D8.5 FITMAN Phase III Package and SEs Terms and Conditions (First)

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VERSION HISTORY

VERSION	DATE	NOTES AND COMMENTS
0.1	**15/06/2013**	**GENERAL STRUCTURE**
0.2	20/06/2013	Template
1.1	20/06/2013	Draft ToC as presented and discussed at WP8 KOM
1.2	17/07/2013	Major restructure of ToC: distribute subsections of what was Section 3 (an ordered list of FITMAN deliverables) throughout more meaningful sections.
1.3	31/07/2013	Changes based on actions arising from WP8 telco on 19 July: • "2013-07-19.02 Amend assignments for D8.5 so NTUA, not VTT are responsible for the D2.1-based component" Done. • "2013-07-19.03 Arrange a conference call with ENG, PTIN and Polimi to discuss whether a separate section is needed in D8.5 to cover their contributions to Task 8.4." Section 4 still in place but to be dropped (its components are covered elsewhere in FITMAN deliverables such as those from WP2). Other changes: • IVLab leader for Section 3 overall • ENG leader for Section 5 overall
1.4	09/08/2013	Changes based on actions arising from WP8 telcos: As described in the changes for v1.3 of this document, Section 4 (Impact Mechanisms and Metrics) has now been removed, because its components are covered elsewhere in FITMAN deliverables WP2. Re action 2013-08-02.02 (Discuss with PTIN whether they or IT Innovation are better placed to lead D8.5 Section 6 SE T&Cs): IT Innovation will lead Section 6. Re action 2013-08-02.03 (Discuss with VTT whether material for D2.4 is better positioned in Section 5 FITMAN Architecture and Trials or Section 3 Methodologies and Tools): Materials from D2.4 will be in the Section 3 Methodologies and Tools, not what was Section 5 (now Section 4), FITMAN Architecture and Trials.
1.5	28/08/2013	Updated responsibilities: Section 4.5 (about FITMAN D1.5) is run by TXT, not ENG, and Section 4.6 (about FITMAN D1.6) is run by ENG, not TXT. Section 1 drafted. Section 2 amended: it will include details of the D8.5 website Section 6.3 added: this will point to relevant external documents.
1.6	07/102013	Moved Section 3.1 Trial Expansion Methodology into Section 2; added a subsection to Section 2 about the FI-PPP and Phase III. Restructured Section 5 to reflect changes to SEs in Athens GA: it will have 8 subsections (one per SE) rather than 3 subsections (one per factory type). Added Section 3.5, a summary of D8.3 provided by INNOV. Integrated contributions: 2.1 - 2.4 (IV-Lab); 2.5 (IT Inno); 3.1 (NTUA); 3.2 (IV-Lab); 3.3 (POLIMI); 3.4 (VTT); 4.1 (Innov); 4.2 (POLIMI); 4.3 (ATOS); 4.4 (ENG); 4.5 (TXT); 4.7 (ENG); 4.8 (INNOV); 4.9 (IV-Lab); 6.1 (IT Inno); 6.2 (IT

		Inno); 6.3 (IT Inno); 7.1 (IT Inno).
1.7	08/10/2013	Integrated expanded versions of Sections 4.4 (ENG) and 4.7 (ENG). Executive summary and conclusions added (IT Inno).
1.8	09/10/2013	Integrated summary of D1.6 in section 4.6 (IT Inno); added more material to Section 2.5, the package website guide.
1.9	10/10/2013	General improvements to language and style based on review feedback. More material added to Section 2.5, the package website guide.
2.0	1110/2013	Changes made based on Sergio's feedback, including editing the footer, expanding Section 2.5, expecting Section 5, and renaming Section 7. Expansion of Section 4.7 based on new input.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This information package supports potential Phase III participants who wish to build on FITMAN work and/or address ICT in manufacturing. It provides information about FITMAN deliverables and about other aspects of relevance to Phase III.

Regarding FITMAN deliverables, this package provides summaries of those deliverables, with the website version of the package including links to full versions of public deliverables and public versions of confidential deliverables. Deliverable summaries appear in two sections:

1. **Methodologies and Tools**, which contains outputs of FITMAN's Verification and Validation work package (WP2) and of the SME Innovation Preparation task (T8.3). The former work package provides methodologies for conducting verification and validation, while the latter task provides methodologies for creating technology awareness and supporting SME service and application development.
2. **FITMAN Architecture and Trials**, which contains outputs of two technical work packages: the FITMAN Baseline System (WP1) and the Design and Development of FITMAN Experimentation Sites (WP3). This section encompasses information about FITMAN's use case scenarios and business requirements, trials IT requirements, selection of FI-WARE Generic Enablers (GEs), use cases of GEs in manufacturing, the FITMAN reference architecture, the FI-PPP capacity building analysis, existing IT infrastructures, trials business cases, trials competencies and capabilities gap analysis, and open call specifications.

