INPUT/STEPS	**COMMENTS**	**PASS/FAIL**
create report specifying only simple words as keywords		
review created pie chart	pie chart shows the percentage of documents containing each of the defined keywords	PASS
FAIL NOTES	it needs to be explained how documents that contain more than one of the keywords are handled	
ACTION		

ITERATION ID	TC_13.2	**DATE**	May-14
TITLE	trend analysis charts examination for keywords, phrases and extra desined categories-processing of request		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
create report specifying keywords,phrases and 2 extra categories			
repeat steps from 13.1			PASS
examine how phrases are handled	phrases correctly identified as a whole		PASS
examine how the values of the categories are handled	all values are included in corresponding diagrams		PASS
	trend pie charts per category are created		PASS
inspect results	including phrases as values in extra categories violates the 'AND' condition when this is selected		FAIL
FAIL NOTES	error in constructed elastic search query		
ACTION	option "minimum_should_match:1" should change – done.		

ITERATION ID	TC_13.2.1	DATE	May-14
TITLE	trend analysis charts examination for keywords, phrases and extra desined categories-processing of results		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	COMMENTS		PASS/FAIL
create report specifying keywords,phrases and 2 extra categories			
repeat steps from 13.1			PASS
examine how phrases are handled	phrases correctly identified as a whole		PASS
examine how the values of the categories are handled	all values are included in corresponding diagrams		PASS
	trend pie charts per category are created		PASS
inspect results	numbers in bubble diagram are wrong (count of partial > count of total!!!)		FAIL
FAIL NOTES	initial search inside response counts words in 3 fields instead of only processed text field		
ACTION	search only inside text_no_url_* fields		FIXED

ITERATION ID	TC_13.2.2	DATE	May-14
TITLE	trend analysis charts examination for keywords, phrases and extra desined categories-processing of results		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	COMMENTS		PASS/FAIL
create report specifying keywords,phrases and 2 extra categories			
repeat steps from 13.1			PASS
examine how phrases are handled	phrases correctly identified as a whole		PASS
examine how the values of the categories are handled	all values are included in corresponding diagrams		PASS
	trend pie charts per category are created		PASS

inspect results	numbers in bubble chart are inconsistent	FAIL
FAIL NOTES	count of total = #pos+#neg+#neu INCLUDING multiple appearenced inside same doc	
ACTION	NOT AN ACTUAL ERROR - numbers in bubble chart need to be explained	

8.3.3.2 **Step P-5**

The FITMAN "Unstructured and Social Data Analytics" Specific Enabler (FITMAN-Anlzer) offers insights to unstructured data published in the web and to social data generated by users in social networks which are relevant to specific topics of interest.

FITMAN-Anlzer is based on state-of-the art, open-source technologies and is delivered as a web-based platform.

For more information and for accessing FITMAN-Anlzer please visit: http://catalogue.fitman.atosresearch.eu/enablers/unstructured-and-social-data-analytics

In order to provide your feedback after testing the solution, please answer how much you agree/disagree to the following statements. In case you cannot provide an answer (e.g. if you have not tested the corresponding feature), you can leave it empty.

I. I can set up a new anlzer instance from the beginning, following the provided instructions. In case I use the provided VM, I understand how to use the SE and integrate it into the workflow of my program/application.

II. I understand how to set up a new project and adjust it to my desired domain of interest.

III. I understand what information needs to be filled in to create a report and how the combination of the defined parameters will affect the retrieved results.

IV. I understand how to train the system in order to provide meaningful results.

V. The provided instructions are correct and complete (i.e. I did not need to take any extra or different steps than the ones described).

VI. I understand how to the NLP processes (inside rapidminer) work and how to change them

VII. I understand how to set up extra Couchbase buckets and/or change the size of the preconfigured bucket.

VIII. The system gives error messages that clearly tell me how to fix problems.

IX. I find that the UI successfully incorporates and represents the full potential of the underlying functionalities.

X. I find that the selected technology stack is scalable and appropriate for processing a large amount of data.

8.3.4 SEI_4 Collaborative Assets Management

8.3.4.1 Step P-4

8.3.4.1.1 Test Case 1

TEST CASE ID	TC_1	**PRODUCT VERSION**	1.0
TITLE	Import custom ontology into Asset Repository	**TESTER**	MC Mantuano
DESCRIPTION	Test if classes, named individuals, data properties and object properties as defined in the source ontology are correctly represented in the Asset Repository UI		
COMPONENTS INVOLVED	Asset Repository, User Interface	**TYPE**	FUNCTIONAL
ITERATION ID	TC_1.1	**DATE**	December 2013
TITLE	Clear the Asset Repository		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Connect to the Asset Repository admin UI	System displays the list of repositories		PASS
Select the DEFAULT repository	System displays the DEFAULT repository meta-data		PASS
Select the Modify->Clear menu entry	System displays a confirmation page		PASS
Press the Clear Context(s) button	System confirms the operation		PASS
Connect to the Asset Repositoy regular UI and navigate	The Asset Repository contains no data		PASS

FAIL NOTES			
ACTION			
ITERATION ID	TC_1.2	**DATE**	December 2013
TITLE	Import the base MSEE ontology into the Asset Repository		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Connect to the Asset Repository admin UI	System displays the list of repositories		PASS
Select the DEFAULT repository	System displays the DEFAULT repository meta-data		PASS
Select the Modify->Add menu entry	System displays the "Add RDF" web form		PASS
Press the Choose File button	System displays the filesystem browser dialog		PASS
Select a local file containing the base MSEE ontology, as released with the software distribution			
Press the Upload button	System confirms the operation		PASS
Connect to the Asset Repositoy regular UI and navigate	The Asset Repository contains only the basic data		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_1.3	**DATE**	December 2013
TITLE	Import the custom ontology into the Asset Repository		

MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Connect to the Asset Repository admin UI	System displays the list of repositories		PASS
Select the DEFAULT repository	System displays the DEFAULT repository meta-data		PASS
Select the Modify->Add menu entry	System displays the "Add RDF" web form		PASS
Press the Choose File button	System displays the filesystem browser dialog		PASS
Select a local file containing the custom ontology, which complies with MSEE standards			
Press the Upload button	System confirms the operation		PASS
Connect to the Asset Repositoy regular UI and navigate	The Asset Repository contains all the Classes, Asset Owners, Asset Models, Assets, Attributes and Relationships defined by the custom ontology		
FAIL NOTES			
ACTION			

8.3.4.1.2 Test Case 2

TEST CASE ID	TC_2	**PRODUCT VERSION**	1.0
TITLE	Manage Asset Classes	**TESTER**	MC Mantuano
DESCRIPTION	Test if Asset Classes can be added to, deleted from and moved across different branches of the class hierarchy		
COMPONENTS INVOLVED	Asset Repository, User Interface	**TYPE**	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			
ITERATION ID	TC_2.1	**DATE**	February

			2014
TITLE	Add a new Asset Class as a top-level node		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Right-click on the "root" node of the Asset Classes tree	System pops-up a contextual menu with three entries		PASS
Click on the "Add child" entry of the contextual menu	System pops-up a "Add New Class" modal dialog		PASS
Type a valid an unique Asset Class name in the "Name" input box			
Press the "Save" button	The Asset Classes tree is updated: the new node is added under "root"		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_2.2	**DATE**	February 2014
TITLE	Add a new Asset Class as a child node of an existing Asset Class		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS

Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Right-click on an Asset Class node of the Asset Classes tree	System pops-up a contextual menu with three entries		PASS
Click on the "Add child" entry of the contextual menu	System pops-up a "Add New Class" modal dialog		PASS
Type a valid and unique name in the "Name" input box			
Press the "Save" button	The Asset Classes tree is updated: the new Asset Class is added under the selected parent		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_2.3	**DATE**	February 2014
TITLE	Move an existing Asset Class under a different parent node		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Right-click on an Asset Class node of the Asset Classes tree	System pops-up a contextual menu with three entries		PASS
Click on the "Move" entry of the contextual menu	System pops-up a "Move Class" modal dialog		PASS
Select a different Asset Class parent from the "Parent" list			

