D8.1 – FITMAN Use Case Trials Comparative Evaluation

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0.2	**11 FEB 2015**	**MODIFICATION OF TOC BASED ON DISCUSSIONS IN LYON**
0.3	**20 FEB 2015**	**UPLOADING OF VTT CONTRIBUTION AND SUGGESTIONS** **UPLOADING OF ITINNO AND PTIN GUIDELINES**
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0.96	**30/04/2015**	**REFINEMENT ON TRIALS NAMES, TABLES AND FIGURES NAMES AND NUMBERS** **FINAL DRAFT**
0.97	**4/05/2015**	**FINAL VERSION FOR PEER REVIEW**
0.99	**31/05/2015**	**INPUTS FROM PEER REVIEWERS (BIBA, UPV, TXT)** Removed Chapter 2.3 (out of context and not providing value) → PTIN please comment Required further contributions (see comments) to : 1. NTUA Chapter 5.2, 4.2.4 + Caption/Reference to figures and tables 2. IVLAB Chapter 2.2.2 and comment in Exec Summary on adoption of BPI for evaluating trials expansion suitability 3. TXT Chapter 3 4. ITINNO Chapter 5.4 5. VTT Chapter 5.3
1.0	**1/6/15**	**RELEASED**

DELIVERABLE PEER REVIEW SUMMARY

ID	Comments	Addressed (✓) Answered (A)
1	Please check the document for coherent formatting (I have improved some formatting in track changes mode, please check and accept changes where sensible). See my inline comments for more details.	✓
2	Please check tables and figures for coherent and consistent captioning – some are missing. See my inline comments for more details.	✓
3	Not all tables and figures are referenced in the text, and some not addressed at all. Please check. I have inserted some examples in track changes mode. See my inline comments for more details.	✓
4	Some text in the trial sections appear to have informal comments from the trial owners in the text. Please either better integrate these into the text or remove.	✓
5	Please make sure captions are on the same page as the figures and tables they describe.	✓
6	Several minor corrections in track change mode. Please check and accept.	✓
7	Some sections (cf. 5.2) contain many tables without much or any explanation. In many cases the explanations are most likely given dozens of pages before – which means a lot of flipping back and forward for the reader. These tables are difficult to digest without some (brief!) explanation close to the tables themselves.	✓

Table of Contents

Executive Summary

This deliverable addresses the consolidation and comparison of results of Use Case Trials, based on methods developed in WP2, according various dimensions and different levels of granularity with the final aim to assess the maturity of FITMAN trials to support FIWARE Acceleration programme.

In the deliverable different perspectives of the Trials' have been evaluated in order to define on the one hand different rankings of the trials and on the other one to allow to have different level of detail and perspective. In this respect, section 5.1 (Business Consolidation) provides a detailed analysis per each Trail, per each Scenario in the Trial and per each considered performance indicator, providing a clear view of the Trials' evolution and benefits and paving the way towards their business expansion in Phase III. Section 5.2 (Technical Consolidation) addresses the analysis of the technical indicators for the software components implemented in the trials and how they are ranked per trial and per Industrial domain and preparing a possible software expansion by Phase III OC winners.

The selection of various indicators categories has been carried out since the very beginning of the project (please refer WP2: FITMAN Verification & Validation Method and D2.2-FITMAN Business and Technical Indicators) to ensure across all trials and all along the project a consistent set of measures able to provide a reliable indication of the suitability of the Trials to take benefits from FITMAN platform implementation. The interest of the chosen method is that the definitions of BPIs is adapted to each trial, the information given by the BPIs are connected with the objectives of the Trial (it is a reliable indication) , and could take in account any evolution of the Trial Business Scenario, for example if the objectives are changing., but is strongly connected with the context, it means the platform implementation.

The approach and conclusions from this deliverable consider the suggestions from Review Meeting at M18 and specifically RR#1[1]. In fact in connection with WP7 "Lessons learned, recommendation, best practices" and specifically Task 7.1 "Synthesis of Use Case Trials Experiences", the complete set of Performance Indicators has been finally obtained for all Trials and it constituted the platform for consolidation and comparison in view of Phase III. All the expected data have been collected and their analysis per indicator domain (see sections 4.1, 4.2) and across indicators domains (see sections 4.3 and 4.4) provide a multi-dimensional perspective for investigating benefits of FITMAN Platform in the three industrial original Domains (Smart, Virtual and Digital).

The comparison among the trials has been possible thanks to the careful selection of a limited number of specific indicators for each trial, but we have to be aware that in any case it is not always possible (and appropriate) to compare companies and processes with such different characteristics.

[1] **: Ensure full relevance of trial outcomes within D7.1**
Effort spent on trials impact assessment (through technical as well as business performance indicators) should result in meaningful outcomes, to be documented extensively within the next version of D7.1 (scheduled at month 21). Confidentiality barriers and anonymisation should not limit the relevance of the disclosed indicators, otherwise resources claimed for the assessment exercise will be rejected at next month 24 review meeting. Cases of AS-IS value resulting to be just a theoretical value will not be tolerated but rejected. The scope should be to reach an objective assessment able to provide to FITMAN (and to the constituency) solid arguments that should demonstrate its validity and support its claimed impact. Moreover, the month 21 version of D7.1 should include full evidence of evaluation results from all trials, including those that actually present an unsatisfactory level (AgustaWestland and Complus) and involving all envisaged Business Performance Indicators. This should be accompanied by a critical interpretation of indicators and parameters, informing and transforming them into extensive lessons learning.

This deliverable is consolidating how different Trials are modifying business performances after FITMAN platform implementations, but is not aiming to draw any conclusion in terms of possibility for Trial expansion, this is carried out in D8.2 “FITMAN expanded Trials proposition and roadmap”.

Anyway, it is worth to mention first results from the Trial implementation, on average (considering that few processes have not been implemented yet in some trials) we have a progress of 98.5% towards the target for the Business Performance Indicators. This is a very good result because, considering the remaining time for implementation and monitor, it shows that the implemented platforms have provided on average actual improvements on the business processes.

Also on the technical standpoint (see section 5.2.3) it is very interesting to observe 83% of the ranks provided overall to FIWARE Components (GEs) are positive (Medium and High).

Last on the impact perspective, (See section 5.4) there is a huge difference in terms of expected impacts among the trials; the total impact expected from the three top ranked is two order of magnitude of the last three.

It also emerge how (considering Business Performance Indicators, Technical Indicators and Socio Economic Impacts) Trials belonging to Digital and Smart Domains are more impacted than the ones belonging to Virtual Domain.

A consolidated evaluation according the 3 indicators categories: Business Performance Indicators, Technical Indicators and Trial Progress and Impact is reported in Table 136 Compound Ranking for Trials according BPI, Technical and Impact. According this analysis we identified a set of Trials which globally over-perform with respect to other. These are for our opinion the best candidates for the future expansion. We have any way consider that some trials was still deploying the full pilots, so evaluations and Business Results were not fully there.

These are only few elements that emerge from the analysis carried out on the collected data. Much more details are presented in Sections 5 Synthesis of collected data and summarized in 6 Final Remarks and conclusion, providing as well a number of context information supporting data interpretation.

1. Task 8.1 Description

1.1 Document Scope and Structure

This deliverable D8.1 - FITMAN Use Case Trials Comparative Evaluation, compares Use Case Trials, based on method developed in WP2, allowing an easy comparison of specific performances and identification of inconsistencies.
The approach utilized has been defined and validated in WP2 - FITMAN Verification & Validation Method. Chapter 2 Data Gathering process describe the different information sources and how the FITMAN V&V Methodology has been leveraged.
To ensure that the analysis of the Trials' results is consistent with the FIWARE program in general and specifically with on-going initiatives, in Section 3 Linkages with phase , we gained the awareness of related Phase III Accelerators activities and initiatives and FIWARE Supporting Actions. That will inform analysis of FITMAN trials and consolidation of their results to provide better hints in terms of how they might be expanded in D8.2.
The analysis and consolidation of results is then carried out according different dimensions:

1. The first one is a technically oriented consolidation of the results (see Section 4.2 Technical Aspects and Indicators). Defined methodologies and tools have been utilized to compare first of all different trials from an overall technical evaluation of performances and usability, in that users and business owners have been involved. Then a specific investigation per software component has been carried out consolidating results per GE in different domain and SEs.
2. The second one is a Business oriented analysis and consolidation. In doing that (See Section 4.1 Business Aspects and Indicators) we have to be fully aware, as explained, that it is not easy compare Business Performance indicators from different Business and Operational context. Too many elements can influence the process and the risk is to compare not congruent entities and to come to wrong conclusions. In doing that we have also to recognize the limited amount of information (number of indicators, but more limited number of measures), so statistical significance can be impacted by "noise" coming from external sources.
3. Third, considering the scope of the FITMAN project, we focused our attention (see Section 4.3 Technical and Business Analysis) on understanding how the Technical solution implemented (the FITMAN Architectures based on FIWARE GEs) actually impacted the performances of the implemented processes in the trials.
4. Fourth, in 4.4 Analysis of trial progress and impact, we compare how the achieved results could, in the medium/long term bring benefits considering both trial progress towards BPIs and trial impact in broader respects (i.e. for industry and broader society)..
5. In Section 5 Synthesis of collected data the above mentioned approaches have been instantiated to get the different perspectives from the collected data, establishing also a correlation among various classes (e.g. Technical, Business, Economical).
6. In Section 6 Final Remarks and conclusion consolidation of most significant results.

For detailed description of the collected information and detailed algorithms, please refer to templates inserted in Section 7 Annex

1.2 Contribution to Other WPs and Deliverables

D8.1 contributes in a significant way to "D8.2 - FITMAN expanded Trials proposition and roadmap" and will support in driving propositions for extension or further exploitation of the Trials. The contribution to D8.2 will be constituted by the ranks derived from the comparison of the Trials according various criteria (Business, Technical and Broader Impact).
D8.1 will also provide significant inputs to WP9 Exploitation and socio-economic Impact, providing elements for evaluation of benefits from adoption of FITMAN paradigm in various contexts.
At M30, considering the evolution of the trials and availability of new data (mainly Business Performance Indicators, TO-BE3) an addendum to D8.8 will provide significant new information.

2. Data Gathering process

This chapter explains in brief the various data gathering processes for FITMAN Use Case Trials Comparative Evaluation. This chapter explains the data gathering process, while the analysis approaches and results are explained in later chapters.

2.1 Data Gathering through the FITMAN V&V Method

The FITMAN V&V method was developed to assess the FITMAN trials and to support comparative evaluation. As a first step we developed a method to assess individual trials from technical and business perspectives. As the second step, a method for cross trial assessment was built. The cross trial assessment helps to make conclusions concerning e.g. the technical features of the general and specific enablers in different environments. The different environments include e.g. basic characteristics and scope of the trial, type of industry, trial's role in the supply chain or function inside the company. It also helps to draw conclusions about business effects in the above mentioned cases. The cross trial assessment of FITMAN is also used as a basis when developing an approach for assessing the trials' expansion potential.

In this chapter we describe the FITMAN V&V method, especially from the point of view how it supports the data gathering process for trial comparative evaluation as well as evaluation concerning the trial expansion potential. We briefly describe the overall V&V method, business indicators, technical indicators as well as what kind of data can be drawn out of the trial journals for comparative evaluation. Chapter 4 describes the comparison and consolidation approach, developed based on the FITMAN V&V methodology. The V&V method and its building process have been described in detail in FITMAN Deliverables D2.1-4 of, and the methodology for cross trial assessment in D2.5 FITMAN V&V Assessment Summary, M18 issue. The V&V method has been updated also after these deliverables according to needs emerged during the project from the implementation processes of the trials as well as from the FITMAN open call.

2.1.1. The V&V method overview

FITMAN V&V method provides a data definition method, a collection platform and process support for assessing and measuring FITMAN impact in the trials. The method is divided into four main sections:

1) Business performance indicators
2) Technical indicators at component and trial solution level

3) Trial Journal for collection of unstructured information for each trial
4) 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 1).

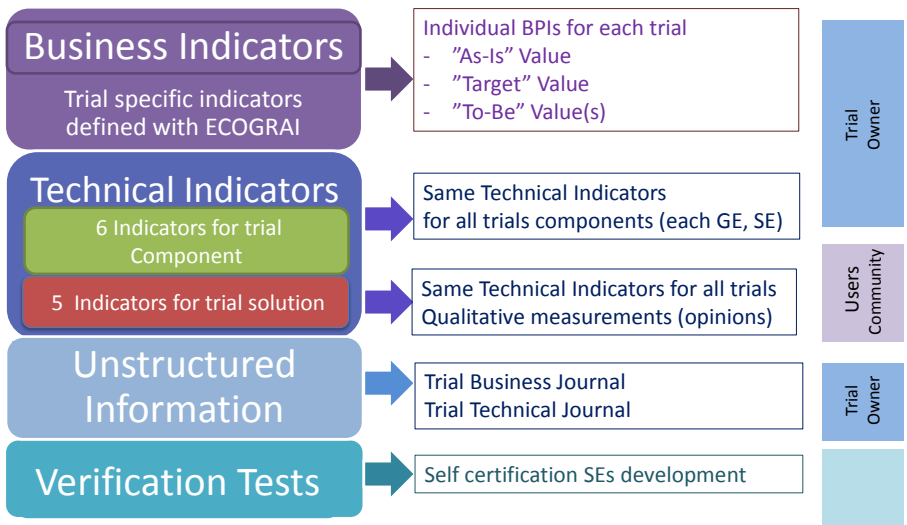


Figure 1 FITMAN V&V assessment overview

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

The Trial Journal collects unstructured feedbacks from each Trial, addressing both Technical and Business aspects.

Within FITMAN, it has been decided to implement all the data collection techniques by means of a web-based system able to integrate different types of forms according to their functions. The SurveyMonkey software has been selected for the implementation. All data gathering is done through Survey Monkey forms.

The FITMAN V&V assessment process supports comparative evaluation for potential expansion mainly in four ways:

- Enabling trial specific and comparative analysis of the business indicator values
- Enabling trial specific and comparative analysis of the technical indicator values
- Enabling comparative analysis of the relation between business and technical indicator values
- Related information drawn from the Trial Journals.

2.1.2. Analysis of the indicators and their values

The indicators are collected both from technical and business perspectives. The data collection supports comparative analysis by offering values of both individual trials and values for cross trial assessment of all trials. The individual values offer data concerning the expansion potential of each trial and of the trial sector and its scope. The cross trial analysis gives input for expansion potential evaluation with data concerning comparison of different trials, sections and solutions, as well as comparison of the use of the same components in different environments.

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 data for comparative evaluation. The conclusions will be used e.g. for identifying best practices, sector specific challenges as well as identifying the expansion potential of the trials.

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 analysing the results.

2.1.3. Trial journals

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. 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.

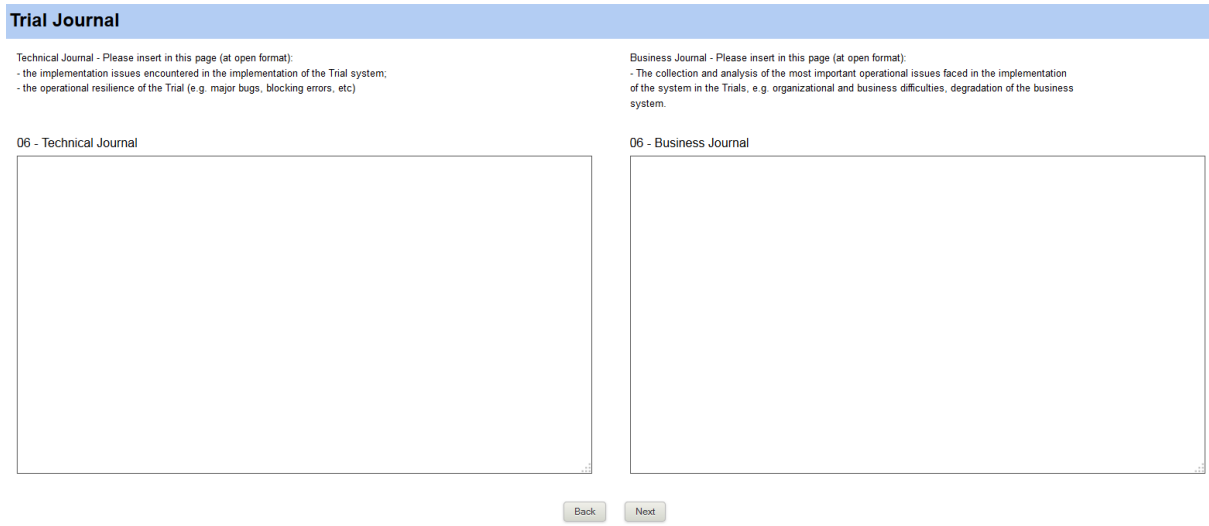


Figure 2 Template of the Trial Journal

The Trial Journal offers key input for comparative evaluation of the trials. We are able to obtain complimentary information concerning experiences of the trials implementation process. This information supports also the evaluation of the trials expansion potential. In Figure 2 Template of the Trial Journal it is presented the layout Trials utilized for inserting data in journals.

2.2 Data Gathering through the Trial Handbooks

In this chapter, first we present the data gathering process through the Trial Handbook (TH), second the elaboration of the Business Performance Indicators.

2.2.1. Description of the use of the Trial Handbooks

The TH aims to be a document allowing to collect all the information concerning the trials and to put at disposal these information for the various tasks which must be performed along the project, in order to:

- Facilitating the work with the different trials
- Preventing overlapping among tasks
- Avoiding duplication of efforts
- Coordinating the development of activities
- Ensuring the schedule accomplishment

The first two chapters of the TH were used to write the deliverable D1.1 “FITMAN Use Case Scenarios and Business Requirements”. It provides a background in terms of business scenarios and business requirements identified by the 10 FITMAN trials.
The 3rd chapter of the TH was planned to collect the IT requirement and GEs selection.

The 4th chapter of the TH was planned to present the Business Performance Indicators. In fact it was replaced by a report regularly updated by INTEROP-VLab.

The 5th chapter of the TH has been used to write the deliverable D 3.2 “FITMAN Trials business cases”. It aims at providing a deeper understanding about the 10 Trials’ business cases on:

- The Business Processes that are supported by Future Internet technology
- The business requirements that drive such an adoption.

Furthermore, the document carries out an insight on the pre-existing controlled environments for the GEs (Generic Enablers), SEs (Specific Enablers) and TSCs (Technical Specific Components).

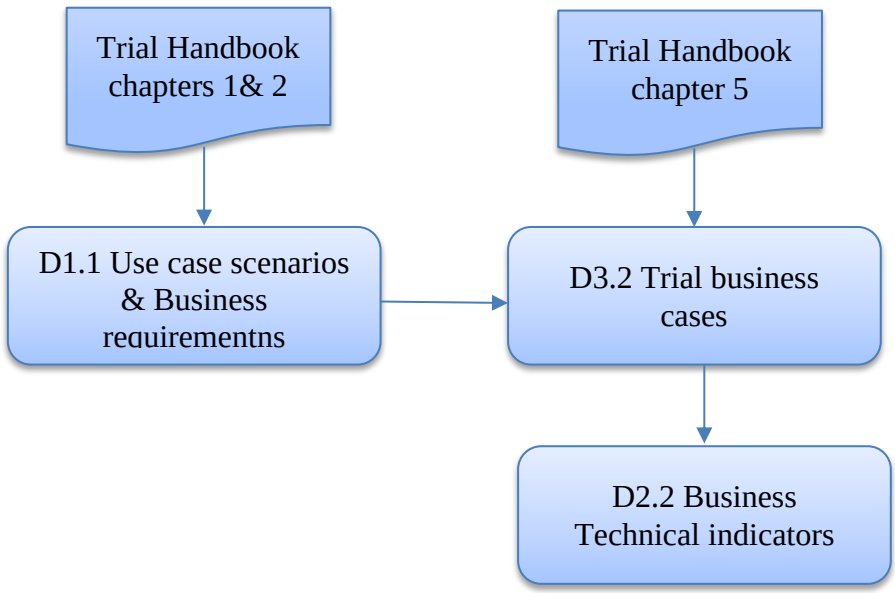


Figure 3 Example of the TH contribution to deliverable D2.2

Figure 3 above shows how to use the Trial Handbook.

2.2.2. Determination of the Business PIs based on the information collected through the Trial Handbooks

The FITMAN Use Case Trials Comparative Evaluation is based, among other parameters, on the measure and analysis of the Business Performance Indicators (BPIs).
In this chapter, the BPIs definition methodology will be recalled. Particular attention will be given on how the information has been gathered using the TH.

The BPIs definition methodology used in FITMAN has been defined by the FITMAN team in the deliverable D2.2 “Business Technical Indicators”. It uses the simplified ECOGRAI methodology which defines three steps.

The **first** step is the description of the system in which the BPI will be defined. It is impossible to determine BPIs for any kinds of activities, if we don’t know in which conditions these activities are performed. So it is necessary to describe the system where these PIs will be determined.
To describe a system using System Modelling we need to determine:

- The components which compose the system and the relations between these elements.
- The actions which allow to reach the objectives.
- The processes which support the dynamic transformations.

- The boundary which allows to determine the elements not belonging to the system. It could be interesting to evaluate the influence of these external elements on the running of system.
- The dynamic of evolution of the system, particularly in the case of the evolution from AS IS to TO BE. In fact a system is always evolving, if not it dies. The speed of evolution could be low or rapid.
- The objectives assigned to the system.

It is important to underline that the BPIs cannot be taken in consideration out of the context (the system) they are implemented
In order to define the first step, the following elements of the deliverable D3.2 have been collected:

- The definition of the Business Processes in the Smart / Digital and Virtual Factory and their impacts.
- The components of the systems' trial.

In the **second** step, the owner of the system determines the potential actions to reach these the objectives of the system (called Decision Variables (DV) or Action Variables (AV)). In fact they are the proposed FITMAN solutions.

Third, the performance indicators indicate or characterize the reaching of the objectives by using the DV/AV.

The initial results of the Performance Indicators definition is presented in the deliverable D2.2 "FITMAN Verification & Validation Business and Technical Indicators Definition". Nevertheless, the trials scenarios has improved and refined along the development of the project and, based on the initial information gathered, the BPIs have evolved and are presented in D4.1-D5.1-D6.1 (Smart-Digital-Virtual factory), D7.1 "FITMAN Smart-Digital-Virtual Factory Trials Experiences" and finally in this deliverable.

To support the BPIs implementation, the information collected are gathered in a simplified specification sheet (Table 1).

Table 1 Simplified specification sheet

Indicator	*The title of the PI*
Purpose:	*Why the measure is performed*
Objective	*The trial objective*
DV/AV	*The Decision/Action variables which allow to reach the objective*
PI nature	*Quantitative or Qualitative*
Information needed	*The information needed to calculate the PIs*
Processing (Formula)	*The formula to calculate the PI*
Required evolution (Target)	*Evolution of the value of the PI that it is recommended*
The owner (Who measures)	*The person who is responsible of the domain in which the PI is implemented*
Period	*The interval of time to evaluate the value of the PI*
Actions to react depending on the value of the PI	*Action that the owner that take to evolve in the right direction*

Description mode	*Representation of the PI (Example: Histogram)*

2.2.3. Data Gathering through the extended trials first experimentation

The first experimentation of extended trials on Smart Factory (SF), Digital Factory (DF) and Virtual Factory (VF) are described at the following Deliverables:

- D12.2 – Extended SF trials first experimentation
- D13.2 – Extended DF trials first experimentation
- D14.2 – Extended VF trials first experimentation

Task WP12.2 performed testing and evaluation of the Specific Enablers in the FITMAN **Smart Factory** (SF) at the following sectors: Automotive Supplier (TRW Automotive), White Goods (OEM) (Whirlpool) and Textile / Clothing (Piacenza), task WP13.2 performed testing and evaluation on the new Open Call components for **Digital Factories** (DF) at TRW and Whirlpool extended trials and The task WP14.2 performed testing and evaluation of the following Specific Enablers in the FITMAN **Virtual Factory** (VF) at Volkswagen, Consulgal, TRW, AIDIMA and Whirlpool extended trials.

For each extended SF/DF/VF, several instances of a trial was run, encompassing different entities like the owner of the new Specific Enabler (SE), the trial provider and the trial owner itself.
An extended trial aims to verify and validate the new SE, by comparing new requirements with specific business indicators, and taking into account the integration with existing GE or with other legacy and/or external systems, as explained in Figure 4 below.

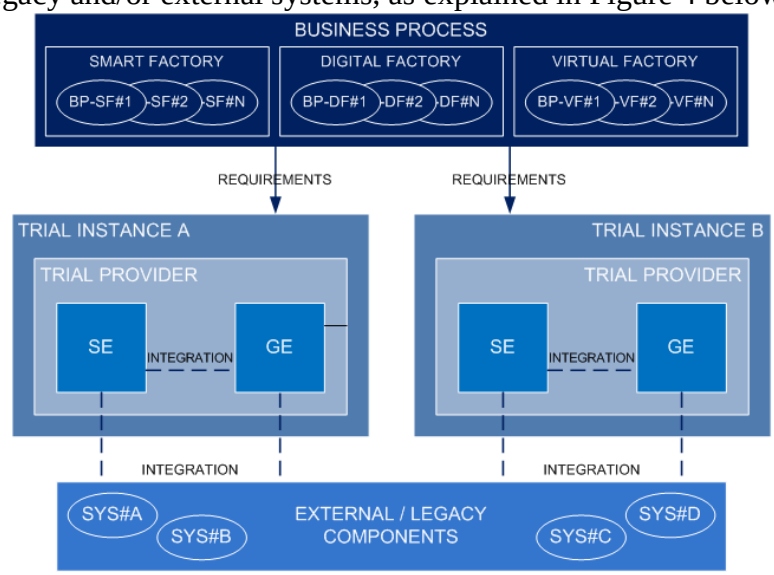


Figure 4 Trial SE validation environment

The data gathering process, based on the V&V methodology (in order to collect data to the trial assessment and comparative evaluation, as defined in D2.1-D2.4, and cross trial assessment, as defined in D2.5, to for trial expansion. A description of the adopted methodology for the extended trials is summarized in 2.1 Data Gathering through the FITMAN V&V Method.), provides the content for data analysis at Chapter 5 and passes through the following steps:

- A trial maps on an use case scenario and new business requirements are identified
- The analysis of the existing software components status and the possible interoperability issues leads to the new technical requirements

- Those technical requirements are implemented in a SE
- Along the trial, the functionality is verified, data is collected for analytics, in the form of Business Indicators, and improved software components can further be published to the catalogue
- The software component is deployed to the IT provide infrastructure
- The functionality is validated against the initial requirements
- The process can now be gauged from the beginning, as explained in Figure 5 Trial SE validation process below

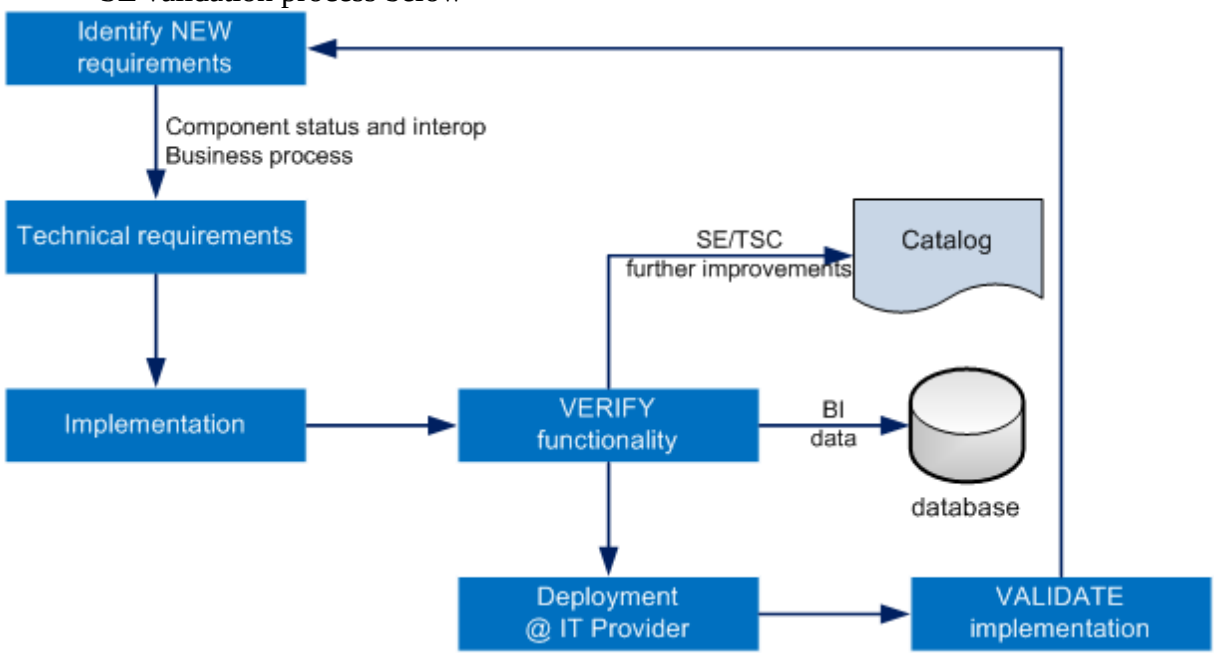


Figure 5 Trial SE validation process

The perimeter of the assessment includes GEs, SEs selected in the first phase . (see D7.1 FITMAN Smart-Digital-Virtual Factory Trials Experiences version M24) and SEs selected with the Open Call. The extended trials objects included in evaluation are listed in the Table 3 Extended Trials SEs at page 22

3. Linkages with phase III initiatives

FITMAN project belongs to a broader effort to define and promote a brand new approach to solution development based on standard and open components. To such purpose, it is important that the related action in a specific domain (for FITMAN, it is manufacturing) are coherent with all initiatives both at technical development level and at awareness and dissemination level.
Overall, the awareness of related Phase III Accelerators and FIWARE Supporting Actions described in this section will inform analysis of FITMAN trials and consolidation of their results and providing hints in terms of how they might be expanded in D8.2.

3.1 FIWARE Accelerator Programme

Phase III of the FI-PPP includes 16 accelerator projects, whose goal is to enable uptake of Phase I and Phase II results by SMEs and Web Entrepreneurs, who will use those results to develop innovative services and applications.

The 16 accelerators each run one to three open calls. Each project has a particular focus:

1. CEED Tech is a regional accelerator to support CEE countries, focusing on smart connected TV, smart city services, virtual factories, and smart buildings.
2. CreatiFI is about gaming, interactive ads, interactive urban experience, industrial design and wearable technology in the Nordics, Lowlands/UK, Northern Italy and Cataluña.
3. EuropeanPioneers (prev. ExpaMeco) builds on FI Content, focusing on media, education, and gaming.
4. FABulous is focused on 3D printing virtual fabrication in Europe.
5. FI-C3 is focused on SMEs in smart territories (smart cities, location-based services, open data), media and contents, and care and wellbeing.
6. FI-ADOPT is focused on networked media, social networking, mobile apps and gamification, particularly in learning, training, wellbeing and social integration.
7. FICHe builds on FI-STAR in e-health, focusing on the e-health market only.
8. FINish aims to transition food supply chains towards information-intensive dynamic networks. It builds on Smart Agri-Food, FIspace and FInest.
9. FINODEX will bring Open Data to the FI-PPP: goals are innovative infrastructures for digital services, high QoS and security guarantees in health, transport, environment, finance.
10. FRACTALS focuses on agriculture, with a regional focus on the Balkans but open to SMEs from other European countries.
11. FrontierCities builds on INSTANT MOBILITY and OUTSMART to address sustainable smart mobility in cities, focusing on Guildford, UK; Maribor, Slovenia; Messina, Italy; and Brussels, Belgium.
12. IMpaCT builds on FI-WARE and FI-CONTENT, focusing on mobile technologies. They want to develop social connected TV, smart cities services and pervasive games.
13. INCENSe focuses on smart energy and smart grid, building on FINSENY and FISPACE.
14. SmartAgriFood2 is focused on smart farming with data-rich ICT services and applications; it builds on SmartAgriFood, FInest, FIspace and ICT-AGRI ERA-NET1. It focus on arable, livestock and horticulture production.

15. SOUL-FI focuses on the Internet of Services and Products, heeding open data, crowd-sourced data and IoT. There are 5 pilot cities: Amsterdam, Birmingham, Florence, Rotterdam and Valladolid.
16. SpeedUP! (prev. SpeedupEurope) is about agri-business, smart city and clean technology, with emphasis on the Nordics, Benelux and Germany.

Each accelerator was analysed in terms of its potential relevance to FITMAN. Projects without a direct focus on manufacturing but with some emphasis on other areas of relevance (i.e. supply chain management or smart technologies, which link with virtual factories and smart factories respectively) were designated as having 'low' (i.e. potentially some) relevance. Table 2 shows the result of this analysis.

As shown in Table 2 below, three accelerators (FABulous, CEED Tech and FI-ADOPT) identify FITMAN as relevant. Nine accelerators work in areas with potential (but not guaranteed) relevance to FITMAN, while the remaining four have no obvious link.

Project	Comment	Relevance
FABulous	FITMAN has existing connections with FABulous. FABulous are interested in collaboration with FITMAN.	Very high
CEED Tech	CEED identifies virtual factories as one of four key areas of interest and explicitly links this area with FITMAN.	High
FI-ADOPT	FI-ADOPT is not focused on manufacturing, but the DOW describes use of FITMAN SEs for social integration.	Low to medium
CreatiFI	CreatiFI is not focused on manufacturing, but plans a Brussels-based task force on Factories of the Future. If this goes ahead, there is medium relevance.	Low to medium
FI-C3	No focus on manufacturing, but a possible link in terms of Smart Factory trials and SEs.	Low
FInish	No focus on manufacturing, but a possible link in terms of Virtual Factory platform and SEs.	Low
FINODEX	Focus on open data, not big data or manufacturing. Only relevant if FITMAN becomes active in open data.	Low
FrontierCities	No focus on manufacturing but a possible link in terms of Smart Factory platform and SEs.	Low
IMpaCT	No focus on manufacturing, but a possibility of a link in terms of Smart Factory platform and SEs.	Low
INCENSe	No focus on manufacturing but a possible link in terms of Smart Factory platform and SEs.	Low
SmartAgriFood2	No focus on manufacturing but a possible link in terms of Virtual Factory platform and SEs.	Low
SpeedUp!	No focus on manufacturing, but a possible link in terms of Smart Factory platform and SEs.	Low
EuropeanPioneers	EuropeanPioneers is not focused on areas in which FITMAN is active.	Very low
FICHe	FICHe is not focused on areas in which FITMAN is active.	Very low
FRACTALS	FRACTALS is not focused on areas in which FITMAN is active.	Very low
SOUL-FI	SOUL-FI is not focused on areas in which FITMAN is active.	Very low

Table 2. Summary of Phase III accelerators' relevance to FITMAN

The above analysis formed input to T8.4 for supporting Phase III. Discussions with the accelerators were started at the second European Conference on the Future Internet (ECFI2), which was followed up with two webinars that FITMAN held to present to all the Phase III accelerators what the FITMAN is about and its assets that may be of interest to them or their future open call proposers. As a result of these interactions, additional contact was made with FABulous, CEED Tech and FInish to explore potential closer collaborations. The closest link was established with the FABulous project, and the result of the conversations between the projects was that FITMAN contributed directly to the FABulous open call text (describing the FITMAN platforms, SEs and support offered) as well as sending a representative to a FABulous meeting to present FITMAN technologies.

3.2 FIWARE Support Actions

The following FIWARE support actions have been considered in the execution of the D8.1 consolidation exercise.

FI Business http://www.fiware.org/fi-business/
FI-business are open initiatives aiming to create a sustainable ecosystem to grasp the opportunities that will emerge with the new wave of digitalization caused by the integration of recent Internet technologies.
FITMAN needs these support actions to maximize results exploitation potentiality. In the same way support actions are fed by projects such as FITMAN in terms of contribution to the increase of hubs network, Labs capillarity and exploitation to stakeholders (investment funds, consulting companies, peers through matchmaking events, workshops and webinars).

Mentoring and Innovation Support

Boot Camps

Three day events with on-site workshops for early and advanced stage startups and companies.

Two boot camps will be organized, one held in Berlin and the other in Athens. Each boot camp will take 3 days and consists of parallel tracks for early and advanced stage start-ups and companies. Each one will be open to 60 start-ups from all FIWARE accelerators.
These workshops will focus on sector specific topics such as IPR Management, CRM, Patents, License Management etc.

Webinars

Online Seminars on General Entrepreneurship Topics and Specific Challenges

A number of webinars will be offered to the start-ups and companies of all FIWARE accelerators tackling generic entrepreneurship topics such as business plan, legal issues, marketing as well as specific challenges for start-ups and companies in an advanced stage like internationalization, IPR Management, CRM and licensing. Each webinar will be composed of the following modules:

Recorded Video Stream
Interviews with experts, serial entrepreneurs and investors on relevant topics for ICT start-ups and high-quality video material available on public stream to all accelerators and their start-ups and companies.

Live Discussion with the expert
Every 2-3 months a row of online discussion rounds on basic entrepreneurship topics following the application rounds of the accelerators.

Online Library of FIWARE Webinars
Next to self-produced webinars, a pool for the webinars produced by FIWARE accelerators in a central library is open to all accelerators.

Online Pitching Presentations of Selected FIWARE startups and companies

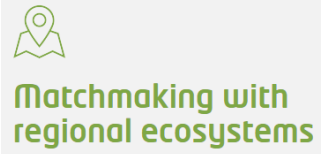
All FIWARE accelerators will have the chance to select their best start-ups and companies to take part in an E-Pitch to qualify for the attendance of onsite FIWARE Investment Forums. The online pitches will be evaluated by sector-experienced business angels and investors and each start-up will receive detailed feedback on the quality of their presentation and business idea.

On-site Pitching Event with Selected Investors

At least 5 investment forums will be organized. They will be linked to other FIWARE events or third-party events in order to offer the participating start-ups a chance to get in touch with business angels, investors and other European start-ups and companies.
It's planned a pitching phase that takes place in front of selected investors that are focused on the sectors of the selected start-ups and companies.

Online Platform to arrange consulting sessions with international experts

Online platform to arrange one-on-one consulting session between the FIWARE start-ups and international experts. Each accelerator can suggest coaches from their networks to join the pool and distribute consulting voucher to their start-ups.
A consulting session can either take place online via Skype or any other conferencing tool or in form of a personal meeting on-site. The choice is up to the consultant and the start up.



Getting in touch with established companies

Several events in different places to match FIWARE start-ups and companies with established companies in order to get in contact with potential customers for FIWARE innovations.

FI-Core http://www.create-net.org/projects/6/3613/FI-CORE

FI-Core seeks to provide a truly open, public and royalty-free architecture and a set of open specifications that will allow developers, service providers, enterprises and other organizations to develop products that satisfy their needs while still being open and innovative.
The platform aims to reduce obstacles and foster innovation and entrepreneurship in a variety of ways:

- Offering a set of open APIs that allow developers to avoid getting tied to any specific vendor, therefore protecting application developer's investment.
- Providing a powerful foundation for the Future Internet, cultivating a sustainable ecosystem for:
  - Service providers: delivering new applications and solutions meeting the requirements of established and emerging areas of use.
  - End users and consumers actively participating in content and service consumption and creation.

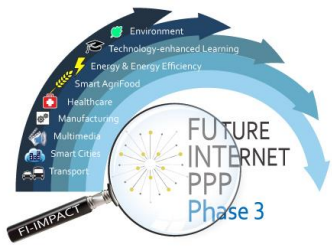
Enterprises and organizations wish to get closer to their customers in order to deliver an even more compelling user experience and better service. For this reason, they would like to exploit contextual user data which may lead to a more personalized interaction experience and service offering, creating stronger participation of users in all phases of product and service lifecycles. In order to develop and operate these services, new methods, technologies are needed and FITMAN can offer tools to create an appropriate Future Internet platform with the aim to contribute to meeting enterprises and business customers.

FI-Links http://fi-links.eu/

Road mapping for 2016/2017, workshops

FI-Links will support the process of evolving FI-PPP to a worldwide champion of Internet innovation by taking into account the specific business requirements of both large European industries and SMEs, supporting the adoption of the FI-PPP in non-covered EU regions and beyond, and validating the long-term vision of FI-PPP. FI-Links will leverage on different results from FI-PPP such as FIWARE-Ops, FIWARE-Lab, FIWARE products, the Coalition of Action for the European Regions, XiPi and XIFI, the community cloud for FI-PPP developers. In involving FITMAN Trial Experimentations into FI-Links programme it could be a strong contribution to the generation of a global ICT-based network in manufacturing.

FI-IMPACT http://fi-impact.net/home/



Socio-Economic impact, Best Practices

FI-IMPACT is focused on measuring and projecting potential take-up and impact of Phase III Accelerator Projects co-funded under the Future Internet PPP, by collecting and assessing qualitative and quantitative evidence of their potential socio-economic impact to 2020.
FI-IMPACT will support all Future Internet (FI) stakeholders to better understand and achieve the Impact expected from the FI Programme by clearly defining and describing what the observable impact is in the context of the FI Programme to maximize programme objectives, providing clear examples of the factors that lead to a sustainable success and impact.
The FI-IMPACT opportunities fit the manufacturing field and allow the dissemination of project results such as FITMAN providing:

- Detailed observable measurement of the Programme to assess the potential impact of the activities being performed, giving the initiatives the possibility to self-assess their potential in relation to industry standards and to the overall community of FI projects.
- An Impact Assessment Framework including Key Performance Indicators and FI Impact Assessment Guide to support Phase III initiatives to identify, assess and maximize their potential and actual impacts.

I3H http://www.fi-ppp.eu/i3h/

Incubating Internet Innovation Hubs – ICT Labs

I3H project is a FP7 coordination action contributing to the sustainability of Future Internet Public-Private-Partnership (FI PPP) through the creation of a European network of Internet

Innovation Hubs (IIH). IIHs are regional or thematic clusters that bring together web entrepreneurs, mentors, investors, students, academia, industry, and public sector innovators to speed up the transformation of FI PPP results, aka FIWARE, to services and applications addressing the needs of European citizens, companies, and society.
This support action is aligned with the intent of the FITMANNovationLab and its aim is to create a link between ICT-Labs and third parts with the ambition to build a network of new Internet Innovation Hubs in manufacturing field.
I3H starting point is its partnership, consisting of EIT ICT Labs and its Nodes and Associate Partners in Budapest, Eindhoven, Helsinki, Madrid, Paris and Trento. I3H will grow this "seed" network by accompanying hubs sharing the objectives and goals of the project through a so-called "stage gate process". In the latter, candidate hubs will be guided, trained and supported towards achieving tangible milestones and eventually becoming part of a fully-fledged IIHs' network.