This package also provides additional information of relevance to Phase III:

- an overview of FITMAN, the FI-PPP and the information package itself
- terms and conditions for FITMAN Specific Enablers
- checklists of legal issues and business models in the context of ICT for manufacturing, and links to external resources
- best practices for SME engagement.

At the time of writing, FITMAN is only six months into its twenty-four month duration. This package will be maintained and updated as FITMAN progresses. The interested reader can find out when updates have occurred by following the Twitter stream[1] or the LinkedIn group[2], or by emailing fitman-phase-iii-info@txtgroup.com to register either general interest, or interest in updates to specific parts of this package.

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[1] https://twitter.com/FitmanFI

[2] http://www.linkedin.com/groups?about=&gid=4986259

TERMS USED

FITMAN – Future Internet Technologies for MANufacturing: EC project No. 604674 [1], under which work described in this report was carried out.

FI-PPP - Future Internet Public-Private Partnership: The Public-Private Partnership programme for Internet-enabled innovation, in the scope of which the FITMAN project is funded.

FoF - Factories of the Future: One of the Public-Private Partnership programmes included in the European Commission's recovery package. The objective is to help EU manufacturing enterprises, in particular SMEs, to adapt to global competitive pressures by improving the technological base of EU manufacturing across a broad range of sectors [2].

SF - Smart Factories: One of the three Domains defined by FoF. Its scope is agile manufacturing, customisation, efficiency and safety.

DF - Digital Factories: One of the three Domains defined by FoF. Its scope is manufacturing design and product lifecycle management.

VF - Virtual Factories: One of the three Domains defined by FoF. Its scope is global networked manufacturing and logistics.

UC - Use Case: The behaviour of a complex system (people + organisation + infrastructure + software) targeted at the achievement of a specific business goal. In the FITMAN context, it may refer to one of the implemented experiments in a Trial, or to one of the abstract and generic cases characterizing the FoF Domains.

GE - FI-WARE Generic Enabler: Software element which offers reusable and commonly shared functions serving a multiplicity of usage areas across various sectors [3]

SE - Specific Enabler: Software element which offers reusable and commonly shared functions in the context of a specific usage area [3].

TSC - FITMAN Trial-Specific Component: Software element which offers a set of ad-hoc functions in the context of a specific FITMAN Trial.

FP - FITMAN Platform: A platform constructed as an integrated set of GEs and SEs, targeted at a specific Use Case.

STEEP - Social Technological Economical Environmental Political: STEEP objectives are included in the 'ICT for Manufacturing' and 'Future Internet Enterprise Systems' EU research roadmaps [1]. One FITMAN goal is to contribute to the STEEP of EU manufacturing industries.

1. INTRODUCTION

This report documents FITMAN D8.5, the Phase III Information Package, which is a set of resources to support the use of FITMAN results in Phase III, and is disseminated via the FITMAN website [1]. First, FITMAN Task 8.4 is described, after which a description of the scope and structure of the document is provided. The links between D8.5 and other FITMAN work packages and deliverables is enumerated, including an index linking sections of D8.5 with other FITMAN deliverables. This lets the reader to lookup summaries of specific FITMAN deliverables with ease.

Note that this report describes FITMAN D8.5, but is not identical to it. Material provided within this section, Section 1, does not appear on the D8.5 website, with the exception of Table 2, which shows the mapping between FITMAN deliverables and their summaries within D8.5.

1.1 Task 8.4 Description

This document exists to support FI-PPP Phase III proposals which intend to address Use Cases expansion in the manufacturing domain. The task that let to this document, FITMAN Task 8.4 (T8.4), is entitled FITMAN Support to Phase III Expansion of Use Cases. The task is to: "package FITMAN knowledge (namely methods and conceptual frameworks) and assets (namely Specific Enablers and Reference Architectures) in order to be used by Phase III proposals and projects in obj 1.8 Expansion of the Use Cases, including SEs Terms and Conditions" [1].