Press the "Save" button	The Asset Classes tree is updated: the Asset Class is now placed under its new parent		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_2.4	**DATE**	February 2014
TITLE	Delete an existing Asset Class which is not referenced by any Assets / Asset Models		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Right-click on an Asset Class node of the Asset Classes tree	System pops-up a contextual menu with three entries		PASS
Click on the "Delete" entry of the contextual menu	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	The Asset Classes tree is updated: the Asset Class no longer belongs to the tree		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_2.5	**DATE**	February 2014
TITLE	Try to delete an existing Asset Class having one or more child Asset		

	Classes		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Right-click on an Asset Class node of the Asset Classes tree	System pops-up a contextual menu with three entries		PASS
Click on the "Delete" entry of the contextual menu	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	System pops-up a "Error" modal dialog, without updating the Asset Classes tree		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_2.6	**DATE**	February 2014
TITLE	Try to delete an existing Asset Class which is referenced by one or more Assets / Asset Models		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Right-click on an Asset Class node of the Asset	System pops-up a contextual menu with three entries		PASS

Classes tree			
Click on the "Delete" entry of the contextual menu	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	System pops-up a "Error" modal dialog, without updating the Asset Classes tree		PASS
FAIL NOTES			
ACTION			

8.3.4.1.3 Test Case 3

TEST CASE ID	TC_3	**PRODUCT VERSION**	1.0
TITLE	Manage Assets and Asset Models	**TESTER**	MC Mantuano
DESCRIPTION	Test if Assets and Asset Models can be defined by assigning attributes and relationships, and if Assets can be derived from Asset Models		
COMPONENTS INVOLVED	Asset Repository, User Interface	**TYPE**	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			
ITERATION ID	TC_3.1	**DATE**	February 2014
TITLE	Create a new Asset Model		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS

Click the "New Asset Model" in the main display area	System pops-up a "New Asset Model" modal dialog		PASS
Type a valid and unique name in the "Asset" input box			
Select one entry from the "Owner" selection list			
Click on the "Save" button	The new Asset Model is added to the list view in the main display area		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_3.2	**DATE**	February 2014
TITLE	Assign a new Attribute to an existing Asset Model		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the detail icon of an Asset Model row in the Asset list view	System loads the Property list view in the main display area		PASS
Click on the "Add Attribute" button in the main display area	System pops-up a "Add Attribute" modal dialog		PASS
Select one entry from the "Property" selection list			
Select one entry fron the "Type"			FAIL

selection list [OPTIONAL]			
Type a default value in the "Value" input box			
Click on the "Save" button	The new Attribute with the given default value is added to the list view in the main display area		PASS
FAIL NOTES			The "Type" selection list is disabled
ACTION			Fixed
ITERATION ID	TC_3.3	**DATE**	February 2014
TITLE	Assign a new Relationship to an existing Asset Model		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the detail icon of an Asset Model row in the Asset list view	System loads the Property list view in the main display area		PASS
Click on the "Add Relationship" button in the main display area	System pops-up a "Add Relationship" modal dialog		PASS
Select one entry from the "Relation" selection list			
Select one entry from the "Asset" selection list			
Click on the "Save" button	The new Relationship with the selected endpoint is added to the		PASS

	list view in the main display area		
FAIL NOTES			
ACTION			
ITERATION ID	TC_3.4	**DATE**	February 2014
TITLE	Create a new Asset from an existing Asset Model		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the "plus" icon of an Asset Model row in the Asset list view	System pops-up a "New Asset" modal dialog		PASS
Type a valid and unique name in the "Asset" input box			
Select one entry from the "Owner" selection list			
Click on the "Save" button	The new Asset is added to the list view in the main display area, and is a perfect clone of the Asset Model		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_3.5	**DATE**	February 2014
TITLE	Edit an existing Attribute of an Asset		

MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the detail icon of an Asset row in the Asset list view	System loads the Property list view in the main display area		PASS
Click the detail icon of an Attribute row in the Property list view	System pops-up a "Edit Data Property <name>" modal dialog		PASS
Type the new value in the "Value" input box			
Click on the "Save" button	The Attribute's value is updated in the list view in the main display area		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_3.6	**DATE**	February 2014
TITLE	Edit an existing Relationship of an Asset		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS

Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the detail icon of an Asset row in the Asset list view	System loads the Property list view in the main display area		PASS
Click the detail icon of a Relationship row in the Property list view	System pops-up a "Edit Relationship" modal dialog		PASS
Select an item of the "<relationship name>" select list			
Click on the "Save" button	The Relationship's value is updated in the list view in the main display area		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_3.7	**DATE**	February 2014
TITLE	Delete an existing Attribute of an Asset		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the detail icon of an Asset row in the Asset list view	System loads the Property list view in the main display area		PASS
Click the delete icon of an Attribute row in the Property list view	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	The Attribute is removed from the list view in the main display		PASS

	area		
FAIL NOTES			
ACTION			
ITERATION ID	TC_3.8	**DATE**	February 2014
TITLE	Delete an existing Relationship of an Asset		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the detail icon of an Asset row in the Asset list view	System loads the Property list view in the main display area		PASS
Click the delete icon of a Relationship row in the Property list view	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	The Relationship is removed from the list view in the main display area		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_3.9	**DATE**	February 2014
TITLE	Delete an existing Asset Model which is not referenced by any existing Local Service		
MANUAL TESTING	YES		

PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the delete icon of an Asset Model row in the Asset list view	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	The Asset Model is removed from the list view in the main display area		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_3.10	**DATE**	February 2014
TITLE	Delete an existing Asset which is not referenced by any existing Local Service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the delete icon of an Asset row in the Asset list view	System pops-up a "Delete" modal dialog		PASS

Press the "Yes" button	The Asset is removed from the list view in the main display area		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_3.11	**DATE**	February 2014
TITLE	Try to delete an existing Asset which is referenced by one or more existing Local Services		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on an Asset Class node of the Asset Classes tree	System loads the Asset list view in the main display area		PASS
Click the delete icon of an Asset row in the Asset list view	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	System pops-up an "Error" modal dialog		PASS
FAIL NOTES			
ACTION			

8.3.4.1.4 Test Case 4

TEST CASE ID	TC_4	**PRODUCT VERSION**	1.0
TITLE	Manage Local Services	**TESTER**	MC Mantuano
DESCRIPTION	Test if Local Services can de defined on top of Assets, and if Public Services can be defined on top of		

	Local Services.		
COMPONENTS INVOLVED	Service Repository, User Interface	**TYPE**	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			
ITERATION ID	TC_4.1	**DATE**	March 2014
TITLE	Create a new Local Service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Press the "Add Local Service" button	System pops-up a "Add Local Service" modal dialog		PASS
Type a valid and unique name in the "Name" input box			PASS
Type a descrition in the "Description" input box			
Select one entry from the "Owner" selection list			
Click on the "Save" button	The new Local Service is added to the list view in the main display area		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_4.2	**DATE**	March 2014
TITLE	Assign an Asset to an existing Local Service		

MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the detail icon of a Local Service row in the Service list view	System loads the Service detail view in the main display area		PASS
Click on the "Add Asset" button	System pops-up a "Add Asset" modal dialog		PASS
Select one Asset row			
Click on the "Close" button	The selected Asset is displayed in the Service detail view		PASS
Navigate to another page, then back to the Service detail view	The same Asset is still displayed in the Service detail view		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_4.3	**DATE**	March 2014
TITLE	Change the Asset assignment of an existing Local Service		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the detail icon of a Local Service row in the Service list view	System loads the Service detail view in the main display area		PASS