4. Consolidation and comparison approach

This chapter has the objective to formulate the assessment methodology strategy to be applied to FITMAN trials. The evaluation methodology is based on the definition of key performance indicators (KPI) that will be cross-checked against the project life cycle and validated by FITMANs trials and surveys. The outlined strategy aims to determine the main factors that affect the platform and pilot acceptance and ensure the best quality results.
The perimeter of the assessment includes GEs, SEs selected in the first phase and SEs selected with the Open Call. (see D7.1 FITMAN Smart-Digital-Virtual Factory Trials Experiences version M24).
The extended trials object of evaluation are listed in the next table (Table 3):

Domain	Code	Name	Function	Provider	Trial
Open Call Digital Factory Artifacts - ELITE					
DF	SE-DF-1 SE-DF-1	SEMed	Semantic Mediator front-end & back-end	BIBA	VW, CONSULGAL
	SE-DF-2 SE-DF-2	C3DWV	Collaborative 3D Web Viewer	DFKI	VW, AIDIMA
	SE-DF-3 SE-DF-4	3DScan	3D Scanning Storage and Visualisation	DATAPIXEL	TRW, WHIRLPOOL
	PC-DF-1 PC-DF-1	iLike	Product-centric, modular item-level Product Lifecycle Management	HOLONIX	AIDIMA, CONSULGAL, VW
	PC-DF-2 PC-DF-2	Virtual Obeya	Dynamic environment for collaboration and information sharing	HOLONIX	AIDIMA, CONSULGAL, VW
	PC-DF-3 PC-DF-3	3D Point Cloud Analysis	3D analysis of the digital products	DATAPIXEL	WHIRLPOOL
Open Call Smart Factory Artifacts - MagniFI					
SF	SE-SF-1 SE-SF-1	DyCEP	Dynamic CEP	FZI / NISSA	TRW, WHIRLPOOL
	SE-SF-2 SE-SF-2	DyVisual	Dynamic Visualization and Interaction	DFKI	TRW, WHIRLPOOL
Open Call Virtual Factory Artifacts - ASSET-KIT					
VF	SE-VF-1	MoVa	Management of Virtualized Assets	DITF	TANet, COMPLUS
	SE-VF-2 SE-VF-2	GeToVa	Generation and Transformation of Virtualized Assets	STI	TANet, COMPLUS

Table 3 Extended Trials SEs

As explained previously, feedback from different actors in the trials has been collected through the following channels according the define methodology (see Chapter 2 Data Gathering process):

- Chapter questionnaires, directed to GE/SE IT managers
- Community and online surveys, filled by solution end users
- Trial Journals, in an open free text style

For each family of KPI a proper methodology will be applied, as explained in detail on subchapters:

- 4.1 – Business Aspects and Indicators
- 4.2 – Technical Aspects and Indicators
- 4.3 – Technical and Business Analysis
- 4.4 – Analysis of trial progress and impact

As an example, BPI's will be measured in different phases of the project Trials in order to compare and evaluate the execution of the trials. However, despite the solid analysis for each KPI family, a co-relation between those KPI families should also be considered. The technical and business analysis carried out in Section 4.3 should be related with a broader impact analysis. The societal, business and technical dimensions could also be interpreted in its co-relations. For instance, an innovative piece of software easily deployed and integrated in a technical solution, accelerating the product time-to-market and reducing costs, introduces industry competitiveness and protects employment.

4.1 Business Aspects and Indicators

The goal of this chapter is to present:

- The evaluation of the reaching of the Target for each TO BE value it means TO BE 1/ TARGET, TO BE 2 / TARGET and TO BE 3 / TARGET
- The comparison between the 10 trials regarding the reaching of the targets.

For each trial, BPIs have been defined. These BPI descriptions will be provided along with a description of the business scenario and, their associated business processes and BPIs (objectives, name, category and how the BPI is calculated). There is a difficulty for the comparison approach because the trials have given non-homogeneous values for the BPIs such as:

- Measured values (e.g. a duration)
- Calculated values (e.g. anonymized data, Quality Assurance indicator)
- Percentages (e.g. the processes consume 4% less material)

In order to homogenize the values, we use the notion of progress ratios. The progress ratios indicate by a percentage the reaching of the BPI's Target for TO BE 1, TO BE 2 and TO BE 3 (i.e. a progress ratio of 100% means the BPI reached its target at the TO BE 3 measure).

The calculations used to obtain the progress ratio are the following:

$$PROGRESS\ ratio\ TO\ BE\ 1 = \left(\frac{TO\ BE\ (1)\ measure - AS\ IS\ value}{TARGET\ value - \ AS\ IS\ value}\right) x100$$

$$PROGRESS\ ratio\ TO\ BE\ 2 = \left(\frac{TO\ BE\ (2)\ measure - AS\ IS\ value}{TARGET\ value - \ AS\ IS\ value}\right) x100$$

$$PROGRESS\ ratio\ TO\ BE\ 3 = \left(\frac{TO\ BE\ (3)\ measure - AS\ IS\ value}{TARGET\ value - \ AS\ IS\ value}\right) x100$$

At the time of the writing of the deliverable, TO BE 1 and TO BE 2 are available, TO BE 3 will be available for the next issue of the deliverable. The target must be reached for TO BE 3.
Analysis of the reaching TO BE 3:

- If the progress TO BE 3 / Target is 100%, the trial reach its objective.
- If the progress TO BE 3 / Target is more than 100%, the trial has underestimated the target and must increase the value of the target for the next period.
- If the progress TO BE 3 / Target is less than 100%, there are two situations:
  - One is the result of some problems in the running of the solution and an analysis must be performed to find these reasons.
  - Second, the target is too ambitious and must be reviewed for the next period.

To obtain the overall progress of the trial, there are two possibilities:

- To calculate the average of all the BPIs progress of the trial regardless of the business scenarios decompositions.
- To calculate the average of BPIs progress for each business scenario then to calculate the progress average of the business scenarios which gives the average for the trial.

We choose the second approach taking in account that each scenario influence globally the result of the trial with the same weight.

Finally, the progresses of the trials are compared in order to try to propose some conclusions concerning the business aspects. The application of the method is presented in chapter 5.1 Business Consolidation.

4.2 Technical Aspects and Indicators

4.2.1. Methodological Approach

In order to proceed to conclusions as far as it concerns the outcomes of the Technical Verification and Validation of the components and the solutions developed in the framework of the project, a cross-trial analysis is required. Technical V&V in FITMAN was based on a selected series of Technical Indicators (TIs), defined in the framework of WP2. Specifically, three groups of TIs have been defined, addressed to the Generic Enablers (GEs), the Specific Enablers (SEs) and the Trial Solutions (TS) respectively. The scope of the present section is to define a consolidated approach for analysing the values of the TIs and identifying correlations among them which can lead to meaningful conclusions regarding the quality and the attributes of all the software components utilised in the framework of the project.
In this context, the analysis of the TIs will follow a three level approach, as shown in the following diagram (Figure 6).

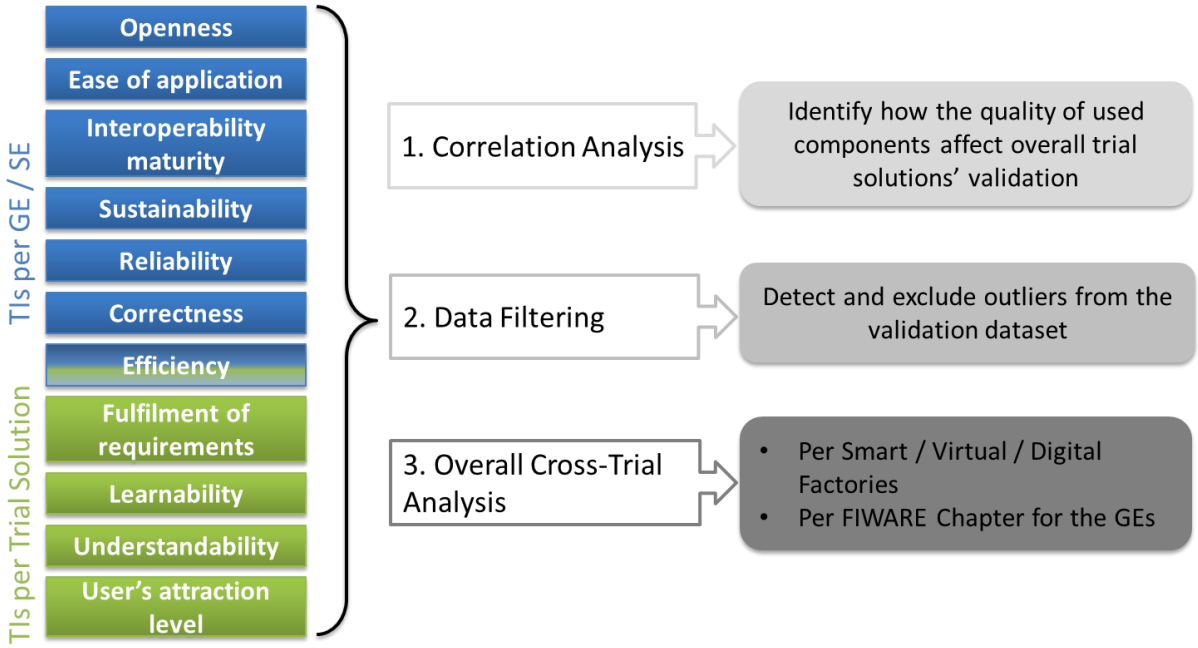


Figure 6 Analysis of the TIs

The presented approach consolidates the 5 TIs defined for the Trial Solutions with the 9 TIs defined for the V&V of the Generic and the Specific Enablers utilized in FITMAN. The main sources of information are the general surveys and the community surveys performed, from which the values of the TIs can be extracted directly.

As shown in the diagram, three levels of analysis are defined for consolidating the technical V&V results:

- Level 1: Correlation Analysis
- Level 2: Data Filtering
- Level 3: Overall Cross-Trial Analysis

The analysis in all three levels is based on statistical calculations and tests selected out of well-documented approaches proposed in the bibliography for analyzing software quality indicators and metrics [2,3,4]. The exact approach followed in each analysis level, as well as the expected outcomes are described next.

4.2.2. Correlation Analysis of Technical Indicators

The main expectation out of the correlation analysis is to identify whether and how much the attributes of the software components (Generic and Specific Enablers) affected the validation results of the integrated Trial Solutions. This is a very important step since it can identify whether the characteristics and especially the drawbacks of each GE/SE utilized in a Trial Solution are mapped to the installed integrated system or not. The scope of the

[2] Munson, J. C. (2002). Software Engineering Measurement, CRC Press, Inc.1st Edition, ISBN: 978-0849315039
[3] Lee, M.-C. (2005). Statistical Data Analysis for Software Metrics Validation. Knowledge-Based Intelligent Information and Engineering Systems. R. Khosla, R. Howlett and L. Jain, Springer Berlin Heidelberg. 3684: 389-395.
[4] Andi Wahju Rahardjo Emanuel et al. (2011). Statistical Analysis on Software Metrics Affecting Modularity in Open Source Software. International Journal of Computer Science & Information Technology (IJCSIT), Vol 3, No 3: 105-118

analysis is not limited in checking if such correlations exist but also in identifying which specific attributes of the components are crucial and significantly affect the characteristics of the final solution.

In statistical terms, the GEs and SEs utilized in the trials will be examined as far as it concerns their correlation to the trials solutions TIs. Given that there are 9 TIs for the GEs/SEs and 5 TIs for the Trial Solutions, performing just pairwise analysis does not cover correlation aspects in full extend. Different combinations of GEs/SEs indicators could have different effect on the Trial Solution indicators. This is considered a multivariate problem requiring a modelling process that allows mapping multiple independent variables (such can be considered the TIs of the GEs and SEs) onto sets of multiple dependent variables (i.e. the TIs of the trial solutions). In order to handle the complexity, a statistical procedure called Canonical Correlation[5] will be utilized. Canonical correlation analysis is a method for exploring the relationships between two multivariate sets of variables (vectors), all measured on the same individual. Theoretically, in order to proceed to a complete analysis using pairs of TIs, it would be required to create pairwise scatter plots with variables in the first set (GEs/SEs), and variables in the second set (Trial Solutions). But given that the dimension of the first set is 9 and that of the second set is 5, there will be 45 such scatter plots, which would make very difficult, if not outright impossible, to look at all of these graphs together and be able to objectively interpret the results. This is why Canonical Correlation Analysis is selected for this step instead of the simple Correlation analysis, since Canonical Correlation allows us to summarize the relationships into lesser number of statistics while preserving the main facets of the relationships[6]. Literally, it goes one step beyond the pair-wise correlations since it provides a complete analysis of how the total set of TIs of the utilized components affect the final installed system's TIs.

In order to apply Canonical Correlation Analysis at Trial level, the first thing to do is to determine is if there is any relationship between the two sets of variables at all. In other words it has to be examined if, according to the provided TIs values, the GE/SE indicators set and the Trial solution indicators set are completely unrelated to one another and independent. In such a case there is no meaning to proceed to additional analysis, but a direct conclusion can be extracted concerning the fact that the GEs and SEs attributes did not affect in any way the Trial solution attributes. Although this is not something we expect, it can be true for some cases, requiring a deeper interpretation of such a result.

To test for independence between the two sets of Technical Indicators (which are the variables under analysis) a multivariate multiple regression model is considered "predicting" Trial Solution TIs from the utilized GEs/SEs TIs variables. In this case, there are 5 multiple regressions, each multiple regression predicting one of the variables in the first group (Trial Solution) from the 11 variables in the second group (GEs/SEs). The hypothesis to be tested is the null hypothesis that the regression coefficients are all equal to zero. This would be equivalent to the null hypothesis that the first set of indicators is independent from the second set of indicators.

Considering that the hypotheses of independence will be rejected (so it will be proved that a correlation does exist) the next step is to obtain estimates of canonical correlation and to proceed to applying the Canonical Correlation Analysis procedure[7], by obtaining the Canonical Coefficients and at the end by interpreting the components and producing the final results of the correlation.

[5] Thompson, B. (2005). Canonical correlation analysis. Encyclopedia of statistics in behavioral science.

[6] The Pennsylvania State University (2015). STAT 505 - Applied Multivariate Statistical Analysis, Available online in: https://onlinecourses.science.psu.edu/stat505/

[7] Thompson, B. (2005). Canonical correlation analysis. Encyclopedia of statistics in behavioral science.

Through this procedure it will be possible to jump to conclusions concerning:

- Justification of the validation results of the trial solutions on the base of the attributes of the GEs and SEs utilized in the solutions
- Identification of the characteristics of the GEs/SEs (based on their validation) which have been inherited to the trial solutions or have indirectly affected their characteristics.

4.2.3. Data Filtering

The results of the validation of the GEs and SEs which has been performed in the framework of the project by the technical partners are useful for providing insights of the attributes as well as of the strong and weak characteristics of these components. However due to the fact that the users validating the GEs/SEs have different backgrounds and expectations, depending on the trial solutions' requirements as well as on way that they have chosen to utilize each GE/SE, proceeding to any type of direct comparison among the validated components could lead to incomplete and in some cases inaccurate conclusions. Given that the validation of the GEs/SEs, as well as of the Trial Solutions was based on the perception of the validators concerning specific attributes, cases that provide values far from the average to most or all of the TIs shall be identified and handled separately. In statistical terms what has to be examined is whether there are cases that the combination of scores on different variables are statistically unusual, or in other words whether there are any multivariate outliers. In case any outliers are identified then a qualitative approach shall be followed in order to decide whether to include them in the calculations of the average scores or not.

For identifying multivariate outliers during the analysis of the validation results, the BACON[8] (Blocked Adaptive Computationally Efficient Outlier Nominators) method will be utilized. In brief, the 1st step of the method is the identification of an initial subset of outlier-free validations. The 2nd step is the calculation of Mahalanobis Distances[9] from this basic subset.

In step 3, After computing the distances, all observations with a distance smaller than some threshold - a corrected percentile of a x^2 distribution - are added to the basic subset. Steps 2 and 3 are iterated until the basic subset no longer changes. Observations excluded from the final basic subset are nominated as outliers, whereas those inside the final basic subset are non-outliers.

The validations which will be characterized as outliers have to be examined qualitatively. If, for example, they all come from the same validator or a specific sub-group of validators, then we could consider that those validators had a totally different perspective of the indicators than the others, or that for any reason they were very positive or very negative towards the components which they were called to validate. In this case the specific validations shall probably be removed in order to get a calibrated set of indicators' values and to proceed in calculating averages and then to any comparisons. On the other hand in case there is a dispersion in the validators which have provided validations characterized as outliers then each separate case has to be examined taking into account any descriptive

[8] Nedret Billor, Ali S. Hadi, Paul F. Velleman, BACON: blocked adaptive computationally efficient outlier nominators, Computational Statistics & Data Analysis, Volume 34, Issue 3, 28 September 2000, Pages 279-298

[9] The Mahalanobis distance of a p-dimensional vector $xi = (xi1, xi2, \ldots, xip)^T$ from a group of values with mean $x = (x1, x2, \ldots, xp)^T$ and covariance matrix S is defined as: $di(x, S)^2 = (xi - x)^T S^{-1}(xi - x)$, $i = 1, 2, \ldots, n$

justification provided either in the online surveys or in the trial journals. Depending on the case, the specific validations could be removed or could be used either as-is or after being adjusted using a weight factor.
In any case, after the identification of outliers and their removal or adjustment the validation results could be characterized as calibrated. The next step is the calculation of average values for the TIs per GE/SE, as well as per trial. Any comparison concerning how "good" or "mature" a component is towards a specific attribute can be initially based on those average values and lead to conclusions. However, in the next section, the "percent favourable" approach is being presented which can be used instead of the average score and has significant advantages, especially for interpreting the results of the validation process.

4.2.4. Overall Cross-Trial Analysis

The Cross-Trial Analysis will be based on the calibrated values of the TIs after the removal or proper adjustment of any multivariate outliers, as presented above. The scope of the analysis at this stage is the extraction of conclusions out of the validation process in a cross-trial level:

- The first set of conclusions shall refer to the components validated, referring to all the FIWARE Generic Enablers utilised and the FITMAN Specific Enablers developed and used.
- The second level will go deeper, examining the validation results in clusters. For the GEs, clustering will be based on the FIWARE chapter to which each GE belongs. For the SEs on the other hand, as well as for the validation of the trial solutions as a whole, clustering will refer to the Smart, Digital and Virtual Factories respectively.

In the whole analysis, instead of calculating and presenting mean scores (ie average values of the TIs), a "percent favourable" approach will be utilized. The "percent favourable" score represents the percentage of the validators who provided each of the alternative answers to the survey during the validation of a component, e.g. the percentage of the validators that for a specific SE provided the answer 'High' in the "Sustainability" indicator. The main reason that "percent favourable" scores are selected is that they are easily interpreted and can be perceived better even by people without training in statistics. Another important reason, given that the population of the validation process is relatively small, is the better handling of any outliers which have not been removed. For example, in the dataset 4,5,4,4,5,4,1, the average scores would not necessarily be reflective of true validation levels. Mean is 3.86 out of 5 (or 77%), while, on the other hand, with the "percent favourable" representation, the result would be that versus 6 out 7 (or 86%) provided a high or very high value. In this case, one outlier dropped the overall score significantly. The usage of the "percent favourable" scores will, finally, provide a better understanding and more accurate results concerning the distribution of the validation scores. For example if there is a significant number of scores on both ends of the spectrum, but few in the middle, then although the average could lead to a "neutral" conclusion for the attribute under examination this could be far from the reality.

Following the aforementioned approach for scoring, a cross-trial analysis in clusters (FIWARE Chapters on one hand and Smart/Virtual/Digital on the other) will take place, overcoming the problem of having different population size per cluster. In the framework of the analysis, direct comparisons will be made, in order to extract conclusions regarding

the maturity and the quality of the utilised and/or developed components per cluster, for each characteristic under examination.
Finally, a cross-trial comparison of the validation results will take place regarding the trial solutions. Since the use case trials (as well as the trial-specific individual solutions), are of different nature, differences regarding the validation results could be attributed to many different reasons, the identification of which is out of the scope of the present deliverable. However proceeding to such comparisons is considered useful in the framework of identifying weaknesses that were not taken into account earlier, as well as for defining specific best-practices that could serve as points of reference both for the project and generally for the FI domain.

4.3 Technical and Business Analysis

4.3.1. Different actors and approaches

This chapter discusses the analysis and comparison of technical and business indicators. The objective is to identify if there are any typical behaviours of business and technical values given by the trials or if there are significant differences between the trial behaviours. Possibly also potential inconsistencies can be found which need further explanation and clarification.
It should be remembered that the same actors do not give the values for both the technical and business indicators. Depending on the level of assessment, the actors are always different or the group of actors participating in the value measurement is not the same:

- The technical indicators of the software components are assessed by the IT-partners.
- The technical indicators of the trial solution level are measured through a community-based survey for the trial end users.
- The business indicators are assessed by users through the experiments for each trial business scenario involved in FITMAN. The users of different scenarios may be different.
- Thus probably the actors involved in the assessment of the trial solution level technical and business scenario level business indicators are partly overlapping.

The definition of the technical and business indicators also have different approaches: The technical indicators are the same for all the trials, while the business indicators are always unique and linked to each trial-specific scenario. Also, for the business indicators target values have been set up and the technical indicators do not have any target values. So, the technical indicators are commensurable as such but to compare the business indicators with each other, normalization in relation to target is needed: how far the trial is in the progress towards the target.

4.3.2. Identification of comparison scope

Figure 7 Measurement scopes represents the different scopes of TI and BPI measurement. Each trial may have one or more scenarios. As the different scenarios may have different business objectives, they also have their own business indicators.
As described before, the technical measurement is performed at two levels:

- Software components (GEs and SEs; TSCs and TICs are not assessed)
- Trial solution level user acceptance and assessment: this covers all the scenarios of each trial and users of all the scenarios should be involved. Thus the user acceptance –type assessment is consolidated from the users of all the scenarios.

Thus, if a trial has more than one scenario, there is no strictly common level of measurement for the business and technical indicators. However, when assessing the trial solution level technical indicators (community-based user acceptance), the idea is to assess all the trial solutions, taking into account all the scenarios involved in the trial.

Thus, the best option for the business-technical comparison is to compare for each trial the business indicators of the trial scenarios with the trial solution – level technical indicators. In principle, also the technical indicators of the software components could be analysed against the business performance achieved. Figure 7 Measurement scopes illustrates the relationships among Components, Business Scenarios and Trials as a whole. To avoid random results, this would require that the components (GEs, SEs) have a significant role in the solution. On the other hand, the comparison of the technical indicators at different levels (component level and trial level) is described in chapter 4.2.

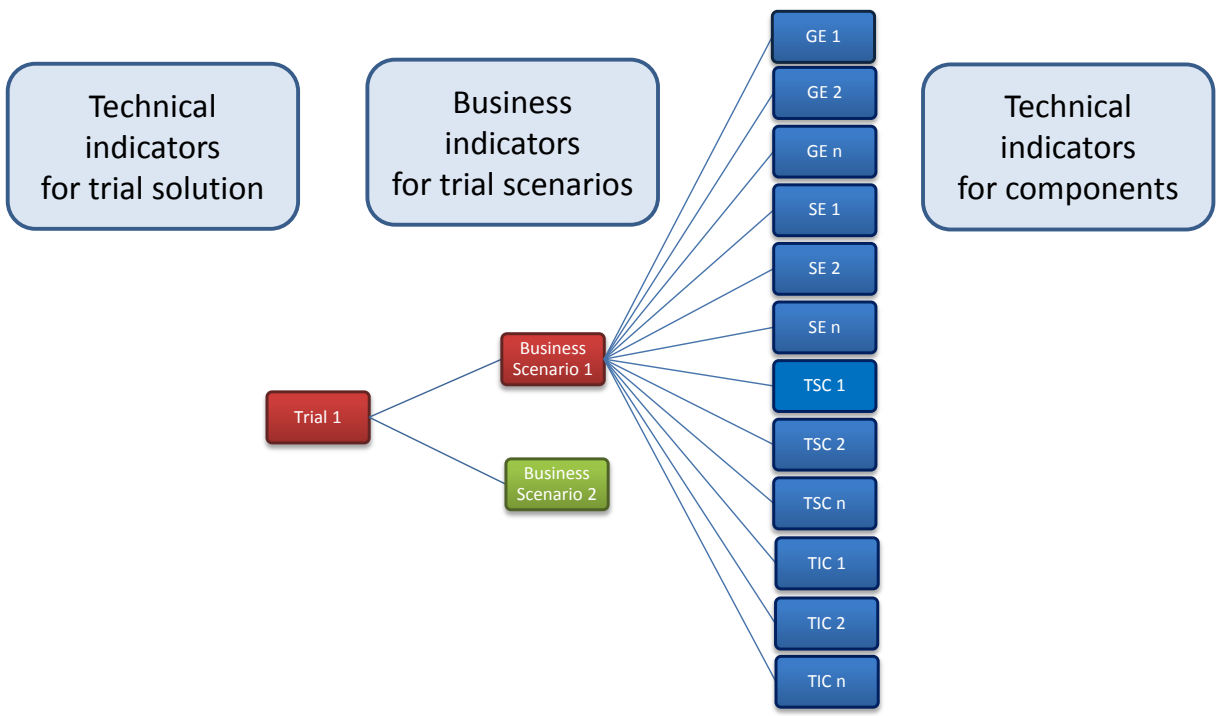


Figure 7 Measurement scopes

4.3.3. Cross-trial BI-TI -comparison approaches

When talking about cross-trial assessment, it is clear, that it is no sense to compare the business indicators of one trial to the technical indicators of another trial. Thus the BI-TI combination is always handled for one trial. Thus cross-trial BI-TI comparison means the comparison of single trial BI-TI against the BI-TI another trial. Alternatively, the trials could be grouped according to some criteria, and the cross-trial assessment could be presented using these groups (like smart / virtual / digital). Also other kinds of criteria for grouping the trials could be used but as such it is more relevant for business indicator analysis.

The trials have 5-17 business indicators as a whole, each defined for a specific scenario. Thus, in principle, a similar indicator can be defined for different scenarios but the definition and the context may be different.
At the trial solution level there are 5 technical indicators. To make the comparison between BI-TI different aggregation levels may be used:

- Each BI can be compared to each TI (N*5 comparisons for each trial; N = number of trial business indicators).
- Each BI can be compared with the aggregated TI = average of the solution level TI values. This leads to N comparisons for each trial.
- The normalized BIs of the trial may be aggregated together (average) and this value could be compared separately with each TI. Here we have 5 comparisons for each trial.
- The normalized BIs of the trial are aggregated taking an average and similarly the trial level TIs could be aggregated. For each trial this means one comparison.

In the next example the comparison is performed at trial level aggregated BPI and trial solution level single TI (fulfilment of requirements). The results from all the trials are collected together in the same Figure 8 Example of trial BPI-TI comparison. The example uses the data from to-be-1 evaluation. The analysis in chapter 5.3 will use the latest data.

4.3.4. Example

Figure 8 Example of trial BPI-TI comparison. shows the results of the comparison between normalized and aggregated business indicators and trial level user satisfaction on the fulfilment of requirements.

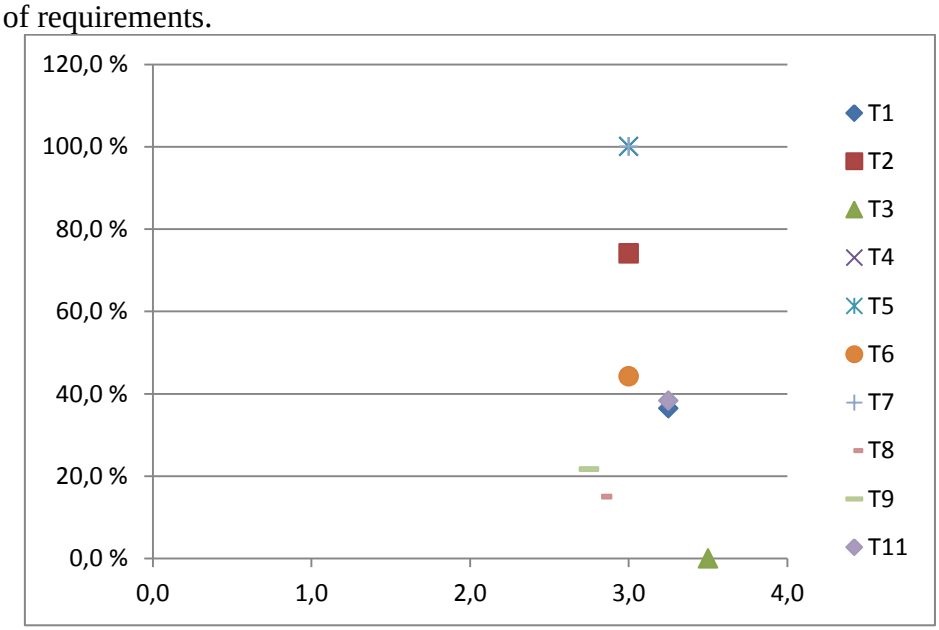


Figure 8 Example of trial BPI-TI comparison.

The x-axis shows the fulfilment of requirements and the y-axis is the BPI normalized and aggregated.(Example below for Fulfilment of requirements against Business BPI).
The data is not final but presents the presents the end of January (to-be-1) situation. The BPI values over 100% (relation to achievement of target value) have been set up at 100%.

4.4 Analysis of trial progress and impact

In this section, we describe the approach taken to analyse a) trial progress, b) trial impact on manufacturing, and c) trial impact on society. This approach is based in part on the socio-economic assessment of the trials as reported in some detail in D9.2 (*q.v.*). Note that the approach taken and described in this section (and in Section 5.4) is different to that taken and described in D9.2 and D9.3, which consider for each trial its value network, cost-benefit analysis, and long-term impact. As will be described, the approach taken here considers different aspects: trial progress towards BPIs; potential trial benefits to industry sector; trial applicability to manufacturing as a whole; broader societal benefit of trial.

The purpose of this analysis is twofold: (i) to provide a high-level ranking of those factors which would influence the long-term viability and success of the trials in respect of their effects on the industry sector as a whole; and (ii) to provide the meta-analysis of those trials going beyond what is reported in D9.2 and D9.3.

A simplistic approach to trial ranking would be order the trials on the basis of their success in reaching the business objectives and targets they had set for themselves (BPIs). This internally-focused procedure would fail to take into account the broader perspectives of the potential contributions of those trials to the industry sector, to manufacturing and to society as a whole. Instead we propose to integrate internal, self-defined, target attainment within a broader approach:

1. Each trial is given a weighting on the basis of the potential beneficial contribution (PBC) of what is being done to the industry sector as a whole from 1 (=little impact) to 5 (=major impact); this could be in terms of financial gains as well as cost savings; an example would be the process efficiencies as part of the VW trial;
2. Each trial is given a weighting on the basis of the general applicability (GA) of their outcome to manufacturing as a whole from 1 (=more specific to this case / scenario) to 5 (=major impact beyond the case). One pertinent example would be the improvements for collaboration and resource efficiencies in the COMPlus trial; and
3. Each trial is given a weighting in accordance with the broader societal benefit (BSB), 1 being low impact / relevance, and 5 being broader and significant contribution; an example here might be the TRW case where health and safety practices would have wider implications for the firm itself, the workforce, and those dependent on the employees.

These three factors together would moderate the effects of any progress towards internal targets, and in keeping with the conceptual basis of ECORGRAI [REF] allow some measure of how the trial could be viewed by relevant stakeholders in making decisions about the way ahead thus:

PBC x GA x BSB x [progress towards BPI targets]

A final consideration is worth mentioning: some of the trials are active in the same general industry sector; as well as the same broad factory type (smart, digital and virtual). Should trials generate the same score in the basis of the method outlined in the previous section, we would propose to seek to separate them to avoid having the same broad area / factory

type over-represented. As a *post hoc* consideration, this will only be used if entirely necessary; as can be seen in Section 5.4, this was not necessary..

5. Synthesis of collected data

Based on the criteria defined in 4 - Consolidation and comparison approach, the following will result from the consolidation of gathered data:

1. A business trial oriented consolidation aiming to identify in which measure the adoption of the FITMAN platform actually benefits the performances of the Trials Business processes (see 4.1 Business Aspects and Indicators)
2. A software components analysis on the different trials will assess how in the Trials (and in the three Virtual, Smart and Digital domains) the FITMAN platforms were implemented (see 4.2 Technical Aspects and Indicators
3. A cross business-technical exercise will allow to identify where and how specific trials benefits of FITMAN Platform components (see 4.3 Technical and Business Analysis)
4. In the end we provide a high-level ranking of those factors which would influence the long-term viability and success of the trials in respect of their effects on the industry sector as a whole; and provide the meta-analysis of those trials on the basis of what is reported in D9.2 and D9.3 (see 4.4 Analysis of trial progress and impact)

5.1 Business Consolidation

The objectives of this chapter are:

- To consolidate the business evaluation of each trial based on the Business Performance Indicators (BPIs).
- To determine an evaluation on the progresses accomplished by each trial in the reaching of the target.

The method is proposed in chapter 4.1 and the result of the application to all the trials is given in this chapter.
The chapter is structured as follow:

- Subchapters 5.1.1 to 5.1.10 presents the application of the method to the ten trials.
- Subchapter 5.1.11 gives an overview of the results and try to compare the progresses accomplished by each trial.

5.1.1. Trial No.1 Volkswagen

The FITMAN business evaluation of the VW trial encompasses two business scenarios (BS):

- The first is related to the MR (Machine repository) Management.
- The second is related the MR inquiries process.

The two tables (Table 4, Table 5) below list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Table 4 BPI list of the BS 1: web-service Management of the Machine Repository.

BP #	BPI name	BPI Categorization
BPI 1	Machine Repository Update cost (MR UP.COST)	**C**ost
BPI 2	Machine Repository Update time (MR UP.TIME)	**T**ime

Table 5 BPI list of the BS 2: web service “Support inquiries”.

BP #	BPI name	BPI Categorization
BPI 3	Inquiry respond time (INQ.RESP. TIME)	**T**ime

BPI 4	Inquiry respond cost (INQ.RESP.COST)	**C**ost
BPI 5	Average lead time to access experts' knowledge about production equipment (AV.LT)	**T**ime
BPI 6	Evaluation accuracy (EV. ACC.)	**Q**uality

Application to Business scenario 1

The **BPI no. 1** (BS1) *Machine Repository Update cost* is shown in Table 6 and measured as the following ratio: MR Update cost after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to reduce the costs for the management of the Machinery Repository (MR). The values provided by the Volkswagen trials are percentage of improvement aiming to anonymize the BPIs real Values.

Table 6 Volkswagen BPI 1 collected data and progress

	DATA *(provided by trial)*	PROGRESS (% of target's reaching)
AS IS	100	-
TO BE 1	85	30%
TO BE 2 (current state)	75	50%
Target	50	-

Analysis of the progress ratio (*see chapter 4.1***):**

The progress ratio: TO BE 1 / TARGET is 30%. The progress ratio: TO BE 2 / TARGET is 50%. Knowing that the reaching of the target is 100%, the target is not yet reached. The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. The figure below (Figure 9) shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

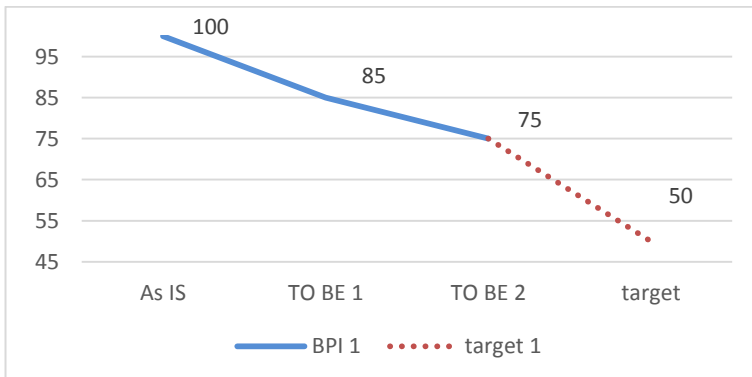


Figure 9 Volkswagen BPI 1: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 2** (BS1) *Machine Repository Update time* is shown in Table 7 measured as the following ratio: MR Update time after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to reduce the costs for the management of the Machinery Repository (MR reduce the time for the updating of a production module within in MR. The values provided by the Volkswagen trials are percentage of improvement aiming to anonymize the BPIs real Values.

Table 7 Data for Volkswagen BPI 2 collected data and progress

	DATA *(provided by trial)*	PROGRESS (% of target's reaching)
AS IS	100	-

TO BE 1	80	37%
TO BE 2 (current state)	70	56%
Target	46	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 37%. The progress ratio for TO BE 2 / TARGET is 56%. Knowing that the reaching of the target is 100%, the target is not yet reached. The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. The figure below (Figure 10) shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

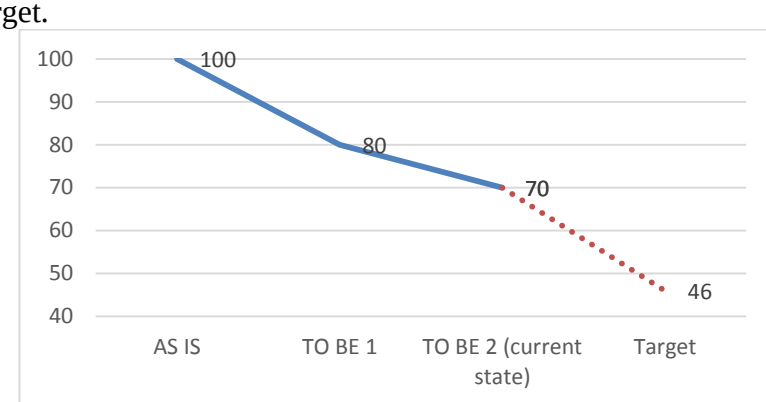


Figure 10 Volkswagen BPI 2: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Application to Business scenario 2

The **BPI no. 3** (BS2) *Inquiry respond time* is shown in Table 9measured as the following ratio: Time needed for the assessment of product related inquiries after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to reduce the time needed for the assessment of product related inquiries. The values provided by the Volkswagen trials are percentage of improvement aiming to anonymize the BPIs real Values.

Table 8 Volkswagen BPI 3 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	100	-
TO BE 1	95	25,00%
TO BE 2 (current state)	90	50,00%
Target	80	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 25%. The progress ratio for TO BE 2 / TARGET is 50%. Knowing that the reaching of the target is 100%, the target is not yet reached. The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. The figure below (Figure 11) shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

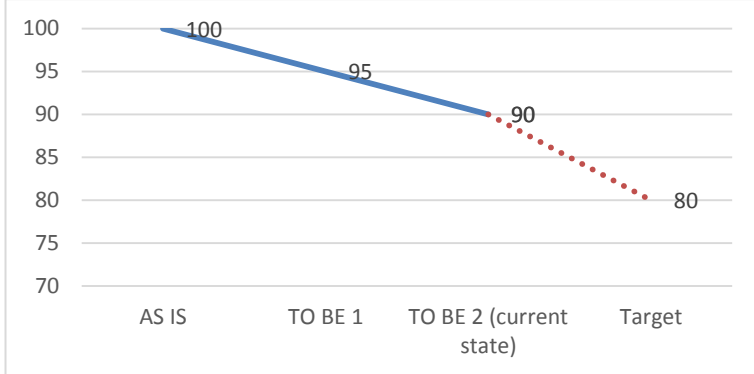


Figure 11 Volkswagen BPI 3: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 4** (BS2) *Inquiry respond cost* is measured as the following ratio: Inquiry respond cost after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to reduce the costs for the assessment of product related inquiries. The values provided by the Volkswagen trials are percentage of improvement aiming to anonymize the BPIs real Values.

Table 9 Volkswagen BPI 4 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	100	-
TO BE 1	95	50,00%
TO BE 2 (current state)	90	100,00%
Target	90	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 50%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below (Figure 12) shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

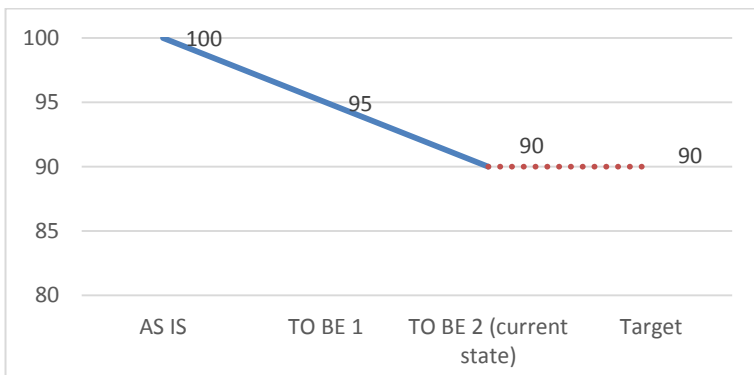


Figure 12 Volkswagen BPI 4: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 5** (BS2) *Average lead time to access experts' knowledge about production equipment* is shown in Table 10 Volkswagen BPI 5 collected data and progress measured

as the following ratio: Average lead time to accede to experts' knowledge about production equipment after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to reduce the lead time to accede to experts' knowledge about production equipment. The values provided by the Volkswagen trials are percentage of improvement aiming to anonymize the BPIs real Values.

Table 10 Volkswagen BPI 5 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	100	-
TO BE 1	60	56,34%
TO BE 2 (current state)	55	63,38%
Target	29	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 56.34%. The progress ratio for TO BE 2 / TARGET is 63.38%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below (Figure 13) shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

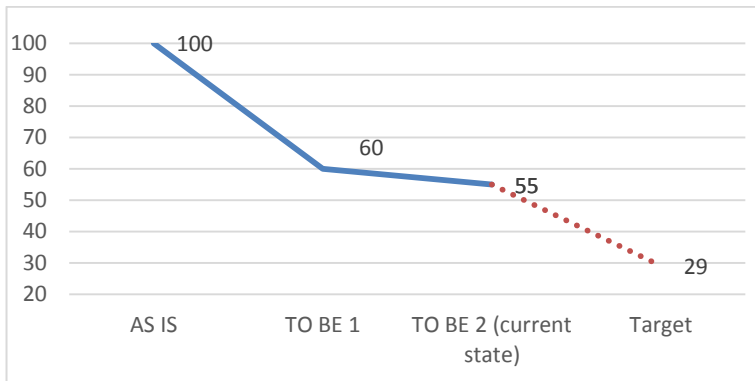


Figure 13 Volkswagen BPI 5: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 6** (BS2) *Evaluation accuracy data collection* is shown in Table 11 Volkswagen BPI 6 collected data and progress and measured as the following ratio: Evaluation accuracy rate after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to improve the evaluation accuracy. The values provided by the Volkswagen trials are percentage of improvement aiming to anonymize the BPIs real Values.