T8.4 yields two deliverables:

1) D8.5, this document, due at M06 of the FITMAN project and supports Phase III proposals
2) D8.6, a subsequent document to be released at M15. D8.6 will support Phase III projects.

From its release until FITMAN M15 (July 2014), this document will be regularly updated to reflect changes in the information contained within. Please consult the version history to ascertain when this document was last updated. In the case of questions, please use the support mechanisms on the D8.5 website (see Section 2.5 for detail).

1.2 Document Scope and Structure

As noted in Section 1.1, D8.5 packages FITMAN knowledge (methods and conceptual frameworks) and assets (Specific Enablers and Reference Architectures) from the first six months of the FITMAN project. D8.5 is available as an interactive website and as a standalone PDF document. A standard Table of Contents exists for both of these forms of D8.5, the content of which is:

Section 2 of D8.5 provides an overview of the FITMAN project and the FI PPP, as well as the D8.5 website. Section 3 presents FITMAN methods and conceptual frameworks, while Sections 4 and 5 provide information on the FITMAN Architecture and Trials, and Specific Enablers. In addition to these sections, Sections 0 provides legal and business checklists, while Section 7 reports on the experiences of Use Case partners who successfully bid in FITMAN. The website offers non-linear ways to access information about FITMAN. Details of this can be found in Section 2.

This document packages M01 – M06 FITMAN deliverables, the majority of which take the form of reports. Two of the deliverables, however, are Prototypes: these are D1.4, the GEs and their Use Cases in Manufacturing, and D3.1, existing IT Infrastructures. Table 2 in Section 1.3 maps FITMAN deliverables with the sections that report on them within this document.

Table 1 specifies which FITMAN partners provided which sections of D8.5.

Section	Partner
Executive summary	IT INNO

Section	Partner
Terms used	IT INNO, ENG
1 Introduction	IT INNO
2 Overview of FITMAN, the FI-PPP and the Phase III Package Website	IVLAB, IT INNO
3 Methodologies and Tools	IVLAB
3.1 FITMAN Verification and Validation Method and Criteria	NTUA
3.2 FITMAN Business and Technical Indicators	IVLAB
3.4 V&V generic assessment package	POLIMI
3.5 V&V Assessment Package instantiations per trial	VTT
4 FITMAN Architecture and Trials	ENG
4.1 Use Case Scenarios and Business Requirements	INNOV
4.2 Trials IT Requirements	POLIMI
4.3 FI-WARE GEs selection for FITMAN	ATOS
4.4 GEs and their Use Cases in Manufacturing	ENG
4.5 FITMAN Reference Architecture	TXT
4.6 FI-PPP Capacity Building Analysis	ENG
4.7 Current Existing IT Infrastructures	ENG
4.8 FITMAN Trials Business Cases	INNOV
4.9 Trials Competencies / Capability Gaps and Open Call Specifications	IVLAB
5 T&Cs for the Envisaged FITMAN SEs	ITINNO, PTIN, TXT, ATOS, INNO
6 Checklists (legal issues and business models)	ITINNO
7 Lessons from Phase II (UC Partners)	ITINNO
8 Conclusions	ITINNO

Table 1. Partner contributions to D8.5

1.3 Contribution to Other WPs and Deliverables

Figure 1 shows the relationship of this deliverable with other FITMAN WPs and Deliverables.

At the WP level, with the exception of WP9 (Impact Planning, Implementation, Evaluation) and WP10 (Project Management and Coordination), D8.5 interacts with all FITMAN WPs that were active in the first 6 months of the project. D8.5 packages outputs from WP1, WP2 and WP3, while there is some coordination with WP11, which is responsible for dissemination of FITMAN materials.

In terms of Deliverables, it can be seen that D8.5 and D8.3 interrelate. This is because D8.3 is responsible for producing three methodologies:

1) A methodology to engage and create technology awareness throughout the European networks of innovation and entrepreneurship
2) A methodology for SME service and application development in Phase III based on the FITMAN platform
3) A methodology for the proactive communication for achievements and innovation generated by SMEs in Phase III.

It is clear that these methodologies are related to the task of increasing awareness of the D8.5 materials.