Click on the "Add Asset" button	System pops-up a "Add Asset" modal dialog		PASS
Select one Asset row			
Click on the "Close" button	The selected Asset is displayed in the Service detail view		PASS
Navigate to another page, then back to the Service detail view	The same Asset is still displayed in the Service detail view		PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_4.4	**DATE**	March 2014
TITLE	Change the Owner of an existing Local Service		
MANUAL TESTING	YES		
PRIORITY	Low		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the detail icon of a Local Service row in the Service list view	System loads the Service detail view in the main display area		PASS
Select an item from the "Owner" selection list			
Click on the "Save" button			
Navigate to another page, then back to the Service detail view	The same Owner is still displayed in the Service detail view		PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_4.5	**DATE**	March 2014
TITLE	Delete an existing Local Service which is not referenced by any Public Service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the delete icon of a Local Service row in the Service list view	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	The Local Service is removed from the list view in the main display area		PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_4.6	**DATE**	March 2014
TITLE	Try to delete an existing Local Service which is referenced by one or more Public Services		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS

Click the delete icon of a Local Service row in the Service list view	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	System pops-up an "Error" modal dialog		PASS
FAIL NOTES			
ACTION			

8.3.4.1.5 Test Case 5

TEST CASE ID	TC_5	**PRODUCT VERSION**	1.0
TITLE	Manage Public Services	**TESTER**	MC Mantuano
DESCRIPTION	Test if Local Services can de defined on top of Assets, and if Public Services can be defined on top of Local Services.		
COMPONENTS INVOLVED	Service Repository, User Interface	**TYPE**	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			
ITERATION ID	TC_5.1	**DATE**	March 2014
TITLE	Create a new Public Service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Press the "Add Public Service" button	System pops-up a "Add Public Service" modal dialog		PASS

Type a valid and unique name in the "Name" input box			PASS
Type a descrition in the "Description" input box			
Select one entry from the "Owner" selection list			
Click on the "Save" button	The new Public Service is added to the list view in the main display area		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_5.2	**DATE**	March 2014
TITLE	Assign multiple Local Services to an existing Public Service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the detail icon of a Public Service row in the Service list view	System loads the Service detail view in the main display area		PASS
Click on the "Add Local Service" button	System pops-up a "Add Local Service" modal dialog, displaying a Local Service list view		PASS
Check multiple rows in the Local Service list view			
Click on the "Save" button	All the checked Local Services are added to the list view in the main display area		PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_5.3	**DATE**	March 2014
TITLE	Change the Local Service assignments of an existing Public Service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the detail icon of a Public Service row in the Service list view	System loads the Service detail view in the main display area		PASS
Click on the delete icon of one Local Service row in the Service detail view	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	The Local Service is removed from the list view in the main display area		PASS
Click on the "Add Local Service" button	System pops-up a "Add Local Service" modal dialog, displaying a Local Service list view		PASS
Check multiple rows in the Local Service list view			
Click on the "Save" button	All the checked Local Services are added to the list view in the main display area		PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_5.4	**DATE**	March 2014
TITLE	Change the Owner of an existing Public Service		
MANUAL TESTING	YES		

PRIORITY	Low		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the detail icon of a Public Service row in the Service list view	System loads the Service detail view in the main display area		PASS
Select an item from the "Owner" selection list			
Click on the "Save" button			
Navigate to another page, then back to the Service detail view	The same Owner is still displayed in the Service detail view		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_5.5	**DATE**	March 2014
TITLE	Delete an existing Public Service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the delete icon of a Public Service row in the Service list view	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	The Local Service is removed from the list view in the main display area		PASS

FAIL NOTES			
ACTION			

8.3.4.1.6 Test Case 6

TEST CASE ID	TC_6	**PRODUCT VERSION**	1.0
TITLE	Publish Local and Public Services on the Markeplace	**TESTER**	MC Mantuano
DESCRIPTION	Test if Local and Public Services can be described in USDL terms		
COMPONENTS INVOLVED	Service Repository, Service Marketplace, User Interface	**TYPE**	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			
ITERATION ID	TC_6.1	**DATE**	March 2014
TITLE	Publish a Local Service filling a USDL template		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the detail icon of a Local Service row in the Service list view	System loads the Service detail view in the main display area		PASS
Click on the "Publish" button	System pops-up a "Publish Service <service name>" modal dialog		PASS
Select an item from the "Template" selection list			

Click on the "Next" button	System displays a form in the same modal dialog; the form has an input field for each variable item of the selected template		PASS
Fill in the form input fields			
Click on the "Publish" button	The Service detail view displays the publishing date	The modal dialog does not close, no publishing is done	FAIL
FAIL NOTES	Integration with the Service Marketplace component is not working		
ACTION			FIXED July 2014
ITERATION ID	TC_6.2	**DATE**	March 2014
TITLE	Publish a Public Service filling a USDL template		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset-as-a-Service main menu entry	System loads the Asset-as-a-Service main page, with the Service list view displayed in the main area		PASS
Click the detail icon of a Public Service row in the Service list view	System loads the Service detail view in the main display area		PASS
Click on the "Publish" button	System pops-up a "Publish Service <service name>" modal dialog		PASS
Select an item from the "Template" selection list			
Click on the "Next" button	System displays a form in the same modal dialog; the form has an input field for each variable item of the selected template		PASS
Fill in the form input fields			

Click on the "Publish" button	The Service detail view displays the publishing date	The modal dialog does not close, no publishing is done	FAIL
FAIL NOTES	Integration with the Service Marketplace component is not working		
ACTION			FIXED July 2014

8.3.4.1.7 Test Case 7

TEST CASE ID	TC_7	**PRODUCT VERSION**	1.0
TITLE	Manage Asset Owners	**TESTER**	MC Mantuano
DESCRIPTION	Test if Asset Owner can be added and removed		
COMPONENTS INVOLVED	Asset Repository, User Interface	**TYPE**	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			
ITERATION ID	TC_7.1	**DATE**	July 2014
TITLE	Create a new Asset Owner		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS

Click on the "people" icon on top right corner of Asset Classes tree	System pops-up a "Owners" modal dialog, displaying an Owner list view		PASS
Type a valid and unique name in the input box at the bottom			
Click on the "plus" icon at the bottom	The new Owner is added to the Owner list view		PASS
Click on the "Close" button	The modal dialog closes, and the Asset Repository main page is displayed again		PASS
Navigate to the detail view of any Asset			
Expand the "Owner" selection list on the Asset detail view	The new Owner appears as a list item		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_7.2	**DATE**	July 2014
TITLE	Delete an existing Asset Owner which does not own any Asset		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on the "people" icon on top right corner of Asset Classes tree	System pops-up a "Owners" modal dialog, displaying an Owner list view		PASS
Click on the delete icon on an Owner row	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	The Owner is removed from the Owner list view		PASS
Click on the "Close" button	The modal dialog closes, and the Asset Repository main page is displayed again		PASS
Navigate to the detail view of any Asset			

Expand the "Owner" selection list on the Asset detail view	The deleted Owner does not appear any more as a list item		PASS
FAIL NOTES			
ACTION			
ITERATION ID	TC_7.3	**DATE**	July 2014
TITLE	Try to delete an existing Asset Owner which owns one or more Assets		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**EXPECTED OUTPUT**	**ACTUAL OUTPUT**	**PASS/FAIL**
Navigate to the home page	System displays the home page		PASS
Select the Asset->Asset Repository main menu entry	System displays the Asset Repository main page, with the Asset Classes tree on the left side pane		PASS
Click on the "people" icon on top right corner of Asset Classes tree	System pops-up a "Owners" modal dialog, displaying an Owner list view		PASS
Click on the delete icon on an Owner row	System pops-up a "Delete" modal dialog		PASS
Press the "Yes" button	An error message is displayed		PASS
FAIL NOTES			
ACTION			

8.3.4.2 **Step P-5**

1. I was able to set up a fully-functional FITMAN-CAM instance in my working environment, using the provided Virtual Machine and installation instructions.
2. The FITMAN-CAM instance, once correctly installed and configured in my environment, worked fast and smoothly, without any significant issue related with performance or software defects.