Table 11 Volkswagen BPI 6 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	100	-
TO BE 1	90	20,00%
TO BE 2 (current state)	85	30,00%
Target	50	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 20%. The progress ratio for TO BE 2 / TARGET is 30%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below (Table 12) shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

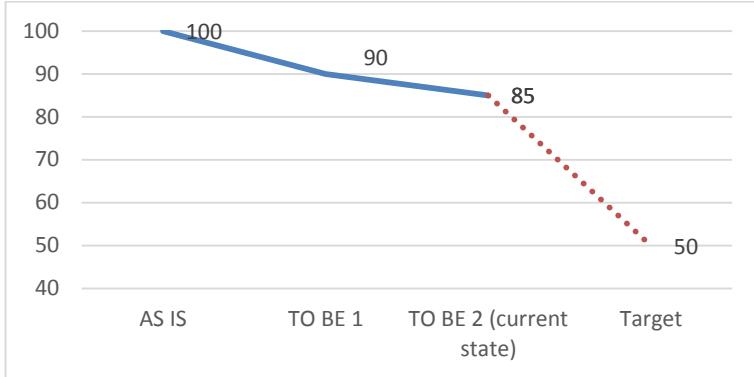


Figure 14 Volkswagen BPI 6: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Conclusion for the trial Volkswagen

The overall progress of the trial Volkswagen is calculated using the TO BE 2 / Target progress values reported in Table 12 below.

BS #	BPIs	Progress TO BE 2 / TARGET
1	BPI 1: Machine Repository Update cost (MR UP.COST)	50,00%
1	BPI 2: Machine Repository Update time (MR UP.TIME)	55,56%
2	BPI 3: Inquiry respond time (INQ.RESP. TIME)	50,00%
2	BPI 4: Inquiry respond cost (INQ.RESP.COST)	100,00%
2	BPI 5: Average lead time to access experts' knowledge about production equipment (AV.LT)	63,38%
2	BPI 6: Evaluation accuracy (EV. ACC.)	30,00%

Table 12 Volkswagen BPI overall progress

The progress of the trial is calculated at the BS level, then at the trial level:

- For the first Business scenario of Volkswagen, the web service management of the Machinery Repository, BPIs 1 and 2 are taken into account for the calculation (see chapter 4.1 for the calculation method). The average progress accomplished towards the targets for BS1 is 52.8%.
- For the second Business scenario, the web service "Support inquiries", BPIs 3 to 6 are taken into account for the calculation. The average progress accomplished towards the targets for BS2 is 60.85%.

The overall progress of the Volkswagen trial calculated using the average progresses of the BS at TO BE 2 is 54,31%.

5.1.2. Trial No. 2 TRW

The business evaluation of the TRW trial encompasses two business scenarios (BS):

- The first BS is related to risk modelling
- The second BS is related to risk detection and information.

The two tables below (Table 13, Table 14) list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Table 13 BPI list of the BS 1: Risk Modelling

BP #	BPI name	BPI Categorization / comments
BPI 1	Number of standards and regulations (STD.REG.)	**P**roductivity
BPI 2	Number of accidents and incidents (ACC.INC.)	**P**roductivity
BPI 3	Number of risks (RISKS)	**P**roductivity
BPI 4	Number of preventive actions (PREV.ACT.)	**P**roductivity
BPI 5	Number of human errors (HUM.ERR.)	**P**roductivity

Table 14 BPI list of the BS 2: Risk Detection and Information

BP #	BPI name	BPI Categorization / comments
BPI 6	Number of accidents and incidents (ACC.INC.)	**P**roductivity
BPI 7	Number of deployed monitoring systems (MONIT.SYST.)	**P**roductivity
BPI 8	Number of risk detections, alarms and warnings set up (RISK DET.)	**P**roductivity
BPI 9	Number of training sessions (TRAIN. SESS.)	**P**roductivity

Application to Business scenario 1

The **BPI no. 1** (BS1) Number of standards and regulations is shown in Table 15 and measured as the following ratio: *Number of standards and regulations added in the repository after/before the DV/AV implementation during a period.* The objective associated to the BPI 1 is to increase the number of standards and regulations in the repository. 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.

Table 15 TRW BPI 1 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	-	-
TO BE 1	4	80%
TO BE 2 (current state)	6	120%
Target	5	-

Analysis of the progress ratio of BPI 1:

The progress ratio for TO BE 1 / TARGET is 80%. The progress ratio for TO BE 2 / TARGET is 120%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.

The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.

Figure 15 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

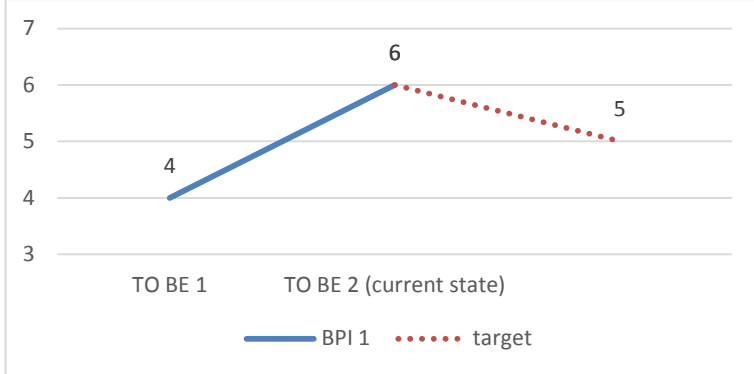


Figure 15 TRW BPI 1: evolution TO BE 1 / TO BE 2 / TARGET

The **BPI no. 2** (BS1) Number of accidents and incidents (ACC.INC.) is shown in Table 16 and measured as the following ratio: *Number of accidents and incidents in the factory after / before the DV/AV implementation during a period.* The objective associated to the BPI 2 is to reduce the number of accidents and incidents in the factory. 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.

Table 16 TRW BPI 2 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	-	-
TO BE 1	9	90%
TO BE 2 (current state)	13	130%
Target	10	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 90%. The progress ratio for TO BE 2 / TARGET is 130%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 16 TRW BPI 2: evolution TO BE 1 / TO BE 2 / TARGET below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

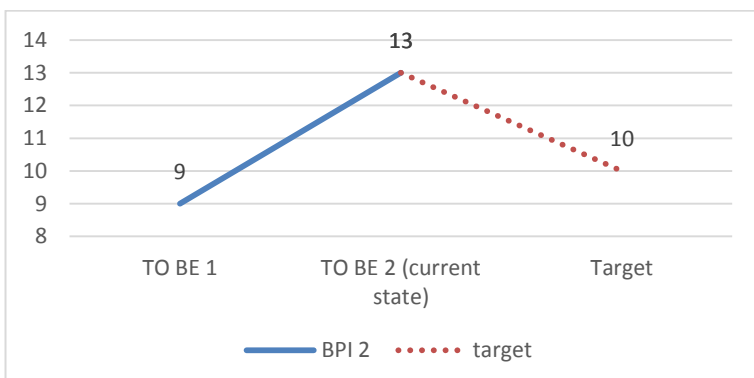


Figure 16 TRW BPI 2: evolution TO BE 1 / TO BE 2 / TARGET

The **BPI no. 3** (BS1) *Number of risks* is shown in Table 17 and measured as the following ratio: Number of risks that have been defined after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to increase the modelled risks. 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.

Table 17 TRW BPI 3 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	-	-
TO BE 1	25	83.33%
TO BE 2 (current state)	40	133.33%
Target	30	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 83.33%. The progress ratio for TO BE 2 / TARGET is 133.33%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 17 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

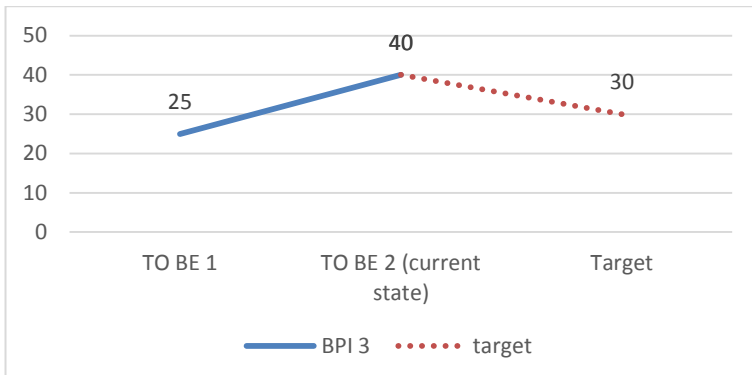


Figure 17 TRW BPI 3: evolution TO BE 1 / TO BE 2 / TARGET

The **BPI no. 4** (BS1) *Number of preventive actions* is shown in Table 18 and measured as the following ratio: Number of preventive actions after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to increase the modelled preventive actions. 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.

Table 18 TRW BPI 4 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	-	-
TO BE 1	18	60%

TO BE 2 (current state)	30	100%
Target	30	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 60%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 18 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The remaining progress to the target is shown by the dotted line.

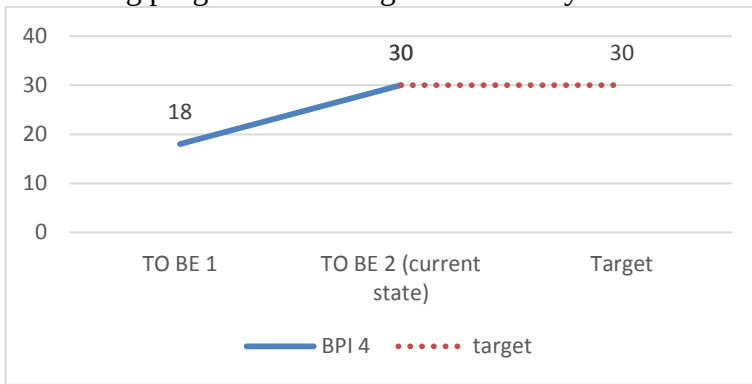


Figure 18 TRW BPI 4: evolution TO BE 1 / TO BE 2 / TARGET

The **BPI no. 5** (BS1) *Number of human errors* is shown in Table 19 and measured as the following ratio: Number of human errors in the design of prevention strategy planning after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to decrease the errors in the prevention strategy. 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.

Table 19 TRW BPI 5 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	-	-
TO BE 1	-	-
TO BE 2 (current state)	10	100%
Target	10	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is not available. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 19 below shows the progress of the BPI from TO BE 2 to TARGET. The dotted line shows the expected remaining progress.

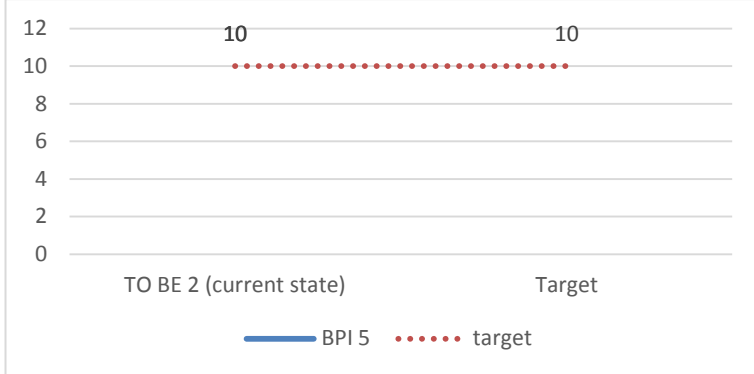


Figure 19 TRW BPI 5: evolution TO BE 2 / TARGET

Application to Business scenario 2

The **BPI no. 6** (BS2) *Number of accidents and incidents* is shown in Table 20 and measured as the following ratio: Number of accidents and incidents in the factory after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to reduce the number of accidents and incidents in the factory. 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.

Table 20 TRW BPI 6 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	-	-
TO BE 1	9	90%
TO BE 2 (current state)	13	130%
Target	10	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 90%. The progress ratio for TO BE 2 / TARGET is 130%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 20 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

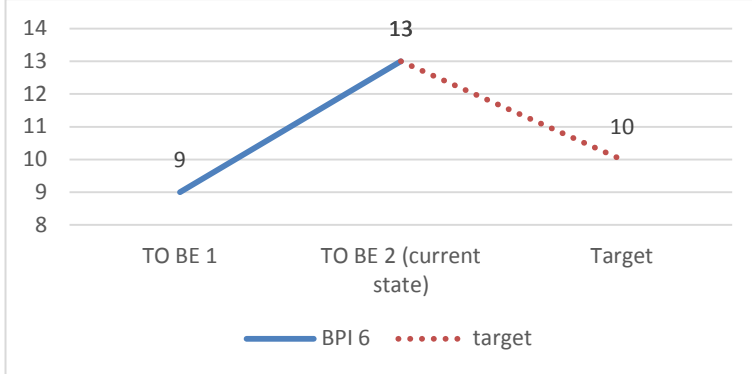


Figure 20 TRW BPI 6: evolution TO BE 1 / TO BE 2 / TARGET

The **BPI no. 7** (BS2) *Number of deployed monitoring systems* is shown in Table 21 and measured as the following ratio: Number of deployed monitoring systems after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to increase the number of safety systems. 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.

Table 21 TRW BPI 7 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	-	-
TO BE 1	50	90.9%
TO BE 2 (current state)	70	127.27%
Target	55	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 90.9%. The progress ratio for TO BE 2 / TARGET is 127.27%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 21 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

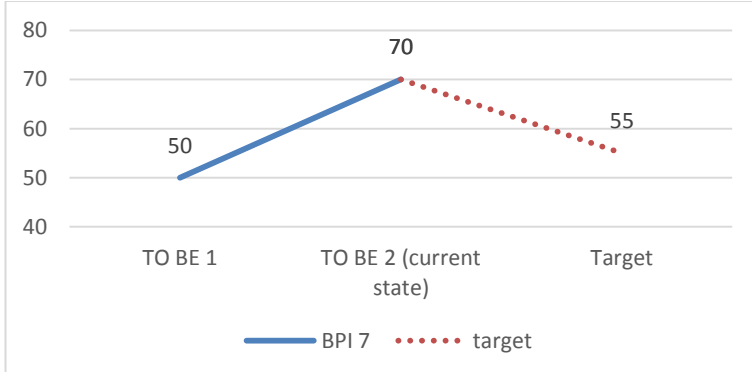


Figure 21 TRW BPI 7: evolution TO BE 1 / TO BE 2 / TARGET

The **BPI no. 8** (BS2) *Number of risk detections, alarms and warnings set up* is shown in Table 22 and measured as the following ratio: Number of risk detections, alarms and

warnings set up after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to increase the number of risk detections, alarms and warnings. 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.

Table 22 TRW BPI 8 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	-	-
TO BE 1	60	92.3%
TO BE 2 (current state)	80	123.08%
Target	65	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 92.3%. The progress ratio for TO BE 2 / TARGET is 123.08%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 22 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

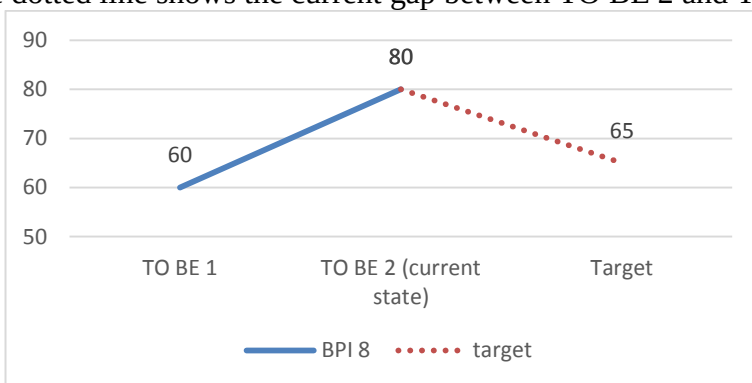


Figure 22 TRW BPI 8: evolution TO BE 1 / TO BE 2 / TARGET

The **BPI no. 9** (BS2) *Number of training sessions* is measured as the following ratio: Number of training sessions regarding safety after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to increase the number of training sessions regarding safety. 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.

Table 23 TRW BPI 9 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	-	-
TO BE 1	20	80%
TO BE 2 (current state)	35	140%
Target	25	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 80%. The progress ratio for TO BE 2 / TARGET is 140%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 23 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

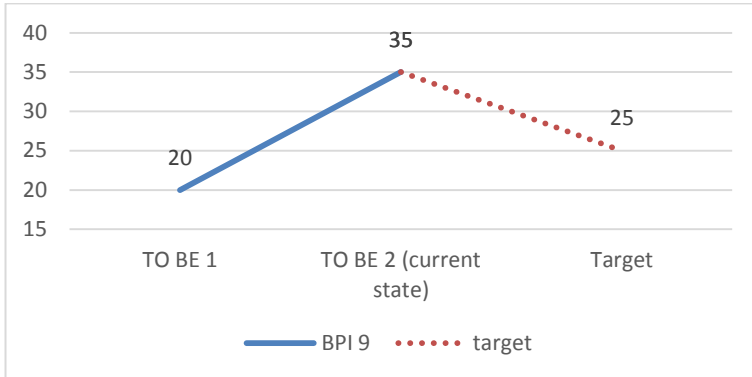


Figure 23 TRW BPI 9: evolution TO BE 1 / TO BE 2 / TARGET

Conclusion for the trial no.2 TRW

The overall progress of the trial TRW is calculated using the progress TO BE 2 /Target value. For the two business scenarios, the progresses are reported in the table below.

BS#	BPI name	Progress TO BE 2 / TARGET
1	BPI1 Number of standards and regulations (STD.REG.)	120%
1	BPI2 Number of accidents and incidents (ACC.INC.)	130%
1	BPI3 Number of risks (RISKS)	133.33%
1	BPI4 Number of preventive actions (PREV.ACT.)	100%
1	BPI5 Number of human errors (HUM.ERR.)	100%
2	BPI6 Number of accidents and incidents (ACC.INC.)	130%
2	BPI7 Number of deployed monitoring systems (MONIT.SYST.)	127.27%
2	BPI8 Number of risk detections, alarms and warnings set up (RISK DET.)	123.08%
2	BPI9 Number of training sessions (TRAIN. SESS.)	140%

Table 24 TRW BPI overall progress

The progress of the trial is calculated at the BS level, then at the trial level:

- For the first Business scenario of TRW, the risks modelling, BPIs 1 to 5 are taken into account for the calculation. The average progress accomplished towards the targets for BS1 is 116.67%.
- For the second Business scenario, the Risk Detection and Information, BPIs 6 to 9 are taken into account for the calculation. The average progress accomplished towards the targets for BS2 is 130,09%.

The overall progress of the TRW trial calculated using the average progresses of the BS at TO BE 2 is 123.38%.

5.1.3. Trial No. 3 AgustaWestland

The business evaluation of the AgustaWestland trial encompasses two business scenarios (BS):

- The first BS is related to the monitoring and management of tool tracking.
- The second BS is related to the management of documentation and report creation.

The two tables below list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Table 25 BPI list of the BS 1: Support for monitoring and management of tool tracking

BP #	BPI name	BPI Categorization / comments
BPI 1	Average time spent to track the tools management during working operation (RAT_1)	Time
BPI 6	Average number discrepancy reduction (ANDR_1)	*New BPI*

Table 26 BPI list of the BS 2: support for management of documentation and report creation

BP #	BPI name	BPI Categorization / comments
BPI 3	Average time to make data available in a digital format to different business units (DDT)	BPI removed
BPI 2	Number of tailored training materials linked to the results of tracking tools after/before the DV/AV implementation during a period (TDTM_2)	Quality
BPI 4	Number of people/departments to contact in order to have the information actually not digitalised or available on different sources (PEOP./DEP.)	BPI Removed
BPI 5	Number of technical interfaces (including files, browser, paper documents ...) to contact to have access to all the needed information (TECH.INT.)	BPI Removed

Application to Business scenario 1

The **BPI no. 1** (BS1) *Reduction of average time spent to track the tools management during working operation* is measured as the following ratio: Average time spent to track the tools management during working operation after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to improve the monitoring and management of tools tracking in FAL and Service Centre.
The BPI data are reported in "Minutes per person".

Table 27 AgustaWestland BPI 1 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	57	-
TO BE 2 (current state)	8	163.33%
Target	27	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is unknown. The progress ratio for TO BE 2 / TARGET is 163.33%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.

The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 24 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

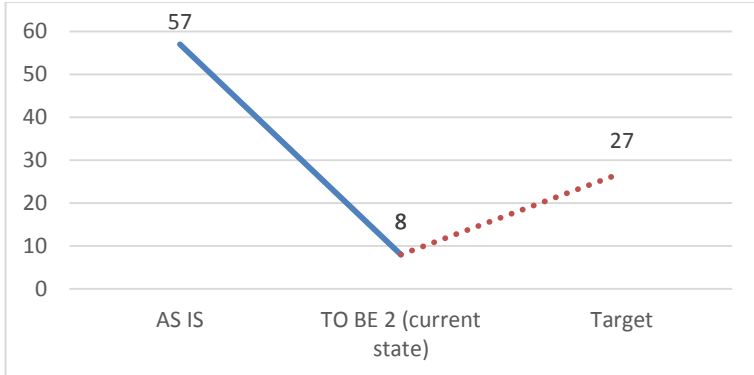


Figure 24 AgustaWestland BPI 1: evolution AS IS / TO BE 2 / TARGET

The **BPI no. 6** (BS1) *Average number of discrepancy* is measured as the following ratio: Average number of discrepancy per helicopter after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to reduce the number of discrepancy.
The BPI data are reported as "Number of Discrepancy per Helicopter".

Table 28 AgustaWestland BPI 6 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	35	-
TO BE 2 (current state)	8	270%
Target	25	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is unknown. The progress ratio for TO BE 2 / TARGET is 270%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 25 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

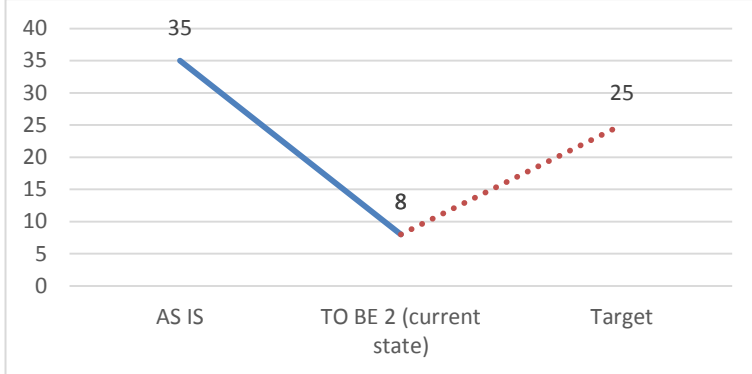


Figure 25 AgustaWestland BPI 6: evolution AS IS / TO BE 2 / TARGET

Application to the Business Scenario 2

The **BPI no. 2** (BS2) *Tailored data for training materials* is measured as the following ratio: Number of tailored training materials linked to the results of tracking tools after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to improve the monitoring and management of tools tracking linked to training purpose in FAL and Service Centre.
The BPI data are reported as a qualitative evaluation of training materials.

Table 29 AgustaWestland BPI 2 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0	-
TO BE 2 (current state)	0	0%
Target	1	-

Analysis of the progress ratio (*see chapter 4.1***):**
The progress ratio: TO BE 1 / TARGET is unknown. The progress ratio: TO BE 2 / TARGET is 0%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
Figure 26 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

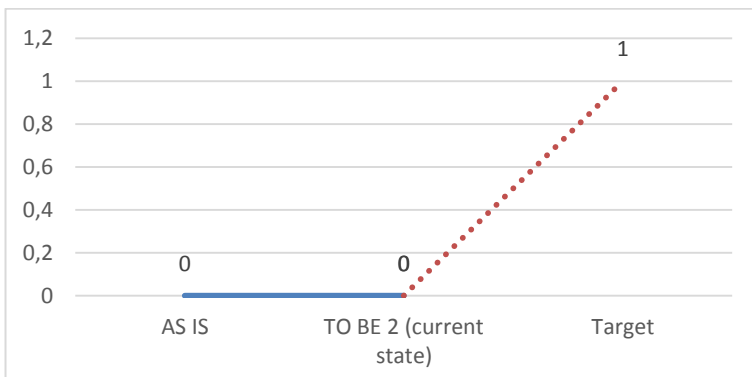


Figure 26 AgustaWestland BPI 2: evolution AS IS / TO BE 2 / TARGET

Conclusion on the trial AgustaWestland

The overall progress of the trial AgustaWestland is calculated using the progress TO BE 2 / Target value. For the business scenarios, the progresses are reported in the table below.

Table 30 AgustaWestland BPI overall progress

BS No.	BPI name	Progress TO BE 1 / TARGET
1	BPI 1 Average time spent to track the tools	163.3%
1	BPI 6 Average number of discrepancy	270%
2	BPI 2 Tailored data for training materials	0%

The progression of the trial will be analysed at the BS level and then at the trial level.

- For the first BS, the support for monitoring and management of tool tracking. The average progress accomplished towards the targets for BS 1 is 216.67%.
- For the second BS, support for management of documentation and report creation (a qualitative indicator), BPI were not available as the platform is not completely implemented yet and we are assuming to calculate the progress ratio of the BS 2 as 0%.

The overall progress of the AgustaWestland trial calculated using the average progresses of the BSs at TO BE 2 is so 108.33%.

5.1.4. Trial No. 4 Whirlpool

The business evaluation of the Whirlpool trial encompasses two business scenarios (BS):

- The first BS is related the management of events produced during the assembly of washing units (e.g. quality event)
- The second BS is related to the collection of data (e.g. energy consumption) from the shop floor.

The two tables below list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Table 31 Whirlpool BPI list of the BS 1 Event Scenario

BP #	BPI name	BPI Categorization
BPI 1	Fall of rate (FOR) of bearing insertion station (WUBI)	**Q**uality
BPI 2	Fall of rate (FOR) of Seal insertion station (WUSI)	**Q**uality
BPI 3	Fall of rate (FOR) of Functional tests station (ASFT)	**Q**uality
BPI 4	Fall of rate (FOR) of normative electrical test station (ASNT)	**Q**uality
BPI 5	Defective parts to rework (ASFT_DEFP)	**Q**uality
BPI 6	Defective parts to rework (ASNT_DEFP)	**Q**uality
BPI 7	Conversion cost per unit (CCPU)	**C**ost

Table 32 Whirlpool BPI list of the BS 2 Big Data Scenario

BP #	BPI name	BPI Categorization
BPI 8	Fall of rate (FOR) of Tube Welding station (WUBR_FOR)	**Q**uality
BPI 9	Fall of rate (FOR) of Functional tests station (ASZHBC_FOR)	**Q**uality
BPI 10	defective parts to rework of Functional tests station (ASZHBC_DEFP)	**Q**uality
BPI 11	Service incidence rate SIR (ASZHA_SIR)	**Q**uality

Application to Business scenario 1

The **BPI no. 1** (BS1) *Fall of rate (FOR) of bearing insertion station (WUBI)* is measured as a percentage, represents the internal defectiveness; it is the ratio between the number of defects detected along the production line and the total production volume in a specified period. The objective associated to the BPI is to improve the product quality.

Table 33 Whirlpool BPI 1 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0,24	-
TO BE 1	0,121	595,00%
TO BE 2 (current state)	0,216	120,00%
Target	0,22	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 595%. The progress ratio for TO BE 2 / TARGET is 120%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.

The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.

Figure 27 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

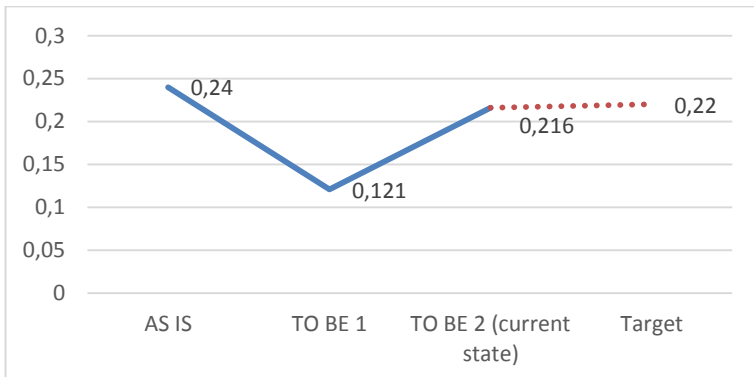


Figure 27 Whirlpool BPI 1: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 2** (BS1) *Fall of rate (FOR) of Seal insertion station (WUSI)* is measured as a percentage, represents the internal defectiveness; it is the ratio between the number of defects detected along the production line and the total production volume in a specified period. The objective associated to the BPI is to improve the product quality.

Table 34 Whirlpool BPI 2 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0,2	-
TO BE 1	0,118	82,00%
TO BE 2 (current state)	0,115	85,00%
Target	0,1	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 82%. The progress ratio for TO BE 2 / TARGET is 85%. Knowing that the reaching of the target is 100%, the target is not yet reached.

The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
Figure 28 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

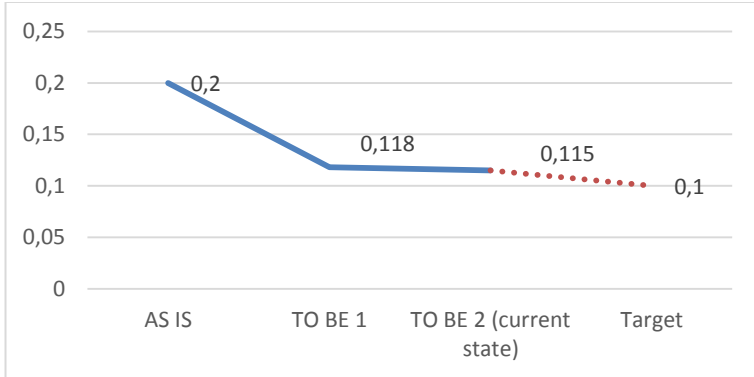


Figure 28 Whirlpool BPI 2: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 3** (BS1) *Fall of rate (FOR) of Functional test station (ASFT)* is measured as a percentage, represents the internal defectiveness; it is the ratio between the number of defects detected along the production line and the total production volume in a specified period. The objective associated to the BPI is to improve the product quality.

Table 35 Whirlpool BPI 3 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	4,49	-
TO BE 1	2,8	113,42%
TO BE 2 (current state)	2,85	110,07%
Target	3	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 113.42%. The progress ratio for TO BE 2 / TARGET is 110.07%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 29 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

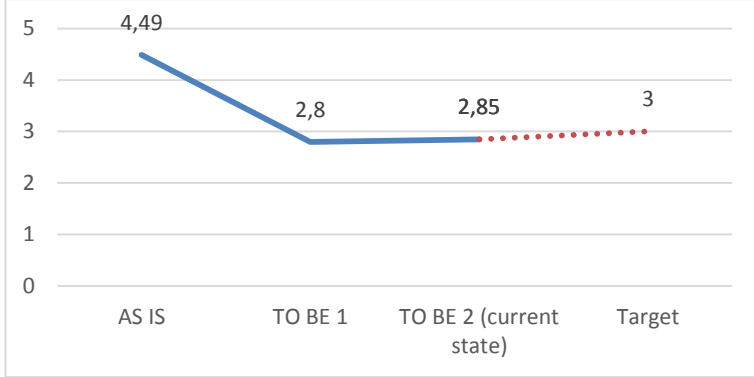


Figure 29 Whirlpool BPI 3: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 4** (BS1) *Fall of rate (FOR) of normative electrical test station (ASNT)* is measured as a percentage, represents the internal defectiveness; it is the ratio between the number of defects detected along the production line and the total production volume in a specified period. The objective associated to the BPI is to improve the product quality.

Table 36 Whirlpool BPI 4 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	4,49	-
TO BE 1	2,8	113,42%
TO BE 2 (current state)	2,85	110,07%
Target	3	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 113.42%. The progress ratio for TO BE 2 / TARGET is 110.07%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 30 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

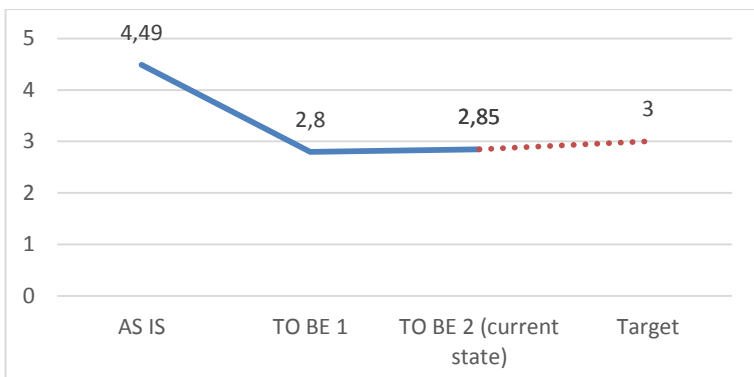


Figure 30 Whirlpool BPI 4: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 5** (BS1) *Defective parts to rework (DEFP) for the functional test station (*ASFT_DEFP*)* is measured as a percentage, represents the internal defectiveness; it is

calculated as the following ratio % of defective parts to rework (DEFP) after /before the DV/AV implementation during a period. The objective associated to the BPI is to improve the effectiveness of equipment preventive maintenance.

Table 37 Whirlpool BPI 5 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	31181	-
TO BE 1	16764	453,22%
TO BE 2 (current state)	13872	544,14%
Target	28000	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 453.22%. The progress ratio for TO BE 2 / TARGET is 544.14%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.

The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.

Figure 31 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

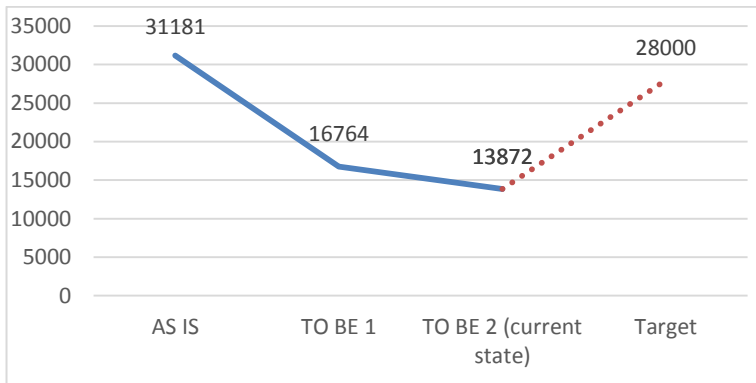


Figure 31 Whirlpool BPI 5: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 6** (BS1) *Defective parts to rework (DEFP) for the normative electrical test station (ASNT_DEFP)* is measured as a percentage, represents the internal defectiveness; it is calculated as the following ratio % of defective parts to rework after /before the DV/AV implementation during a period. The objective associated to the BPI is to improve the effectiveness of equipment preventive maintenance.

Table 38 Whirlpool BPI 6 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	31181	-
TO BE 1	16764	453,22%
TO BE 2 (current state)	13872	544,14%
Target	28000	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 453.22%. The progress ratio for TO BE 2 / TARGET is 544.14%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.

Figure 32 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

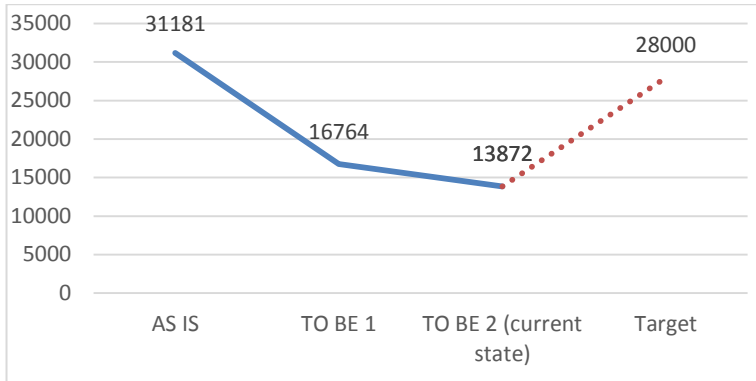


Figure 32 Whirlpool BPI 6: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 7** (BS1) *Conversion cost per unit (CCPU)* is measured as a percentage, represents the internal defectiveness; it is calculated as the following ratio: Conversion cost per unit after /before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the production cost.

Table 39 Whirlpool BPI 7 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	9,67	-
TO BE 2 (current state)	9,47	29,85%
Target	9	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is unknown. The progress ratio for TO BE 2 / TARGET is 29.85%. Knowing that the reaching of the target is 100%, the target is not yet reached.

The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
Figure 33 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

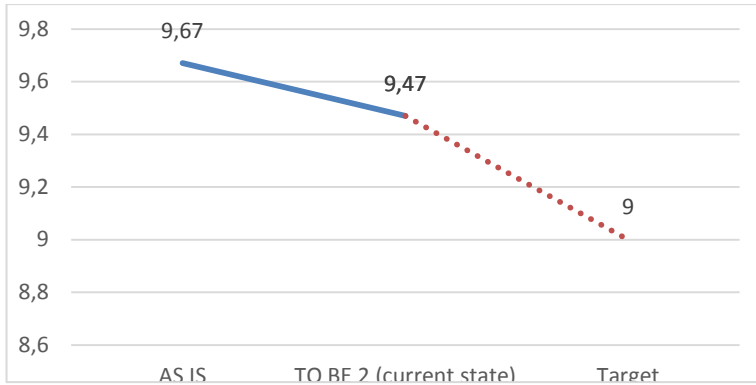


Figure 33 Whirlpool BPI 7: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Application to Business scenario 2

The **BPI no. 8** (BS2) *Fall of rate (FOR) of Tube Welding station (WUBR_FOR)* is measured as a percentage, represents the internal defectiveness; it is the ratio between the number of defects detected along the production line and the total production volume in a specified period. The objective associated to the BPI is to improve the product quality.

Table 40 Whirlpool BPI 8 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0,03	-
TO BE 1	0,05	-200,00%
TO BE 2 (current state)	0,02	100,00%
Target	0,02	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is -200%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

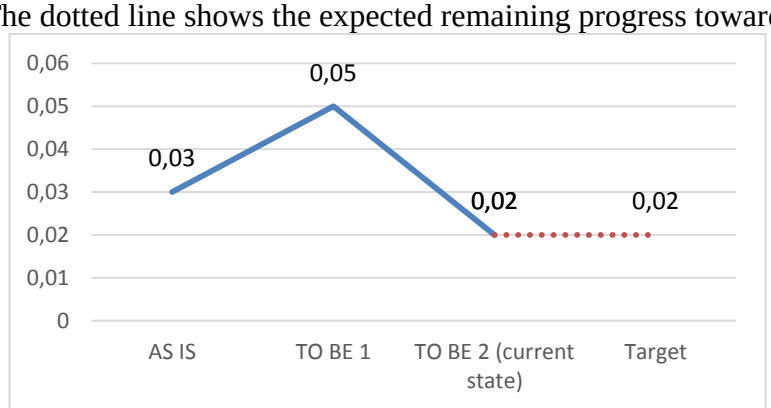


Figure 34 Whirlpool BPI 8: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 9** (BS2) *Fall of rate (FOR) of Functional tests station (ASZHBC_FOR)* is measured as a percentage, represents the internal defectiveness; it is the ratio between the number of defects detected along the production line and the total production volume in a specified period. The objective associated to the BPI is to improve the product quality.

Table 41 Whirlpool BPI 9 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	4,49	-
TO BE 1	2,8	113,42%
TO BE 2 (current state)	2,85	110,07%
Target	3	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 113.42%. The progress ratio for TO BE 2 / TARGET is 110.07%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

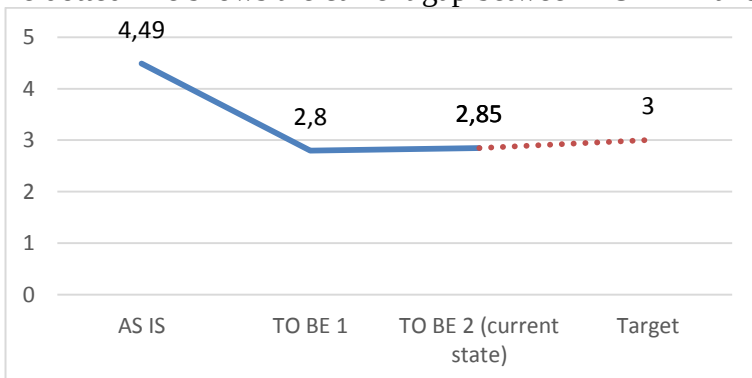


Figure 35 Whirlpool BPI 9: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 10** (BS2) *Defective parts to rework (DEFP) for the Functional tests station (ASZHBC_DEFP)* is measured as a percentage, represents the internal defectiveness; it is calculated as the following ratio % of defective parts to rework after /before the DV/AV implementation during a period. The objective associated to the BPI is to improve the effectiveness of equipment preventive maintenance.

Table 42 Whirlpool BPI 10 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	31181	-
TO BE 1	16764	83,91%
TO BE 2 (current state)	13872	100,75%
Target	14000	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 83.91%. The progress ratio for TO BE 2 / TARGET is 100.75%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

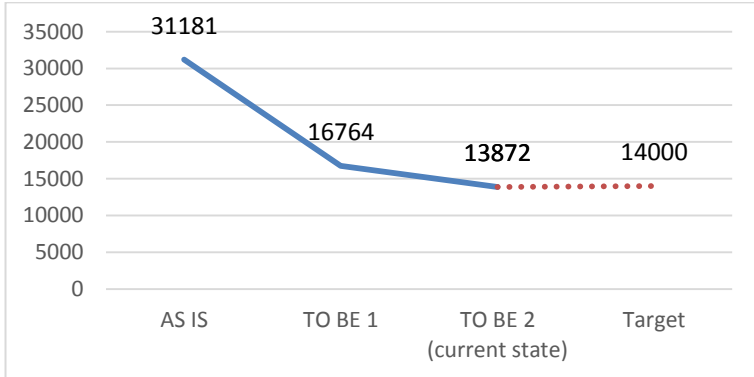


Figure 36 Whirlpool BPI 10: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 11** (BS2) *Service incidence rate SIR (ASZHA_SIR)* is the percentage of how many calls received from the Customer Service on the overall production in a time period. It is calculated as the following ratio: Service Incidence Rate after /before the DV/AV implementation during a period. The objective associated to the BPI is to improve product quality.

Table 43 Whirlpool BPI 11 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	50000	-
TO BE 1	Na	Na
TO BE 2 (current state)	Na	Na
Target	47500	-

Analysis of the progress ratio:
Whirlpool reported that the measures were not relevant due factors external to the FITMAN solution and thus, the BPI is not included in this evaluation.

Conclusion for the trial Whirlpool

The progress of the trial will be analysed at the Business scenario level and then at the trial level.