Of course, all M01 - M06 deliverables from WP1, WP2 and WP3 relate to D8.5 in that they are packaged and presented here. For simplicity, these are not individually displayed in Figure 1, but instead are enumerated in Table 2.
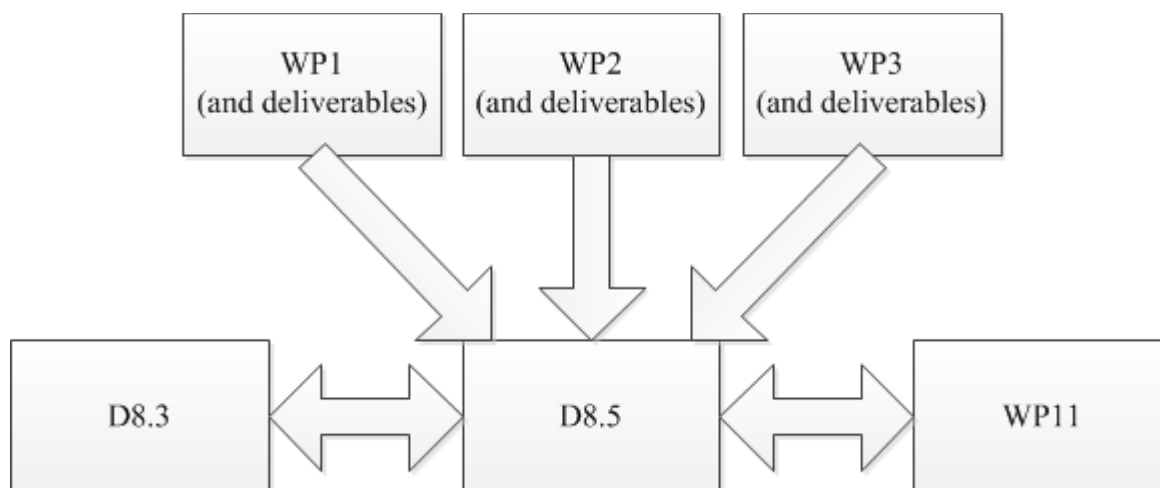
Figure 1. D8.5's relationship with other FITMAN Work Packages and Deliverables

Table 2 shows the mapping between FITMAN deliverables and Sections of D8.5, the Phase III Package.

Topic	FITMAN Deliverable	D8.5 Section
Use Case Scenarios and Business Requirements	D1.1	4.1
Trials IT Requirements	D1.2	4.2
FI-WARE Generic Enablers Selection for FITMAN	D1.3	4.3
GEs and their Use Cases in Manufacturing	D1.4	4.4
FITMAN Reference Architecture	D1.5	4.5
FI-PPP Capacity Building Analysis	D1.6	4.6
FITMAN Verification & Validation Method and Criteria	D2.1	3.1
FITMAN Business and Technical Indicators	D2.2	3.2
FITMAN Verification & Validation generic Assessment Package	D2.3	3.3
FITMAN V&V Assessment Package instantiations per trial	D2.4	3.4

Topic	FITMAN Deliverable	D8.5 Section
FITMAN SMEs Innovation Preparation First	D8.3	3.5
Current Existing IT infrastructures	D3.1	4.7
FITMAN Trials Business Cases	D3.2	4.8
Trials Competencies / Capability Gaps and Open Call Specifications	D3.6	4.9

Table 2. Mapping between FITMAN deliverables and sections of D8.5

2. OVERVIEW OF FITMAN, THE FI PPP AND THE PHASE III PACKAGE WEBSITE

2.1 Overview of FITMAN and its methodology

Manufacturing is a significant element of the European economy accounting for around 10% of all enterprises in the EU-27's non-financial business economy in 2010 (2 million enterprises, around 22% of EU'27 employment, an annual value added around 27% of the EU'27 non-financial business economy value added). The presence of SMEs in the European manufacturing sector accounts for around of 45% of the whole EU manufacturing added value, and around 59% of the manufacturing employment. These figures clearly demonstrate the criticality of this sector and the relevance of promoting its innovation to maintain and possibly expand its economic relevance.

The *Europe 2020 Strategy* underlines the role of *technology* as the key solution-provider for tackling the challenges Europe has to face in the coming years and help in promoting innovative ideas, new products and services to assure EU growth, high-skilled jobs, and address European and global societal challenges.

FITMAN, Future Internet Technologies for MANufacturing is a project developed in the Framework Programme 7 under the FI-PPP (Future Internet Public-Private-Partnership). FI-PPP has three phases. Phase I surveyed Future Internet infrastructure in Europe (in the INFINITY project), analysed and captured requirements for Future Internet use cases in various sectors and verified them in proof-of-concept demos (in 8 Use Case projects), and developed a common platform allowing applications to access Future Internet facilities. This platform consists of a set of Generic Enablers (GEs), developed by the FI-WARE project and each providing a functional building block of the FI-WARE Future Internet platform. Any implementation of a FI-WARE GE is made up of a set of components which together supports a concrete set of Functions and provides a concrete set of APIs and interoperable interfaces.