3. The user interface is simple and straightforward. I was actually able to leverage the full capability of the software by following the manual provided and/or by receiving direct support.
4. Ontology-related functionality is adequate to model my real-life business assets. Features that are missing with respect to full-fledged ontology editors (e.g., multiple inheritance, constraints on properties) are not mandatory in my context.
5. I understand what Asset Classes are. I use them to model a hierarchy of generic concepts, and ultimately to organize my Assets in a useful way.
6. I understand the difference between Assets and Asset Models. I use the latter to define abstract "asset types" which play the role of a blueprint for deriving several concrete Assets having similar structure.
7. I understand the difference between Attributes and Relationships. I use the former to describe intrinsic properties as an Asset, the latter to declare the role of another Asset with respect to first one.
8. I understand what Asset-as-a-Service are. I use them to advertise items from the Asset Repository as Services available under well-defined terms and conditions.
9. I understand the difference between Local and Public Services. I use the former to export individual Assets to the local ecosystem marketplace, while the latter are exposed globally and can aggregate one or more Local Services into one single Service.
10. I understand the USDL templating mechanism. I use it offline to define the blueprint of terms and conditions. I then use the online UI to create instances of these blueprints and to assign actual terms and conditions to published Asset-as-a-Service items (i.e., Local and Public Services).

8.3.5 SEI_5 Supply Chain and Business Ecosystems Apps

8.3.5.1 Step P-4

8.3.5.1.1 Test Case 1

TEST CASE ID	TC_1	**PRODUCT VERSION**	0,9,2
TITLE	Search machineries and send a request for Quotation	**TESTER**	Zheng
DESCRIPTION	Search a certain kind of machineries, send a request for quotation to some actors and negotiate with them till the agreement with one		
COMPONENTS INVOLVED	User Interface, search services, repository, collaboration services, ubl manager	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	TC_1.1	**DATE**	Dec 2013
TITLE	Search machineries and send a request for Quotation		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
access the search interface			PASS
insert search parameters and start the search			PASS
look at results and select a machinelry to see details	no results		FAIL
open two virtual rooms sending two request for quotation to two machineries owner			PASS
reject quotation in the first room	no button available		FAIL
accept first quotation in the second room and generate order			PASS
FAIL NOTES	COMA restriction, same name not allowed		

ACTION	None

ITERATION ID	TC_1.2	**DATE**	February 2014
TITLE	Test the usage of the wizard in order to semantically register the service		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
access the search interface			PASS
insert search parameters and start the search			PASS
look at results and select a machinelry to see details			PASS
open two virtual rooms sending two request for quotation to two machineries owner			PASS
reject quotation in the first room	no confirmation message		FAIL
accept first quotation in the second room and generate order			PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.3	**DATE**	June 2014
TITLE	Test the usage of the wizard in order to semantically register the service		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system	no acess to the system		FAIL
access the search interface			PASS
insert search parameters and start the search			PASS

look at results and select a machinelry to see details		PASS
open two virtual rooms sending two request for quotation to two machineries owner		PASS
reject quotation in the first room		PASS
accept first quotation in the second room and generate order		PASS
FAIL NOTES	check the service for user accounting	
ACTION		

ITERATION ID	TC_1.4	**DATE**	September 2014
TITLE	Test the usage of the wizard in order to semantically register the service		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
access the search interface			PASS
insert search parameters and start the search			PASS
look at results and select a machinelry to see details			PASS
open two virtual rooms sending two request for quotation to two machineries owner			PASS
reject quotation in the first room			PASS
accept first quotation in the second room and generate order			PASS
FAIL NOTES			
ACTION			

8.3.5.1.2 Test Case 2

TEST CASE ID	TC_2	**PRODUCT VERSION**	0,9,2
TITLE	search and execute a transformation service	**TESTER**	Zheng
DESCRIPTION	Test the usage of the wizard in order to semantically search and invoke a service		
COMPONENTS INVOLVED	User Interface, transformation wizard and services	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	TC_2.1	**DATE**	Dec 13
TITLE	test with internet connection		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
access the search interface			PASS
insert search parameters and start the search			PASS
look at results and select a machinery to see details	machinery details missing		FAIL
open two virtual rooms sending two request for quotation to two machineries owner	same data visible in both virtual rooms		FAIL
reject quotation in the first room	rejects also the first		FAIL
accept first quotation in the second room and generate order	quotation already rejected		FAIL
FAIL NOTES	the unique ID of the VR seems not working		
ACTION	check VR ID and the method to load machinery details		

ITERATION ID	TC_2.2	**DATE**	Feb-14
TITLE	test without internet connection		
MANUAL TESTING	YES		

PRIORITY	High	
INPUT/STEPS	**COMMENTS**	**PASS/FAIL**
logs into the system		PASS
access the search interface		PASS
insert search parameters and start the search		PASS
look at results and select a machinery to see details		PASS
open two virtual rooms sending two request for quotation to two machineries owner	machineries are added but cannot be opened	FAIL
reject quotation in the first room	N/A	FAIL
accept first quotation in the second room and generate order	N/A	FAIL
FAIL NOTES		
ACTION		

ITERATION ID	TC_2.3	DATE	June 14
TITLE	test without internet connection		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
access the search interface			PASS
insert search parameters and start the search			PASS
look at results and select a machinery to see details			PASS
open two virtual rooms sending two request for quotation to two machineries owner			PASS
reject quotation in the first room			PASS
accept first quotation in the second room and generate order	file not generated correctly (.zip file reports "corrupted")		FAIL
FAIL NOTES			
ACTION			

ITERATION ID	TC_2.4	DATE	September 2014
TITLE	test without internet connection		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	COMMENTS		PASS/FAIL
logs into the system			PASS
access the search interface			PASS
insert search parameters and start the search			PASS
look at results and select a machinery to see details			PASS
open two virtual rooms sending two request for quotation to two machineries owner			PASS
reject quotation in the first room			PASS
accept first quotation in the second room and generate order			PASS
FAIL NOTES			
ACTION			

8.3.5.2 **Step P-5**

The FITMAN "Supply Chain & Business Ecosystem Apps" Specific Enabler (FITMAN-SCApp) is a web-based application for exploiting ecosystem Tangible and Intangible Assets in relation with application in Collaborative Capacity Scheduling and Team Building. This assets work in strict cooperating with the FITMAN "Collaborative Asset Management" Specific Enabler (FITMAN-CAM), a web-based, integrated platform for the management of Virtualized Assets in the scope of service-oriented Manufacturing Ecosystems

1. I'm able to search the machineries I need inside my ecosystem and look at machineries details
2. I'm able to launch a Call for Tender (CfT) and discuss in a Virtual Room with potential supplier
3. I'm able to open a virtual room to answer to a Call for Tender (CfT)
4. I'm able to close a tender and generate the corresponding element
5. I'm able to search for people having the competence I need to create a Virtual Team
6. I'm able to search for similar people to the one I need

7. I'm able to open a Virtual Room to discuss with candidates to enter in the team
8. The software is easy to understand and offers online all the additional information needed to accomplish the work
9. The software gives error messages that clearly tell me what is happening in the tool, which problems occurred and how to manage them
10. The software generally reacts in an acceptable interval of time without long lags

8.3.6 SEI_6 Metadata and Ontologies Semantic Matching

8.3.6.1 Step P-4

8.3.6.1.1 Test Case 1

TEST CASE ID	TC_1	**PRODUCT VERSION**	0.9
TITLE	Export xslt file from xsd matching result	**TESTER**	Evmorfia
DESCRIPTION	Test if the verified xsd matching is successfully exported in xslt		
COMPONENTS INVOLVED	User Interface, XSLT creation mechanism	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE16_A01		