BS No.	BPI name	Progress TO BE 2 / TARGET
1	BS1 - BPI1 Fall of rate (FOR) of bearing insertion station (WUBI)	85,0%
1	BS1 - BPI2 Fall of rate (FOR) of Seal insertion station (WUSI)	110,1%
1	BS1 - BPI3 Fall of rate (FOR) of Functional tests station (ASFT)	110,1%
1	BS1 - BPI4 Fall of rate (FOR) of normative electrical test station (ASNT)	544,1%
1	BS1 - BPI 5 Defective parts to rework (ASFT_DEFP)	544,1%
1	BS1 - BPI 6 Defective parts to rework (ASNT_DEFP)	29,9%

1	BS1 - BPI 7 Conversion cost per unit (CCPU)	100,0%
2	BS2 - BPI 8 Fall of rate (FOR) of Tube Welding station (WUBR_FOR)	110,1%
2	BS2 - BPI 9 Fall of rate (FOR) of Functional tests station (ASZHBC_FOR)	120,0%
2	BS2 - BPI 10 defective parts to rework of Functional tests station (ASZHBC_DEFP)	100,7%
2	BS2 - BPI 11 Service incidence rate SIR (ASZHA_SIR)	Na

Table 44 Whirlpool BPI overall progress

The progress of the trial is calculated at the BS level (see summary in Table 44 Whirlpool BPI overall progress), then at the trial level:

- For the first Business scenario of Whirlpool, the event scenario, seven BPIs (BPI 1 to 7) are taken into account for the calculation. The average progress accomplished towards the targets for 220.47%.
- For the second Business scenario, the big data scenario, the four other BPIs (BPI 8 to 11) are taken into account for the calculation. The average progress accomplished towards the targets for 103.60%.

The overall progress of the Whirlpool trial calculated using the average progresses of the BS at TO BE 2 is 162.03%.

5.1.5. Trial No. 5 Piacenza

The business evaluation of the Piacenza trial encompasses two business scenarios (BS):

- The first BS is related to the sale of production capacity.
- The second BS is related to purchase of production capacity.

The two tables below list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Table 45 Piacenza BPI list of the BS 1 "Production Capacity Seller"

BP #	BPI name	BPI Categorization
BPI 1	Machine fixed costs per produced unit (MFC)	**C**ost
BPI 2	Energy spent per meter produced (EPM)	**T**ime
BPI 3	Percentage of forecast error in delivery (FOR.ERR.)	**Q**uality

Table 46 Piacenza BPI list of the BS 2 "Production Capacity Purchaser"

BP #	BPI name	BPI Categorization
BPI 4	Average production lead time per meter produced from order to delivery (AV.LT.)	**T**ime
BPI 5	Number of production records including machine identification (PROD.REC)	**C**ost

Application to Business scenario 1

The **BPI no. 1** (BS1) *Machine fixed costs per produced unit* is measured as the following ratio: Machine fixed costs per produced unit after / before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the fixed costs per machinery and a better exploitation of machineries by the offer to third parties of the unexploited production capacity**.**

Table 47 Piacenza BPI 1 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0	-
TO BE 1	28,8	96,00%
TO BE 2 (current state)	28,8	96,00%
Target	30	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 96%. The progress ratio for TO BE 2 / TARGET is 96%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.

Figure 37 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

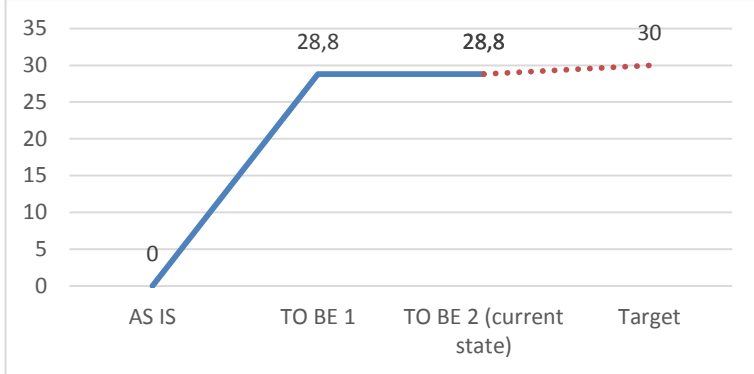


Figure 37 Piacenza BPI 1: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 2** (BS1) *quantity of energy spent per meter produced* is measured as the following ratio: The quantity of energy spent per meter produced after / before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the quantity of energy for supporting systems for production, note that energy cost of supporting system can be reduced by increasing production.

Table 48 Piacenza BPI 2 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0	-
TO BE 1	10	62,50%
TO BE 2 (current state)	10	62,50%
Target	16	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 62.50%. The progress ratio for TO BE 2 / TARGET is 62.50%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
Figure 38 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

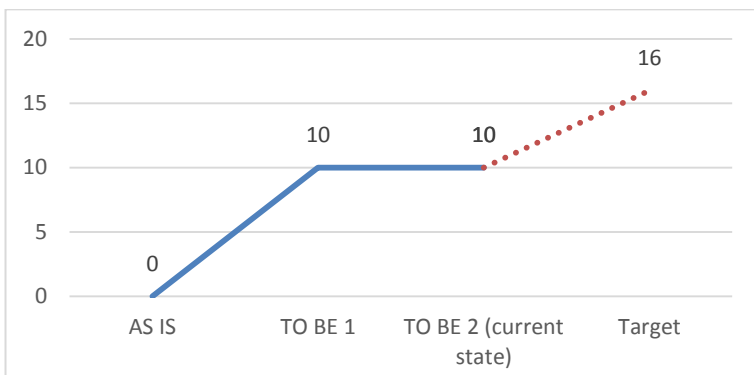


Figure 38 Piacenza BPI 2: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 3** (BS1) *Percentage of forecast error in delivery* is measured as the following ratio: Percentage of forecast error after / before the DV/AV implementation during a

period. The objective associated to the BPI is to improve the monitoring of the production capacity.

Table 49 Piacenza BPI 3 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	4	-
TO BE 1	0	100,00%
TO BE 2 (current state)	0	100,00%
Target	0	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 100%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

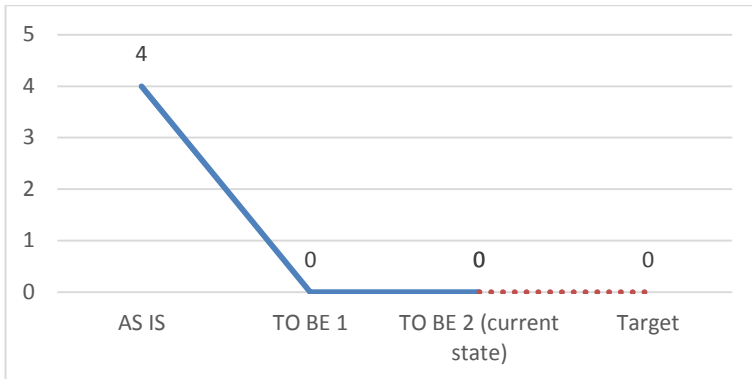


Figure 39 Piacenza BPI 3: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Application to Business scenario 2

The **BPI no. 4** (BS2) *Average production lead time per meter produced from order to delivery* is measured as the following ratio: Average production lead time per meter produced from order to delivery after / before the after / before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the production time from order to delivery.
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.

Table 50 Piacenza BPI 4 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	15	-
TO BE 1	12	100,00%
TO BE 2 (current state)	12	100,00%
Target	12	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 100%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
Figure 40 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

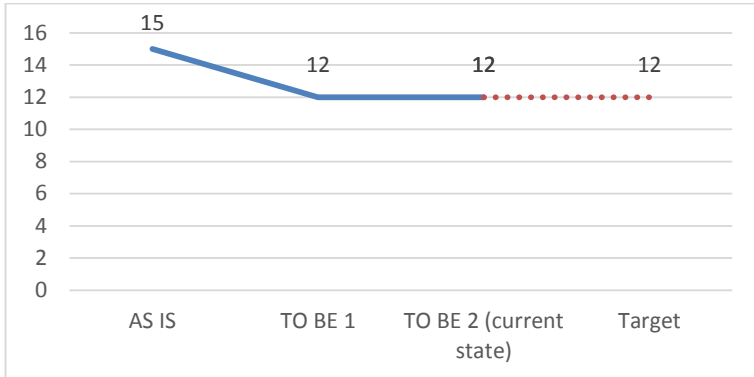


Figure 40 Piacenza BPI 4: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 5** (BS5) *Number of production records including machine identification* is measured as the following ratio: the number of production records after / before the DV/AV implementation during a period. The objective associated to the BPI is to improve the monitoring of the production capacity.

Table 51 Piacenza BPI 5 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	1	-
TO BE 1	3	100,00%
TO BE 2 (current state)	3	100,00%
Target	3	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 100%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.

Figure 41 below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

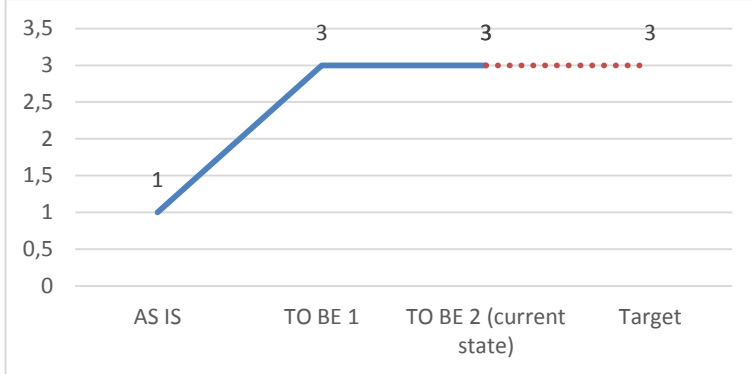


Figure 41 Piacenza BPI 5: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Conclusion for the trial Piacenza

Table 52 Piacenza BPI overall progress

BS No.	BPI #	BPI name	Progress TO BE 2 / TARGET
1	BPI 1	MACHINE FIXED COSTS PER PRODUCED UNIT	96,0%
1	BPI 2	ENERGY PER METER PRODUCED	62,5%
1	BPI 3	PERCENTAGE OF FORECAST ERROR	100,0%
2	BPI 4	AVERAGE PRODUCTION LEAD TIME PER METER	100,0%
2	BPI 5	NUMBER OF PRODUCTION RECORDS	100,0%

The progress of the trial is calculated at the BS level, then at the trial level:

- For the first Business scenario of Piacenza, the Production Capacity seller scenario, BPIs 1 to 3 are taken into account for the calculation. The average progress accomplished towards the targets for BS1 is 89.62%.
- For the second Business scenario, the Production Capacity purchaser scenario, BPIs 4 and 5 are taken into account for the calculation. The average progress accomplished towards the targets forBS2 is 100%.

The overall progress of the Piacenza trial calculated using the average progresses of the BS at TO BE 2 is 94.81%.

5.1.6. Trial No. 6 A.P.R.

The business evaluation of the A.P.R. trial encompasses two business scenarios (BS):

- The first BS is related to the information quality around Customer Relationship Management (CRM).
- The second BS is related to the information quality around Supplier Relationship Management (SRM).

The two tables below list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Table 53 A.P.R. BPI list of the BS 1 Improving the information quality around Customer Relationship Management (CRM)

BP #	BPI name	BPI Categorization
BPI 1	Time limit for responding of quotes (current/new product) - RESP.TIME	**T**ime
BPI 2	% Number of unsuccessful quotes due to high price/Total number of quotes processed -UNSUCC.QUOT.	**C**ost
BPI 3	% of time for analysis and control of customer recovery AN.CTRL.	**T**ime
BPI 4	Average customer recovery (CUST. REC.)	**T**ime

BPI 5	Average time to confirm the order with acknowledgement of receipt (with/without quote) - ACKN.REC.	**T**ime
BPI 6	% of time for analysis and control of orders (AN.CTRL.ORD.)	**T**ime
BPI 7	Customer service rate (CSR)	**P**roductivity
BPI 8	Number of products received back due to faults (RATE.PR)	**Q**uality

Table 54 A.P.R. BPI list of the BS 2 Improving the information quality around Supplier Relationship Management (SRM)

BP #	BPI name	BPI Categorization
BPI 9	% internal stockout rate (INT.ST.OUT)	**C**ost
BPI 10	% external stockout rate (EXT.ST.OUT)	**C**ost
BPI 11	Value of stock (VOS)	**C**ost

Application to Business scenario 1

The **BPI no. 1** (BS1) *Time limit for responding to quotes* is measured as the following ratio: Time limit for responding of quotes (current/new product) after/before the DV/AV implementation during a period. The objective associated to the BPI is to improve the leadtime of answer to the quotes.

Table 55 A.P.R. BPI 1 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	4	-
TO BE 1	2	100,00%
TO BE 2 (current state)	2	100,00%
Target	2	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 100%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

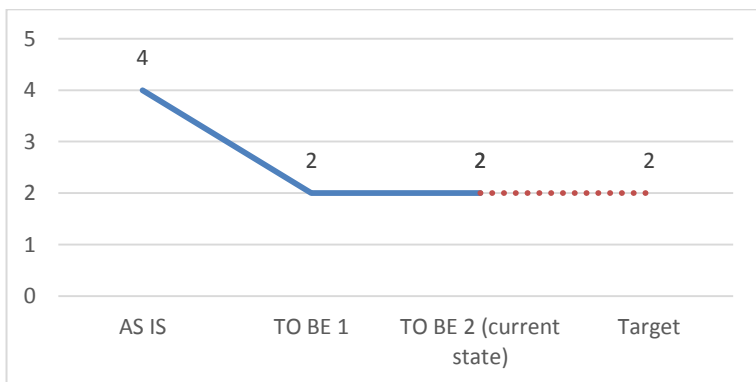


Figure 42 A.P.R. BPI 1: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 2** (BS1) *Number of unsuccessful quotes* is measured as the following ratio: Number of unsuccessful quotes due to high price/Total number of quotes processed after/before the DV/AV implementation during a period. The objective associated to the BPI is to control the quote cost.

Table 56 A.P.R. BPI 2 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	60	-
TO BE 1	36	80,00%
TO BE 2 (current state)	32	93,33%
Target	30	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 80%. The progress ratio for TO BE 2 / TARGET is 93.33%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE 2. The dotted line shows the expected remaining progress towards the target.

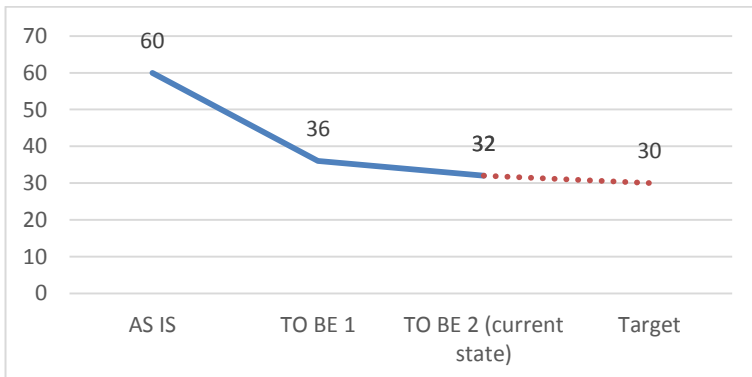


Figure 43 A.P.R. BPI 1: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 3** (BS1) *customer recovery analysis and control time* is measured as the following ratio: time for analysis and control of customer recovery after/before the DV/AV implementation during a period. The objective associated to the BPI is to optimize the time for analysis and control of customer recovery.

Table 57 A.P.R. BPI 3 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	10	-
TO BE 1	17	23,33%
TO BE 2 (current state)	22	40,00%
Target	40	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 23.33%. The progress ratio for TO BE 2 / TARGET is 40%. Knowing that the reaching of the target is 100%, the target is not yet reached.

The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

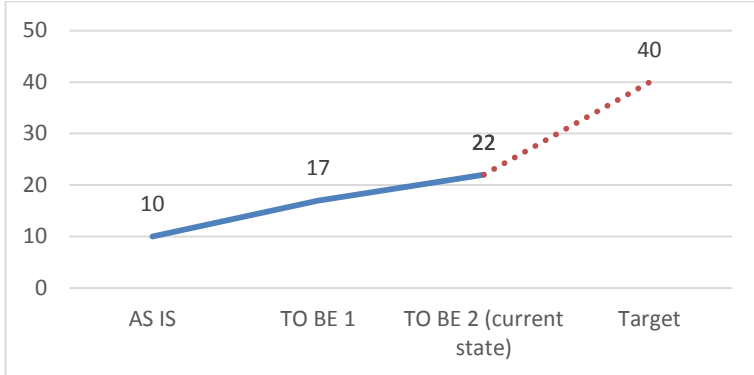


Figure 44 A.P.R. BPI 3: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 4** (BS1) *Average time of customer recovery* is measured as the following ratio: Lead time for analysis and control of customer recovery after/before the DV/AV implementation during a period. The objective associated to the BPI is to optimize the time for analysis and control of customer recovery.

Table 58 A.P.R. BPI 4 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	14	-
TO BE 1	7	100,00%
TO BE 2 (current state)	7	100,00%
Target	7	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 100%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

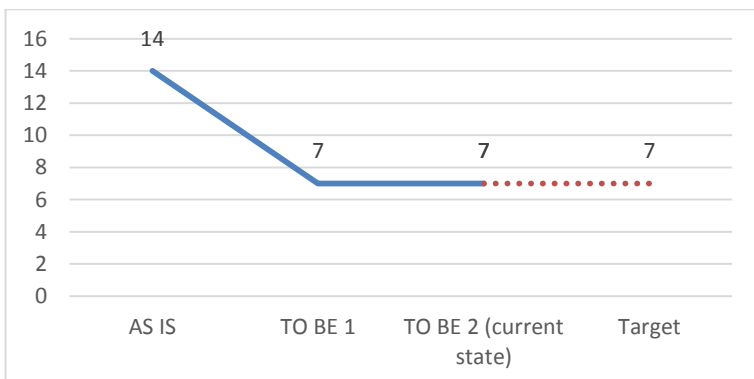


Figure 45 A.P.R. BPI 4: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 5** (BS1) *Average time to confirm the order with acknowledgement of receipt* is measured as the following ratio: Average lead time to confirm the order with acknowledgement of receipt (with/ without quote) after/before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the leadtime of the acknowledgement of receipt.

Table 59 A.P.R. BPI 5 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	4	-
TO BE 1	3	50,00%
TO BE 2 (current state)	2,17	91,50%
Target	2	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 50%. The progress ratio for TO BE 2 / TARGET is 91.50%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

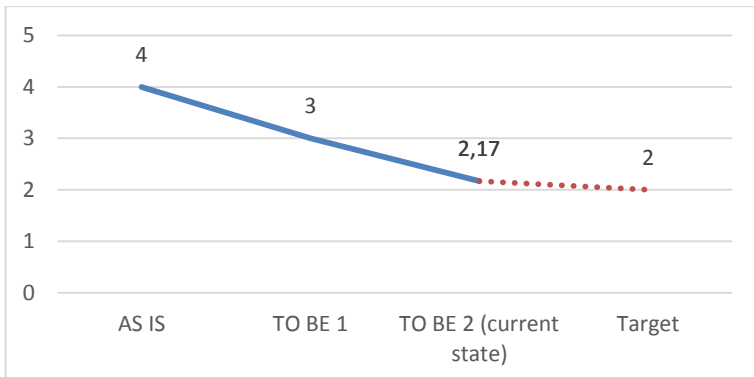


Figure 46 A.P.R. BPI 5: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 6** (BS1) *time for analysis and control of orders* is measured as the following ratio: % of time for analysis and control of orders after/before the DV/AV implementation during a period. The objective associated to the BPI is to increase the time part for analysis and control

Table 60 A.P.R. BPI 6 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	20	-
TO BE 1	30	33,33%
TO BE 2 (current state)	38	60,00%
Target	50	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 33.33%. The progress ratio for TO BE 2 / TARGET is 60%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

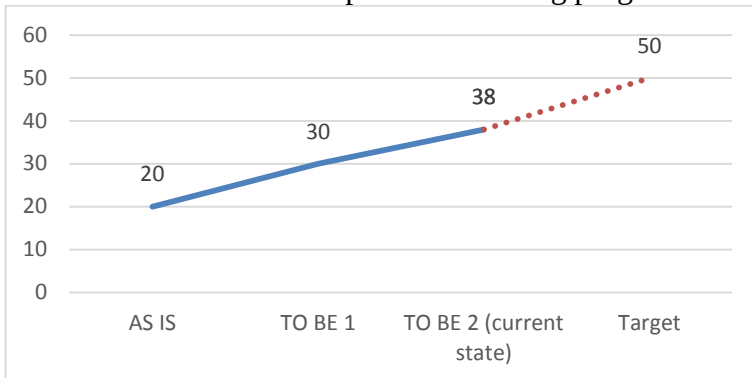


Figure 47 A.P.R. BPI 6: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 7** (BS1) *Customer service rate* is measured as the following ratio: Customer service rate after/before the DV/AV implementation during a period. The objective associated to the BPI is to optimize the production time.

Table 61 A.P.R. BPI 7 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	93	-
TO BE 1	94	33,33%
TO BE 2 (current state)	95	66,67%
Target	96	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 33.3%. The progress ratio for TO BE 2 / TARGET is 66.7%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

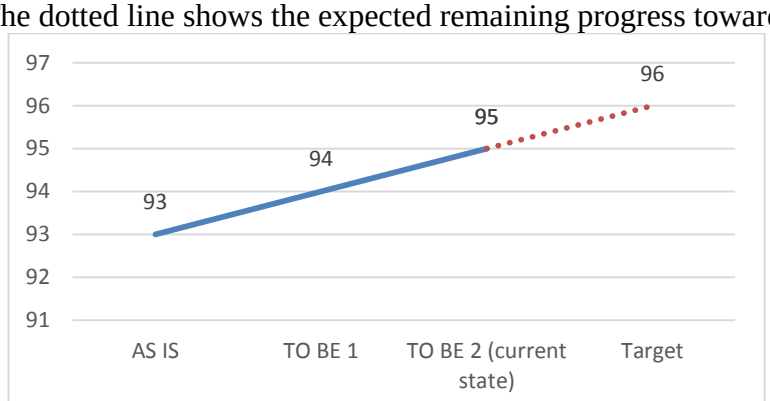


Figure 48 A.P.R. BPI 7: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 8** (BS1) *Number of products received back due to faults* is measured as the following ratio: Number of products received back due to faults after/before the DV/AV implementation during a period. The objective associated to the BPI is to decrease the number of products received back due to faults.

Table 62 A.P.R. BPI 8 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	**10**	-
TO BE 1	8	66,67%
TO BE 2 (current state)	8	66,67%
Target	7	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 66.67%. The progress ratio for TO BE 2 / TARGET is 66.67%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

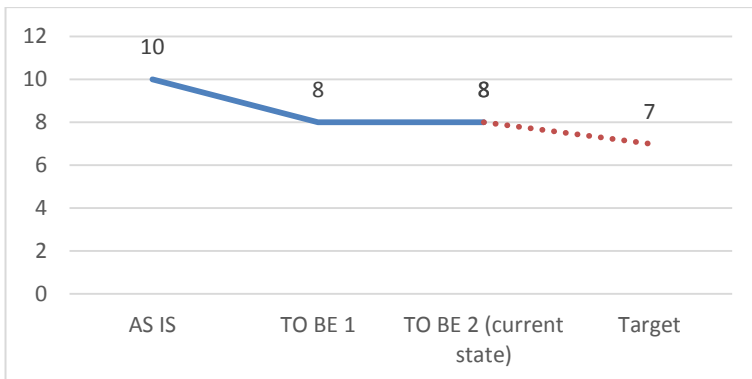


Figure 49 A.P.R. BPI 8: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Application to Business scenario 2

The **BPI no. 9** (BS2) *internal stockout* is measured as the following ratio: Internal Stock out rate after/before the DV/AV implementation during a period. The objective associated to the BPI is to decrease of the internal stock out.

Table 63 A.P.R. BPI 9 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	20	-
TO BE 1	20	0,00%
TO BE 2 (current state)	15	33,33%
Target	5	-

Analysis of the progress ratio:

The progress ratio for TO BE 1 / TARGET is 0%. The progress ratio for TO BE 2 / TARGET is 33.33%. Knowing that the reaching of the target is 100%, the target is not yet reached.

The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

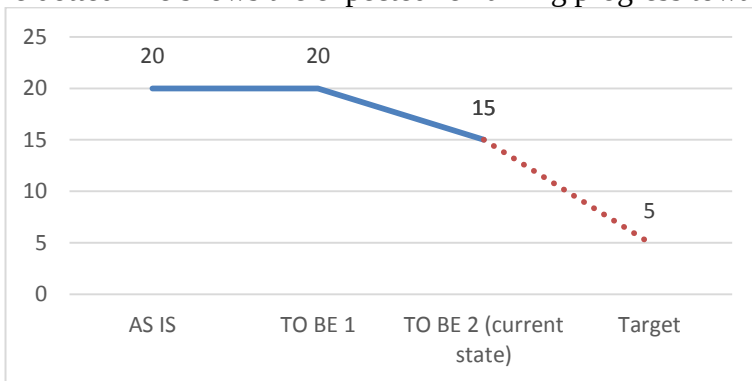


Figure 50 A.P.R. BPI 9: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 10** (BS2) *external stockout* is measured as the following ratio: external Stock out rate after/before the DV/AV implementation during a period. The objective associated to the BPI is to decrease of the external stock out.

Table 64 A.P.R. BPI 10 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	5	-
TO BE 1	5	0,00%
TO BE 2 (current state)	4	25,00%
Target	1	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 0%. The progress ratio for TO BE 2 / TARGET is 25%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

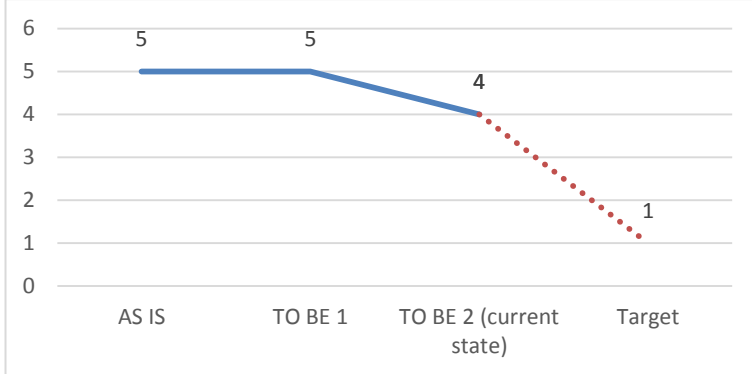


Figure 51 A.P.R. BPI 10: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 11** (BS2) *Value of stock* is measured as the following ratio: Value of stock at the end of last period after/before the DV/AV implementation during a period. The objective associated to the BPI is to increase the parts of orders realized within a negotiated market.

Table 65 A.P.R. BPI 11 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	230	-
TO BE 1	230	0,00%
TO BE 2 (current state)	218	24,00%
Target	180	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 0%. The progress ratio for TO BE 2 / TARGET is 24%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

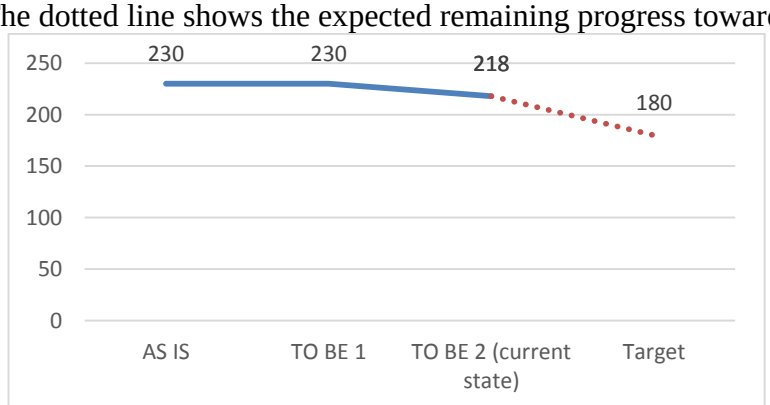


Figure 52 A.P.R. BPI 11: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Conclusion for the trial no.6 A.P.R.

The overall progress of the trial A.P.R is calculated using the progress TO BE 2 /Target value. For the two business scenarios, the progresses are reported in the table below.

Table 66 A.P.R. BPI overall progress

BS No.	BPI #	BPI name	Progress TO BE 2 / TARGET
1	BPI 1	Time limit for responding of quotes (current/new product) - RESP.TIME	100,0%
1	BPI 2	% Number of unsuccessful quotes due to high price/Total number of quotes processed -UNSUCC.QUOT.	93,3%
1	BPI 3	% of time for analysis and control of customer recovery AN.CTRL.	40,0%
1	BPI 4	Average customer recovery (CUST. REC.)	100,0%
1	BPI 5	Average time to confirm the order with acknowledgement of receipt (with/without quote) - ACKN.REC.	91,5%
1	BPI 6	% of time for analysis and control of orders (AN.CTRL.ORD.)	60,0%
1	BPI 7	Customer service rate (CSR)	66,7%
1	BPI 8	Number of products received back due to faults (RATE.PR)	66,7%
2	BPI 9	% internal stockout rate (INT.ST.OUT)	33,3%
2	BPI 10	% external stockout rate (EXT.ST.OUT)	25,0%
2	BPI 11	Value of stock (VOS)	24,0%

- For the first Business scenario of A.P.R., the "Improve information quality in the interaction with customers" scenario, BPIs 1 to 8 are taken into account for the calculation. The average progress accomplished towards the targets for BS1 is 77.27%.
- For the second Business scenario, the "Improve information quality in the interaction with suppliers" scenario, BPIs 9 to 11 are taken into account for the calculation. The average progress accomplished towards the targets for BS2 is 27.44%.

We can mention that two BPIs have reached their targets at TO BE 2 and achieved a progress of 100%.

The overall progress of the A.P.R. trial measured at TO BE 2 is 52.36%.

5.1.7. Trial No. 7 Consulgal

The business evaluation of the Consulgal trial encompasses three business scenarios (BS):

- The first BS is related to the Identification of concrete class and concrete composition process.
- The second BS is related to the Concreting plan process.
- The third BS is related to the identification, collection and classification of concrete samples process

The three tables below list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Table 67 Consulgal BPI list of the BS 1 Identification of concrete characteristics and Concreting Plan

BP #	BPI name	BPI Categorization
BPI 1	Average LT to access information (LT Char.&Plan)	**Time**
BPI 2/1	Time for data exchange (EXCH.TIME)	**T**ime

Table 68 Consulgal BPI list of the BS 2 Samples collection and testing

BP #	BPI name	BPI Categorization
BPI 3	Average number of pages (NUM.PAGE)	**C**ost
BPI 4	Average LT to perform and record results (LT RES.)	**T**ime
BPI 2/2	Time for data exchange (EXCH.TIME)	**T**ime
BPI 6	Average cost to perform and record result (COST RES.)	**C**ost

Table 69 Consulgal BPI list of the BS 3: Test results treatment and evaluation

BP #	BPI name	BPI Categorization
BPI 7	Average LT to analyse results (LT AN.RES.)	**T**ime
BPI 8	Average cost to analyse result (COST AN.RES.)	**C**ost
BPI 2/3	Time for data exchange (EXCH.TIME)	**T**ime

BPI 2 (EXCH.TIME) is implemented in the three scenarios

Application to Business scenario 1

The **BPI no. 1** (BS1) *Average lead time to access the information (LT Char.&Plan)* is measured as the following ratio: Average lead time to access the information relating to concrete characteristics and concreting plan after/before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the time to access information relating to concrete characteristics and concreting plan.

Table 70 Consulgal BPI 1 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	14000	-
TO BE 1	7.5	102%
TO BE 2 (current state)	5.39	102%
Target	288	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 102%. The progress ratio for TO BE 2 / TARGET is 102%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

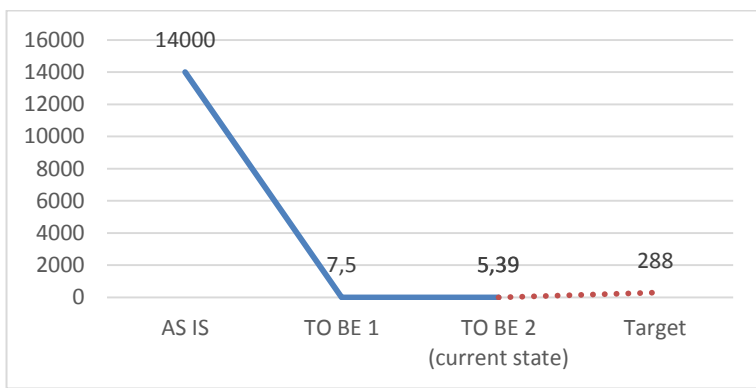


Figure 53 Consulgal BPI 1: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 2** (BS1) *time for data exchange (EXCH.TIME)* is measured as the following ratio **time for data exchange between stakeholders** after/before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the time for exchange of information between stakeholders.

Table 71 Consulgal BPI 2 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	28800	-
TO BE 1	5.15	102%
TO BE 2 (current state)	6.35	102%
Target	576	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 102%. The progress ratio for TO BE 2 / TARGET is 102%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

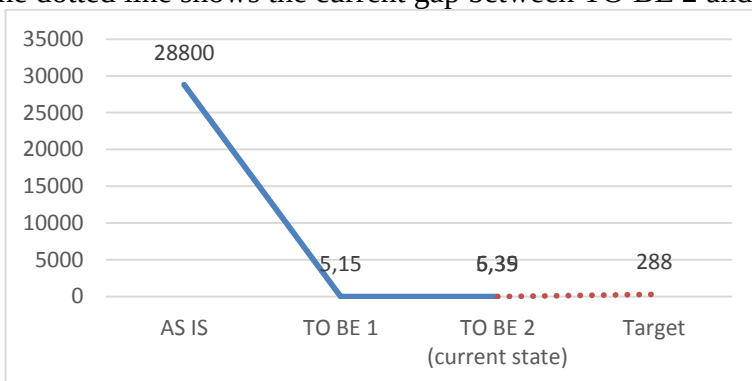


Figure 54 Consulgal BPI 2: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 3** (BS1) *Average number of pages (NUM.PAGE)* is measured as the following ratio: Average number of pages used in the test results recording, archival, after / before the DV/AV implementation during a period (NUM.PAGE) after/before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the use of paper.

Table 72 Consulgal BPI 3 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	5	-
TO BE 1	2	150%
TO BE 2 (current state)	2	150%
Target	3	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 150%. The progress ratio for TO BE 2 / TARGET is 150%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

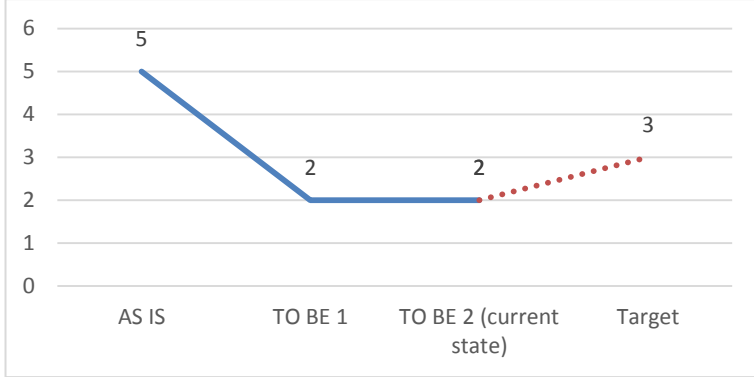


Figure 55 Consulgal BPI 3: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 4** (BS1) *average lead time to perform and record results (LT RES.)* is measured as the following ratio: average lead time needed to perform and record the test after / before the DV/AV implementation during a period (NUM.PAGE) after/before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the time to perform, record and analyse the test results.

Table 73 Consulgal BPI 4 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	1650	-
TO BE 1	7.04	331.9%
TO BE 2 (current state)	5.58	332.2%
Target	1155	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 331.9%. The progress ratio for TO BE 2 / TARGET is 332.2%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

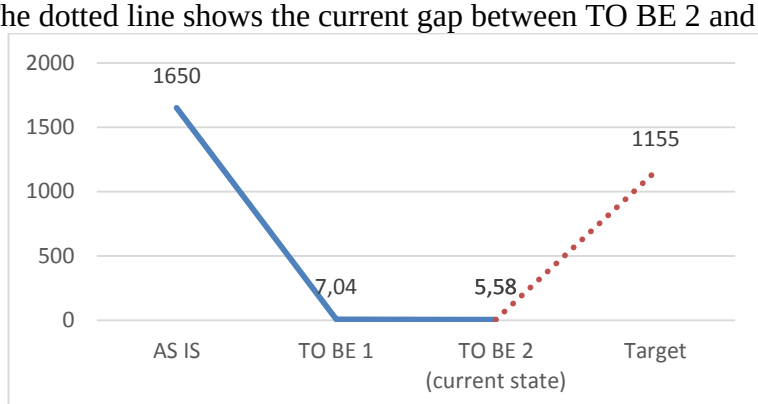


Figure 56 Consulgal BPI 4: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Application to Business scenario 2

The **BPI no. 5** (BS2) *time for data exchange (EXCH.TIME)* is measured as the following ratio **time for data exchange between stakeholders** after/before the DV/AV

implementation during a period. The objective associated to the BPI is to reduce the time for exchange of information between stakeholders.

Table 74 Consulgal BPI 5 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	28800	-
TO BE 1	8.2	102%
TO BE 2 (current state)	5.1	102%
Target	576	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 102%. The progress ratio for TO BE 2 / TARGET is 102%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

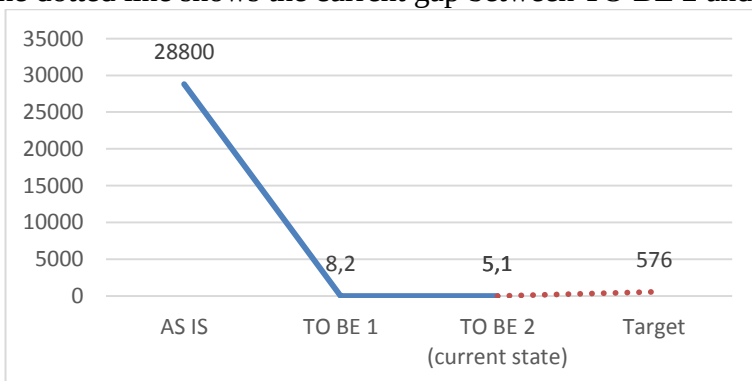


Figure 57 Consulgal BPI 5: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 6** (BS2) *average cost to perform and record result (COST RES.)* is measured as the following ratio: Average cost needed to perform and record the test result after/before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the cost to perform, record and analyse the test results.

Table 75 Consulgal BPI 5 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	1.41	-
TO BE 1	0.52	96.7%
TO BE 2 (current state)	0.41	108.7%
Target	0.49	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 96.7%. The progress ratio for TO BE 2 / TARGET is 108.7%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

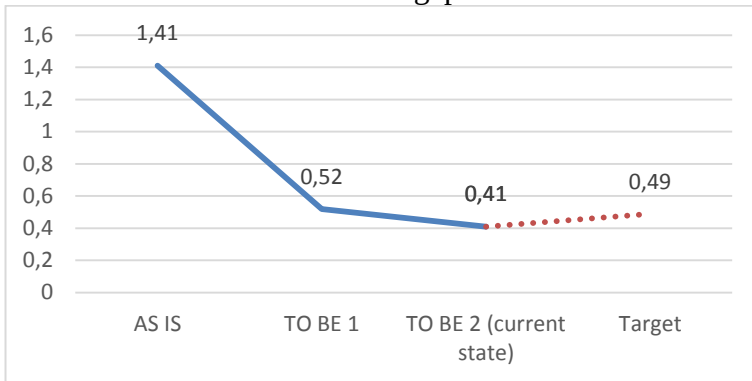


Figure 58 Consulgal BPI 6: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Application to Business scenario 3

The **BPI no. 7** (BS3) *average LT to analyse results (LT AN.RES.)* is measured as the following ratio: Average lead time needed to analyse the test results after/before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the time to perform, record and analyse the test results.

Table 76 Consulgal BPI 7 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	39	-
TO BE 1	0	102%
TO BE 2 (current state)	0	102%
Target	0.78	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 102%. The progress ratio for TO BE 2 / TARGET is 102%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

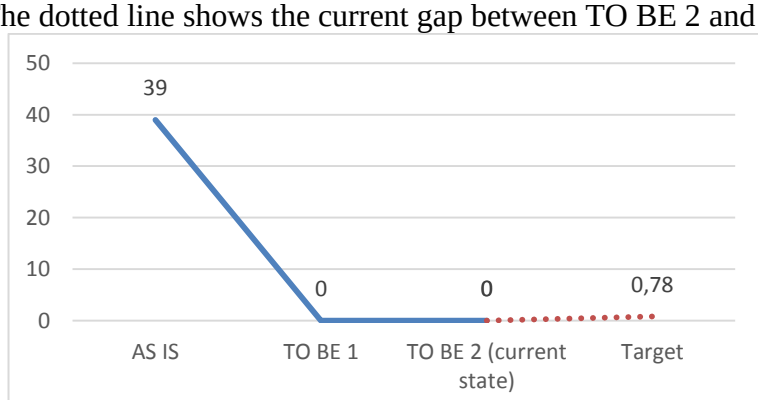


Figure 59 Consulgal BPI 7: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 8** (BS3) *average cost to analyse result (COST AN.RES.)* is measured as the following ratio: Average cost needed to analyse the test result after/before the DV/AV

implementation during a period. The objective associated to the BPI is to reduce the cost to perform, record and analyse the test results.

Table 77 Consulgal BPI 8 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	1.41	-
TO BE 1	0.52	96.7%
TO BE 2 (current state)	0.41	108.7%
Target	0.49	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 96.87%. The progress ratio for TO BE 2 / TARGET is 108.7%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

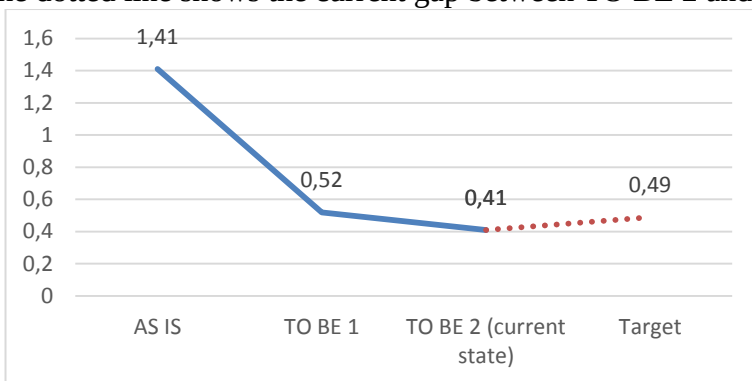


Figure 60 Consulgal BPI 8: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 9** (BS3) *time for data exchange (EXCH.TIME)* is measured as the following ratio **time for data exchange between stakeholders** after/before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the time for exchange of information between stakeholders.