Phase II of the FI-PPP is deploying the FI-WARE platform on selected infrastructure, and implementing full-scale prototype applications in 5 Use Case projects of which FITMAN is one. Each Use Case project focuses on a particular application domain, and is augmenting the FI-WARE common platform by developing Specific Enablers (SEs), also known as Domain-Specific Common Enablers. These are software elements which offer reusable and commonly shared functions in the context of a specific usage area. The Use Case projects will test the GEs and SEs in a working environment to deserve specific industry-led case trials.

Phase III aims to expand the Phase II Use Case Trials, building on the Phase I and II technology to address a wider range of application domains, supporting innovative application creation by SMEs and Web Entrepreneurs, and establishing an ecosystem of infrastructure operators, application developers and end users around the common Future Internet platform.

FITMAN's goal, as a Phase II project, is to provide the FI-PPP programme with a set of industry-led use case trials in manufacturing. FITMAN draws on the latest trends developed by EFFRA, with work on three domains [4]. The smart factory of the future domain involves use of simpler and streamlined ICT enables more energy efficient processes, a more flexible shop floor, increased safety and a convergence between machines and personal computer/devices. The digital factory domain aims at developing Product Lifecycle Management (PLM) by improving the collaborative work, exchange of data between the whole manufacturing chain from the concept to the design, the manufacturing and finally to the customer. Virtual Factories of the Future aims to develop virtual platform particularly for the supply chain which concepts such as cloud manufacturing and virtual marketplaces. The main output of FITMAN is to test and assess the suitability, openness and flexibility of FI-WARE Generic Enablers. FITMAN will also contribute to the social-technological-economical-environmental-political sustainability (STEEP) of EU manufacturing industries.

The FITMAN project will deliver:

- One FITMAN Generic Platform for manufacturing Industries as a collection of several Generic Enablers Implementations belonging to most of the identified technological Chapters of FI-WARE. The platform addresses the Smart, Digital and Virtual Factory areas for eleven trials (LEs and SMEs).
- Three FITMAN Specific Platforms, one for each Smart, Digital and Virtual Factory as an integrated set of FI-WARE Generic Enablers (GE). These platforms will also take into consideration 2nd/3rd release GEs, FITMAN Specific Enablers (SE) and Trial Specific Components (TSC) belonging to Factories of the Future and Future Internet Enterprise Systems research areas. The GEs and SEs are packaged inside Virtual Machines (VM) for off-the-shelf deployment.
- Eleven FITMAN Trials Platforms based on FITMAN Specific Platforms by composing FI-WARE GEs, FITMAN SEs, TSCs and Trial Integration Components (TIC) which bind TSCs to GEs/SEs. These platforms can be deployable using cloud computing or in local.
- A generic and flexible Trials Verification and Validation Framework encompassing concepts, methods and tools. This package includes among other data collection through on-line measurement forms (self-certification, PIs measurement), data elaboration through the 5 step of V&V, communication package on web support.
- An open-to-all FITMAN Phase III Package, to support FI-WARE PPP Phase III Obj. 1.8, Expansion of Use Cases, access to FITMAN Reports / Prototypes. The objective of this package is in two parts. The first provide public versions of FITMAN knowledge and assets for the preparation of Phase III Proposals, in particular Specific Enablers specifications and reference implementations Terms and Conditions. The second will be constantly updating such public versions and SEs Terms and Conditions till the end of the project, in order to offer support to the selected Phase III projects.

2.2 FITMAN structure and timescale; description of the WPs

FITMAN project is composed of eleven work packages. The first WP is the FITMAN Baseline System (WP1) which manages the synergy between Phase I project and FITMAN, the outcomes of WP1 are a set of business requirements and a selection of GE/SE to be used for the use cases trial.

The goal of the FITMAN Verification & Validation Method (WP2) is to define Business Performance Indicators (BPI) to evaluate the global performance of the Trials, and Technical Indicators to evaluate the performance of technical elements as GEs, SE, and TSC (Technical Specific Components). FITMAN WP2 has developed a 7-step method for verification and validation (V&V), including 5 steps for the software V&V and a two-step specific V&V for trials instantiation. The final step includes the GRAI (Graphs with Results and Activities Interrelated) business modelling tool and particularly the use a specific tool developed for FITMAN Project which is the simplified ECOGRAI method which is a powerful PI (Performance Indicator) characterisation method due to its flexible and highly reconfigurable essence. The V&V method will be used to assess the developed solution from a business point of view.