ITERATION ID	TC_1.1	**DATE**	Dec-2013
TITLE	test xslt export for two xsd files that only have different node names (1:1 mapping for all elements and attributes and identical structure)		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
import xsd files			PASS
select source and target files			PASS
select matching strategy and perform matching			PASS
verify and manually complete matching			PASS
create xslt file for source to target transformations	file exported		PASS
save xslt file	file successfully stored locally		PASS

review xslt file		PASS
test file to perform transformation	xslt file correct based on performed source xml-> target xml transformation	PASS
create xslt file for target to source transformations	file exported	PASS
save xslt file	file successfully stored locally	PASS
review xslt file		PASS
test file to perform transformation	xslt file correct based on performed source xml-> target xml transformation	PASS
FAIL NOTES		
ACTION		

ITERATION ID	TC_1.2	**DATE**	Dec-2013
TITLE	test xslt export for two xsd files that only have different node names (1:1 matching for all,source attributes are target elements,identical structure)		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
import xsd files			PASS
select source and target files			PASS
select matching strategy and perform matching			PASS
verify and manually complete matching			PASS
create xslt file for source to target transformations	file exported		PASS
save xslt file	file successfully stored locally		PASS
review xslt file			PASS
test file to perform transformation	xslt file correct based on performed source xml-> target xml transformation		PASS
create xslt file for target to source transformations	file exported		PASS
save xslt file	file successfully stored locally		PASS
review xslt file			PASS

test file to perform transformation	xslt file correct based on performed source xml-> target xml transformation	PASS
FAIL NOTES		
ACTION		

ITERATION ID	TC_1.3	**DATE**	Dec-2013
TITLE	test xslt export for two xsd files that only have different node names (missing some matchings,some source attributes are target elements,identical structure)		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
import xsd files			PASS
select source and target files			PASS
select matching strategy and perform matching			PASS
verify and manually complete matching			PASS
create xslt file for source to target transformations	file exported		PASS
save xslt file	file successfully stored locally		PASS
review xslt file			PASS
test file to perform transformation	xslt file correct based on performed source xml-> target xml transformation		PASS
create xslt file for target to source transformations	file exported		PASS
save xslt file	file successfully stored locally		PASS
review xslt file			PASS
test file to perform transformation	xslt file correct based on performed source xml-> target xml transformation		PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.4	**DATE**	Dec-2013

TITLE	test xslt export for two xsd files that only have different node names (missing matchings,different structure,corresponding nodes in the same place inside hierarchy)	
MANUAL TESTING	YES	
PRIORITY	High	
INPUT/STEPS	**COMMENTS**	**PASS/FAIL**
import xsd files		PASS
select source and target files		PASS
select matching strategy and perform matching		PASS
verify and manually complete matching		PASS
create xslt file for source to target transformations	file exported	PASS
save xslt file	file successfully stored locally	PASS
review xslt file		PASS
test file to perform transformation	xslt file correct based on performed source xml-> target xml transformation	PASS
create xslt file for target to source transformations	file exported	PASS
save xslt file	file successfully stored locally	PASS
review xslt file		PASS
test file to perform transformation	xslt file correct based on performed source xml-> target xml transformation	PASS
FAIL NOTES		
ACTION		

ITERATION ID	TC_1.5	**DATE**	Dec-2013
TITLE	test xslt export for two xsd files that only have different node names (1:1 matching for all,corresponding nodes not in the same place inside hierarchy)		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
import xsd files			PASS

select source and target files		PASS
select matching strategy and perform matching		PASS
verify and manually complete matching		PASS
create xslt file for source to target transformations	file exported	PASS
save xslt file	file successfully stored locally	PASS
review xslt file		FAIL
test file to perform transformation	xslt file not correct based on performed source xml-> target xml transformation	FAIL
create xslt file for target to source transformations	file exported	PASS
save xslt file	file successfully stored locally	PASS
review xslt file		FAIL
test file to perform transformation	xslt file not correct based on performed source xml-> target xml transformation	FAIL
FAIL NOTES	xslt restrictions, incompatible xsd files, depending on incompatibility type xslt may not be exported at all- error message	
ACTION	None - automatic xslt creation cannot be achieved	

ITERATION ID	TC_1.6	**DATE**	Apr-14
TITLE	1:1 mapping for all elements and attributes and identical structure, elements exist with same name and different type		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
import xsd files			PASS
select source and target files	tree representation incorrect		FAIL
select matching strategy and perform matching			PASS
verify and manually complete matching			PASS
create xslt file for source to target transformations	file exported		PASS
save xslt file	file successfully stored locally		PASS

review xslt file		PASS
test file to perform transformation	xslt file not correct based on performed source xml-> target xml transformation	FAIL
create xslt file for target to source transformations	file exported	PASS
save xslt file	file successfully stored locally	PASS
review xslt file		PASS
test file to perform transformation	xslt file not correct based on performed source xml-> target xml transformation	FAIL
FAIL NOTES	COMA restriction, same name not allowed	
ACTION	None	

8.3.6.1.2 Test Case 2

TEST CASE ID	TC_2	**PRODUCT VERSION**	0.9
TITLE	xslt retrieval service	**TESTER**	Evmorfia
DESCRIPTION			
COMPONENTS INVOLVED	xslt retrieval service	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	TC_2.1	**DATE**	May-14
TITLE	test with internet connection		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
perform xsd matching			PASS
create xslt source -> target			PASS
copy the url for the xslt retrieval service			PASS
paste url in browser address bar and press enter	contents of exported xslt file retrieved		PASS

FAIL NOTES	
ACTION	

ITERATION ID	TC_2.2	**DATE**	May-14
TITLE	test without internet connection		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
perform xsd matching			PASS
create xslt source -> target			PASS
receive error message	message prompts user to check internet connection and states that xslt was not stored in remote db		PASS
FAIL NOTES			
ACTION			

8.3.6.1.3 Test Case 3

TEST CASE ID	TC_3	**PRODUCT VERSION**	0.9
TITLE	Connection to SAS GE	**TESTER**	Evmorfia
DESCRIPTION	Integration with SAS GE through a RESTful API to provide better ontology support		
COMPONENTS INVOLVED	User Interface, rapidminer sentiment analysis process, rapidanalytics training service	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS	ITR_SE16_I15,TR_SE16_U09		

ITERATION ID	TC_3.1	**DATE**	May-14
TITLE	Load ontology from SAS testbed workspace		
MANUAL TESTING	YES		

PRIORITY	High	
INPUT/STEPS	**COMMENTS**	**PASS/FAIL**
select import ontology from menu		PASS
select ontology to import		PASS
select imported ontology as source/target	ontology correctly visualised	PASS
FAIL NOTES		
ACTION		

ITERATION ID	TC_3.2	**DATE**	May-14
TITLE	Store ontology to SAS testbed workspace		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
select ontology file to upload to testbed			PASS
retrieve list of ontologies in SAS workspace	selected ontology imported successfully		PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.3	**DATE**	May-14
TITLE	Create workspace inside SAS testbed		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
use described POST method to create workspace (directly use SAS API)	<created>false</created><error>null</error>		FAIL
FAIL NOTES	contact SAS team		

ACTION	

ITERATION ID	TC_3.4	**DATE**	May-14
TITLE	cross-ontology SPARQL query		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
select ontologies to query			
select matchresults to import to existing SAS workspace			PASS
perform SPARQL query to retrieve results from all the ontologies	results contain data from all the ontologies		PASS
FAIL NOTES			
ACTION			

8.3.6.2 **Step P-5**

The FITMAN Metadata and Ontologies Semantic Matching SE (FITMAN-SeMa) is offered as an infrastructure containing an installable Windows software which support users through the provision of an infrastructure which will allow the semi-automatic matching of different ontologies (OWL) and also of different XML schemas (XSD).