Table 78 Consulgal BPI 9 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	28800	-
TO BE 1	150	101.5%
TO BE 2 (current state)	120	101.6%
Target	576	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 101.5%. The progress ratio for TO BE 2 / TARGET is 101.6%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

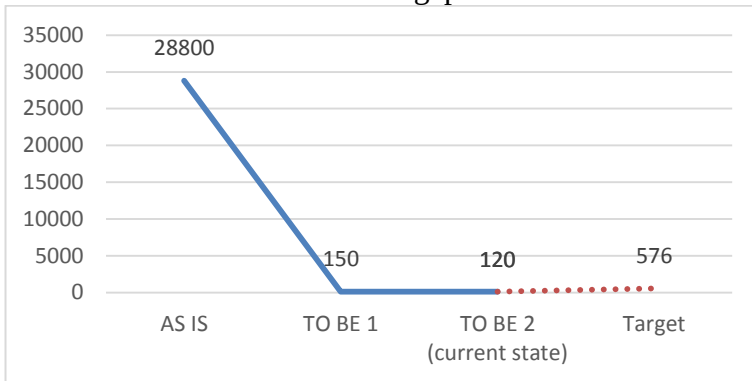


Figure 61 Consulgal BPI 9: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Conclusion for the trial no.8 Consulgal

The overall progress of the trial Consulgal is calculated using the progress TO BE 2 /Target value. For the two business scenarios, the progresses are reported in the table below.

Table 79 Consulgal BPI overall progress

BS No.	BPI name	Progress TO BE 2 / TARGET
1	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)	102%
1	time for data exchange between stakeholders after / before the DV/AV implementation during a period (EXCH.TIME)	102%
2	Average number of pages used in the test results recording, archival, after / before the DV/AV implementation during a period (NUM.PAGE)	150%
2	average lead time needed to perform and record the test results after / before the DV/AV implementation during a period (LT RES.)	332.2%
2	Time for data exchange between stakeholders after / before the DV/AV implementation during a period (EXCH.TIME)	102%
2	Average cost needed to perform and record the test result after / before the DV/AV implementation during a period (COST RES.)	108.7%
3	Average lead time needed to analyse the test results after / before the DV/AV implementation during a period (LT AN.RES.)	102%
3	Average cost needed to analyse the test result after / before the DV/AV implementation during a period (COST AN.RES.)	180.7%
3	time for data exchange between stakeholders after / before the DV/AV implementation during a period (EXCH.TIME)	101.6%

The progress of the trial is calculated at the BS level, then at the trial level:

- For the first Business scenario of Consulgal, the “identification of concrete characteristics and concreting plan” scenario, BPI 1 and 2 are taken into account for the calculation. The average progress accomplished towards the targets for BS 1 is 102.01%.
- For the second Business scenario, the “samples collection and testing” scenario, the two other BPIs (BPI 4 and 5) are taken into account for the calculation. The average progress accomplished towards the targets for BS2 is 192.60%.
- For the third BS “test results treatment and evaluation” BPI 7 to 9 are taken into account for the calculation. The average progress accomplished towards the targets is 104.25%

The overall progress of the Consulgal trial calculated using the average progresses of the BS at TO BE 2 is 132.95%.

5.1.8. Trial No. 8 TANet

The business evaluation of the TANet trial encompasses two business scenarios (BS):

- The first BS is related to the Import of tender opportunities.
- The second BS is related to the Improvement of the facilitator role

The two tables below list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Table 80 TANet BPI list of the BS 1: Import of tender opportunities

BP #	BPI name	BPI Categorization
BPI 1	TENDERS ACCRUED MONTHLY	**C**ost
BPI 2	NUMBER OF ACTIVE FACILITATORS (FAC.NUM.)	**T**ime
BPI 3	NUMBER OF REGISTERED SERVICES PROVIDERS	

Table 81 TANet BPI list of the BS 2: Improvement of facilitator role

BP #	BPI name	BPI Categorization
BPI 4	END-TO-END CLUSTERING	**T**ime
BPI 5	AUTOMATED TENDER INPUT TIME	**C**ost

Application to Business scenario 1

The **BPI no. 1** (BS1) *Tenders accrued monthly* is measured as the following ratio: Tenders accrued monthly after / before the DV/AV implementation during a period**.** The objective associated to the BPI is to increase the number of business opportunities.

Table 82 TANet BPI 1 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	3	-
TO BE 1	3	0,00%
TO BE 2 (current state)	12	52,90%
Target	20	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 0%. The progress ratio for TO BE 2 / TARGET is 52.9%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI. The dotted line shows the expected remaining progress towards the target.

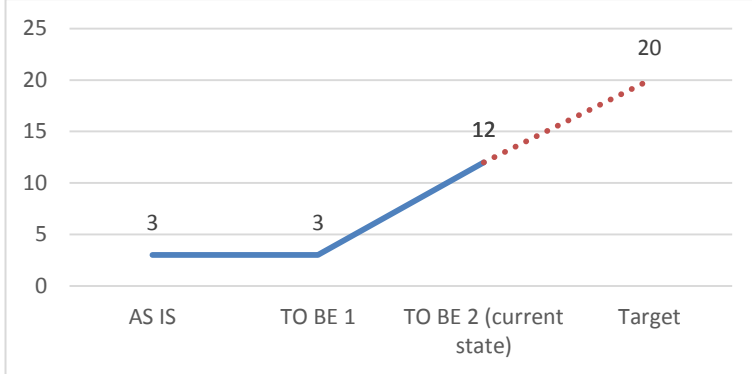


Figure 62 TANet BPI 1: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 2** (BS1) *Number of Active Facilitators* is measured as the following ratio: Number of Active Facilitators monthly after / before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the time to integrate the new business opportunity sources.

Table 83 TANet BPI 2 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	1	-
TO BE 1	2	50,00%
TO BE 2 (current state)	2	50,00%
Target	3	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 50%. The progress ratio for TO BE 2 / TARGET is 50%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

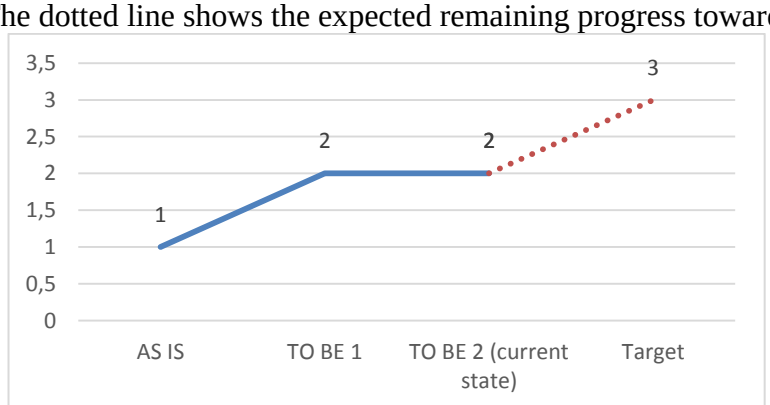


Figure 63 TANet BPI 2: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 3** (BS1) *Number of Registered service providers* is measured as the following ratio: Number of Registered service providers after / before the DV/AV implementation during a period. The objective associated to the BPI is to increase the number of services offered for tender matching on the platform.

Table 84 TANet BPI 3 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	23	-
TO BE 1	23	0,00%
TO BE 2 (current state)	71	52,20%
Target	115	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 0%. The progress ratio for TO BE 2 / TARGET is 52.2%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

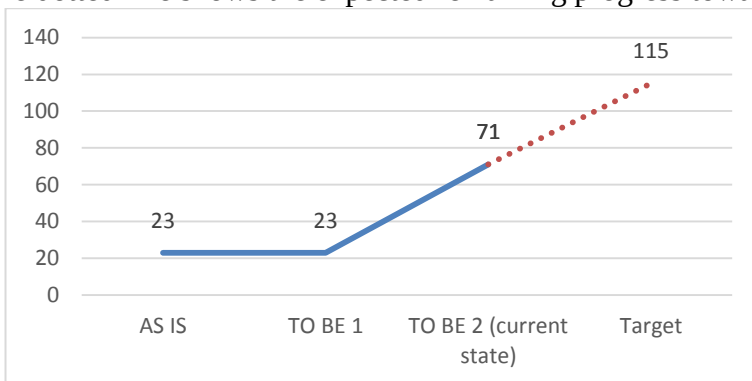


Figure 64 TANet BPI 3: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Application to Business scenario 2
The **BPI no. 4** (BS2) *End-to-end clustering time* is measured as the following ratio: End-to-end clustering time after / before the DV/AV implementation during a period. The objective associated to the BPI is to provide a service that allows more efficient supplier search.
TANet comments:
Current Value and Target are in hours. Decrease in time due to use of CAM as data store. SCAPP implementation expected to significantly reduce time by providing negotiation tools. Open call components will also reduce time through import of tender opportunities.

Table 85 TANet BPI 4 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	6	-
TO BE 1	5	25,00%
TO BE 2 (current state)	2	100,00%
Target	2	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 25%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

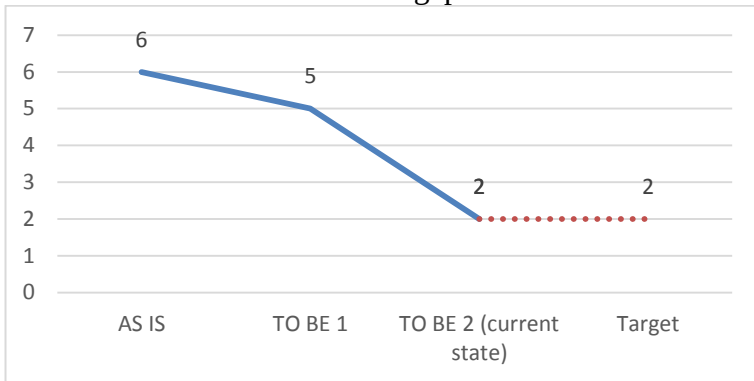


Figure 65 TANet BPI 4: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 5** (BS2) *Automated tender input time* is measured as the following ratio: Automated tender input time after / before the DV/AV implementation during a period. The objective associated to the BPI is to decrease the time taken to enter a new tender into the system.

Table 86 TANet BPI 5 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	30	-
TO BE 1	30	0,00%
TO BE 2 (current state)	6	82,80%
Target	1	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 0%. The progress ratio for TO BE 2 / TARGET is 82.8%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

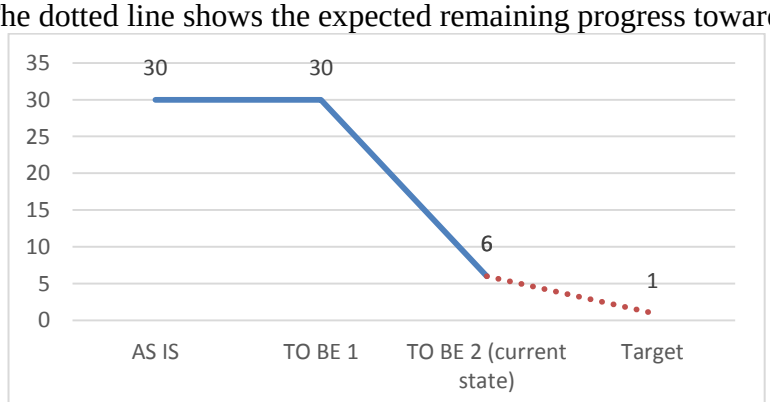


Figure 66 TANet BPI 5: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Conclusion for the trial no.8 TANet

The overall progress of the trial TANet is calculated using the progress TO BE 2 /Target value. For the two business scenarios, the progresses are reported in the table below.

Table 87 TANet BPI overall progress

BS No.	BPI name	Progress TO BE 2 / TARGET
1	NUMBER OF ACTIVE FACILITATORS (FAC.NUM.)	50,0%
1	NUMBER OF REGISTERED SERVICES PROVIDERS	52,2%
1	TENDERS ACCRUED MONTHLY	52,9%
2	END-TO-END CLUSTERING	100,0%
2	AUTOMATED TENDER INPUT TIME	82,8%

The progress of the trial is calculated at the BS level, then at the trial level:

- For the first Business scenario of TANet, the "import of tender opportunities" scenario, BPIs 1 to 3 are taken into account for the calculation. The average progress accomplished towards the targets for BS1 is 51.71%.
- For the second Business scenario, the "improvement of facilitator role" scenario, BPIs 4 and 5 are taken into account for the calculation. The average progress accomplished towards the targets for BS2 is 91.38%.

The overall progress of the TANET trial calculated using the average progresses of the BS at TO BE 2 is 71.54%.

5.1.9. Trial No. 9 COMPLUS

The business evaluation of the COMPLUS trial encompasses two business scenarios (BS):

- The first BS is related to the Network Transparency for more efficient Supplier Search.
- The second BS is related to the Transparency and consistency of ITs and documents.

The two tables below list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Table 88 COMPLUS BPI list of the BS 1: Network Transparency for more efficient Supplier Search

BP #	BPI name	BPI Categorization
BPI 1	Number of mistakes and errors after / before the DV/AV implementation during a period (DECR. MIST.)	**C**ost
BPI 2	• Number of standardized IT landscape / Number of total IT landscape after / before the DV/AV implementation during a period (STD. IT LAND)	**T**ime

Table 89 COMPLUS BPI list of the 2: Transparency and consistency of ITs and documents

BP #	BPI name	BPI Categorization
BPI 3	Average time for configuration and data entry of LED Network (CONF. DATA)	**T**ime
BPI 4	Level of transparency of the Network according to the trial requirements (LEV. TRANS.)	**C**ost
BPI 5	Average development time for searching of the supplier in the LED Network (SEARCH. SUPP.)	**T**ime

Application to Business scenario 1

The **BPI no. 1** (BS1) *Number of mistakes and errors* is measured as the following ratio: Number of mistakes and errors due to versioning and non-consistent documents after / before the DV/AV implementation during a period. The objective associated to the BPI is to improve the performance of document sharing using a platform.

Table 90 COMPLUS BPI 1 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	1	-
TO BE 1	2	50,00%
TO BE 2 (current state)	2	50,00%
Target	3	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 50%. The progress ratio for TO BE 2 / TARGET is 50%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

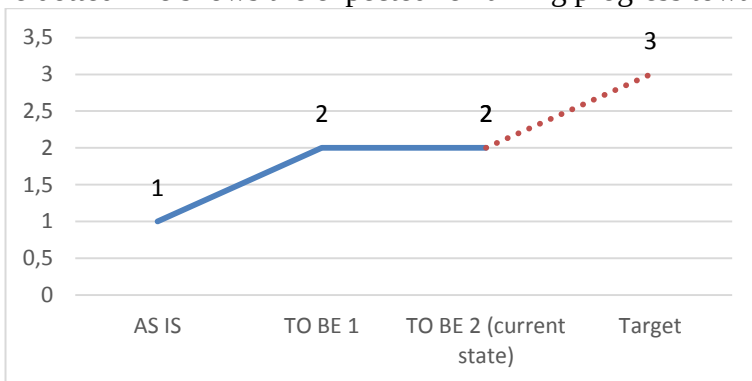


Figure 67 COMPlus BPI 1: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 2** (BS1) *Number of standardized IT landscape / Number of total IT landscape* is measured as the following ratio: : Number of standardized IT landscape after / before the DV/AV implementation during a period. The objective associated to the BPI is to improve the performance of sharing best practices in reference processes and IT using a platform.

Table 91 COMPLUS BPI 2 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	23	-
TO BE 1	23	0,00%
TO BE 2 (current state)	71	52,17%
Target	115	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 0%. The progress ratio for TO BE 2 / TARGET is 52.17%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

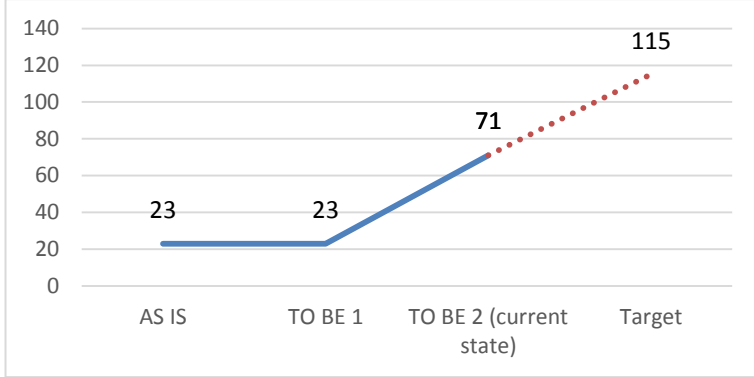


Figure 68 COMPlus BPI 2: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Application to Business scenario 2

The **BPI no. 3** (BS2) *Average time for configuration and data entry of LED Network* is measured as the following ratio: Average time for configuration and data entry of LED Network after / before the DV/AV implementation during a period. The objective associated to the BPI is to provide a service that allows transparent and visual Network Configuration.

Table 92 COMPLUS BPI 3 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	3	-
TO BE 1	3	0,00%
TO BE 2 (current state)	12	52,94%
Target	20	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 0%. The progress ratio for TO BE 2 / TARGET is 52.94%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

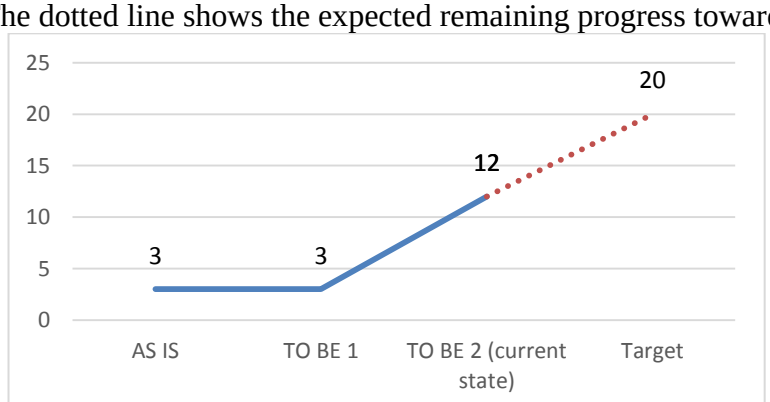


Figure 69 COMPlus BPI 3: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 4** (BS2) *Level of transparency of the Network according to the trial requirements* is measured as the following ratio: Level of Transparency of the Network

according to the trial requirements after / before the DV/AV implementation during a period. The objective associated to the BPI is to provide a service that allows transparent and visual Network Configuration.

Table 93 COMPLUS BPI 4 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	6	-
TO BE 1	5	25,00%
TO BE 2 (current state)	2	100,00%
Target	2	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 25%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

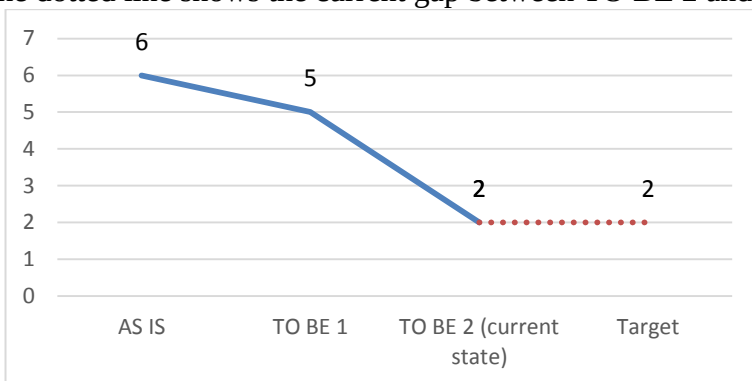


Figure 70 COMPlus BPI 4: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 5** (BS2) *Average development time for searching of the supplier in the LED Network (SEARCH. SUPP.)* is measured as the following ratio: Average development time for searching the supplier in the LED Network after / before the DV/AV implementation during a period. The objective associated to the BPI is to provide a service that allows more efficient supplier search.

Table 94 COMPLUS BPI 5 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	30	-
TO BE 1	30	0,00%
TO BE 2 (current state)	6	82,76%
Target	1	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 0%. The progress ratio for TO BE 2 / TARGET is 82.76%. Knowing that the reaching of the target is 100%, the target is not yet reached.

The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

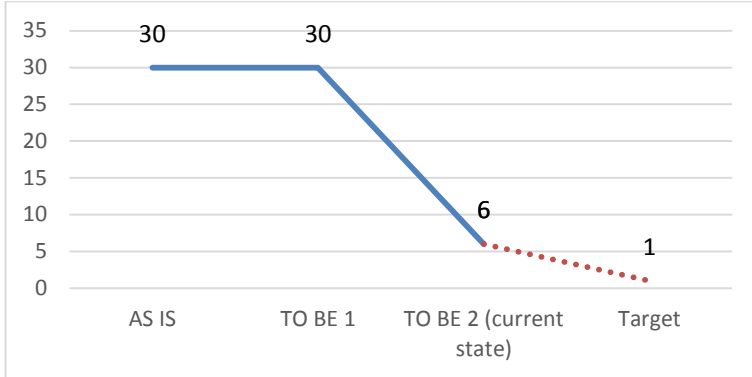


Figure 71 COMPlus BPI 5: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Conclusion on the Trial COMPlus

The overall progression of the trial COMPLUS is calculated using the progress TO BE 2 /Target value. For the two business scenarios, the progresses are reported in the table below.

Table 95 COMPlus BPI overall progress

BS No.	BPI name	Progress TO BE 2 / TARGET
1	BPI 1 - DECREASE OF MISTAKES AND ERRORS	40,0%
1	BPI 2 - STANDARDISED IT LANDSCAPE	37,5%
2	BPI 3 - CONFIGURATION AND DATA ENTRY	40,0%
2	BPI 4 - LEVEL OF TRANSPARENCY	62,5%
2	BPI 5 - SEARCHING OF THE SUPPLIER	41,7%

The progress of the trial is calculated at the BS level, then at the trial level:

- For the first Business scenario of Complus, “the Network Transparency for more efficient Supplier Search scenario”, BPIs 1 and 2 are taken into account for the calculation. The average progress accomplished towards the targets for BS 1 is 38.75%.
- For the second Business scenario, the “Transparency and consistency of ITs and documents” scenario, BPIs 3 to 5 are taken into account for the calculation. The average progress accomplished towards the targets for BS 2 is 48.06%.

The overall progress of the COMPLUS trial calculated using the average progresses of the BS at TO BE 2 is 43.40%.

5.1.10. Trial No. 11 AIDIMA

The business evaluation of the AIDIMA trial encompasses three business scenarios (BS):

- The first BS is related to the automation of the furniture trends forecasting process for product development
- The second BS is related to social media and opinion mining processes in furniture product.
- The third BS is related to collaborative work for product design

The three tables below list the BPIs per BS and their categories (Cost, Time, Quality and Productivity).

Note that, due to the evolution of the trial, the lists of BPIs were updated.

Table 96 AIDIMA BPI list of the BS 1: Furniture Trends Forecasting for Product Development

BP #	BPI name	BPI Categorization *Comments*
BPI 1	Search time process per source (SEARCH TIME)	**P**roductivity
BPI 2	Number of electronic sources analysed by trends experts (SOURCES)	**P**roductivity
BPI 3	Number of weak signals identified (WEAK SIGN.)	**P**roductivity
BPI 4	Number of index cards created (INDEX CARDS)	**P**roductivity
BPI 5	*Number of R+D projects based on Home Trends Report (R+D PROJECTS)*	***BPI removed***
BPI 6	Number of new products based on trends (NUMB. PROD.)	**P**roductivity
BPI 7	Time to market for publishing the Home Trends Report (TIME TO MARKET HTR)	**T**ime
BPI 10	Number of trends research institutes using FITMAN solutions (HTR DEPS.)	***Moved from BS2 to BS1***

Table 97 AIDIMA BPI list of the BS 2: Opinion Mining in Furniture Products

BP #	BPI name	BPI Categorization *Comments*
BPI 8	*Number of companies purchasing biannual Home Trends Report (NUMB. COMP. HTR)*	***BPI removed***
BPI 9	*Number of companies professionals attending home trends reports seminars (HTR SEMINARS)*	***BPI removed***
BPI 11	Complaints resolution time process (COMPL. TIME PROCESS)	**T**ime
BPI 12	Number of reported complaint response (COMPL. RESP.)	**P**roductivity
BPI 13	Number of companies using FITMAN opinion mining solutions (COMPANIES)	**P**roductivity
BPI 14	Number of identified electronic customer opinions (OP. RETRIEVAL)	**P**roductivity
BPI 15	*Number of online fake opinions identified (OP. SPAM)*	***BPI removed***
BPI 16	Number of non- reported customer online dissatisfaction identified (NON-REP. DISS.)	**P**roductivity
BPI 17	Number of positive online WOM (Word-Of-Mouth) (W-O-M)	**Q**uality
BPI 18	Number of opinion leaders identified (OP. LEADERS)	**P**roductivity

Table 98 AIDIMA BPI list of the BS 3: Collaborative Work for Product Design

BP #	BPI name	BPI Categorization *Comments*
BPI 19	Average lead time for the design process (TIME SAVING TECH. OFF.)	**T**ime
BPI 20	Number of design sketches per piece of furniture (NUMBER OF SKETCHES)	**P**roductivity
BPI 21	Number of players taking part in the piece of furniture design (NUMBER OF PLAYERS DES.)	**P**roductivity

Application to Business scenario 1

The **BPI no. 1** (BS1) *Search time process per source (SEARCH TIME)* is measured as the following ratio: Search time process per source after / before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the searching time process per source to identify and classify the weak signals.

Table 99 AIDIMA BPI 1 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	8	-
TO BE 1	6	100%
TO BE 2 (current state)	6	100%
Target	6	-

Analysis of the progress ratio:

Neither TO BE 1 nor TO BE 2 values have been available. The progression of the BPI is unknown.

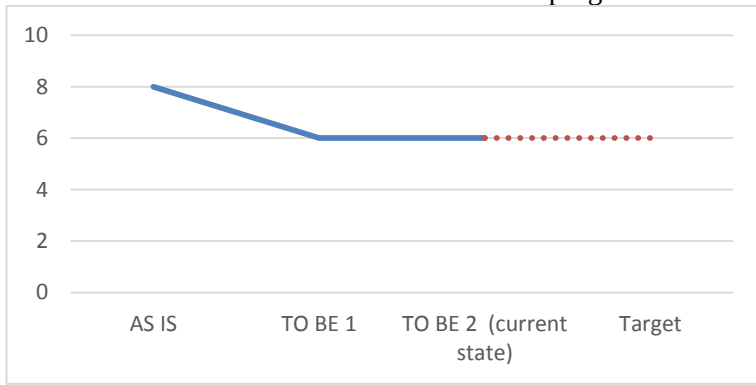


Figure 72 AIDIMA BPI 1: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 2** (BS1) *Number of electronic sources analysed by trends experts (SOURCES)* is measured as the following ratio: Number of electronic sources analysed by trends experts after / before the DV/AV implementation during a period. The objective associated to the BPI is to increase the number of electronic sources analysed by trends experts due to FITMAN automated solutions.

Table 100 AIDIMA BPI 2 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	20	-
TO BE 1	25	25%
TO BE 2 (current state)	25	25%
Target	40	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 25%. The progress ratio for TO BE 2 / TARGET is 25%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

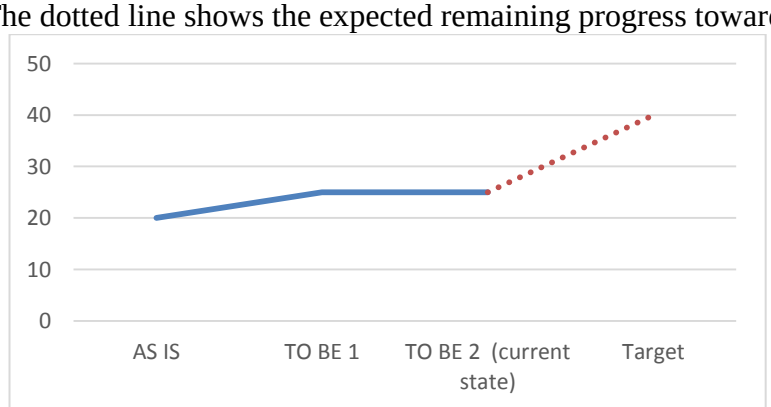


Figure 73 AIDIMA BPI 2: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 3** (BS1) *Number of weak signals identified (WEAK SIGN.)* is measured as the following ratio: Number of weak signals identified after / before the DV/AV

implementation during a period. The objective associated to the BPI is to increase the number of weak signals identified due to FITMAN automated solutions.

Table 101 AIDIMA BPI 3 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	200	-
TO BE 1	220	10%
TO BE 2 (current state)	220	10%
Target	400	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 10%. The progress ratio for TO BE 2 / TARGET is 10%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

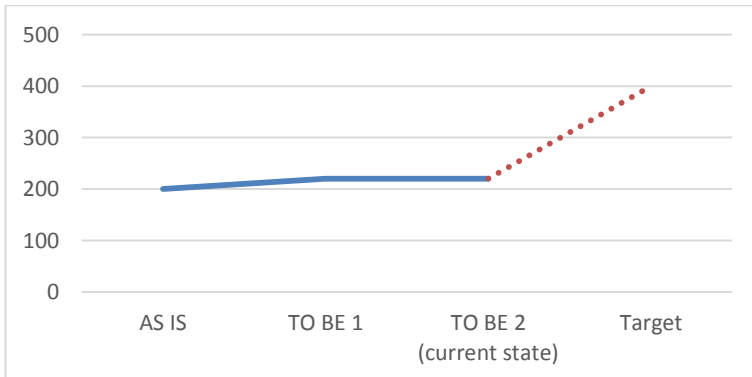


Figure 74 Whirlpool BPI 3: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 4** (BS1) *Number of index cards created (INDEX CARDS)* is measured as the following ratio: Number of index cards created after / before the DV/AV implementation during a period. The objective associated to the BPI is to increase the number of index cards due to FITMAN automated solutions.

Table 102 AIDIMA BPI 4 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	100	-
TO BE 1	150	25%
TO BE 2 (current state)	150	25%
Target	300	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 25%. The progress ratio for TO BE 2 / TARGET is not available. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management has to evaluate the conditions of the BPI evolution towards TO BE 2 and TO BE 3 (analysis of all parameters) and to decide if the target must be modified.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

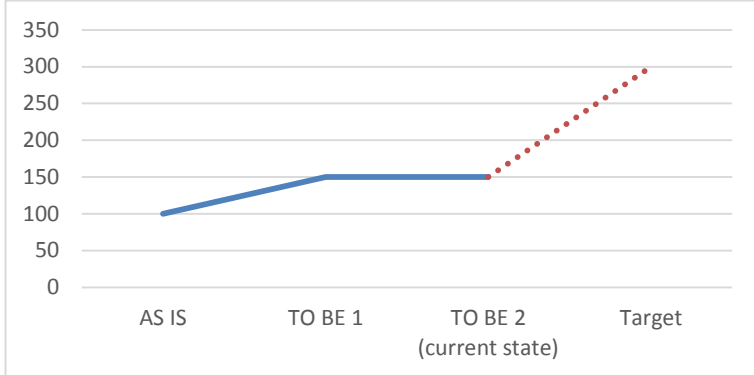


Figure 75 AIDIMA BPI 4: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 6** (BS1) *Number of new products based on trends (NUMB. PROD.)* is measured as the following ratio: Number of new products based on trends after / before the DV/AV implementation during a period. The objective associated to the BPI is to increase the number of private projects for new Product Development worked out in collaboration with Home Trends Observatory analysts.

Table 103 AIDIMA BPI 6 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	5	-
TO BE 1	No yet contemplated	Na
TO BE 2 (current state)	No yet contemplated	Na
Target	10	-

Analysis of the progress ratio:
Neither TO BE 1 nor TO BE 2 values have been available. The progression of the BPI is unknown.

The **BPI no. 7** (BS1) *Time to market for publishing the Home Trends Report (TIME TO MARKET HTR)* is measured as the following ratio: Time to market for publishing the Home Trends Report after / before the DV/AV implementation during a period. The objective associated to the BPI is to reduce the trends report delivery time since initial weak signals detection until trends report publication.

Table 104 AIDIMA BPI 7 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	15	-
TO BE 1	No yet contemplated	Na
TO BE 2 (current state)	No yet contemplated	Na
Target	12	-

Analysis of the progress ratio:
Neither TO BE 1 nor TO BE 2 values have been available. The progression of the BPI is unknown.

The **BPI no. 10** (BS1) *Number of trends research institutes using FITMAN solutions (HTR DEPS.)* is measured as the following ratio: Number of trends research institutes using FITMAN solutions after / before the DV/AV implementation during a period. The objective associated to the BPI is to increase the number of external home trends research departments using FITMAN solutions for trends forecasting. (External means not member of AIDIMA organization chart).

Table 105 AIDIMA BPI 10 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0	-
TO BE 1	No yet contemplated	Na
TO BE 2 (current state)	No yet contemplated	Na
Target	2	-

Analysis of the progress ratio:
Neither TO BE 1 nor TO BE 2 values have been available. The progression of the BPI is unknown.

Application to Business scenario 2

The **BPI no. 11** (BS2) *Complaints resolution time process (COMPL. TIME PROCESS)* is measured as the following ratio: Complaints resolution time process after / before the DV/AV implementation during a period. The objective associated to the BPI to reduce the complaints resolution time process.

Table 106 AIDIMA BPI 11 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	1	-
TO BE 1	1	100%
TO BE 2 (current state)	1	100%
Target	1	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 100%. The progress ratio for TO BE 2 / TARGET is 100%. Knowing that the reaching of the target is 100%, the target is reached at an earliest stage that initially planned.
The management has to evaluate the conditions of the BPI evolution towards TO BE 2 and TO BE 3 (analysis of all parameters) and to decide if the target must be modified. We recommend a modification of the target in order to keep some challenges.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the current gap between TO BE 2 and Target value.

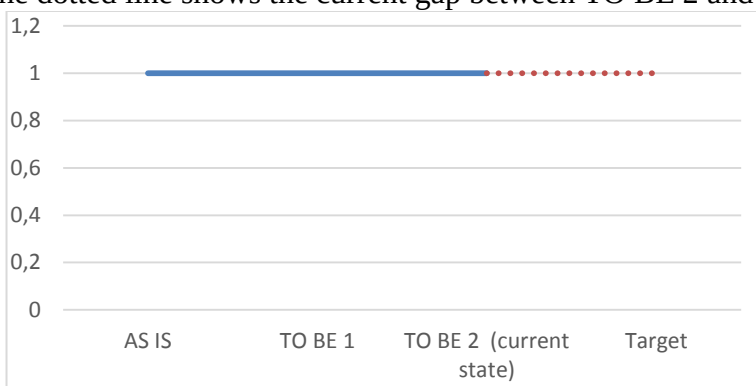


Figure 76 AIDIMA BPI 11: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 12** (BS2) *Number of reported complaint response (COMPL. RESP.)* is measured as the following ratio: Number of reported complaint response after / before the DV/AV implementation during a period. The objective associated to the BPI to increase the number of reported complaints related to product and/or service solved electronically by the firm.

Table 107 AIDIMA BPI 12 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	75	-
TO BE 1	80	20%
TO BE 2 (current state)	80	20%
Target	100	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 20%. The progress ratio for TO BE 2 / TARGET is 20%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

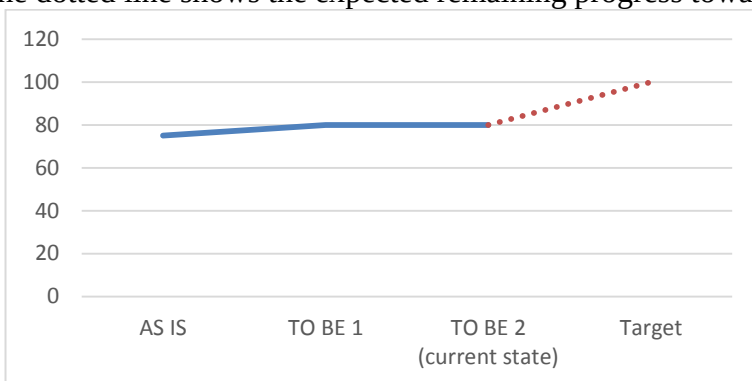


Figure 77 AIDIMA BPI 12: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 13** (BS2) *Number of companies using FITMAN opinion mining solutions (COMPANIES)* is measured as the following ratio: Number of companies using FITMAN opinion mining solutions after / before the DV/AV implementation during a period. The objective associated to the BPI to increase the number of companies using FITMAN opinion mining solutions.

Table 108 AIDIMA BPI 13 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0	-
TO BE 1	1	33.33%
TO BE 2 (current state)	1	33.33%
Target	3	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 33.33%. The progress ratio for TO BE 2 / TARGET is 33.33%. Knowing that the reaching of the target is 100%, the target is not yet reached.

The management has to evaluate the conditions of the BPI evolution towards TO BE 2 and TO BE 3 (analysis of all parameters) and to decide if the target must be modified.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

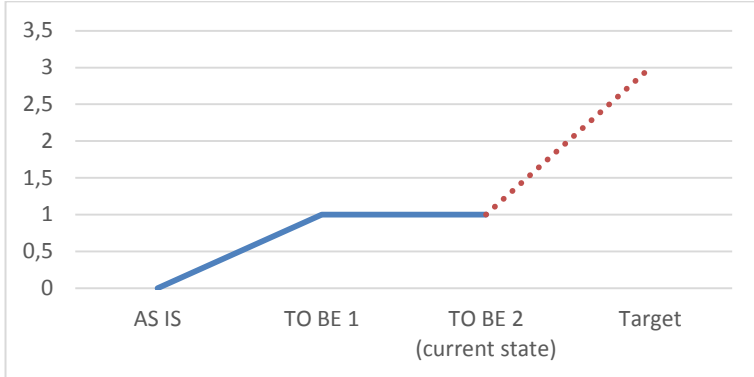


Figure 78 AIDIMA BPI 13: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 14** (BS2) *Number of identified electronic customer opinions (OP. RETRIEVAL)* is measured as the following ratio: Number of identified electronic customer opinions after / before the DV/AV implementation during a period. The objective associated to the BPI to increase the number of identified electronic customer opinions about the firm or its products, services and brands.

Table 109 AIDIMA BPI 14 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0	-
TO BE 1	30	30%
TO BE 2 (current state)	30	30%
Target	100	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 30%. The progress ratio for TO BE 2 / TARGET is 30%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management has to evaluate the conditions of the BPI evolution towards TO BE 2 and TO BE 3 (analysis of all parameters) and to decide if the target must be modified.

The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

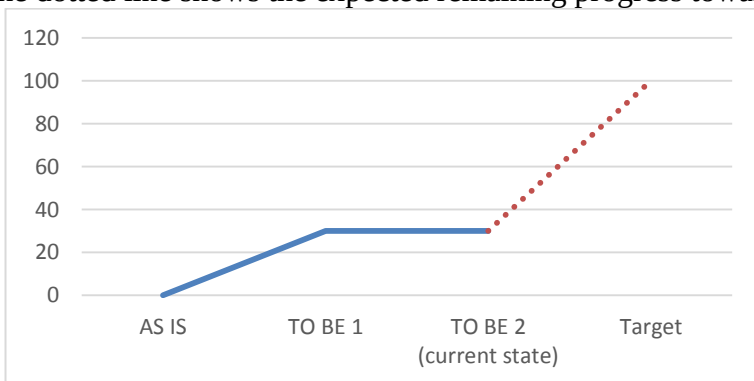


Figure 79 AIDIMA BPI 14: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 16** (BS2) *Number of non-reported customer online dissatisfaction identified (NON-REP.DISS.)* is measured as the following ratio: Number of non-reported customer online dissatisfaction identified after / before the DV/AV implementation during a period. The objective associated to the BPI to increase the identification cases of non-reported customer online dissatisfaction related to product and/or service.

Table 110 AIDIMA BPI 16 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0	-
TO BE 1	20	20%
TO BE 2 (current state)	20	20%
Target	100	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 20%. The progress ratio for TO BE 2 / TARGET is 20%. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1 and from TO BE 1 to TO BE2. The dotted line shows the expected remaining progress towards the target.

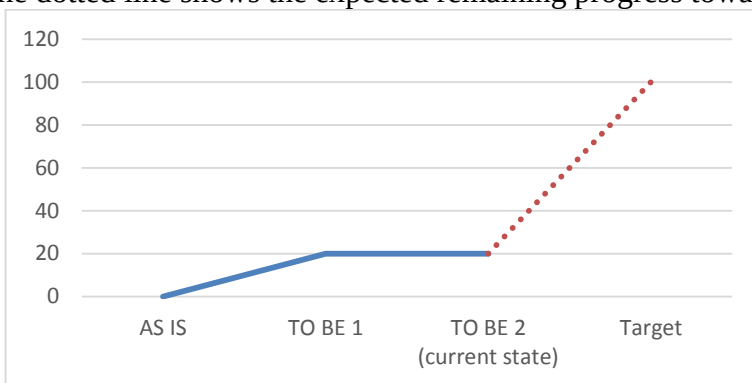


Figure 80 AIDIMA BPI 16: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

The **BPI no. 17** (BS2) *Number of positive online Word-Of-Mouth (W-O-M)* is measured as the following ratio: Number of positive online WOM (Word-Of-Mouth) after / before the DV/AV implementation during a period. The objective associated to the BPI to increase the brand presence in positive Social Network comments.

Table 111 AIDIMA BPI 17 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	Na	-
TO BE 1	Not yet contemplated	Na
TO BE 2 (current state)	Not yet contemplated	Na
Target	10	-

Analysis of the progress ratio:
Neither TO BE 1 nor TO BE 2 values have been available. The analysis of the BPI progress cannot be performed.

The **BPI no. 18** (BS2) *Number of opinion leaders identified (OP. LEADERS)* is measured as the following ratio: Number of opinion leaders identified after / before the DV/AV implementation during a period. The objective associated to the BPI to improve the identification of opinion leaders amongst customers (i.e. bloggers, etc.).

Table 112 AIDIMA BPI 18 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	0	-
TO BE 1	1	20%
TO BE 2 (current state)	Not contemplated yet	Na
Target	5	-

Analysis of the progress ratio:
The progress ratio for TO BE 1 / TARGET is 20%. The progress ratio for TO BE 2 / TARGET is unknown. Knowing that the reaching of the target is 100%, the target is not yet reached.
The management will have to evaluate the conditions of the BPI evolution towards TO BE 3 (analysis of all parameters) and to decide if the target must be modified or not.
The figure below shows the progress of the BPI from AS IS to TO BE 1. The dotted line shows the expected remaining progress towards the target.

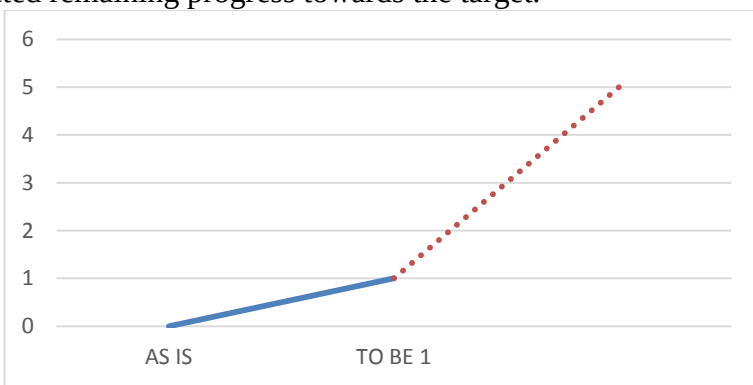


Figure 81 AIDIMA BPI 18: evolution AS IS / TO BE 1 / TO BE 2 / TARGET

Application to Business scenario 3

The **BPI no. 19** (BS3) *Average lead time for the design process (TIME SAVING TECH. OFF.)* is measured as the following ratio: Average lead time for the design process after / before the DV/AV implementation during a period. The objective associated to the BPI to reduce the time for the design process in the technical office.