The Design and Development of FITMAN Experimentation Sites (WP3) sets up the frame for the experimentation for the eleven trials. It develops the application and instantiate the trials outlook by defining the future structure of the experimentation sites.

WP4, WP6 and WP6 involve the eleven FITMAN trials in smart, digital and virtual factories respectively. These trials will provide use cases trials in the manufacturing domain of:

- **Smart factory of the future (WP4):**

- o Automotive manufacturing (TRW) – The objective is to improve Safe & Health in the workplace by using FITMAN Platform associated to the FASyS system.
- o White good manufacturing (WHIRLPOOL) which has for objective to give more value to mobile workforce by improving communication along the assembly line.
- o Textile/clothing manufacturing (PIACENZA) which has the objective to develop cloud manufacturing, using smart processes on its supply chain.
- **Digital Factory of the future (WP5):**
  - o Automotive manufacturing (VOLKSWAGEN) which has the objective to improve Product Lifecycle Management (PLM) to lower time to market
  - o Aeronautic manufacturing (AGUSTA WESTLAND) which has the objective to improve tooling monitoring by using smart processes.
  - o Furniture manufacturing (AIDIMA) which objective is to improve mass customized production.
  - o Building/Construction (CONSULGAL) has the objective to improve the as-designed versus as-built interoperability.
- **Virtual Factory of the future (WP6):**
  - o Plastic manufacturing (APR) has the objective to improve the collaboration valorisation.
  - o Manufacturing resource management (TANet) which has the objective to set up a Networked Business Innovation framework.
  - o Machinery for wood industry (GEOLOC) which has the objective to improve project based collaboration.
  - o LED/Smart lighting manufacturing (COMPLUS) which has the objective to improve collaborative production using

Notes: Aforementioned couple "Manufacturing industry/ Factory Of the Future Domains" are subjects to change according to the refining process of use cases trials developments.

The WP7 is dedicated to the Lessons learned, recommendations and best practices which comes from FITMAN experimentation. WP8 is the preparation of Use cases expansion (FI-PPP Phase III). The WP9 is the exploitation and socio-economic impact of FITMAN in the context of FI-PPP. WP10 is the project management and coordination and finally WP11 is the dissemination and FI-PPP collaboration of FITMAN Project and consortium it includes the participation on various events related to Future Internet and manufacturing.

2.3 Types of FITMAN deliverable in the Phase III Package

The next four sections provide FITMAN outcomes, particularly:

- Section 3 provides methodology and tools on the V&V and simplified ECOGRAI methods
- Section 4 provides the technical contributions for the different FITMAN platforms with, for each, selected FI-WARE Generic Enablers and Specific Enablers: The Generic platform and the three specific platforms from D1.4 and the eleven trials platforms from deliverable D3.1. Some of these sections are classified as confidential and are not available to the public.
- Section 5 provides information about FITMAN Specific Enablers.
- Section 6 provides check-lists regarding Legal Issues, Business Models and External Resources thus providing guidelines and reference documents in the aforementioned domains.
- Section 7 provides lessons regarding PHASE II from people involved in the project.

2.4 Trial Expansion Methodology

Trial expansion refers to the objective 1.8 of FI-PPP "Expansion of Use Cases" which is also FI-PPP Call 3 (for Phase III).

Note that in phase III of FI-PPP, the materials (results) developed by FITMAN will be put at disposal to the future selected consortiums. These selected consortia will launch calls for projects in order to improve, develop and expand the results of FI-PPP Phase II projects. As mentioned before, FITMAN is a Phase II project, but it has tasks related to Phase III preparation. These include the preparation of material to support Phase III bidders and a methodology for Trial Expansion, which aims to help the future consortia to reach SMEs and Web Entrepreneurs who are potential respondents to the Open Calls of future Phase III consortia.

The goal of Phase III is to expand the Phase II Use Case Trials to address a wider range of application domains, supporting innovation and entrepreneurship, in particular by targeting engagement with SMEs and Web Entrepreneurs [5].