To achieve efficient semantic matching, a number of different algorithms (ranging from context-dependent, fragment-based, and reuse-oriented matching) are used. The proposed matching is visualised in an intuitive and user-friendly graphical interface that allows for manual alteration and/or completion when needed.

For more information and for accessing FITMAN-SeMa please visit: http://catalogue.fitman.atosresearch.eu/enablers/metadata-and-ontologies-semantic-matching

In order to provide your feedback after testing the solution, please answer how much you agree/disagree to the following statements. In case you cannot provide an answer (e.g. if you have not tested the corresponding feature), you can leave it empty.

I. I think the program offers all the functionalities expected from an xsd/owl matching tool.

II. The created xslt file is suitable for xml transformations between source and target format.
III. I can successfully perform cross-ontology SPARQL queries, using the SAS GE through the SeMa interface.
IV. The xslt retrieval service allows me to use the xsd matching in other applications (outside SeMa).
V. I am able to load/store ontologies from/to the remote repository through SeMa.
VI. I can easily set up the required database following the provided instructions.
VII. I understand how to change the database properties.
VIII. I understand how to use the SE from the provided VM and integrate it into the workflow of my program/application.
IX. The error messages are explanatory and provide sufficient guidance to help identify and correct my mistakes.
X. The provided instructions are correct and complete (i.e. I did not need to take any extra or different steps than the ones described).

8.3.7 SEI_7 Collaborative Business Process Management

8.3.7.1 Step P-4

8.3.7.1.1 Test Case 1

TEST CASE ID	TC_1	**PRODUCT VERSION**	1.0
TITLE	Creation of Service Compositions using the BPMN 2.0 Graphical notation	**TESTER**	Jbenedicto
DESCRIPTION	Design service compositions using the BPMN 2.0 Graphical notation		
COMPONENTS INVOLVED	Activity Explorer UI, Activity Modeler	**TYPE**	FUNCTIONAL

Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)

ITERATION ID	TC_1.1	**DATE**	March 2014
TITLE	Access to the application and model creation		

MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Navigate to the home page	System presents the home page	System presents the home page	PASS
2. Select the link "Process" --> "Model Workspace"			
3. Create a "New model" and enter the name.	Win popup appears to introduce the model name and description	Win popup appears to introduce the model name and description	PASS
4. Press Save	"New Model" is stored	"New Model" is stored	PASS
5. Ready to design the new model	The activity Modeler charge and it is ready to design the new model	The activity Modeler charge and it is ready to design the new model	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.2	DATE	March 2014
TITLE	Design a basic BPMN Process		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Start the Desing of the BPMN process	Shape repository is available at the left on the window	Shape repository is available at the left on the window	PASS
2. Expand the "Start Events" submenu	Start Events are shown	Start Events are shown	PASS
3. Drag and drop a StartEvent	The process graph shows the StartEvent	The process graph shows the StartEvent	PASS
4. Expand the "Activities" submenu	Activities are shown	Activities are shown	PASS
5. Drag and drop a Task	The process graph shows the Task	The process graph shows the Task	PASS
6. Expand the "End Events" submenu	End Events are shown	End Events are shown	PASS
7. Drag and drop an EndEvent	The process graph shows the EndEvent	The	PASS

		process graph shows the EndEvent	
8. Communicate the StartEvent with the Task	A line connects the Start Event to the task	A line connects the Start Event to the task	PASS
9. Communicate the Task with the End Event	A line connects the Task to the End Event	A line connects the Task to the End Event	PASS
6. Press save	Win popup appears to confirm the model name and description	Win popup appears to confirm the model name and description	PASS
7. Close the Activity Modeler	The Activity Explorer UI Appears	The Activity Explorer UI Appears	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.3	**DATE**	March 2014
TITLE	Visualize the Graphical design of the process		
MANUAL TESTING	YES		

PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Select the link "Process" --> "Model Workspace"	Stored Models are shown at the left on the window	Stored Models are shown at the left on the window	PASS
2. Click on the name of the new BPMN process created	The process design is shown graphically	The process design is shown graphically	PASS
4. Click in another process stored	The selected process is shown graphically	The selected process is shown graphically	PASS
FAIL NOTES			
ACTION			

8.3.7.1.2 Test Case 2

TEST CASE ID	TC_2	**PRODUCT VERSION**	1.0
TITLE	Ontology selection to semantically annotate BPMN processes	**TESTER**	Jbenedicto
DESCRIPTION	Checks the selection of a concrete ontology for a given domain modeling context		

COMPONENTS INVOLVED	Activity Explorer UI, Activity Modeler	TYPE	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			

ITERATION ID	TC_2.1	DATE	March 2014
TITLE	Load an existing BPMN Process		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
1. Navigate to the home page	System presents the home page	System presents the home page	PASS
2. Select the link "Process" --> "Model Workspace"	Stored Models are shown at the left on the window	Stored Models are shown at the left on the window	PASS
3. Click on the name of an existing BPMN process	The process design is shown graphically	The process design is shown graphically	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_2.2	DATE	March 2014
TITLE	Selection of a pre-loaded ontology		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Go to the “Light-weighted Semantic Composition” panel			

situated at right of the window			
In the Top Widget, select one of the pre-loaded ontologies			
Display the content of the combobox to select an existing one	Pre-loaded ontologies are shown	Pre-loaded ontologies are shown	PASS
Press "Load"	The Ontology Box shows the ontology tree	The Ontology Box shows the ontology tree	PASS
Navigate into the selected ontology	We can navigate into the selected ontology	We can navigate into the selected ontology	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_2.3	**DATE**	March 2014
TITLE	Add a new ontology		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Go to the “Light-weighted Semantic Composition” panel situated at right of the window			
In the Top Widget, indicate the URL of the new ontology (owl file)			
Press "Add" link	Win popup appears to introduce the ontology name	Win popup appears to introduce the ontology name	PASS
Press "Add" button	The Ontology Box shows the ontology tree	The Ontology Box shows the ontology tree	PASS
Display the combobox to verify	The new ontology is displayed	The new ontology is displayed in the	PASS

if the ontology is loaded	in the combobox	combobox	
Select the new ontology in the combobox			
Press "Load"	The Ontology Box shows the ontology tree	The Ontology Box shows the ontology tree	PASS
Navigate into the selected ontology	We can navigate into the selected ontology	We can navigate into the selected ontology	PASS
FAIL NOTES			
ACTION			

8.3.7.1.3 Test Case 3

TEST CASE ID	TC_3	**PRODUCT VERSION**	1.0
TITLE	Semantic annotation of BPMN processes	**TESTER**	Jbenedicto
DESCRIPTION	Checks the composition model and its elements using semantic		
COMPONENTS INVOLVED	Activity Explorer UI, Activity Modeler	**TYPE**	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			

ITERATION ID	TC_3.1	**DATE**	March 2014
TITLE	Load an existing BPMN Process to edit		
MANUAL TESTING	YES		
PRIORITY	High		

INPUT/STEPS	ACTUAL OUTPUT	EXPECTED OUTPUT	PASS/FAIL
Navigate to the home page	System presents the home page	System presents the home page	PASS
Select the link "Process" --> "Model Workspace"	Stored Models are shown at the left on the window	Stored Models are shown at the left on the window	PASS
Click on the name of an existing BPMN process	The process design is shown graphically	The process design is shown graphically	PASS
Press "Edit" button	The Activity Modeler is loaded to edit the BPMN process	The Activity Modeler is loaded to edit the BPMN process	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.2	DATE	March 2014
TITLE	Selection of a pre-loaded ontology		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Go to the “Light-weighted Semantic Composition” panel situated at right of the window			
In the Top Widget, select one of the pre-loaded ontologies			
Display the content of the combobox to select an existing one	Pre-loaded ontologies are shown	Pre-loaded ontologies are shown	PASS
Press "Load"	The Ontology Box shows the ontology tree	The Ontology Box shows the ontology tree	PASS
Navigate into the selected ontology	We can navigate into the selected ontology	We can navigate into the selected ontology	PASS