Table 113 AIDIMA BPI 19 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	120	-
TO BE 1	Not contemplated yet	Na
TO BE 2 (current state)	Not contemplated yet	Na
Target	100	-

Analysis of the progress ratio:
Neither TO BE 1 nor TO BE 2 values have been available. The progression of the BPI is unknown.

The **BPI no. 20** (BS3) *number of design sketches per piece of furniture (NUMBER OF SKETCHES)* is measured as the following ratio: number of design sketches per piece of

furniture after / before the DV/AV implementation during a period. The objective associated to the BPI to increase the number of design sketches per piece of furniture.

Table 114 AIDIMA BPI 20 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	3	-
TO BE 1	Not contemplated yet	Na
TO BE 2 (current state)	Not contemplated yet	Na
Target	5	-

Analysis of the progress ratio:
Neither TO BE 1 nor TO BE 2 values have been available. The progression of the BPI is unknown.

The **BPI no. 21** (BS3) *number of players taking part in the piece of furniture design (NUMBER OF PLAYERS DES.)* is measured as the following ratio: number of players taking part in the piece of furniture design after / before the DV/AV implementation during a period. The objective associated to the BPI to increase the number of players taking part in the piece of furniture design.

Table 115 AIDIMA BPI 21 collected data and progress

	DATA (provided by trial)	PROGRESS (% of target's reaching)
AS IS	3	-
TO BE 1	Not contemplated yet	Na
TO BE 2 (current state)	Not contemplated yet	Na
Target	3	-

Analysis of the progress ratio:
Neither TO BE 1 nor TO BE 2 values have been available. The progression of the BPI is unknown.

Conclusion on the trial AIDIMA

The overall progression of the trial is calculated using the progress TO BE 2 /Target value. For the three business scenarios, the progresses are reported in the table below.

Table 116 AIDIMA BPI overall progress

BS No.	BPI name	Progress TO BE 1 / TARGET
1	BPI 1 Search time process per source (SEARCH TIME)	100%
1	BPI 2 Number of electronic sources analysed by trends experts (SOURCES)	25%
1	BPI 3 Number of weak signals identified (WEAK SIGN.)	10%
1	BPI 4 Number of index cards created (INDEX CARDS)	25%
1	BPI 6 Number of new products based on trends (NUMB. PROD.)	Unknown
1	BPI 7 Time to market for publishing the Home Trends Report (TIME TO MARKET HTR)	Unknown
1	BPI 10 Number of trends research institutes using FITMAN solutions (HTR DEPS.)	Unknown
2	BPI 11 Complaints resolution time process (COMPL. TIME PROCESS)	100%
2	BPI 12 Number of reported complaint response (COMPL. RESP.)	20%
2	BPI 13 Number of companies using FITMAN opinion mining solutions (COMPANIES)	33.33%
2	BPI 14 Number of identified electronic customer opinions (OP. RETRIEVAL)	30%
2	BPI 16 Number of non- reported customer online dissatisfaction identified (NON-REP. DISS.)	20%
2	BPI 17 Number of positive online WOM (Word-Of-Mouth) (W-O-M)	Unknown
2	BPI 18 Number of opinion leaders identified (OP. LEADERS)	20% (TO BE 1 value)

3	BPI 19 Average lead time for the design process (TIME SAVING TECH. OFF.)	Unknown
3	BPI 20 Number of design sketches per piece of furniture (NUMBER OF SKETCHES)	Unknown
3	BPI 21 Number of players taking part in the piece of furniture design (NUMBER OF PLAYERS DES.)	Unknown

Due to the lack of data for some BPIs, we are unable to calculate in accurate fashion the overall progress of AIDIMA. Anyway, considering what are the available values, we can express :

- For the first Business scenario of AIDIMA, "Furniture Trends Forecasting For Product Development", BPIs 1,2,3 and 4 are taken into account for the calculation. The average progress accomplished towards the targets for BS 1 is 40.00%.
- For the second Business scenario of AIDIMA, "Opinion Mining in Furniture Products ", all BPIs but 17 are taken into account for the calculation. The average progress accomplished towards the targets for BS 1 is 40.67%.
- For the third Business scenario of AIDIMA, "Collaborative Work for Product Design", they clearly stated that at the moment it is not possible to actually fully implement and assess the new process. No significant BPI have been collected, so we assign an arbitrary progress of 0%.

The overall progress of the AIDIMA trial calculated using the average progresses of the BS at TO BE 2 is 26.89%.

5.1.11. Business consolidation conclusion

For the consolidation of the Business Performance Indicators at the project level, we have reported the progress of the trials in decreasing order in the table below and in the figure.

Trial ID	Trial Name	Progress TO BE 2 / TARGET of all the BPIs per trial
4	Whirlpool	162,03%
7	Consulgal	132,95%
2	TRW	123,38%
3	AgustaWestland	108,33%
5	Piacenza	94,81%
8	TANET	71,54%
1	Volkswagen	54,31%
6	APR	52,36%
9	COMPLUS	43,40%
11	AIDIMA	26,89%

Table 117 Trials progression TO BE 2 / TARGET

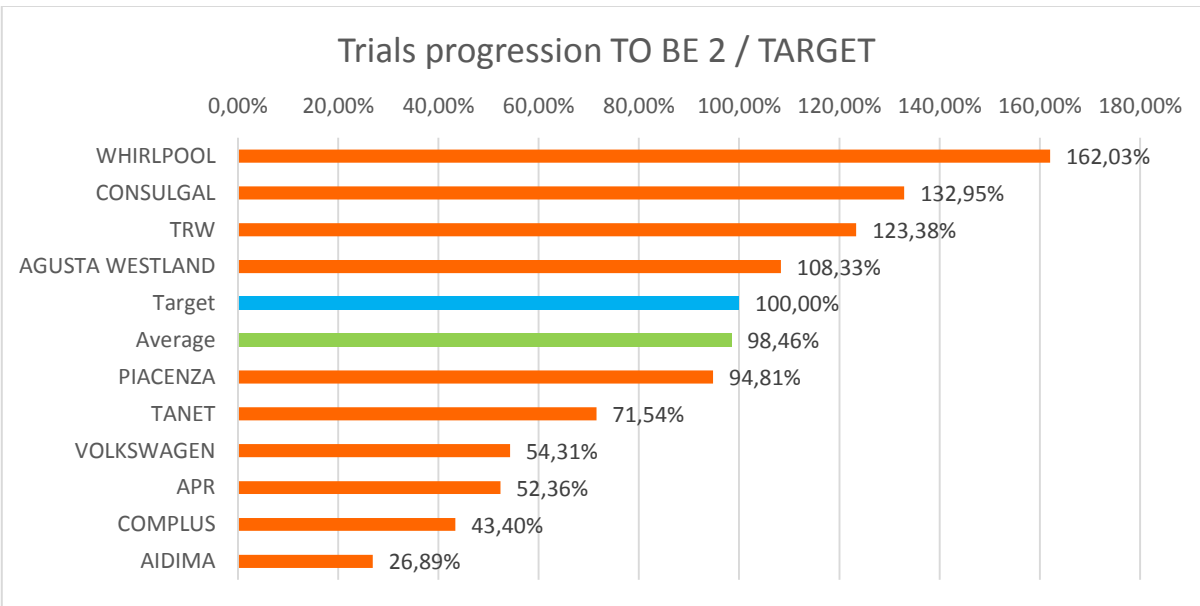


Figure 82 Ranking of the progression TO BE 2 / TARGET of the trials

To conclude, four trials have already reached their targets.
Anyway AIDIMA and AgustaWestland trials miss results for some BS as described in 5.1.3 and 5.1.10.
AIDIMA is confident to provide data (the lack is only due to long dynamic of data collecting.
The objective for all the trials is anyway to collect all values of BPIs and to reach their targets for the TO BE 3 measures planned at M27.

5.2 Technical Consolidation

5.2.1. Correlation Analysis of Technical Indicators

As described in detail in the previous chapter, a Canonical Correlation Analysis of the available TIs took place in order on one hand to justify the validation results of the trial solutions on the base of the attributes of the GEs and SEs utilized and on the other hand to identify which characteristics of the GEs/SEs have been inherited to the trial solutions or have indirectly affected their characteristics.
In order to proceed to the Canonical Correlation Analysis, we have initially calculated the averages per trial as far as it concerns all Technical Indicators. This included both for the set of GEs/SEs technical validation indicators, as well as the set of trials validation indicators.
The outcomes, on which the Canonical Correlation Analysis took place, is presented in the following tables.
The figures provided in the first two tables below are the average values of the indicators referring to the components utilised per trial and to the whole trial solutions, respectively, as provided via specific questionnaires by the involved partners.
The rest of the tables presented below are the results of the statistical analysis of the provided data following the standard Canonical Correlation Analysis process.

Table 118 Averages of the Components (GEs/SEs) Validation Results per Trial

	COMPONENTS VALIDATION RESULTS (AVERAGES)						
	Correctness	Ease of Application	Efficiency	Reliability	Sustainability	Interoperability Maturity	Openness
Agusta Westland	2,25	1,67	2	2,25	1,88	2	1,56
AIDIMA	2,5	1,67	2	2,5	2,83	1,33	1,33
APR	2	1,5	1,83	2	2	0,83	1,33
COMPLUS	2,13	1,75	2	2,13	2,38	1,25	0,75
Consulgal	2	1,6	2	2	2,2	2,2	1,4
Piacenza	2,6	2,8	2,2	3	3	2,8	2,8
TANET	2,11	1,89	1,78	2,38	2,5	2,38	1,86
TRW	3	3	2,71	3	3	2,8	2,8
Volkswagen	2,88	1,78	2,5	2,88	3,22	1	2
Whirlpool	2,5	2,13	2	2,38	2,5	2,38	1,86

Table 119 Averages of the Trial Solutions Validation results per Trial

	TRIAL SOLUTIONS VALIDATION RESULTS (AVERAGES)				
	Efficiency	Fulfillment of requirements	Learnability	Understandability	User's attraction level
Agusta Westland	3,22	3,4	3	3,56	3,14
AIDIMA	3,2	3	3	3,2	3
APR	3	3	2,6	3	4
COMPLUS	3,3	3,2	3	3	3,2
Consulgal	3	3	3	3	2,67
Piacenza	3,2	3,67	3,67	3,67	3,33

TANET	2,83	3,6	3,33	3,17	3,67
TRW	3,6	4	3,67	4	4
Volkswagen	3,5	3	3,2	3	3
Whirlpool	3	3,67	3,67	3,33	3,67

On the basis of the data above, the Mean values and Standard deviations have been calculated:

Table 120 Calculation of Mean Values and Standard Deviations

Variable	Minimum	Maximum	Mean	Std. deviation
Correctness	2,0000	3,0000	2,3970	0,3574
Ease of Application	1,5000	3,0000	1,9790	0,5168
Efficiency	1,7800	2,7100	2,1020	0,2920
Reliability	2,0000	3,0000	2,4520	0,3872
Sustainability	1,8800	3,2200	2,5510	0,4522
Interoperability Maturity	0,8300	2,8000	1,8970	0,7366
Openness	0,7500	2,8000	1,7690	0,6497
Efficiency	2,8300	3,6000	3,1850	0,2392
Fulfillment of requirements	3,0000	4,0000	3,3540	0,3659
Learnability	2,6000	3,6700	3,2140	0,3648
Understandability	3,0000	4,0000	3,2930	0,3467
User's attraction level	2,6700	4,0000	3,3680	0,4498

The Canonical Correlation Analysis has been implemented using the XLSTAT statistical software. The Eigenvalues, the Canonical Correlations, the Redundancy coefficients and the results of the Wilks' Lambda test have been calculated as follows:

Eigenvalues:

	F1	F2	F3	F4	F5
Eigenvalue	1,0000	1,0000	1,0000	0,7238	0,1825
Variability (%)	25,5997	25,5997	25,5997	18,5284	4,6724
Cumulative %	25,5997	51,1995	76,7992	95,3276	100,0000

Canonical correlations:

F1	F2	F3	F4	F5
1,0000	1,0000	1,0000	0,8507	0,4272

Redundancy coefficients (Y1):

F1	F2	F3	F4	F5	Sum
0,0832	0,2149	0,5298	0,0517	0,0052	0,8848

Redundancy coefficients (Y2):

F1	F2	F3	F4	F5	Sum
0,1675	0,3265	0,3044	0,0935	0,0132	0,9051

Table 121 Standardized canonical coefficients

Standardized canonical coefficients (Y1):					
	F1	F2	F3	F4	F5
Correctness	1,1874	-0,4975	-1,1940	0,0099	0,3094
Ease of Application	0,5586	-0,0183	-0,9654	-1,2214	-2,0225
Efficiency	-1,5274	0,7444	0,3758	0,0592	-0,1549
Reliability	-3,1438	-0,1899	1,2830	-0,6588	1,8025
Sustainability	1,2502	0,2744	-0,2520	1,8035	-1,0794
Interoperability Maturity	-1,0550	-0,9000	0,8049	1,1126	0,2355
Openness	2,1902	-0,0298	-0,7495	-0,2510	0,8533

Standardized canonical coefficients (Y2):					
	F1	F2	F3	F4	F5
Efficiency	-0,7584	0,7293	-0,4090	0,0074	-0,6504
Fulfilment of requirements	-2,1313	-0,4430	1,7566	-0,5321	-2,8186
Learnability	1,2432	-0,1634	-1,3438	1,3097	0,7964
Understandability	0,4166	-0,5889	-0,5657	-0,6123	2,2003
User's attraction level	1,1220	0,3202	-0,9505	-0,3965	0,1162

Calculation of Wilks' Lambda:

Wilks' Lambda:				
Lambda	F	DF1	DF2	Pr > F
0,2258	0,2761	8	2	0,9241
0,8175	0,1488	3	2	0,9220

The results above confirm that a correlation exists among the variables examined. In order to build the correlation matrix, the correlations between the input variables and the canonical variables have been calculated, as follows:

Table 122 Correlations between input variables and canonical variables

Correlations between input variables and canonical variables (Y1):					
	F1	F2	F3	F4	F5
Correctness	-0,3172	-0,0388	-0,8910	0,2443	0,1969
Ease of Application	-0,2523	-0,5583	-0,7254	-0,0164	-0,1996
Efficiency	-0,5166	0,1049	-0,7908	0,1275	0,0604
Reliability	-0,2741	-0,2183	-0,8152	0,2650	0,2244
Sustainability	-0,1271	0,0308	-0,7470	0,5852	0,0378
Interoperability Maturity	-0,2246	-0,9184	-0,1790	0,0916	-0,0986
Openness	-0,0965	-0,5367	-0,7133	0,0510	0,2393

On the basis of those data, the required correlation matrixes have been calculated. The first matrix represents the correlation coefficients internally between the GEs/SEs Technical

Indicators, while the second the correlation coefficients between the Trial Solutions Technical Indicators.

Table 123 Correlation coefficients of the Components' TIs

	Correctness	Ease of Application	Efficiency	Reliability	Sustainability	Interoperability Maturity	Openness
Correctness	1	0,6874	0,8952	0,9161	0,8425	0,2567	0,7196
Ease of Application	0,6874	1	0,6558	0,7934	0,5935	0,7472	0,8745
Efficiency	0,8952	0,6558	1	0,7914	0,7136	0,2316	0,6491
Reliability	0,9161	0,7934	0,7914	1	0,8868	0,4059	0,8524
Sustainability	0,8425	0,5935	0,7136	0,8868	1	0,1756	0,6182
Interoperability Maturity	0,2567	0,7472	0,2316	0,4059	0,1756	1	0,6932
Openness	0,7196	0,8745	0,6491	0,8524	0,6182	0,6932	1

Table 124 Correlation coefficients of the Trial Solutions' TIs

	Efficiency	Fulfillment of requirements	Learnability	Understandability	User's attraction level
Efficiency	1	0,6874	0,8952	0,9161	0,8425
Fulfillment of requirements	0,6874	1	0,6558	0,7934	0,5935
Learnability	0,8952	0,6558	1	0,7914	0,7136
Understandability	0,9161	0,7934	0,7914	1	0,8868
User's attraction level	0,8425	0,5935	0,7136	0,8868	1

Finally the following matrix represents the correlation coefficients between the two sets of variables, i.e. the GEs/SEs TIs vs the Trial Solutions TIs.

Table 125 Correlation coefficients between the two sets of TIs

	Efficiency	Fulfillment of requirements	Learnability	Understandability	User's attraction level
Correctness	0,7808	0,4449	0,6559	0,5940	0,1429
Ease of Application	0,4440	0,8519	0,8592	0,8502	0,4257
Efficiency	0,8982	0,3650	0,5078	0,5573	0,0704
Reliability	0,6395	0,5322	0,7305	0,6419	0,1511
Sustainability	0,5745	0,2569	0,6095	0,2866	-0,0188
Interoperability Maturity	-0,0587	0,8383	0,8024	0,7370	0,1899
Openness	0,3470	0,7245	0,7943	0,7707	0,3585

A graphical representation of the correlations is presented in the following diagrams. Given that there are 5 correlation factors/dimensions, a graphical representation of all the

dimensions is not possible. However, based on the Eigenvalues and Variability of the canonical factors F1-F5, the total number of dimensions can be reduced by examining in detail factors F1, F2 and F3.

The biplot diagrams provided (Figure 83 and Figure 84), refer to 2-D representations of the correlations among the examined indicators with reference to factors F1-F2 and F2-F3 respectively. The Trial Solution TIs are represented in green colour, while the Components TIs in red.

The diagrams can be, in a simplistic way, interpreted like this: For any indicators located in the diagrams close to each other, a correlation among them do exist, towards the examined axes, and the closer they are the stronger the correlation is. The correlation among two indicators can be considered even stronger if it can be identified in both diagrams. The examination of the diagrams allows the direct extraction of conclusions regarding potential correlations without the need for examining the exact values of the coefficients, which of course shall verify the outcomes.

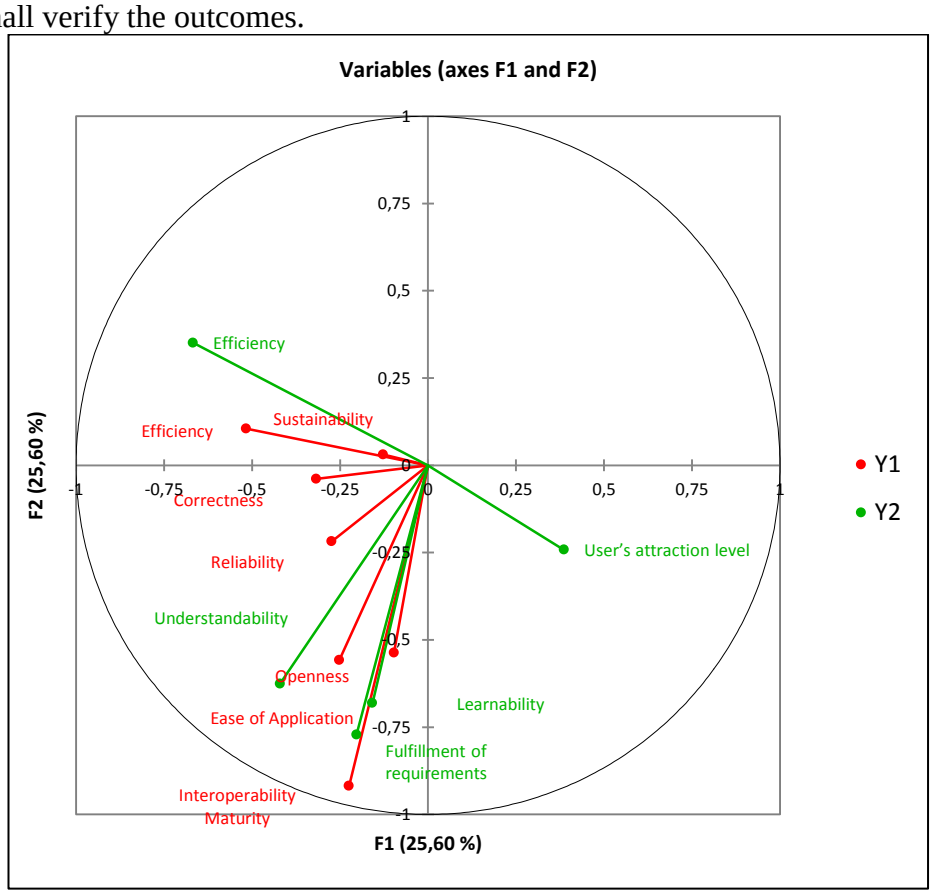


Figure 83 Correlation Analysis Biplot Diagram - Factors F1-F2

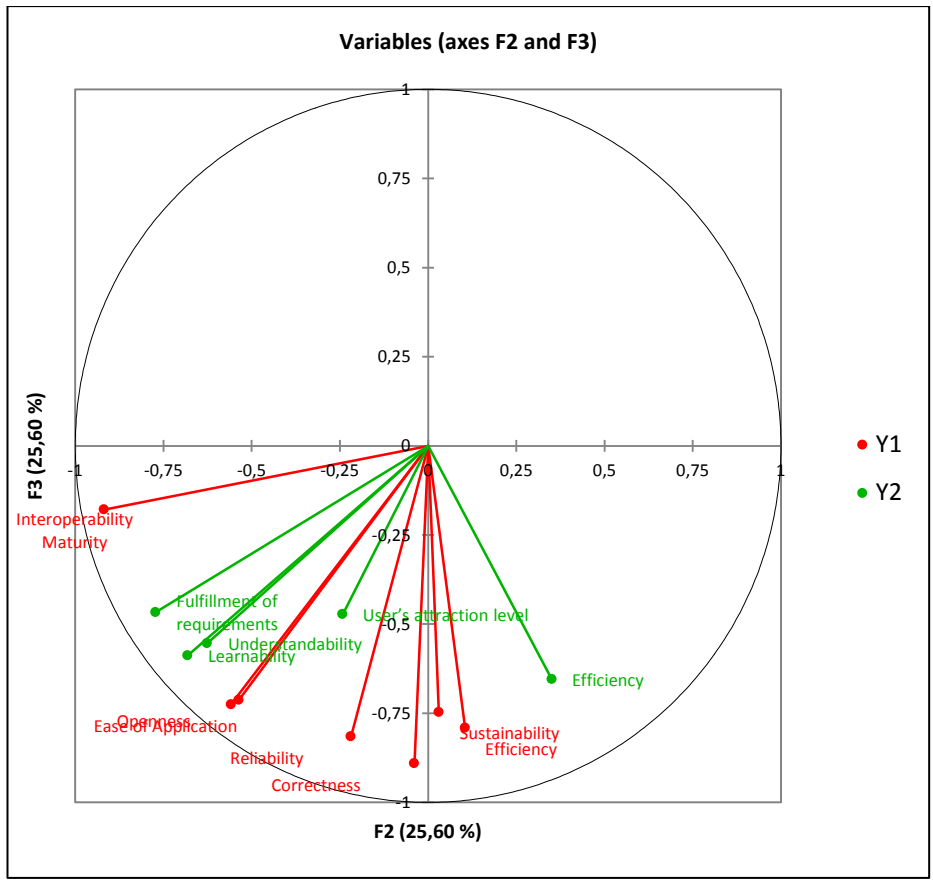


Figure 84 Correlation Analysis Biplot Diagram - Factors F2-F3

The analysis performed has proved that several TIs are interrelated to other, which confirms that the validation results can be considered reliable and in general terms justifiable.

Specifically, as far as it concerns the technical validation of the GEs and SEs, the following conclusions can be extracted:

- The Correctness of a component is correlated to its Efficiency, Reliability and Sustainability. This is something absolutely normal – and expected – given the fact that all four indicators describe in different dimensions how "good" the component is from a technical point of view.
- The Openness indicator is correlated to Ease of Application and Reliability. The interrelation among those variables drives us to the conclusion that the more open a component is the easiest the process of utilising it shall be considered. This outcome is reasonable and expected since having access to the source code of a component is apparently very helpful in the process of utilising it without significant effort. Reliability, on the other hand, is also correlated to Openness. The most obvious reason for this is the fact that the open nature of a component allows any developer using it to easily identify and even correct or report any problems identified in almost real time, which leads to more reliable software.
- Interoperability Maturity is an indicator without significant correlations to other, apart from Ease of Application. Apparently components providing interoperable interfaces based on standards can be utilised much easier that components with low interoperability maturity.

Contrary to the TIs used for the GEs and SEs – the validation of which is focused on technical aspects – the TIs for the validation of the final trial solutions as not significantly correlated to each other. The most important correlation identified is among three indicators: Fulfilment of requirements, Learnability and Understandability. In other terms the perception of the users about the requirements that are covered by a software solution and how easy it is for them to learn how to operate them, depends on how complicated the solution is, thus how difficult it is to understand its operation in full extend.

While the conclusions presented above refer individually either to components or to complete trial solutions, the most meaningful and important outcomes of the correlation analysis performed is related to the correlations among the validation results of the GEs/SEs and the validation results of the Trial Solutions. In general terms the analysis proves that several characteristics of the components used in a trial are indeed inherited in the trial solution and identified during its validations. Specifically the following conclusions can be derived:

- The efficiency of a trial solution depends significantly on the efficiency, as well as the correctness, of the components (GEs/SEs) utilised. This outcome is reasonable and of course expected since the Trial Solutions are really based on the components they utilise. This leads to the fact that the efficiency and in general the operation of the final solutions is strongly connected to the relevant characteristics of the utilised GEs and SEs.
- The trials which have utilised components considered as more easily applicable, get very good validation results as far as it concerns the three interrelated indicators (presented above) "Fulfilment of requirements", "Learnability" and "Understandability". Apparently the components which can be applied without significant effort have allowed the development teams to put effort on other characteristics, e.g. those related to user experience, as well as to be able to fulfil all the initial requirements. On the other hand components with low "ease of application" rating have apparently caused issues, mostly in terms that they required the development teams to focus on them and put much effort in order to incorporate them as planned, that some other characteristics of the trial solutions could not be covered at the best possible level.
- The Interoperability Maturity and the Openness of the utilised GEs and SEs shall be considered as very important for the characteristics of the trial solutions. The more open and interoperable a component, the easiest it is to use it in a way that fulfils all requirements set and at the same time allows the development teams to put effort of issues like making the software easier to get understood.

The general outcome of the analysis performed is that although the trial solutions are focused on the needs and the special characteristics of the trials, they strongly depend, as far as it concerns important aspects, on the individual FI-components (Generic and Specific Enablers) they incorporate. While this was something logical and more or less expected, the validation performed was able not only to confirm this assumption but also to identify which specific characteristics of the components have been inherited (directly or indirectly) to the final solutions. This is very crucial in order to provide recommendations for further improving the GEs and/or the SEs examined and utilised in the framework of the project.

5.2.2. Data Filtering

As presented in section 4.2.3, the scope of the second step of the validation analysis is to identify if there are cases that the combination of scores on different variables are statistically unusual. In other words to identify whether there are any multivariate outliers in the validation data which could lead to misleading conclusions

In order to identify if such cases exist, a series of statistical tests have been performed, through which specific validation data could be characterised as outliers.

The table below summarizes the validation data available for the components (GEs and SEs) utilised in all the trials of the project.

Table 126 Validation data for the components for all trials

Component	Observations	Minimum	Maximum	Mean	Std. deviation
Apps.ApplicationMashup	45	0,0000	4,0000	2,2889	0,7268
Apps.Mediator	17	1,0000	3,0000	1,7059	0,7717
IoT.Gateway.DataHandling	27	1,0000	3,0000	2,3704	0,6293
IoT.Backend.IoTBroker	24	1,0000	3,0000	2,5000	0,5898
Shopfloor Data Collection	24	1,0000	3,0000	2,2083	0,7211
Metadata and Ontologies Semantic Matching	21	0,0000	3,0000	1,7619	0,6249
IoT.Backend.ConfMan	24	1,0000	3,0000	2,7917	0,5090
Data.PubSubCAPContext	20	1,0000	3,0000	2,2500	0,7864
Data.UDA	7	1,0000	2,0000	1,4286	0,5345
Unstructured and Social Data Analytics	7	1,0000	3,0000	2,0000	0,5774
SE-DF-1 - SEMed - Semantic Mediator front-end & back-end	21	0,0000	3,0000	2,1905	0,8729
SE-DF-2 - c3DWV - Collaborative 3D Web Viewer	14	0,0000	3,0000	2,2143	0,9750
Apps.LightSemanticComposition	7	1,0000	2,0000	1,5714	0,5345
Data.SemanticApplicationSupport	14	0,0000	3,0000	2,0000	0,9608
Collaboration Platf. BP Mgmt	17	1,0000	3,0000	1,6471	0,6063
Data Interoperabil. Platform Services	14	0,0000	3,0000	1,6429	0,7449
Apps.Repository	17	0,0000	3,0000	2,0588	0,8269
Apps.Marketplace	17	0,0000	4,0000	2,0000	1,0000
SE-VF-1 - MoVA - Management of Virtualized Assets	7	1,0000	3,0000	1,7143	0,7559
SE-VF-2 - GeToVA - Generation and Transformation of Virtualized Assets	7	0,0000	3,0000	1,7143	0,9512
PC-DF-1 - iLike	7	1,0000	2,0000	1,5714	0,5345
Data.PubSubOrionContext	7	1,0000	3,0000	2,1429	0,8997
Collaborative Assets Management	10	1,0000	3,0000	2,0000	0,8165
Data.BigData	10	1,0000	3,0000	2,1000	0,7379
Secure Event Management	13	0,0000	3,0000	2,0769	0,7596
SE-DF-4 - 3DScan - 3D Scanning Storage and Visualisation	7	2,0000	2,0000	2,0000	0,0000

PC-DF-3 - 3D Point Cloud Analysis	6	2,0000	2,0000	2,0000	0,0000
SE-SF-1 - DyCEP - Dynamic CEP	7	2,0000	3,0000	2,4286	0,5345
IoT.Gateway.ProtocolAdapter	3	1,0000	1,0000	1,0000	0,0000
IoT.Backend.DeviceManagement	3	2,0000	2,0000	2,0000	0,0000
Supply Chain & Business Ecosystem Apps	3	2,0000	2,0000	2,0000	0,0000
PC-DF-2 - Virtual Obeya	2	3,0000	3,0000	3,0000	0,0000

The analysis of the data in order to identify outliers was based on the calculation of a z-score for each individual validation. Values of the z-score higher than "2" and lower that "-2" identify validation data which could be characterised as outliers.

The following cumulative diagram represents the highest/lowest z-score identified in the validation results of each component (GE/SE). Components that in the diagram are presented with z-score either over "2" or below "-2" had to be examined one by one as far as it concerns their validation, since at least one of the scores of their validation is statistically considered as outlier.

After examining all potential outliers, specific data have been removed from the validation analysis worksheet in order the cross-trial analysis performed next to be as accurate as possible. The outliers identified and removed were all based on technical reasons and justified on the basis of the comments that the validators had entered in the validation forms.

An indicative example is the following: Augusta Westland trial had utilised the Apps.ApplicationMashup enabler. However due to the fact that at the time of the validation some specific modules of the trial solution were not fully ready in order to validate the characteristics of the component, zero values were submitted in the validation form. Obviously, not excluding such values would lead to wrong results as far as it concerns the characteristics of this component.

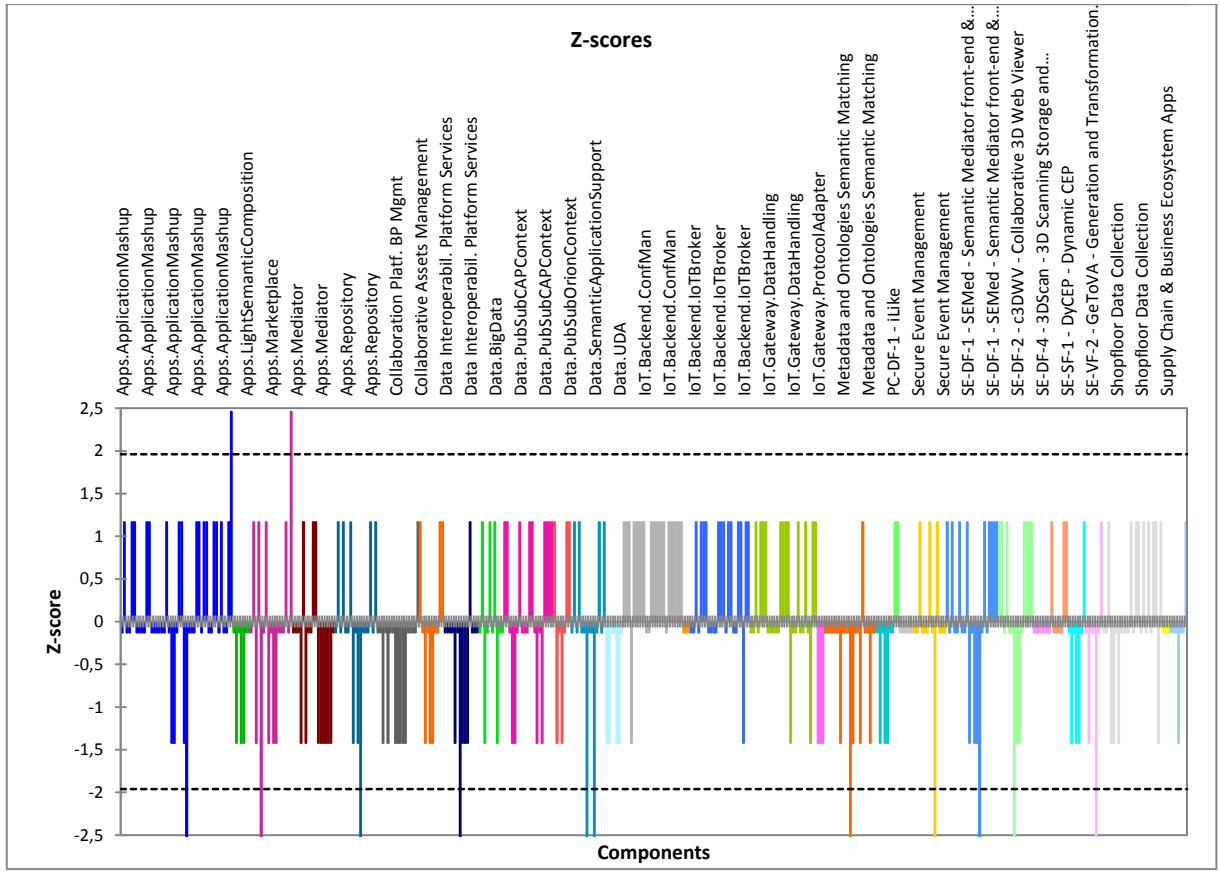


Figure 85 Z-Scores representation for the Identification of potential Outliers (cummulative diagram)

This step of the analysis had as a main scope to process the validation data by excluding misleading values. The cross-trial analysis performed in the next section is based on the new dataset produced as a result of the process described above.

5.2.3. Overall Cross-Trial Analysis

The present section presents the results of the cross-trial analysis according to the technical validation performed. The results have been analysed in clusters according to the Factory Domain of the Specific Enablers and the FIWARE Chapter of the Generic Enablers.

5.2.3.1 Cross-Trial Analysis per FIWARE Chapter

As far as it concerns the Generic Enablers utilised in FITMAN trials, their majority belongs in three FIWARE Chapters:

- Applications/Services Ecosystem and Delivery Framework
- Data/Context Management
- Internet of Things (IoT) Services Enablement

It has to be noted that the available data for any GE not belonging in those three chapters were very limited, so any statistical calculation could not be performed since the sample could not be considered sufficient. This is why the analysis contains only the three chapter in which most of the utilised GEs belong.

The validation results per Technical Indicator per Chapter are presented in the following tables:

Table 127 Technical Indicators per Chapter

Applications/Services Ecosystem and Delivery Framework Chapter	Indicator	Very Low - Low	Medium - High
	Correctness	0%	100%
	Ease of application	24%	76%
	Efficiency	8%	92%
	Interoperability Maturity	47%	53%
	Openness	41%	59%
	Reliability	15%	85%
	Sustainability	8%	92%
Data/Context Management Chapter	Indicator	Very Low - Low	Medium - High
	Correctness	13%	88%
	Ease of application	56%	44%
	Efficiency	0%	100%
	Interoperability Maturity	22%	78%
	Openness	44%	56%
	Reliability	29%	71%
	Sustainability	0%	100%
Internet of Things (IoT) Services Enablement Chapter	Indicator	Very Low - Low	Medium - High
	Correctness	0%	100%
	Ease of application	13%	87%
	Efficiency	0%	100%
	Interoperability Maturity	7%	93%
	Openness	13%	87%
	Reliability	0%	100%
	Sustainability	22%	78%

The following table presents a comparative analysis among the FIWARE Chapters, considering the validations considered as positive (Medium and High) for the enablers of each chapter:

Table 128 Comparative analysis among the FIWARE Chapters, validations considered as positive

Indicator	Applications/Services Ecosystem and Delivery Framework	Data/Context Management Chapter	Internet of Things (IoT) Services Enablement Chapter

	Chapter		
Correctness	100%	88%	100%
Ease of application	76%	44%	87%
Efficiency	92%	100%	100%
Interoperability Maturity	53%	78%	93%
Openness	59%	56%	87%
Reliability	85%	71%	100%
Sustainability	92%	100%	78%
Average	**80%**	**77%**	**92%**

On average the validations considered as positive are **83%.**

The following diagram provides a graphical representation of the analysed data:

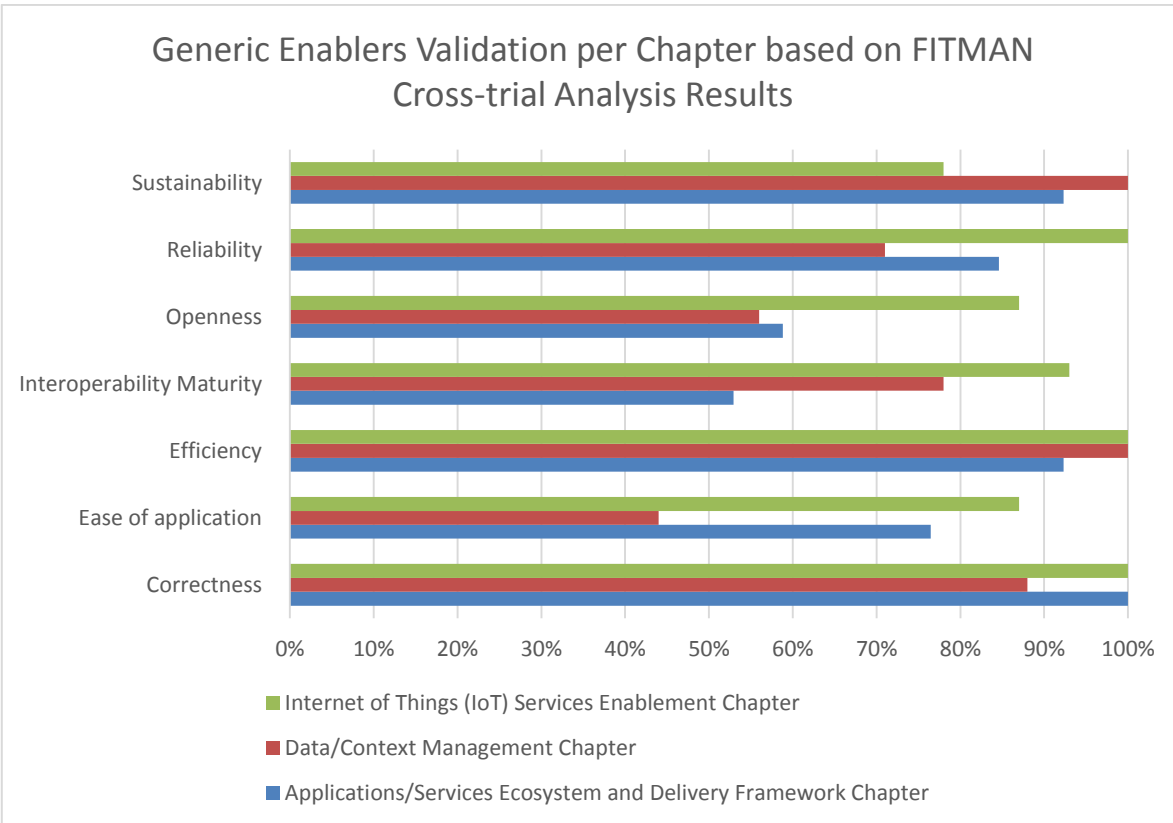


Figure 86 Generic Enablers Validation per Chapter based on FITMAN Cross-trial Analysis Results

5.2.3.2 Cross-Trial Analysis per FITMAN Factory Domain

For each of the three Factory Domains of FITMAN, the validation of the Specific Enablers is presented in the following tables.