The expected impact of phase III is a set of innovative services and applications in various domains and internet usages that will validate FI-PPP developed concepts – GE and SE – on Phase I and II. It is expected that the developed solutions will enable business processes to perform significantly smarter.

FITMAN developed a methodology for use case expansion in manufacturing, with the aim of identifying SME networks in manufacturing to prepare SME innovation. It will exploit the capillarity and scale of SMEs networks and will focus mainly on two aspects:

- Raise technological awareness by disseminating through the SME Networks in EU (European Union)
- Provide a platform for continuous application development (using lean start-up principle and MVP – Minimum Viable Product).

This will allow future consortium to better scope target group of their open calls in order to disseminate the right information by the best appropriate networks to reach innovative ICT players e.g. the Web entrepreneurs and SMEs. To do so, FITMAN provides a database with networks and clusters within EU, ranked to exploit it at best. The database contains the following information:

- The size of organisations – Identifies the biggest organisations.
- The type of association/organisation – e.g. public or private.
- The business area - Identifies core business. I.e. in ICT and /or manufacturing.
- The involvement in research activities – Identifies the best potential innovative players.
- The geographical scope – Provides information of the organisation's location scope.
- The variety of available communication means – Identifies the best networks in term of dissemination potential.

D8.3 has issued this database of networks and clusters, having also ranked them. The ranking was created by adding a weighting to the above items of information (e.g. larger organisations were ranked more highly, as links with these would be more likely to yield a greater impact). Each organisation was given a rating for each criterion based on information from the organisation's web pages. The ranking results can be used by WP11 in dissemination efforts.

*More information and **latest updates on Call 3** can be found on the European commission website:*

Full FI-PPP call 3 website: http://cordis.europa.eu/fp7/ict/netinnovation/call3_en.html

Short introduction: http://cordis.europa.eu/fp7/ict/netinnovation/call3short_en.html

2.5 The Phase III Package website

The primary form of the Phase III Package is an online website, although the Phase III Package is also provided as a single document. The Phase III Package is part of the FITMAN website[3]. It is accessible at: http://www.fitman-fi.eu/phase-iii-package

This section describes the Phase III Package website. First of all, its functionality is described. Next, the structure of the website is described, followed by the 'overlays' that allow easy access to different subsets of the information. Finally, some sample usage scenarios are given.

The Phase III Package website functionality

The Phase III Package website includes the following functionality:

Registration: A mechanism for users to register their interest in the package as Phase III bidders, and thereafter access the package materials.

Support: A forum through which users can discuss the materials, and a form for contacting FITMAN with any queries about the materials. Questions submitted via this form and the answers to these will be made available to all users via a FAQ.

Analytics: The use of Google analytics to track traffic, and counters to track document downloads.

The Phase III Package website structure

The Phase III Package website is structured as follows:

- Overview of Package for Phase III Bidders
  - Executive summary
  - Conclusions
- Overview of FITMAN and the D8.5 website
  - Overview of FITMAN and its methodology
  - FITMAN structure, WPs and timescale
  - Trial expansion methodology
  - The D8.5 website
- Information for Phase III Bidders
  - FITMAN verification and validation method and business performance indicators
  - FITMAN architecture and trials
  - Terms and conditions for Specific Enablers
  - Checklists and external resources (legal issues; business models; external resources)
  - Lessons from Phase II (best practices for SME engagement; lessons learned from FITMAN regarding bidding in the FI-PPP)
- Support
  - FAQ
  - Forum

Phase III Package website overlays

Like any set of linked information, the components of the Phase III Package website can be accessed in any sequence desired by the user. Some sequences may be more helpful than others,

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[3] http://fitman-fi.eu/

however. To support ease of access, a set of overlays is provided. Each overlay gives a suggested sequence of access to the package materials. Overlays include:

- <u>Ordering as a table of contents:</u> organising all package materials as one single linear document. This overlay offers the same structure of the materials as the single PDF of the package that is available for download, but with the addition of the interactive forum.
- <u>Ordering by contribution type:</u> structuring package materials by type. These will be: methodology; technical contribution; checklist or external resource; lessons learned.
- <u>Ordering by deliverable type:</u> package deliverable summaries divided into two lists, 'P' (prototype) and 'R' (report) deliverables. Readers can use this overlay to lookup deliverable by number, e.g. D8.3.
- <u>Information about impact:</u> materials in package that relate to impact.
- <u>Information about Specific Enablers:</u> package materials concerning SEs.