FAIL NOTES	
ACTION	

ITERATION ID	TC_3.3	**DATE**	March 2014
TITLE	Annotate semantically a task		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Select a Task in the BPMN process and click on it	The task is highlighted	The task is higlighted	PASS
Select the concept to associate with the task in the ontology browser	The concept selected is highlighted	The concept selected is highlighted	PASS
Scroll down in the widget to the top where are reflected the Annotation Types to make to the Task	The available Annotations types are shown	The available Annotations types are shown	PASS
Select the Annotation Type to make to the Task (input, Output, Functional Requirement and Non F Req)	The Annotation Type selected is highlighted	The Annotation Type selected is highlighted	PASS
Press "Add" button	The concept selected in the ontology is associated to the Task Annotation previously selected, everything showed in the middle Widget.	the concept selected in the ontology is associated to the Task Annotation previously selected, everything showed in the middle Widget.	PASS

Click the "Search" button in the middle widget.	The result is the combo box to click on one of the resulting services loaded by the tool in the bottom widget and it is the integrated screen of the 4 widgets: Composition Editor, Ontology Browser, Task Annotation and Services List.	The result is the combo box to click on one of the resulting services loaded by the tool in the bottom widget and it is the integrated screen of the 4 widgets: Composition Editor, Ontology Browser, Task Annotation and Services List.	PASS
Close the Activity Modeler	The Activity Explorer UI Appears	The Activity Explorer UI Appears	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_3.4	**DATE**	March 2014
TITLE	Check the persistence of the ontology concept associated to the task		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Select the link "Process" --> "Model Workspace"	Stored Models are shown on the left of the window	Stored Models are shown at the left on the window	PASS
Click on the name of the process previously annotated	The process design is shown graphically	The process design is shown graphically	PASS
Press "Edit" button	The Activity Modeler is loaded to edit the BPMN process	The Activity Modeler is loaded to edit the BPMN process	PASS
Click on the task	the concept of the ontology associated to the Task is shown in the middle Widget.	the concept of the ontology associated to the Task is shown in the middle Widget.	PASS
Close the Activity Modeler	The Activity Explorer UI Appears	The Activity Explorer UI Appears	PASS
FAIL NOTES			

ACTION	

8.3.7.1.4 Test Case 4

TEST CASE ID	TC_4	PRODUCT VERSION	1.0
TITLE	validation and generation of the executable BPMN composition model	TESTER	Jbenedicto
DESCRIPTION	Checks the validation and the generation of the executable BPMN composition model		
COMPONENTS INVOLVED	Activity Explorer UI, Activity Modeler	TYPE	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			

ITERATION ID	TC_4.1	DATE	March 2014
TITLE	Load an existing annotated BPMN Process		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Navigate to the home page	System presents the home page	System presents the home page	PASS
Select the link "Process" --> "Model Workspace"	Stored Models are shown at the left on the window	Stored Models are shown at the left on the window	PASS
Click on the name of an annotated BPMN process	The process design is shown graphically	The process design is shown graphically	PASS

FAIL NOTES	
ACTION	

ITERATION ID	TC_4.2	**DATE**	March 2014
TITLE	Export the annotated process		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Expand the combobox of the "Model Action" option on the right of the screen			
select "Export Model Compel"			
Select a name to store the "XML" file	"Save as" dialog is shown	"Save as" dialog is shown	PASS
Press "Save" button	An executable file (XML) with all the binding task description is stored in the selected HDD location	An executable file (XML) with all the binding task description is stored in the selected HDD location	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_4.3	**DATE**	March 2014
TITLE	Check if the structure of the WSDL has been introduced		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Navigate to the physical location of the stored XML file (process			

model)			
Open the XML file in an editor	The XML syntax is correct	The XML syntax is correct	PASS
Locate the "<serviceTask>" element	The element has all the related information of the web service associated	The element has all the related information of the web service associated	PASS
Close the XML file			
FAIL NOTES			
ACTION			

8.3.7.1.5 Test Case 5

TEST CASE ID	TC_5	**PRODUCT VERSION**	1.0
TITLE	Map the Activity variable(s) with the inputs of the ServiceTask(s).	**TESTER**	Jbenedicto
DESCRIPTION	Manually map the Activity variable(s) with the inputs of the ServiceTask(s).		
COMPONENTS INVOLVED	Activity Explorer UI, Activity Modeler	**TYPE**	FUNCTIONAL

ITERATION ID	TC_5.1	**DATE**	March 2014
TITLE	Open the "Model Compel" of the process to edit		
MANUAL TESTING	YES		
PRIORITY	Medium		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Navigate to the physical location of the stored XML file (process model)			

Open the XML file in an editor	The XML syntax is correct	The XML syntax is correct	PASS
Locate the "<serviceTask>" element	The element has all the related information of the web service associated (WSDL structure)	The element has all the related information of the web service associated (WSDL structure)	PASS
Associate the input of the ServiceTask to the name of the Activiti variable	Manually edition of the activity variable	Manually edition of the activity variable	PASS
Save the edited BPMN (process file) in the local HDD	The XML file is successfully saved	The XML file is successfully saved	PASS
FAIL NOTES			
ACTION			

8.3.7.1.6 Test Case 6

TEST CASE ID	TC_6	**PRODUCT VERSION**	1.0
TITLE	Deploymet and execution of the executable BPMN composition model	**TESTER**	Jbenedicto
DESCRIPTION	Checks the deployment and execution of the executable BPMN composition model. It is necessary that the binding services are ready and available.		
COMPONENTS INVOLVED	Activity Explorer UI, Activity Modeler	**TYPE**	FUNCTIONAL
Note: all tests described below assume authentication of the interactive user (the authentication steps are omitted for clarity)			

ITERATION ID	TC_6.1	**DATE**	March 2014
TITLE	Load an existing annotated		

	BPMN Process		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Navigate to the home page	System presents the home page	System presents the home page	PASS
Select the link "Manage" --> "Deployment" --> "Upload new"	A win popup is displayed to select a file or drag&drop one to a specific area	A win popup is displayed to select a file or drag&drop one to a specific area	PASS
Select the BPMN process (xml file) stored in the HDD	The system upload and deploy the new process	The system upload and deploy the new process	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_6.2	**DATE**	March 2014
TITLE	Check if the BPMN process has been deployed		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Select the link "Process" --> "Deployed process definitions"			
Locate the process deployed in the list	The process is shown in the list of deployed processes on the left of the screen	The process is shown in the list of deployed processes on the left of the screen	PASS
Click on the name of the BPMN process	The process design is shown graphically	The process design is shown graphically	PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_6.3	DATE	March 2014
TITLE	Execution of the BPMN process		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**ACTUAL OUTPUT**	**EXPECTED OUTPUT**	**PASS/FAIL**
Select the link "Process" --> "Deployed process definitions"			
Click on the name of the BPMN process to execute	The process design is shown graphically	The process design is shown graphically	PASS
Select "Start process"	The system asks for the variable Reference (this process has an initial parameter)	The system asks for the variable Reference (this process has an initial parameter)	PASS
Introduce the variable and submit	logs appear in the console of the WS and the process finishes	logs appear in the console of the WS and the process finishes	PASS
Finish the execution of the BPMN process	Final result is that the process is executed and the WebService receives the request automatically	Final result is that the process is executed and the WebService receives the request automatically	PASS
FAIL NOTES			
ACTION			

8.3.7.2 **Step P-5**

1. I was able to set up a fully-functional FITMAN-BPM instance in my working environment, using the provided Virtual Machine and installation instructions.