Table 129 Technical Indicators per Industry Domain

Digital Factory	Indicator	Very Low - Low	Medium - High
	Correctness	0%	100%
	Ease of application	10%	90%
	Efficiency	0%	100%
	Interoperability Maturity	67%	33%
	Openness	50%	50%
	Reliability	0%	100%
	Sustainability	0%	100%
Smart Factory	Indicator	Very Low - Low	Medium - High
	Correctness	0%	100%
	Ease of application	38%	63%
	Efficiency	0%	100%
	Interoperability Maturity	0%	100%
	Openness	13%	88%
	Reliability	0%	100%
	Sustainability	20%	80%
Virtual Factory	Indicator	Very Low - Low	Medium - High
	Correctness	0%	100%
	Ease of application	38%	62%
	Efficiency	20%	80%
	Interoperability Maturity	77%	23%
	Openness	54%	46%
	Reliability	0%	100%
	Sustainability	10%	90%

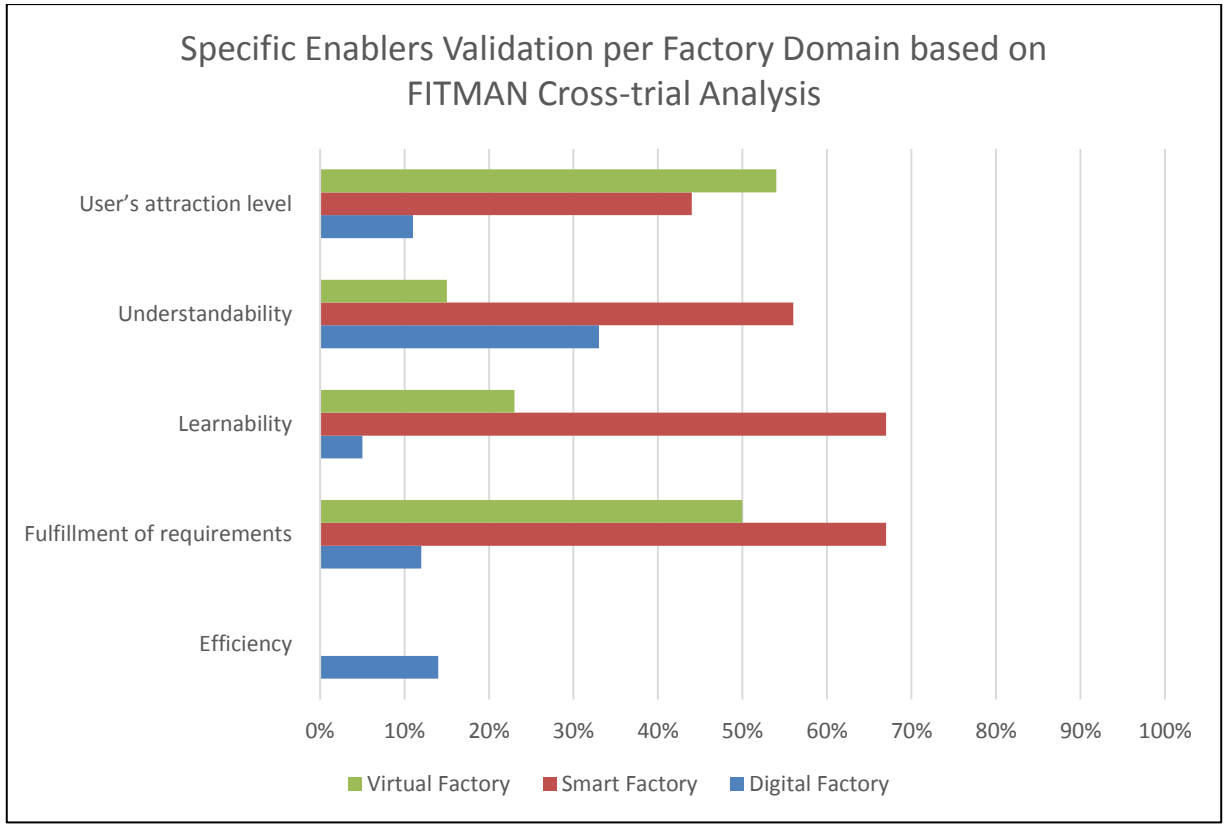
A cross-domain comparison, considering the positive validations (Medium-High-Very High) of the enablers is shown in the table which follows:

Table 130 Cross-domain comparison, considering the positive validations

Indicator	Digital Factory	Smart Factory	Virtual Factory
Correctness	100%	100%	100%
Ease of application	90%	63%	62%
Efficiency	100%	100%	80%
Interoperability	33%	100%	23%

Maturity			
Openness	50%	88%	46%
Reliability	100%	100%	100%
Sustainability	100%	80%	90%

The following diagram provides a graphical representation of the analysed data:



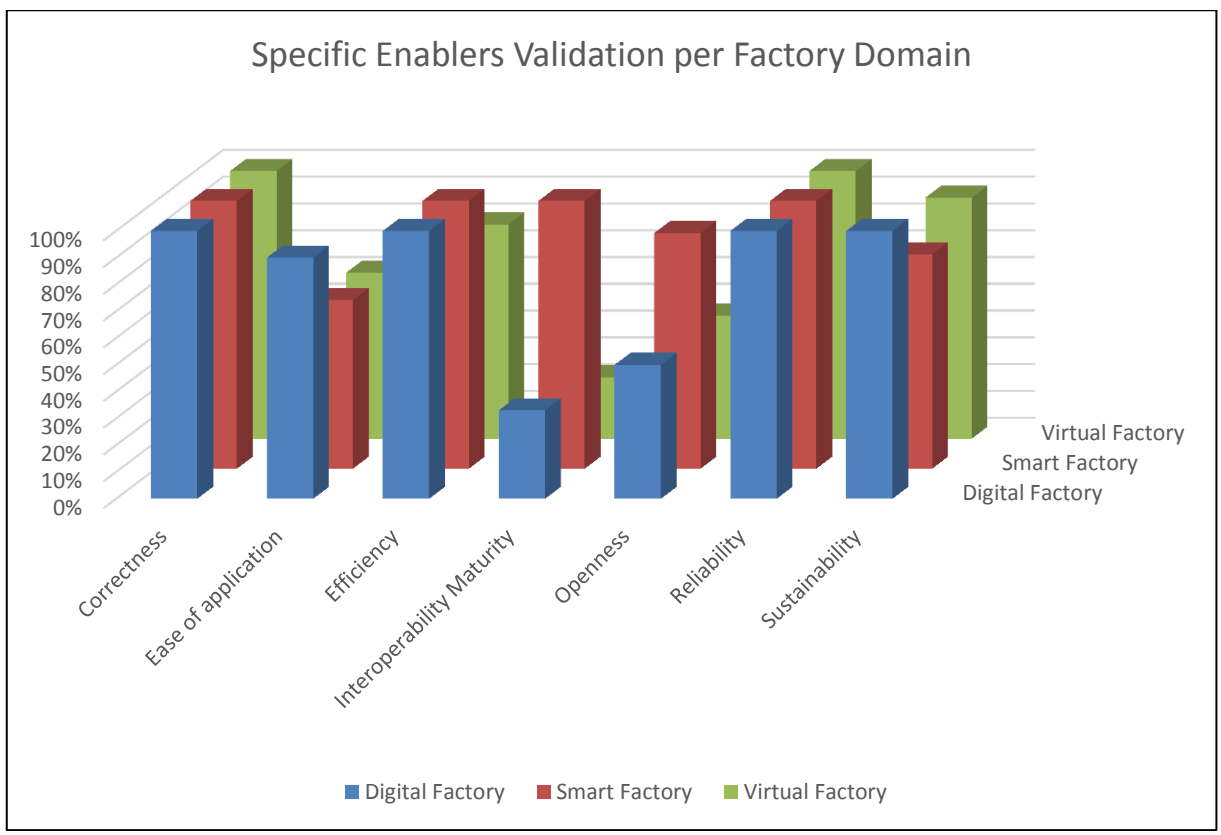


Figure 87 Specific Enablers Validation per Factory Domain based on FITMAN Cross-trial Analysis

5.2.3.3 Trials Validation Comparison

The following table presents a cross-trial analysis concerning the validation of the trial solutions. The results of the cross-trial analysis are cluster according to the Factory Domain of each Trial.

Factory Domain	Technical Indicator	Medium	High	Very High
Digital Factory	*Efficiency*	*0%*	*86%*	*14%*
	Fulfilment of requirements	*0%*	*88%*	*12%*
	Learnability	*5%*	*89%*	*5%*
	Understandability	*5%*	*62%*	*33%*
	User's attraction level	*11%*	*79%*	*11%*
Smart Factory	*Efficiency*	*0%*	*100%*	*0%*
	Fulfilment of requirements	*0%*	*33%*	*67%*
	Learnability	*0%*	*33%*	*67%*
	Understandability	*0%*	*44%*	*56%*
	User's attraction level	*0%*	*56%*	*44%*
Virtual Factory	*Efficiency*	*15%*	*85%*	*0%*
	Fulfilment of requirements	*8%*	*42%*	*50%*
	Learnability	*0%*	*77%*	*23%*
	Understandability	*0%*	*85%*	*15%*
	User's attraction level	*0%*	*46%*	*54%*

Apparently the validation results for most of the trials are very good, since most indicators have an average value of High or Very High.

The following diagram examines the distribution of the "Very High" ratings, as an indicative measure of excellence, among the Trial Domains for each Technical Indicator:

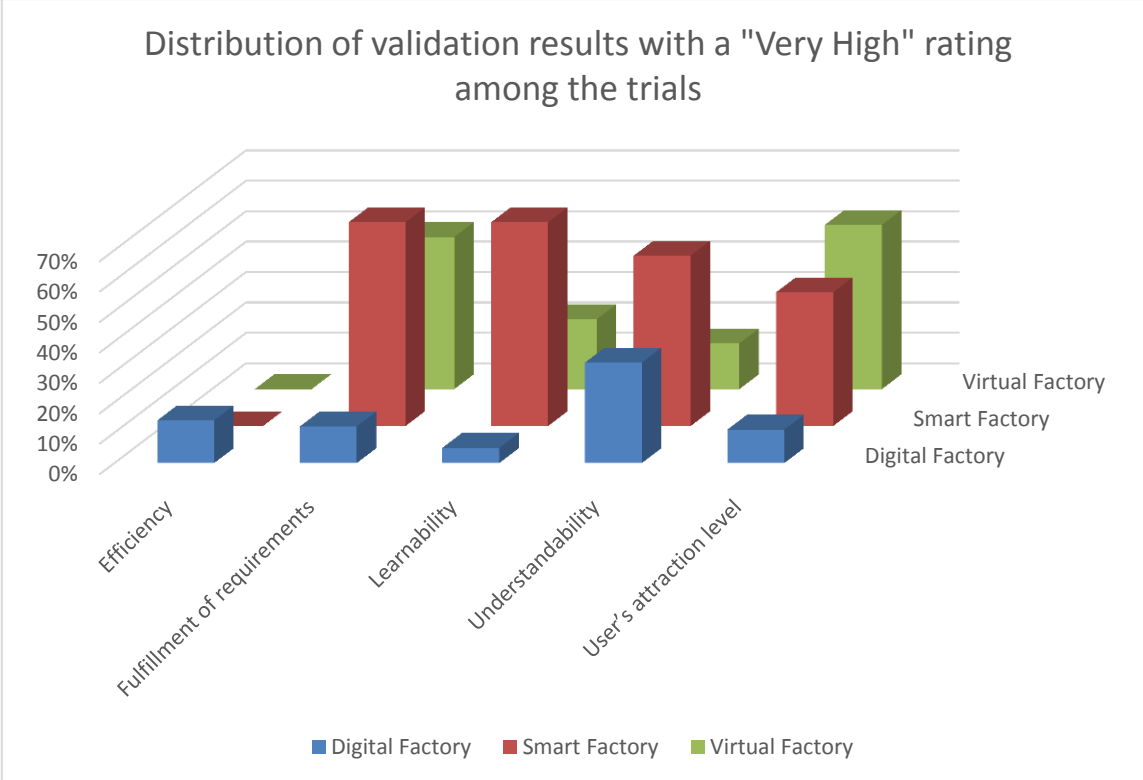


Figure 88 Very High Rating frequency per Industrial Domain

As obvious, the Smart and the Virtual Factory domains have higher ratings as far as it concerns the majority of indicators. Efficiency indicator consists an exception, for which the Digital Factory Trials have been rated higher.

5.3 Cross-trial business-technical analysis

In chapter 4.3 different approaches for technical-business –indicator analysis are presented. The aim is to see if there is any relationship between the satisfaction of the users to the trial technical performance and the business benefits measured.
The different comparison options would embody from 1 to 81 BI-TI comparisons for each trial, depending on the aggregation scope: how far the business and technical indicators of the same trial are aggregated. If no aggregation were performed, 5 Tis X 81 BIs (the total number of BIs in the trials) would lead to 410 BI-TI pairs. Thus it is quite clear that it is reasonable to perform some level of aggregation. This may be influenced by the indicator values given by the trials: if the values are very different, more detailed analysis and comparison could be interesting.

This chapter presents some first BI-TI comparison results, in which the different business indicators of the same trial are aggregated. The analysis uses the latest values given for the business indicators, that is, the to-be-2 values. Also the results of the different domains (digital, smart, virtual) have been compared.

At the highest aggregation level all the technical indicators and business indicators of each trial are aggregated. As explained in chapter 4.3, the aggregation through average is easily done for the technical indicators, as they have the same assessment method and range. Thus they are readily commensurate. The method for data collection is community-based:

the users are asked to give their opinion for the technical performance of the trial solutions through 5 indicators (efficiency, fulfilment of requirements, learnability, understandability, user's attraction level). In the current phase (May 2015) the community-based assessment is still ongoing in some of the trials; the assessment has been performed by 1-9 users/trial. Thus the results are necessarily not final.

To aggregate and compare the business indicators they need to be normalized. This is done by calculating the BI progress from the as-is value as a percentage compared to the needed development towards the BI target:

$$\text{BI-progress \%} = 100*(\text{BI-TO-BE} - \text{BI-AS-IS})/(\text{BItarget} - \text{BI-AS-IS})$$

After the normalization the different BIs of the same trial are aggregated through the average.
The business indicators have been assessed at different phases. These are called TO-BE-1 and TO-BE-2. In the current phase (May 2015) all the trials have given some values for TO-BE-2 but still some scenarios miss the values. 4 out of 10 trials have now achieved or exceeded their business target when looking at the average of trial scenario values.

Figure 89 Trials in aggregate TI-BI space (TI range 1-4). presents the high-level aggregation of the values of all the technical indicators and of all the normalized business indicators separately for each trial. On the x-axis the aggregated trial level TI values are given and the y-axis presents the normalized and aggregated business indicator values for each trial. Thus each trial has one point in this space. Because of the nature of the values (high aggregation and opinion-based assessment) the values should not be taken as exact values. More, the presentation could be taken as showing the placement of each trial in four fields: TI low & BI low, TI high & BI low, TI low & BI high and TI high & BI high. As it can be seen, most of the BI values and all the TI values given by the trials are on the high side. Even if the difference in the values of technical indicators is not high, it looks like the trials having highest TI values also have high BI values.
For clarity in the following Figures (from Figure 89 to Figure 94), Trials are referred with their ID according the following table.

#	Trial Name	Domain	Industry
1	Volkswagen	D	Automotive OEM
2	TRW	S	Automotive Supplier
3	AgustaWestland	D	Aeronautics OEM
4	Whirlpool	S	White Goods OEM
5	Piacenza	S	Textile/Clothing
6	A.P.R.	V	Plastic Industry
7	Consulgal	D	Construction Industry
8	TANet	V	Manuf. Resource Management
9	COMPlus	V	LED Lighting
11	AIDIMA	D	Furniture

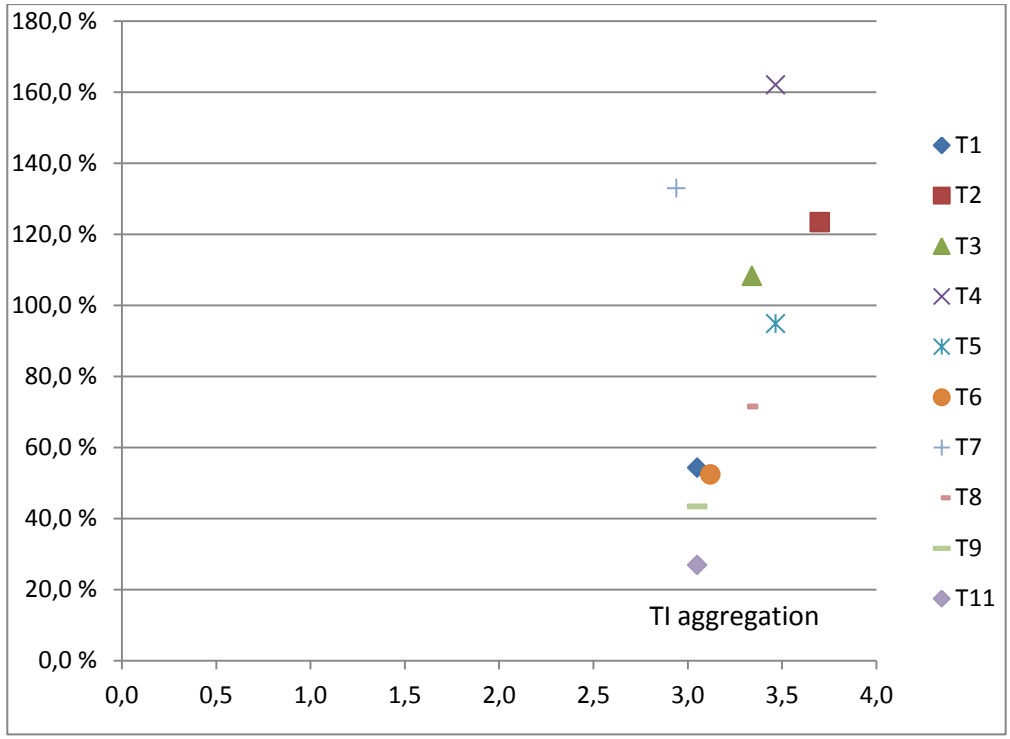


Figure 89 Trials in aggregate TI-BI space (TI range 1-4).

In the next Figure 90 Trial Solution Efficiency and BI ((TI range 1-4).to Figure 94 the same comparison is made separately for all trial solution level Technical indicators against the aggregated business indicator values. (Note that the scale of the x-axis is different in different figures as it is set according to the highest values.)

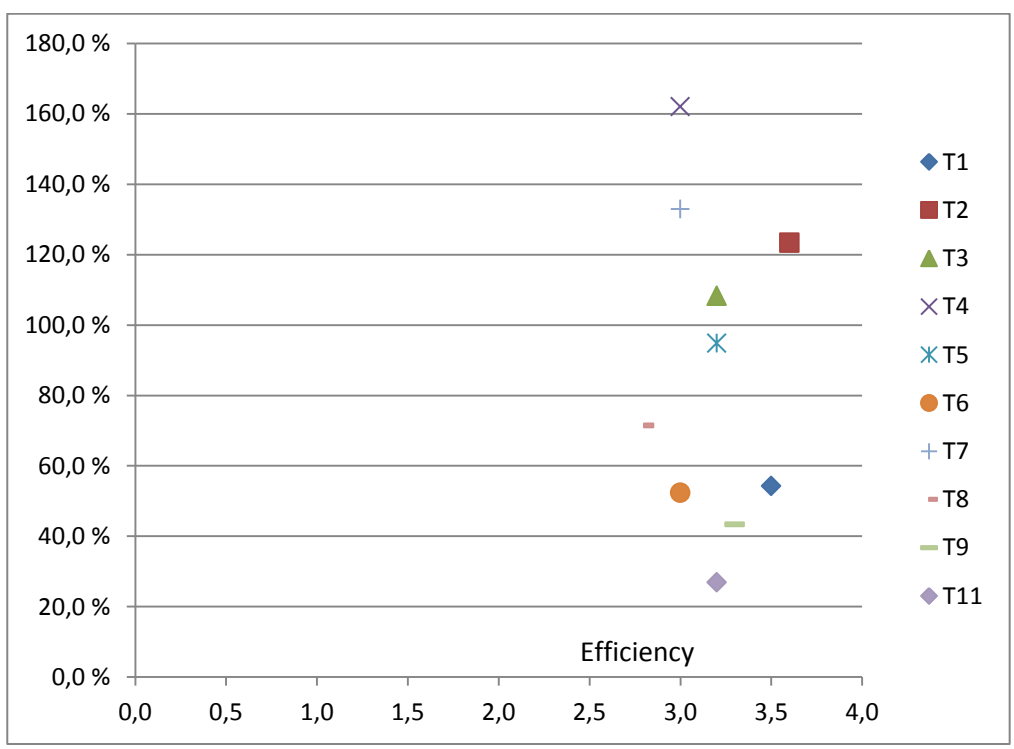


Figure 90 Trial Solution Efficiency and BI ((TI range 1-4).

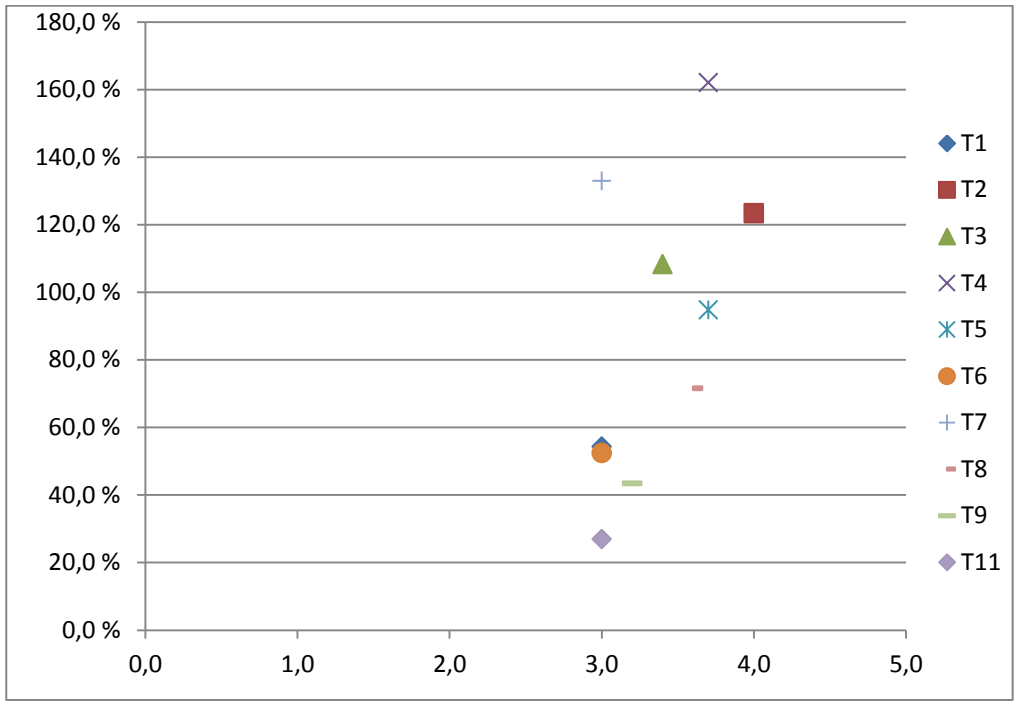


Figure 91 Trial Solution Fulfilment of Requirements and BI (TI range 1-4)

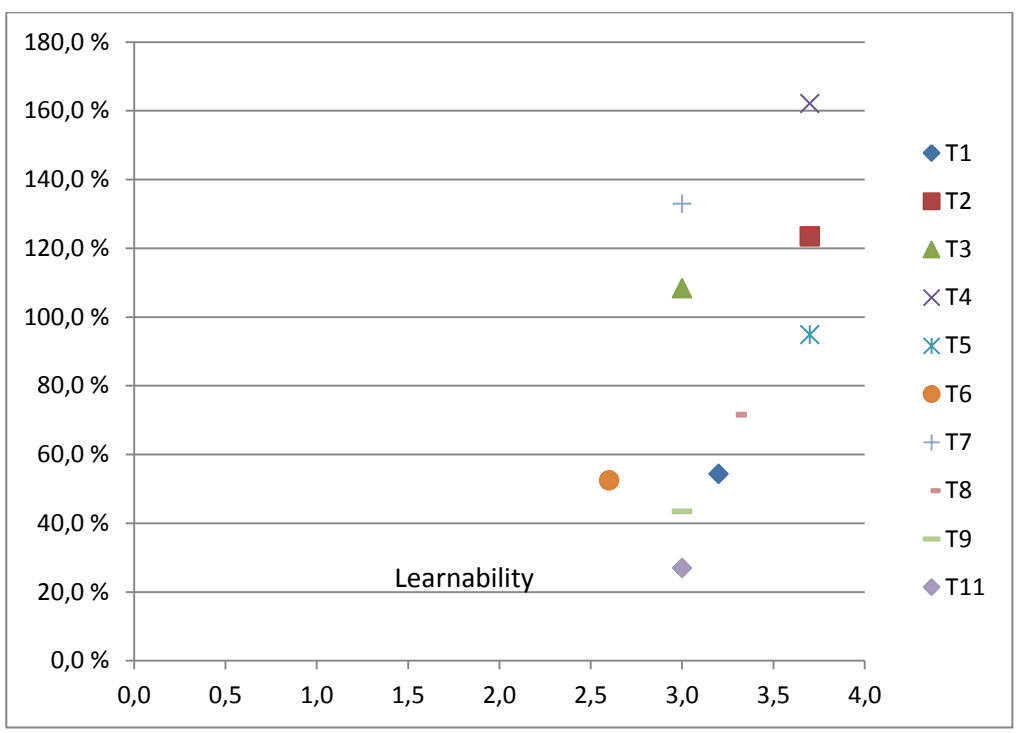


Figure 92 Trial Solution Learnability and BI (TI range 1-4).

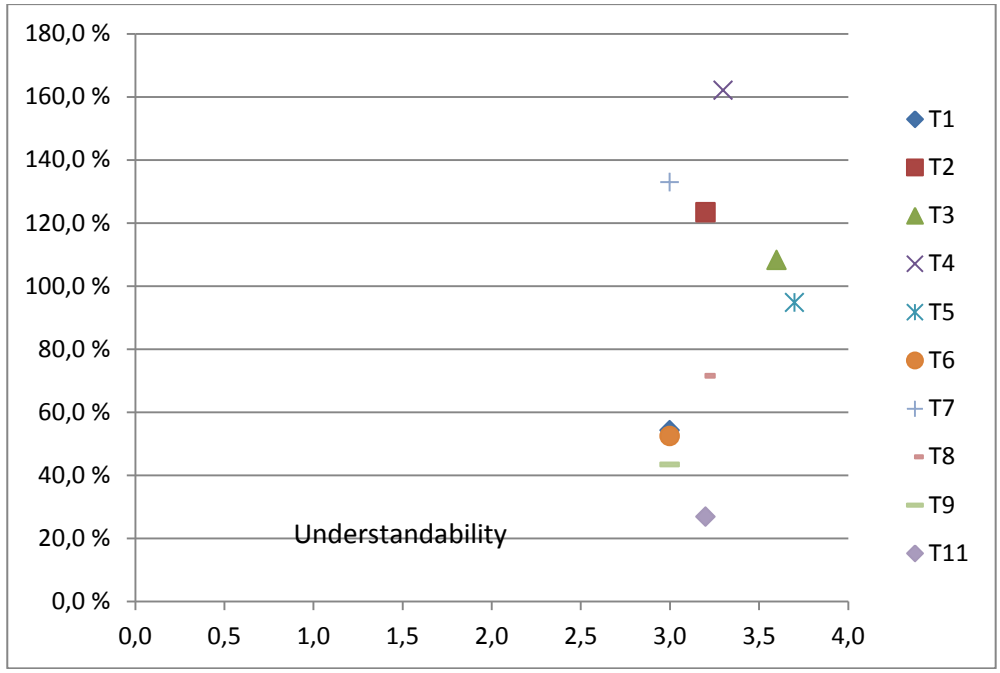


Figure 93 Trial Solution Understandability and BI (TI range 1-4).

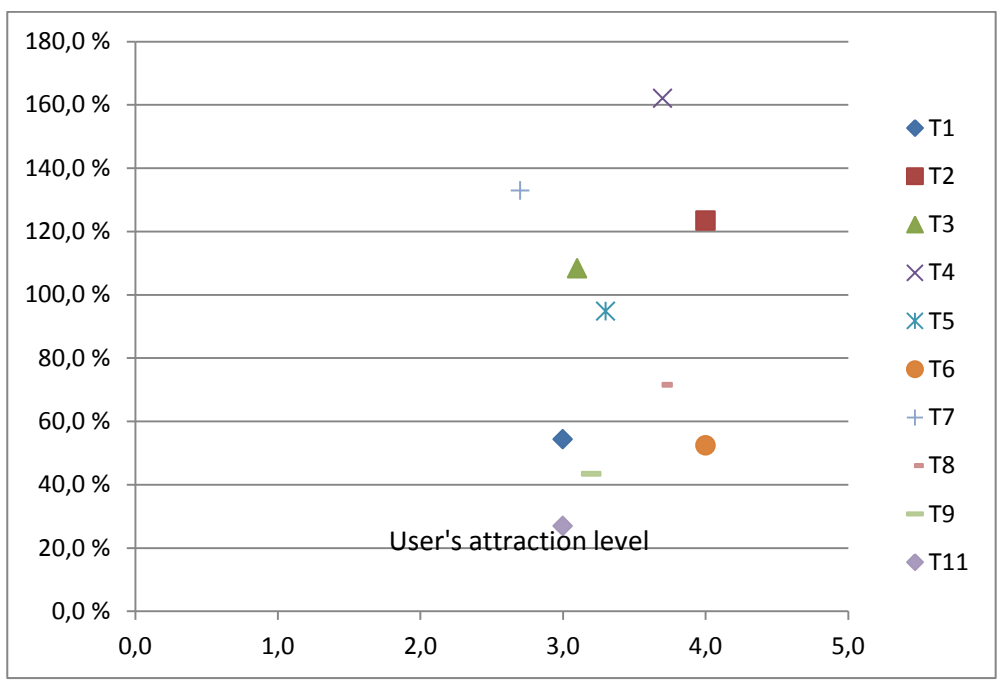


Figure 94 Trial Solution User's Attraction Level and BI (TI range 1-4).

Cross-trial BI-TI comparison conclusion

From the figures it can be seen that at this phase of the project there is a big difference between the different trials in the BPI values. Some of the trials have already exceeded the target while others are in the development phase. The average values of the trial business indicators range from 27% to 162 % of the target.

For the aggregated trial solution level technical indicator values (Figure 92 Trial Solution Learnability and BI (TI range 1-4).) some difference can be seen but not as high as for the BI values. The aggregated values given by the users seem to be quite near each other; the average ranges from 2.9 to 3.7 (scale 1-4). Thus at the high level the users seem to be quite satisfied with the technical performance of the trial solutions. From all community-based assessments of the trial solution level TIs only 5% are non-favourable (given value below 3 as the scale is 1-4).

In Figure 90 - Figure 94 the technical indicators are compared to the aggregated business indicators separately: each having its own figure. This is to see if the average hides some differences. Also here it can be seen that the values are well at the "satisfied" side. The distribution between different trials is slightly more dispersed for the user satisfaction – type of indicators (learnability, understandability, user attraction level) than for the functionality-based indicators (efficiency, satisfaction with requirements).

The differences of the BPIs between the trials are partly coming from the different maturity of the trials but it may also partly depend on the definition of the target values. The high values for the trial technical indicators also for the less developed trials may be a promising signal of their future performance also at the business level. This can be seen better when the final measurements are available.

Comparison of domains TI-BI (smart, digital, virtual)

In Figure 95 BI-TI -comparison has been performed for the different trial domains: digital, smart and virtual. The x-axis shows the average of the trial level 5 technical indicators for each domain and the y-axis the average BI-progress. The figure shows that at this phase the smart trials are in average more advanced in the business benefits. They also are in average more satisfied with the trial technical performance. The digital and virtual trials are at a lower level and near each other both in business benefits and in the technical satisfaction.

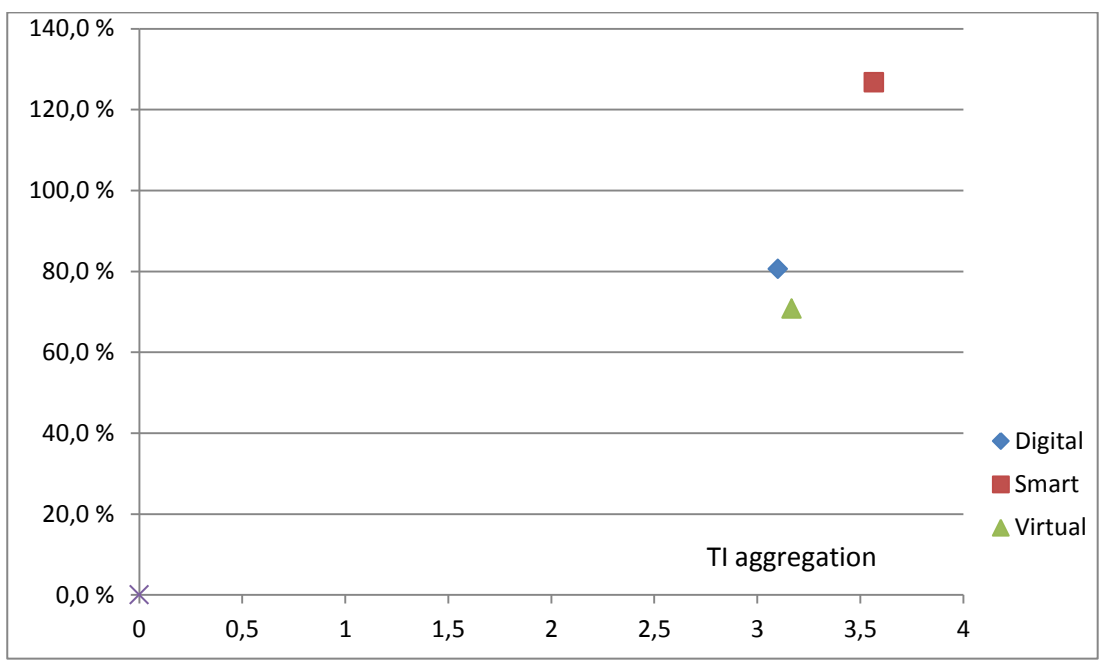


Figure 90 Trial Solution Level Technical Satisfaction and BI for different domains (TI range 1-4).

To better understand the sources of difference between the trial technical satisfaction between the smart and digital & virtual, the different domains and their trial level technical indicators are compared in Figure 96. It can be seen that for all the TIs the smart trials have highest satisfaction but the difference is highest for "Learnability" and lowest for "Efficiency".

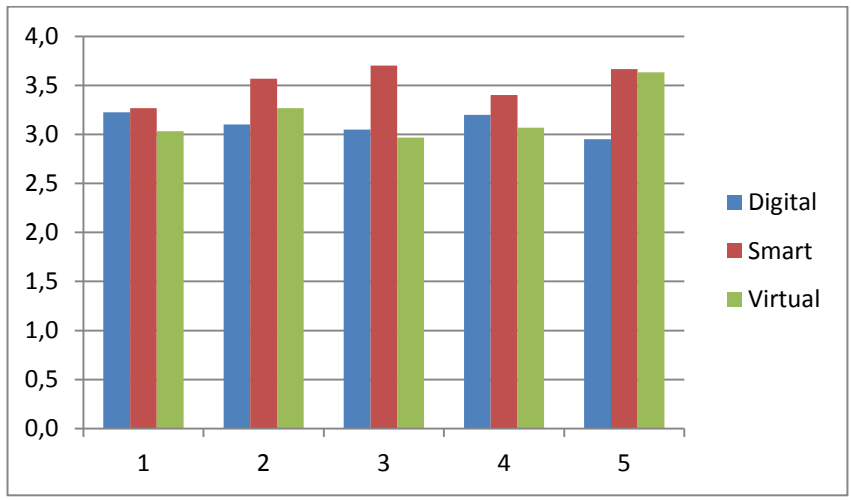


Figure 91 Trial Solution Level TI (TI range 1-4). 1: Efficiency, 2: Fulfilment of requirements, 3: Learnability, 4: Understandability, 5: User's attraction level.

Comments about the comparison of the V&V results

Here following we report some comments regarding the comparison of Trial business-technical values.
About the V&V process and comparison:

- The FITMAN V&V supports the trials comparative evaluation in a couple of ways. It enables trial specific and comparative analysis of the business and technical indicator values, as well as comparative analysis of the relation between business and technical indicator values.
- One of the strengths of the V&V assessment is that it has involved the assessment from different viewpoints and different stakeholders: IT partners, trial groups and end user community. When making conclusions from the given values, the stakeholders involved need to be considered.
- The trials and their objectives as well as their operational conditions are not homogeneous; thus their business achievements are not readily comparable. Setting up target values for the indicators and analysing the progress against the target may help, but as a whole it is not possible to make any far-reaching conclusions based on the comparison. Also, it was evident that setting the target values was not easy for the trials (some of them seemed to be too conservative estimates)

About the assessment status & results:

- The different trials are in different phases in the experimentation. All the trials have been able to give values for the BI and TI indicators but part of the scenarios are still under experimentation. Most of the trials show good progress in BIs in relation to their target values and some have already exceeded the target value (in average).

- The values given for the technical assessment at the trial level mainly show that the trials/ IT partners are happy. For example, 95% of the end user community opinions for the technical performance of the trial solutions were assessed favourable
- The number of trials (10) does not allow to make any real statistical analysis which would validate the path from good components (GE/SE) → good trial solutions → business success. One reason is that the role and importance of the components to the solutions may vary from one trial to another. In general achieving business success through the utilization of IT is a complex process which in addition to IT development also requires organizational change and process development.

5.4 Consolidation of trial progress and impact analysis

This section presents a socio-economic analysis of the FITMAN trials, applying the method described in Section 4.4. In brief, each trial is assessed along four axes:

1. Progress towards internally set BPI targets.
2. Potential beneficial contribution (PBC) of what is being done to the industry sector as a whole from 1 (=little impact) to 5 (=major impact). This could be in terms of financial gains as well as cost savings; an example would be the process efficiencies as part of the VW trial.
3. General applicability (GA) of trial outcome to manufacturing as a whole from 1 (=more specific to this case / scenario) to 5 (=major impact beyond the case). An example is the improvements for collaboration and resource efficiencies in the COMPlus trial.
4. Broader societal benefit (BSB), 1 being low impact / relevance, and 5 being broader and significant contribution. An example is the TRW case where health and safety practices would have wider implications for the firm, the workforce, and those dependent on the employees.

The first axis reflects the analysis in Section 5.1 of this document, while the remaining three axes reflect the analysis in FITMAN Deliverable 9.3 the FITMAN exploitation action plan and implementation including socio-economic impact (2nd edition) (Vega, Castellvi, Engen, & Partners, 2015). For deeper insights into the information that informs the remaining three axes, please consult the appropriate sections of D9.3, which has one section per trial (for example, D9.3 Section 3.2 discusses the VW trial).

Each of the following subsection assesses the above four factors for a given trial, while the final subsection, Section 5.4.11, provides a table (Table 131. Summary of Progress and Broader Impact of FITMAN Trial) that summarises the insights across the trials.

5.4.1. Trial No. 1 Volkswagen

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section 5.1.1, the overall progress of Volkswagen towards its BPI targets is 54.31%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
The Volkswagen trial concerns efficiency savings by improvements made to the in-house Machine Repository, used in production planning. Anticipated outcomes are improvements

to efficiency in updating the Machine Repository, in responding to inquiries and accessing expert knowledge, and better evaluation accuracies. All of these improvements could be relevant to the wider industrial sector: however, the value network diagram for Volkswagen in D9.3 emphasises that all components in the diagram except for customers represent internal departments within Volkswagen. As such, the only benefits to the wider industrial sector may come from 'copycat' implementation of like systems based on the one implemented by Volkswagen, and this trial can be considered to have a low impact on the automotive sector.

Ranking: 1/5 (little impact).

General Applicability (GA) of trial outcome to manufacturing as a whole
The Volkswagen trial concerns improvements to the Machine Repository, with a focus on reduced costs and times to update the repository and make inquiries. Although based in the automotive industry, lessons learned here could be applied more widely to repositories in other industrial sectors. It seems unlikely, however, that Volkswagen would release the innovative technologies developed in this trial for broader use, as to do so would negate any competitive advantage that may be gained.

Ranking: 2/5 (potential for major impact beyond the case, but highly unlikely to be achieved).

Broader Societal Benefit (BSB)
The Volkswagen trial focuses on efficiency improvements, with an emphasis made by the company that savings made will be used to diversify and improve their existing portfolio, not to make current employees redundant. As such, there will not be negative impact from redundancies.

There is a possibility of mild benefits to the environment, as the technology should allow Volkswagen to be more responsive and timely in implementing environmentally-friendly features.

There is a possibility that Volkswagen may produce a greater diversity of vehicles as a result of the technologies. However, the societal benefit of this is not immediately clear.

Ranking: 1/5 (low impact/relevance).

5.4.2. Trial No. 2 TRW

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section 5.1.2, the overall progress of TRW towards its BPI targets is 123.38%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
The TRW trial focuses on improving workplace safety, aiming improved employee vulnerability (fewer risks for employees, improved employee perception of risks), and reduced internal and external costs (i.e. lost working days, compensation or litigation). The changes being trialled by TRW are highly applicable across its industry sector (the manufacture of automotive accessories), as well as standing to have positive impact on the relevant regulators, who can expect better compliance and a reduced need for interventions.

Ranking: 5/5 (major impact to industry sector as a whole).

General Applicability (GA) of trial outcome to manufacturing as a whole
Workplace safety is of course relevant across manufacturing as a whole, as well as within TRW's industrial sector of the manufacture of automotive accessories. Expected results of the trial include better workplace safety, improved industrial relations, and reduced production losses.

Ranking: 5/5 (major impact beyond this case).

Broader Societal Benefit (BSB)
Improved health and safety practice have wide implications for both the firm implementing these (reduced costs i.e. from liabilities, better processes for managing risk), the workforce (reduced objective and subjective risks), those dependent on the workforce, and broader society (considering, for example, health and social care burdens in the community). In addition, the changes in the TRW trial stand to improve the safety of motor vehicles, as this is the type of accessory that TRW manufacture, and TRW can expect to see efficiency improvements arising from a healthier workforce; hence, benefits will also arise from improved motor vehicle safety.

The downside of the TRW trial is increased monitoring of workers, which is required to improve awareness of workplace incidents and to implement better safety measures. As discussed elsewhere **Specificata fonte non valida.**, this is a worthwhile trade-off for the improvements outlined above.

Ranking: 5/5 (broad, significant contribution).

5.4.3. Trial No. 3 AgustaWestland

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section 5.1.3, the overall progress of AgustaWestland towards its BPI targets was 108.33%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
AgustaWestland is a helicopter manufacturer. The trial involves two aspects:

1. Improvements to Final Assembly Line (FAL) Quality Production Assurance by consolidating into one place the different resources that workers need to interact with when updating logbooks about matters such as quality checks and modifications made.
2. Improving Foreign Object Damage (FOD) prevention by way of more tailored courses for FAL workers on FOD prevention, drawing on the results of new tracking tools.

Benefits of the trial include: reduced time to perform, record and analyse FAL logbook information; better quality of FAL logbook information (human error is reduced by removing the need to manually duplicate information); better FOD prevention due to better-trained FAL workers; better service for end users (due to improved quality of support and training for end users). The improvements to logbook information mean better safety assurance and higher quality of products. Workers will be better informed.

Similar technology could offer like benefits to other helicopter manufacturers, although

commercial competitiveness means that it is unlikely that AgustaWestland would share this information freely. Nonetheless, helicopter service stations and end users who rely on AgustaWestland for training or technical support can expect an improved service.

Ranking: 1/5 (potential for some impact beyond the case, but unlikely to be substantial)

General Applicability (GA) of trial outcome to manufacturing as a whole
The general concept of consolidating multiple information sources to improve efficiency applies widely, but the specifics of the AgustaWestland case are unlikely to apply broadly beyond the aerospace sector (if they did, AgustaWestland could have improved their systems by using an off-the-shelf product rather than engaging in a FITMAN trial). The aspect of the trial relating to improving Foreign Object Damage prevention is less likely to apply elsewhere.

Ranking: 1/5 (more specific to this case/scenario).