2. The FITMAN-BPM instance, once correctly installed and configured in my environment, worked fast and smoothly, without any significant issue related with performance or software defects.
3. The usability of the user interface is up to the expectations. I was actually able to leverage the full capability of the software by following the manual provided and/or by receiving direct support.
4. I understand the BPMN 2.0 syntax, and I am able to formally describe real-life business processes using this notation.
5. Using the Modeler UI, I was always able to design and deploy BPMN artefacts which effectively represent the structure and logic of my existing and/or new business processes.
6. Using the Modeler UI, I was able to apply semantic annotations to my BPMN service tasks, choosing from concepts defined in one or more reference ontologies.
7. Using the Modeler UI, I was able to identify possible matches between my annotated BPMN service tasks and corresponding entries in a catalogue of existing web services.
8. Using the Modeler UI, I was able to generate the executable BPMN artefacts with all the wsdl annotations and subsequently store them.
9. Through manual editing of BPMN artefacts, I was always able to define a link between a service task and a web services. At runtime, these linked service tasks executed the call to their web service as expected.
10. Using the Explorer UI, I was able to deploy the processes within the system
11. Using the Explorer UI, I was able to execute the deployed processes
12. Using the Explorer UI, I was able to effectively interact with process instances and human tasks.
13. Using the Explorer UI, I was able to effectively manage deployed processes and to monitor running process instances.

8.3.8 SEI_8 Data Interoperability Platform Services

8.3.8.1 Step P-4

8.3.8.1.1 Test Case 1

TEST CASE ID	TC_1	**PRODUCT VERSION**	0,9,2
TITLE	register a transformation service	**TESTER**	Zheng
DESCRIPTION	Test the usage of the wizard in order to semantically register the service		
COMPONENTS INVOLVED	User Interface, transformation wizard and services	**TYPE**	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	TC_1.1	**DATE**	Dec 13
TITLE	Test the usage of the wizard in order to semantically register the service		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
start the wizard			PASS
Select a namespace and a name for the service			PASS
Import the ontologies and select the concepts from them to compose pre-conditions and post-conditions for the service			PASS
Insert the annotions for the service (Title, Contributor, Description..)			PASS
Add optional Non Functional Properties(price)			PASS
finalize the registration and view the new service registered			PASS
FAIL NOTES			

ACTION	

ITERATION ID	TC_1.2	**DATE**	Feb-14
TITLE	Test the usage of the wizard in order to semantically register the service		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
start the wizard			PASS
Select a namespace and a name for the service			PASS
Import the ontologies and select the concepts from them to compose pre-conditions and post-conditions for the service			PASS
Insert the annotions for the service (Title, Contributor, Description..)			PASS
Add optional Non Functional Properties(price)			PASS
finalize the registration and view the new service registered			PASS
FAIL NOTES			
ACTION			

ITERATION ID	TC_1.1	**DATE**	June 14
TITLE	Test the usage of the wizard in order to semantically register the service		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS

start the wizard		PASS
Select a namespace and a name for the service		PASS
Import the ontologies and select the concepts from them to compose pre-conditions and post-conditions for the service		PASS
Insert the annotions for the service (Title, Contributor, Description..)		PASS
Add optional Non Functional Properties(price)		PASS
finalize the registration and view the new service registered		PASS
FAIL NOTES		
ACTION		

ITERATION ID	TC_1.1	**DATE**	Sept 14
TITLE	Test the usage of the wizard in order to semantically register the service		
MANUAL TESTING	Yes		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
start the wizard			PASS
Select a namespace and a name for the service			PASS
Import the ontologies and select the concepts from them to compose pre-conditions and post-conditions for the service			PASS
Insert the annotions for the service (Title, Contributor, Description..)			PASS
Add optional Non Functional Properties(price)			PASS
finalize the registration and view the new service registered			PASS
FAIL NOTES			
ACTION			

8.3.8.1.2 Test Case 2

TEST CASE ID	TC_2	PRODUCT VERSION	0,9,2
TITLE	search and execute a transformation service	TESTER	Zheng
DESCRIPTION	Test the usage of the wizard in order to semantically search and invoke a service		
COMPONENTS INVOLVED	User Interface, transformation wizard and services	TYPE	FUNCTIONAL
RELEVANT REQUIREMENTS			

ITERATION ID	TC_2.1	DATE	Dec 13
TITLE	search and execute a transformation service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	COMMENTS		PASS/FAIL
logs into the system			PASS
start the wizard			PASS
node selection from the ontology	ontology not loaded		FAIL
template selection	N/A		FAIL
compose semantic goal selecting the concepts	N/A		FAIL
insert the file to finalize the transformation	N/A		FAIL
FAIL NOTES			
ACTION			

ITERATION ID	TC_2.2	DATE	Feb-14
TITLE	search and execute a transformation service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	COMMENTS		PASS/FAIL
logs into the system			
start the wizard			
node selection from the ontology			

template selection		
compose semantic goal selecting the concepts	ontology not available into the forms; is not possible to continue	FAIL
insert the file to finalize the transformation	N/A	FAIL
FAIL NOTES		
ACTION		

ITERATION ID	TC_2.3	**DATE**	June 14
TITLE	search and execute a transformation service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
start the wizard			PASS
node selection from the ontology			PASS
template selection			PASS
compose semantic goal selecting the concepts			PASS
insert the file to finalize the transformation	registration ends with error		FAIL
FAIL NOTES	error 534 on screen		
ACTION			

ITERATION ID	TC_2.4	**DATE**	Sept 14
TITLE	search and execute a transformation service		
MANUAL TESTING	YES		
PRIORITY	High		
INPUT/STEPS	**COMMENTS**		**PASS/FAIL**
logs into the system			PASS
start the wizard			PASS
node selection from the ontology			PASS
template selection			PASS

compose semantic goal selecting the concepts		PASS
insert the file to finalize the transformation		PASS
FAIL NOTES		
ACTION		

8.3.8.2 **Step P-5**

The FITMAN "Data Interoperability Platform Services" Specific Enabler (FITMAN-DIPS) is a web-based platform for the management of Data Interoperability services in the sope of the exploitation of the interoperability service. Targeted at the Virtual Factory domain, and based on open standards like WSMO and WSMX, it is delivered as a web platform in order to maximize its collaborative nature

1. I'm able to register a transformation service using the registration wizard
2. I'm able to understand and navigate the Enterprise Interoperability Ontology (EIO)
3. I'm able to un-register a transformation service
4. I'm able to use the template based semantic search to search the needed service
5. I'm able to visualize semantic search resulting services details
6. I'm able to launch the online test for found services
7. I'm able to invoke a service invocation by a virtual endpoint
8. The software is easy to understand and offers online all the additional information needed to accomplish the work
9. The software gives error messages that clearly tell me what is happening in the tool, which problems occurred and how to manage them

The software generally reacts in an acceptable interval of time without long lags

9. Bibliography

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10. Glossary and Terminology

Term	Description
BPI	Business Performance Indicator
TPI	Technical Performance Indicator
AS-IS Value Performance Indicator	Value of a Specific Indicator before the adoption of FITMAN Trial
TO-BE Value Performance Indicator	Actual Value of a Specific Indicator before the adoption of FITMAN Trial
PI Target Value	Value of a Specific Indicator as objective to achieve after the adoption of FITMAN Trial
AC/DV	• A Decision variable is an element usually used by a decision maker for reaching the objectives. The DV modifies the states of the controlled system. • An Action variable is the inductor of performance, a variable which influences the performance of an activity or a whole process on which we can act to develop the process to reach the goal better In fact, the 2 variables represent very similar concepts, the difference coming from the human decision (D2.2).
V&V	Verification and Validation. Please refer to WP2
Industry Domain	Smart, Digital or Virtual Factory
OC	Open Call
TSC	Trial Specific Component
TIC	Trial Integration Component

11. List of Tables

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