Broader Societal Benefit (BSB)
The trial leads to internal improvements in efficacy as well as to services provided by AgustaWestland, but has little broader impact beyond some economic gains for AgustaWestland arising from its improved service. Note that there are no environmental benefits from reduced paper usage due to aviation regulations that mean helicopter documentation must be in paper form.

Ranking: 1/5 (low impact/relevance).

5.4.4. Trial No. 4 Whirlpool

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section 5.1.4, the overall progress of Whirlpool towards its BPI targets is 162.03%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
This trial aims to reduce the number of defective products by helping workers better identify possible issues in the production line, and to improve data management for faster production. If successful, the trial stands to result in greater competitiveness of Whirlpool, not least as costs associated with servicing and warranties will drop, but that improvement to competitiveness is a strong reason why Whirlpool is unlikely to share the results widely across the sector.

There will be some benefit within the sector as the trial stands to provide a positive impact on the supply chain due to increased process efficiencies.

Ranking: 2/5 (some impact).

General Applicability (GA) of trial outcome to manufacturing as a whole
Better identification of possible production line issues is relevant to manufacturing more widely, but as described above, it is unlikely that the benefits of the trial will rapidly dissipate across industry, as to do so would result in Whirlpool losing its competitive edge.

Ranking: 1/5 (relevant, but low impact).

Broader Societal Benefit (BSB)
Fewer defects in white goods should lead to positive environmental impacts, since the use of white goods is associated with negative impacts on the environment due to energy and water use, waste, materials, and emissions. People in society should see more reliable products of better value, and there is potential for generation of cross-domain IT/manufacturing jobs as well as some small boost to manufacturing that will positively impact the economy.

Ranking: 3/5 (some impact).

5.4.5. Trial No. 5 Piacenza

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section 5.1.5, the overall progress of Piacenza towards its BPI targets is 94.81%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
This trial involves fabric reduction, with outcomes to include reduction of a) fabric production cost per unit, b) time to produce fabric, and c) production errors.

Piacenza plan to promote this FITMAN trial (which has goals applicable across the industry) widely, including within its suppliers and via involvement of the textile innovation pole of Piedmont (with more than 80 partners), the EU industrial association EURATEX, and the Textile/Clothing EU Technology Platform (with more than 750 members). For this reason, as well as positive impacts from the trial in terms of timeliness within Piacenza's supply chain, substantial impact is expected.

Ranking: 5/5 (major impact).

General Applicability (GA) of trial outcome to manufacturing as a whole
This trial has some applicability to manufacturing as a whole, with goals including reduced costs and time of production and reduction of production errors. The planned sharing of information, described above, means a reasonable impact can be expected.

Ranking: 3/5 (reasonable impact beyond the case).

Broader Societal Benefit (BSB)
Efficiency improvements in textile manufacture should bring about a positive impact on the environment, as textile manufacture has negative environmental impacts in terms of water and energy consumption, use of chemicals and emissions. As a result of the trial, for example, Piacenza expects to reduce energy usage. Customers can expect swifter delivery of goods, but no substantial impacts are forecast for employment or the economy.

Ranking: 2/5 (some impact/relevance).

5.4.6. Trial No. 6 APR

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section5.1.6, the overall progress of APR towards its BPI targets is 52.36%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
This trial involves reducing the number of faulty products, more automated generation of

quotes for customers, and improved stock management. These benefits could be applicable across the sector as a whole, but APR is unlikely to share the benefits as to do so is counter to its mission to compete well with other, like companies.

Improvements in products and processes mean that APR's suppliers and customers will see some benefit.

Ranking: 2/5 (good relevance, limited impact)

General Applicability (GA) of trial outcome to manufacturing as a whole
The goals of the trial are applicable more broadly in manufacturing, but unlikely to have an impact as APR is unlikely to share the technology, as described above.

Ranking: 1/5 (limited impact)

Broader Societal Benefit (BSB)
The negative environmental impacts of plastic and rubber work (emissions, land contamination, noise and water pollution, and waste disposal) will be somewhat mitigated by process improvements. This may be countered by a potential increase in plastics production should APR become more competitive as a result of the trial.

Workers are likely to be happier due to having fewer repetitive tasks to do, and APR have made clear that efficiency gains of this type will not lead to redundancies but to wider responsibilities for workers, so no negative impact on employment is expected.

Ranking: 2/5 (some impact/relevance).

5.4.7. Trial No. 7 Consulgal

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section5.1.7, the overall progress of Consulgal towards its BPI targets is 132.95%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
The Consulgal trial involves the use of Future Internet technologies to improve information management processes, with benefits including reduced paper usage, reduced management overhead (due to reduced lead time for analysis of results), leading to reduced risk of project failure. These sorts of improvements are applicable broadly within the sector of civil engineering, particularly given that civil engineering projects typically have a significant impact on society (i.e. development of infrastructure or urban regeneration) as well as a lengthy duration, meaning that improvements to information management will have greater impact than they might in other sectors.

Additionally, the value network for this trial shows that many other companies in civil engineering are involved even within this sector (one other large company and over 100 SMEs), also increased the trial's impact within the sector.

Ranking: 5/5 (major impact to industry sector as a whole).

General Applicability (GA) of trial outcome to manufacturing as a whole
Although the technologies used in this trial are arguably of particular impact within civil engineering (where projects are typically large and of lengthy duration), they concern

topics that are applicable and relevant to manufacturing as a whole. Improved information management, savings due to reduced paper usage, time savings due to faster processes to record test results, and consequent increased chances of project success are relevant across all manufacturing sectors.

Ranking: 5/5 (major impact beyond this case).

Broader Societal Benefit (BSB)
This trial concerns the construction of dams, civil engineering projects with substantial impacts on society. Environmental impacts are of particular note since projects such as dam construction lead to:

- atmospheric pollution from large amount of materials used
- impact on geographical area and natural habitats
- use of fossil fuels during construction
- upon completion, reduction in use of fossil fuels due to generation of hydroelectric power

Any intervention that increases efficiency and increases the chance of project success will have a positive impact on the above factors, and is thus to be welcomed by broader society.

Ranking: 5/5 (broad, significant contribution)

5.4.8. Trial No. 8 TANet

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section5.1.8, the overall progress of TANet towards its BPI targets is 71.54%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
This trial focuses on streamlining of data aggregation and functionality to match suppliers with tender opportunities, generating successful clusters of collaborating organisations. As such, it stands to have a substantial impact on the industry sector.

Ranking: 5/5 (major impact).

General Applicability (GA) of trial outcome to manufacturing as a whole
Matching tenderers with job opportunities is clearly applicable across broad parts of manufacturing, and so this trial has good relevance to manufacturing as a whole.

Ranking: 4/5 (substantial impact).

Broader Societal Benefit (BSB)
With better clustering, leading to more and potentially larger job opportunities, a positive impact on employment and the economy is foreseen. The environmental impact is less obvious.

Ranking: 3/5 (some significant impact/relevance).

5.4.9. Trial No. 9 ComPlus

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section 5.1.9, the overall progress of ComPlus

towards its BPI targets is 43.40%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
The ComPlus trial concerns workflow management within LED lighting manufacture, including collaboration between multiple suppliers. Workflow management is not specific to ComPlus itself, and as such this trial has a wider applicability within its industry sector. That said, it seems unlikely that ComPlus would share innovative trial outcomes with its competitors. The trial can be expected, however, to have a positive impact on the network of suppliers with whom ComPlus interacts, due to factors such as the improved supplier search, better transparency of documentation, and generally increased ease of collaboration.

Ranking: 2/5 (good relevance, some impact).

General Applicability (GA) of trial outcome to manufacturing as a whole
Again, workflow management applies more broadly within manufacturing as a whole, and so this trial would stand to have a wider impact if it were likely that its outcomes were to be widely shared. Considerations of competitiveness, however, mean it is unlikely that such an impact will happen.

Ranking: 1/5 (good relevance, impact unlikely).

Broader Societal Benefit (BSB)
Considering employment, the trial may be expected to re-balance the distribution of the workforce within ComPlus and its network. It is unclear whether this will lead to increased efficiencies or to redundancies. Regarding the environment, there may be some reduction of carbon footprint due to increased efficiencies and better communication and collaboration, but this reduction is likely to be minor (not least as improved efficiencies may well result in more work being done more efficiently, rather than less work being done). The economic impact, however, can be expected to be positive, with collaborations involving ComPlus leading to greater economies of scale.

Ranking: 2/5 (some impact/relevance)

5.4.10. Trial No. 11 AIDIMA

Progress towards Business Performance Indicator (BPI) targets
As described in the concluding remarks of Section 5.1.10, the overall progress of AIDIMA towards its BPI targets is 26.89%.

Potential Beneficial Contribution (PBC) to industry sector as a whole
This trial concerns furniture manufacture, specifically improved (more streamlined, automated) collection of information about product and use trends. This should lead to savings in cost, improved time to market, and a better quality of trends research.

AIDIMA intend to share this information with its associate companies, meaning there will be some impact in the broader industry sector. In addition, sales of the market research brochures will lead to increased impact from the improved results of the market research.

Ranking: 3/5 (some impact).

General Applicability (GA) of trial outcome to manufacturing as a whole

Trends forecasting is clearly relevant in other areas of manufacturing (for example, textile and clothing manufacture), and so the technologies of this trial are relevant elsewhere.

Ranking: 4/5 (relevance beyond the case).

Broader Societal Benefit (BSB)
The efficiency savings of this trial will not lead to redundancies among AIDIMA's market researchers, but rather to a greater volume of higher quality market research reports: as such, no negative impact on employment is expected.

The improved insights into the market for AIDIMA, its associate companies and customers who buy the market research reports are expected to lead to better tailored products and some economic growth, as well a limited environmental impact in terms of reduced waste from work on products that are ultimately unsuccessful.

Ranking: 3/5 (some impact/relevance).

5.4.11. Summary of Progress and Broader Impact of FITMAN Trials

Table 131. Summary of Progress and Broader Impact of FITMAN Trial summarises the findings of Sections 5.4.1 to 5.4.10 inclusive.

Table 131. Summary of Progress and Broader Impact of FITMAN Trial

FITMAN Trial (Number, Name)		Business Performance Indicator targets (%)	Potential Beneficial Contribution (from 1 - 5)	General Applicability (from 1 - 5)	Broader Societal Benefit - (from 1 - 5)	Aggregate Score (BPI * PBC * GA * BSB)
1	Volkswagen	54,31	1	2	1	108,62
2	TRW	123,38	5	5	5	15.422,50
3	AgustaWestland	108,33	1	1	1	108,33
4	Whirlpool	162,03	2	1	3	972,18
5	Piacenza	94,81	5	3	2	2.844,30
6	APR	52,36	2	1	2	209,44
7	Consulgal	132,95	5	5	5	16.618,75
8	TANET	71,54	5	4	3	4.292,40
9	COMPLUS	43,4	2	1	2	173,60
11	AIDIMA	26,89	3	4	3	968,04
	Average					**4.171,82**

6. Final Remarks and conclusion

Based on the different approaches and perspectives illustrated in D8.1 in Chapters 5.1-Business Consolidation, 5.2-Technical Consolidation, 5.3-Cross-trial business-technical analysis, 5.4-Consolidation of trial progress and impact analysis, we collected a great deal of information we can utilize here for a consolidation of results and initial comparison among the different Trials. We proceed keeping the classification of Chapter 5 Synthesis of collected data

BPIs consolidation

For the Business perspective, based on the value of indicators inserted so far (M24-TO BE 2) as described in detail each trial displayed a specific dynamic (see 5.1-Business Consolidation). Being fully aware of the difficulties to compare Trials each other, due the differences of businesses and operations in various realities, we can nevertheless make a simple comparison based on the average values of the TO BE 2 indicators (the most recently collected).

In the following table it is represented the average values of TO BE 2 indicators.

Trial ID	Trial Name	Progress TO BE 2 / TARGET of all the BPIs per trial
4	Whirlpool	162,03%
7	Consulgal	132,95%
2	TRW	123,38%
3	AgustaWestland	108,33%
5	Piacenza	94,81%
8	TANET	71,54%
1	Volkswagen	54,31%
6	APR	52,36%
9	COMPLUS	43,40%
11	AIDIMA	26,89%

Table 132 Trials ranked per Progress of TO BE 2

From this table we can observe that Whirlpool, , Consulgal TRW and AgustaWestland have already achieved their business targets, while Piacenza and TANET are close to.

The following chart represent the same data including the average of the progress of all Trials **(98.46%)** and the target (100%).

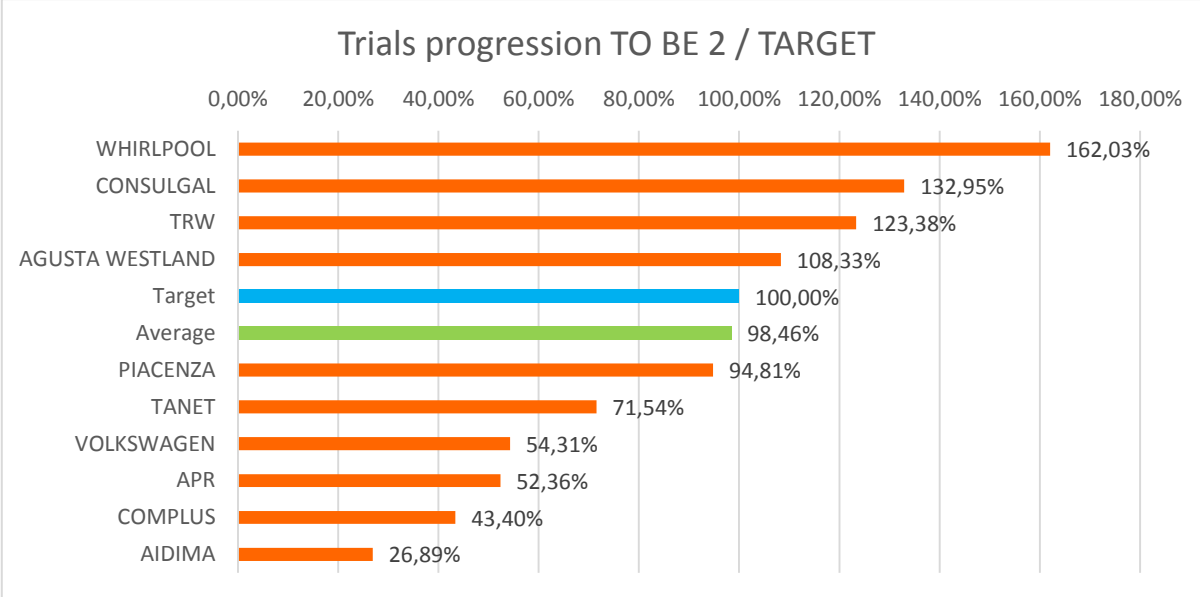


Figure 95 Trials ranked per Progress of TO BE 2

Nevertheless, we have to consider that AIDIMA has a low value, but that is due to the long dynamics to observe results; they are fully convinced that by M30, when TO BE 3 will be collected much better values will be available.
It is important to note that if we aggregate trials per domain (Smart, Digital, Virtual), we get the following results for the Trials progress on the Business Indicators demonstrating where took place the majority of the progress:

Domain	**Weighted Progress**
Smart	43,70%
Digital	37,07%
Virtual	19,23%
Total	**100,00%**

It appears that Smart and Digital T rials on average was the most impacted and the Domains where we had the bigger progress.

Technical indicators analysis

From the technical standpoint, the following table display the Average value of the 7 Technical Indicators (see 4.2 Technical Aspects and Indicators) for adopted GEs by each trial. It is very interesting to observe how some Trial report for all GEs adopted a very high score (in a scale from 1 to 4)

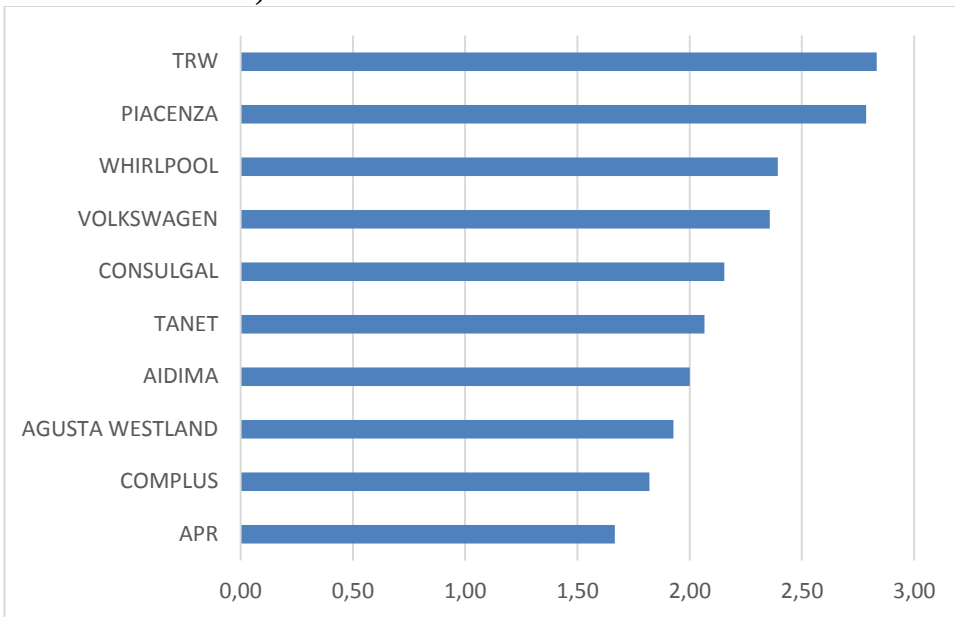


Figure 96 Average value of the 7 Technical Indicators

It is also very interesting to observe how the different Trials provide a feedback, just on the following 3 Technical Indicators (see Figure 97 Ease of adoption of the GEs):

- Ease of application
- Interoperability Maturity
- Openness

These indicators are mainly related to the ease of adoption of the GEs belonging to the FITMAN platform to the different Trials. The chart would represent how the Trials was easily adopt and take benefits from the FIWARE component integrated in the prototypes.

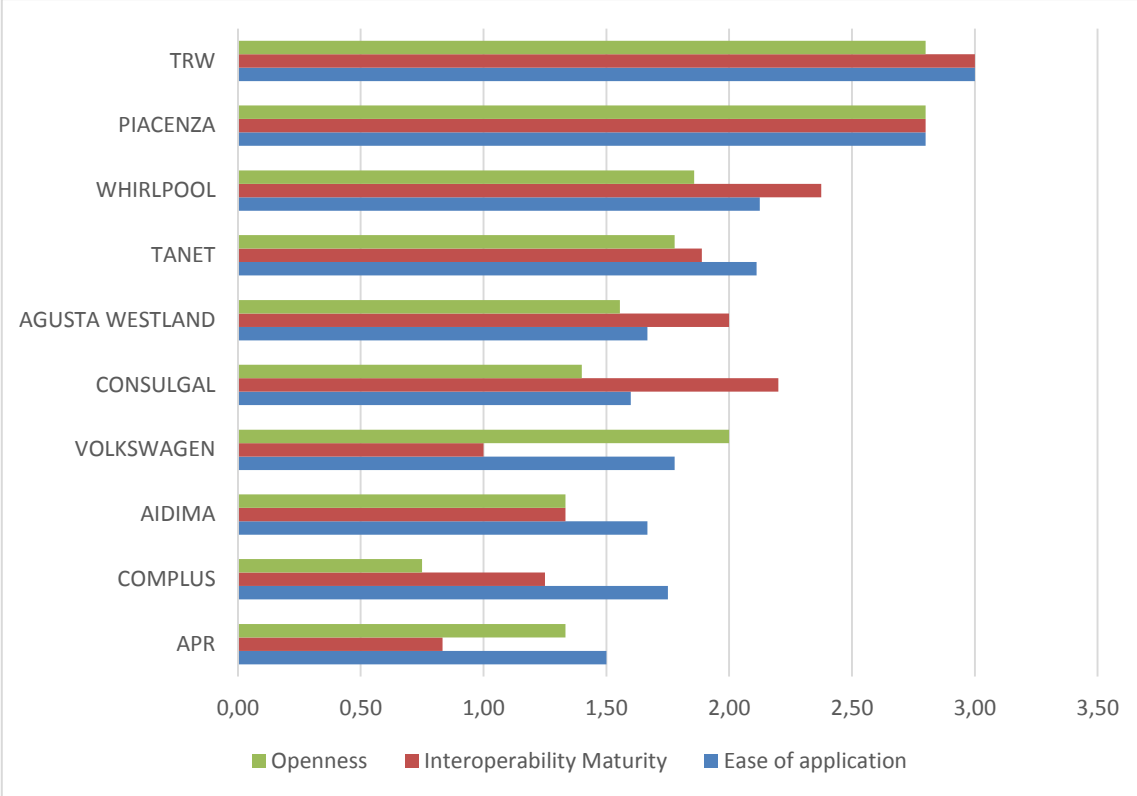


Figure 97 Ease of adoption of the GEs

The consolidation by domain of the same Technical Indicators, was also very interesting

Industrial Domain	Ease of Adoption of Ges
Smart	41,87%
Digital	34,71%
Virtual	23,42%
Total	100,00%

It appears that Smart factory Trials (followed by Digital ones) was adopting much easier FITMAN platforms. It has to be remarked that the same trend is reported for all Technical Indicators on GEs (see Figure 88 Very High Rating frequency per Industrial Domain and Table 130 Cross-domain comparison, considering the positive validations) and for SEs evaluation. (see Figure 87 Specific Enablers Validation per Factory Domain based on FITMAN Cross-trial Analysis)
Here following we report the ranking of the Trials considering the 7 Technical Indicators for level P5 utilized to access GEs and SEs.

Table 133 TI average score on 7 P5 indicators

Trials	TI average score
TRW	2,9
PIACENZA	2,7
VOLKSWAGEN	2,3
WHIRLPOOL	2,3
AIDIMA	2,0

AGUSTA WESTLAND	1,9
TANET	1,9
CONSULGAL	1,9
COMPLUS	1,8
APR	1,6

It appears how top of the list values are almost double the bottom of the list.

TI-BPI comparison for domains (smart, digital, virtual)

One interesting analysis has been to compare the BPI progress with the technical indicators. For this, the trial level indicators were used as they have been measured at the trial level (each trial includes several scenarios; the BPIs have been measured for the scenarios).

Figure 98shows the comparison of BPI-TI aggregated for the different trial domains: digital, smart and virtual. The x-axis shows the average of the trial level 5 technical indicators for each domain and the y-axis the average BPI-progress. The figure shows that at this phase the smart trials are in average more advanced in the business benefits. They also are in average more satisfied with the trial technical performance. The digital and virtual trials are at a lower level and near each other both in business benefits and in the technical satisfaction.

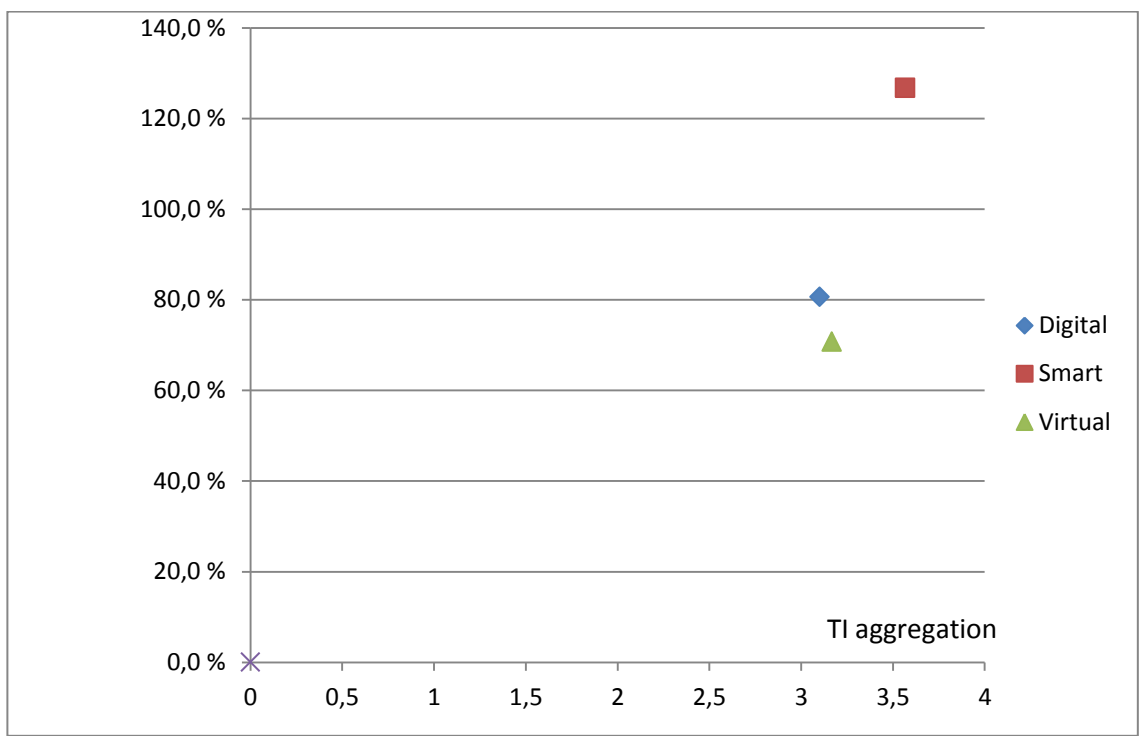


Figure 98 Trial Solution Level Technical Satisfaction and BI for different domains (TI range 1-4).

Socio-Economical impact

Another important element to consider is the estimated Socio Economical impact that the implementation of the FITMAN platforms in different Trial could bring.

Table 131 in Section 5.4.11 summarises the progress and broader impact ranking of each of the 10 trials based on business performance indicators, potential beneficial contribution,

general applicability and broader societal benefit. Table 134 Impact ranking reiterates the aggregate score of each trial, showing the trials in descending order sorted by overall progress and impact score.
The following table summarises the scores of the Trials.

Table 134 Impact ranking

Trial ID	Trial Name	Score
7	Consulgal	16.618,75
2	TRW	15.422,50
8	TANET	4.292,40
Average		4.171,82
5	Piacenza	2.844,30
4	Whirlpool	972,18
11	AIDIMA	968,04
6	APR	209,44
9	COMPLUS	173,60
1	Volkswagen	108,62
3	AgustaWestland	108,33

Table 135 Trial impact scores

In the following chart (Figure 99) it is represented the rank of the envisaged impact for the Trials.

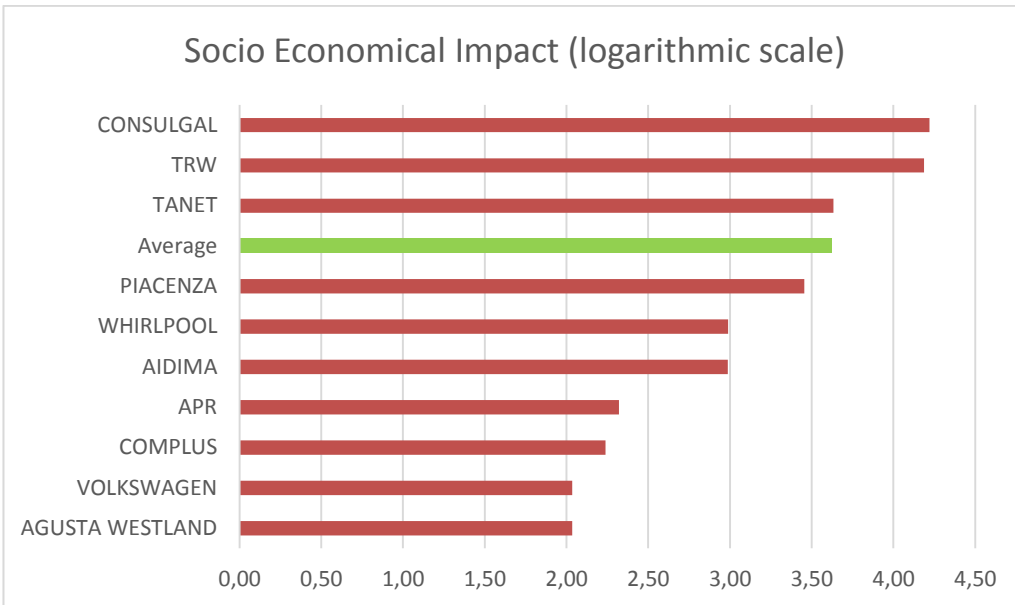


Figure 99 Trial impact scores

Please note the index is in logarithmic scale to allow a readable plotting and the aim of the chart is to display the relative ranks.
It is important to note that if we aggregate trials per domain (Smart, Digital,Virtual), we get the following results for the Trials impact:

Domain	**Weighted Score**
Smart	46,12%
Digital	42,68%
Virtual	11,21%
Total	**100,00%**

It appears that Smart and Digital Trials again (see above for BPIs progress) on average was the most impacted and the Domains where we had the bigger impact.

Conclusion and Compound Analysis

As a final evaluation we can build a compound ranking of the Trials, considering the 3 indicators categories analysed by Trial: Business Performance Indicators, Technical Indicators and Progress and Broader Impact. We normalized each type of indicator per trial utilizing its average value and then we summed them to build an aggregated weighted indicator. Results are presented in the following Table 136 Compound Ranking for Trials according BPI, Technical and Impact.

Table 136 Compound Ranking for Trials according BPI, Technical and Impact

Trial ID	Trial Name	Domain	Business	Technical	Impact	Weighted Indicator
2	TRW	Smart	1,4	1,3	1,4	4,1
4	WHIRLPOOL	Smart	1,9	1,1	1,0	3,9
7	CONSULGAL	Digital	1,5	0,9	1,4	3,8
5	PIACENZA	Smart	1,1	1,3	1,1	3,5
8	TANET	Virtual	0,8	0,9	1,2	2,9
3	AGUSTAWESTLAND	Digital	1,2	0,9	0,7	2,8
1	VOLKSWAGEN	Digital	0,6	1,1	0,7	2,4
11	AIDIMA	Digital	0,3	0,9	1,0	2,2
6	APR	Virtual	0,6	0,8	0,8	2,1
9	COMPLUS	Virtual	0,5	0,8	0,7	2,1

The top 5 Trials are taking the best Business benefits, are expecting to generate the bigger impacts and under the technical stand point they was able to undertake a smoother adoption of the FITMAN Platform.

This conclusions are not aiming to identify specifically the Trials that are more suitable to be expanded with new Business Functions, that is a task due by D8.2.

7. Annex

7.1 Business performance Indicators Report from Survey Monkey DB

All data utilized for the preparation of this deliverable are available in a MS Access Database at this link: https://www.dropbox.com/s/z14fzw471ck5s7x/D81FITMAN.accdb?dl=0 .
The Database contains a number of queries and reports to extract and visualize data with different detail. We mention above others the following reports available:

1. BPI per answers Trial BPIs values entered by each Trial
2. BPI per Category Progress Aggregation of BPI per Category showing their process
3. BPI per Trial Detail of the BPI entered values
4. BPI per Trial Progress Progress for the entered indicators against Target (summary also per scenario and per Trial)
5. Community Survey xxx A set of reports for querying data from Community Survey
6. TI per Component Detail/Summary Values of the Technical Indicators
7. Trial Journals Printout of the Technical and Business Journal per each trial

Here following are reported the values of TO BE 2 of Business Performance Indicators, utilized in chapter 5.1 Business Consolidation and 5.4 Consolidation of trial progress and impact analysis
.
All other information utilized in 5.2 Technical Consolidation and 5.3 Cross-trial business-technical analysis regarding Technical Indicators and Trial Journals can be extracted from the above mentioned DataBase as their printouts in raw mode in this document
are not providing real value.

General Survey Business Indicators - As-Is, To-Be2 and Target - % Progress2

Trial	Trial_Name				
Scenario_Descr					
1	Volkswagen				
1	MANAGEMENT OF THE MACHINE REPOSITORY				
PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
MR UP.COST	MR UPDATE COST	100	75	50	50,00%
MR UP.TIME	MR UPDATE TIME	100	70	46	55,56%
	Progress of Scenario				**52,78%**
2	INQUIRY SERVICE				
PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
AV.LT	AVERAGE LT TO ACCEDE THE EXPERTS KNOWLEDGE	100	55	29	63,38%
EV. ACC.	EVALUATION ACCURACY	100	85	50	30,00%
INQ.RESP. TIME	INQUIRY RESPOND TIME	100	90	80	50,00%
INQ.RESP.COST	INQUIRY RESPOND COST	100	92	90	80,00%
				Progress of Scenario	**55,85%**
	Volkswagen		Average Progress of Trial		**54,31%**
2	TRW				
1	RISK MODELLING				

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
ACC.INC.	NUMBER OF ACCIDENTS AND INCIDENTS		13	10	130,00%
HUM. ERR.	NUMBER OF HUMAN ERRORS		10	10	100,00%
PREV. ACT.	NUMBER OF PREVENTIVE ACTIONS		30	30	100,00%
RISKS	NUMBER OF RISKS		40	30	133,33%
STD.REG.	NUMBER OF STANDARDS AND REGULATIONS		6	5	120,00%
				Progress of Scenario	**116,67%**

2 RISK DETECTION AND INFORMATION

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
ACC.INC.	NUMBER OF ACCIDENTS AND INCIDENTS		13	10	130,00%
MONIT. SYST.	NUMBER OF DEPLOYED MONITORING SYSTEMS		70	55	127,27%
RISK DET.	NUMBER OF RISK DETECTIONS, ALARMS AND WARNINGS SET UP		80	65	123,08%
TRAIN. SESS.	NUMBER OF TRAINING SESSIONS		35	25	140,00%
				Progress of Scenario	**130,09%**
	TRW	Average Progress of Trial			**123,38%**

3 AgustaWestland

1 SUPPORT FOR MONITORING AND MANAGEMENT OF TOOL TRACKING

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
ANDR_1	AVERAGE NUMBER DISCREPANCY REDUCTION	35	8	25	270,00%
RAT_1	REDUCTION OF AVERAGE TIME	57	8	27	163,33%
				Progress of Scenario	**216,67%**

2 SUPPORT FOR MANAGEMENT OF DOCUMENTATION AND REPORT CREATION

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
TDTM_2	TAILORED DATA FOR TRAINING MATERIALS	0	0	1	0,00%
				Progress of Scenario	**0,00%**
	AgustaWestland	Average Progress of Trial			**108,33%**

4 Whirlpool

1 EVENT SCENARIO

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
ASFT_DEFP	DEFECTIVE PARTS TO REWORK	31181	13872	28000	544,14%
ASFT_FOR	FALL OFF RATE	4,49	2,85	3	110,07%
ASNT_DEFP	DEFECTIVE PARTS TO REWORK	31181	13872	28000	544,14%
ASNT_FOR	FALL OFF RATE	4,49	2,85	3	110,07%
CCPU	CONVERSION COST PER UNIT	9,67	9,47	9	29,85%
WUBI_FOR	FALL OFF RATE	0,24	0,216	0,22	120,00%
WUSI_FOR	FALL OFF RATE	0,2	0,115	0,1	85,00%
				Progress of Scenario	**220,47%**

2 BIG DATA SCENARIO

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
ASZHA_SIR	SERVICE INCIDENCE RATE	50000	47500		
ASZHBC_DEFP	DEFECTIVE PARTS TO REWORK	31181	13872	14000	100,75%
ASZHBC_FOR	FALL OFF RATE	4,49	2,85	3	110,07%

WUBR_FOR	FALL OFF RATE	0,03	0,02	0,02	100,00%
				Progress of Scenario	**103,60%**
	Whirlpool		Average Progress of Trial		**162,03%**

5 Piacenza

1 PRODUCTION CAPACITY SELLER

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
EPM	ENERGY PER METER PRODUCED	0	10	16	62,50%
FOR.ERR.	PERCENTAGE OF FORECAST ERROR	4	0	0	100,00%
MFC	MACHINE FIXED COSTS PER PRODUCED UNIT	0	28,8	30	96,00%
PROD.REC.	NUMBER OF PRODUCTION RECORDS	1	3	3	100,00%
				Progress of Scenario	**89,62%**

2 PRODUCTION CAPACITY PURCHASER

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
AV.LT	AVERAGE PRODUCTION LEAD TIME PER METER	15	12	12	100,00%
				Progress of Scenario	**100,00%**
	Piacenza		Average Progress of Trial		**94,81%**

6 APR

1 IMPROVE INFORMATION QUALITY IN THE INTERACTION WITH CUSTOMERS

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
ACKN.REC.	AVERAGE TIME TO CONFIRM THE ORDER WITH ACKNOWLEDGEMENT OF RECEIPT	4	2,17	2	91,50%
AN.CTRL.	CUSTOMER RECOVERY ANALYSIS AND CONTROL TIME	10	22	40	40,00%
AN.CTRL.ORD.	TIME FOR ANALYSIS AND CONTROL OF ORDERS	20	38	50	60,00%
CSR	CUSTOMER SERVICE RATE	93	95	96	66,67%
CUST.REC.	AVERAGE TIME OF CUSTOMER RECOVERY	14	7	7	100,00%
RESP.TIME	QUOTES DEMAND RESPOND TIME	4	2	2	100,00%
RET.PR.	RETURNED FAULTY PRODUCTS	10	8	7	66,67%
UNSUCC.QUOT	UNSUCCESSFUL QUOTE	60	32	30	93,33%
				Progress of Scenario	**77,27%**

2 IMPROVE INFORMATION QUALITY IN THE INTERACTION WITH SUPPLIERS

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
EXT.ST.OUT	% EXTERNAL STOCKOUT RATE	5	4	1	25,00%
INT.ST.OUT	% INTERNAL STOCKOUT RATE	20	15	5	33,33%
VOS	VALUE OF STOCK	230	218	180	24,00%
				Progress of Scenario	**27,44%**
	APR		Average Progress of Trial		**52,36%**

7 Consulgal

1 IDENTIFICATION OF CONCRETE CHARACTERISTICS AND CONCRETING PLAN

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
EXCH.TIME	TIME FOR DATA EXCHANGE	28800	6,35	576	102,02%
LT Char.&Plan	AVERAGE LT TO ACCESS INFORMATION	14400	5,39288	102,00%	
				Progress of Scenario	**102,01%**

2 SAMPLES COLLECTION AND TESTING

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
COST RES.	AVERAGE COST TO PERFORM AND RECORD RESULT	2,04	0,47	1,43	257,38%
EXCH.TIME	TIME FOR DATA EXCHANGE	28800	5,1	576	102,02%
LT RES.	AVERAGE LT TO PERFORM AND RECORD RESULTS	1650	358	1155	261,01%
NUM.PAG.	AVERAGE NUMBER OF PAGES	5	2	3	150,00%
			Progress of Scenario		**192,60%**

3 TEST RESULTS TREATMENT AND EVALUATION

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
COST AN.RES.	AVERAGE COST TO ANALYZE RESULT	1,41	0,41	0,49	108,70%
EXCH.TIME	TIME FOR DATA EXCHANGE	28800	10,5	576	102,00%
LT AN.RES.	AVERAGE LT TO ANALYZE RESULTS	39	0	0,78	102,04%
			Progress of Scenario		**104,25%**
	Consulgal	Average Progress of Trial			**132,95%**

8 TANET

1 IMPORT OF TENDER OPPORTUNITIES

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
FAC.NUM.	NUMBER OF ACTIVE FACILITATORS	1	2	3	50,00%
SERV.PR.NUM.	NUMBER OF REGISTERED SERVICES PROVIDERS	23	71	115	52,17%
TEND.	TENDERS ACCRUED MONTHLY	3	12	20	52,94%
			Progress of Scenario		**51,71%**

2 IMPROVEMENT OF FACILITATOR ROLE

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
CLUST.	END-TO-END CLUSTERING	6	2	2	100,00%
TEND.AUT.	AUTOMATED TENDER INPUT TIME	30	6	1	82,76%
			Progress of Scenario		**91,38%**
	TANET	Average Progress of Trial			**71,54%**

9 COMPLUS

1 TRANSPARENCY AND CONSISTENCY OF ITs AND DOCUMENTS

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
DECR. MIST.	DECREASE OF MISTAKES AND ERRORS	5	35	80	40,00%
STD. IT LAND.	STANDARDISED IT LANDSCAPE	15	30	55	37,50%
			Progress of Scenario		**38,75%**

2 NETWORK TRANSPARENCY FOR MORE EFFICIENT SUPPLIER SEARCH

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
CONF. DATA	CONFIGURATION AND DATA ENTRY	5	35	80	40,00%
LEV. TRANS.	LEVEL OF TRANSPARENCY	0	50	80	62,50%
SEARCH. SUPP.	SEARCHING OF THE SUPPLIER	0	25	60	41,67%
			Progress of Scenario		**48,06%**
	COMPLUS	Average Progress of Trial			**43,40%**

11 AIDIMA

1 FURNITURE TRENDS FORECASTING FOR PRODUCT DEVELOPMENT

PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
HTR DEPS.	NUMBER OF TRENDS RESEARCH INSTITUTES USING FITMAN SOLUTIONS	0		2	
INDEX CARDS	INDEX CARDS	100	150	300	25,00%
NUMB. PROD.	NUMBER OF PRODUCTS BASED ON	5		10	

	TRENDS REPORTS				
SEARCH TIME	SEARCH TIME PROCESS PER SOURCE	8	6	6	100,00%
SOURCES	SOURCES	20	25	40	25,00%
TTOMARKET	TIME TO MARKET FOR PUBLISHING THE HOME TRENDS REPORT	15		12	
WEAK SIGN.	WEAK SIGNALS	200	220	400	10,00%
			Progress of Scenario		**40,00%**
2	**OPINION MINING IN FURNITURE PRODUCTS**				
PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
COMPANIES	COMPANIES	0	1	3	33,33%
COMPL. RESP.	COMPLAINT RESPONSE	75	80	100	20,00%
COMPL. TIME P	COMPLAINTS RESOLUTION TIME PROCESS	1	1	1	100,00%
NON-REP. DISS.	IDENTIFICATION OF NON-REPORTED DISSATISFACTION	0	20	100	20,00%
OP. LEADERS	OPINION LEADERS	0		5	
OP. RETRIEVAL	OPINION RETRIEVAL	0	30	100	30,00%
W-O-M	POSITIVE ONLINE WOM (WORD-OF-MOUTH)			10	
			Progress of Scenario		**40,67%**
3	**COLLABORATIVE WORK FOR PRODUCT DESIGN**				
PI_Desc	PI_Name	AS-IS	TO BE 2	Target	Progress2
NUMPLAYDES.	NUMBER OF PLAYERS TAKING PART IN THE DESIGN	3		5	
NUMSKET	NUMBER OF DESIGN SKETCHES PER PIECE OF FURNITURE	3		5	
TIMETECH. OF	TIME SAVING FOR THE DESIGN PROCESS IN THE TECHNICAL OFFICE	120		100	
			Progress of Scenario		**0%**
	AIDIMA	Average Progress of Trial			**26,89%**
		Average Progress all Trials			**98,46%**

7.2 Table of Tables

7.3 Table of Figures