Phase III Information Package website usage scenarios

This section provides the following set of scenarios for the Phase III Information Package:

- Registering to use the website
- Browsing with menus
- Browsing with overlays
- Searching the website
- Making queries
- Using the forum.

Registering to use the website

It is necessary to register in order to access the Phase III Information Package. Registration is available via the link at the top right of the FITMAN website: see Figure 2.

Figure 2. The registration link for the Phase III Package website.

The registration link brings up the registration form, a simple form that requests your name, username and email address. Please note that the primary purpose for recording an email address is to handle the case where your password is lost. In addition, you may receive one (and only one)

email from the FITMAN consortium in the future, which will link to an optional short survey aimed at helping the FITMAN consortium understand the accessibility and quality of the information provided in the Phase III Package. Figure 3 shows the registration form.

Figure 3. The registration form for the Phase III Package website.

Once you have filled in the form, a URL will be generated and emailed to you. Please follow the link in the email to reach a page, shown in Figure 4, where you can set your password and complete the registration process.

Figure 4. The page to set your password for access to the full Phase III package.

Browsing with menus

The menu structures of the information package can be used to navigate to a specific part of the package. For example, if information is sought on the Verification and Validation Methodology, simply follow the menu structure as follows, and as shown in Figure 5: Phase III package → Information for Phase III bidders → Methodologies and Tools → FITMAN Verification and Validation Method and Criteria.

Figure 5. Using the menus to navigate.

Browsing with overlays

The information overlays, described above, provide access to certain parts of the Phase III Package. To use an overlay, visit the 'overlays' part of the package overview and click on the link of interest, for example 'Information about impact'. You will then see a sequential list of the sections of the package that are relevant to the topic at hand.

Searching the website

Search functionality is accessed via the left hand side of the FITMAN homepage, shown in Figure 6.

Figure 6. The FITMAN search options.

To conduct a simple search, type the text of interest into the search box and press 'search'. Note that the search functionality includes a 'LiveSearch' function that provides relevant results to your query in real time, before you press the search button. Figure 7 shows the search textbox, button, and LiveSearch results.

Figure 7. The search box, including LiveSearch results.

The Phase III Package forum has its own search functionality, described below. However, it is also possible to search it with the 'Advanced Search' link that is below the search textbox on the left hand side of the FITMAN home page. This brings you to the advanced search form. To narrow search results to only those from the forum, simply expand the 'item type' option on the page, and tick the 'forum' box, as shown in Figure 8.

As shown in Figure 8, it is possible to narrow your search in other ways, including searching for new items (that were posted since your last login, or posted in the last day, week, or month), and searching by title and description.

Figure 8. Advanced search form

Making queries

If you have queries about any of the content of the Phase III Package, please email fitman-phase-iii-info@txtgroup.com. Questions and answers will be displayed in the package's FAQ section, which is found under the 'Support' menu.

Using the forum

When you visit the forum, found under Phase III Package → Support → Forum, you will see a set of forums under the heading 'General Forum' (Figure 9). Different forum topics exist for different discussions, with for example one forum set aside for discussion of FITMAN-generated methodologies, and another for discussion of FITMAN Specific Enablers. Please use the forum most appropriate to the topic of interest.

General forums

Forum name	Conversations	Most recent comment
FITMAN Baseline System This forum provides a space for discussion of the FITMAN Baseline System, i.e. outputs related to FITMAN Work Package 1.	1	by John Smith Friday 15:02
FITMAN Experimentation Sites This forum provides a space for discussion of the Design and Development of FITMAN Experimentation Sites, i.e. outputs related to FITMAN Work Package 3.	1	by John Smith Friday 15:02
FITMAN Specific Enablers This forum provides a space for discussion of the FITMAN Specific Enablers.	1	by John Smith Friday 15:02
Other Phase III Package Information This forum provides a space for discussion information in the Phase III Package that is not an output of another FITMAN Work Package: this material includes the checklists and external resources, and the intermediaries' best practices for Phase III.	1	by John Smith Friday 15:02
FITMAN Methodologies This forum provides a space for discussion of FITMAN methodologies.	2	by John Smith Friday 15:01

Figure 9. The forums

To start a new discussion within a forum, press the button labelled 'Start a new Conversation', shown in Figure 10. You will be given a screen where you can add a title and body text, with the option to add an attachment, shown in Figure 11. When you have written your post, press 'Start conversation' and your post will be made available in the forum, shown in Figure 12.

Figure 10. Accessing the form for a new discussion
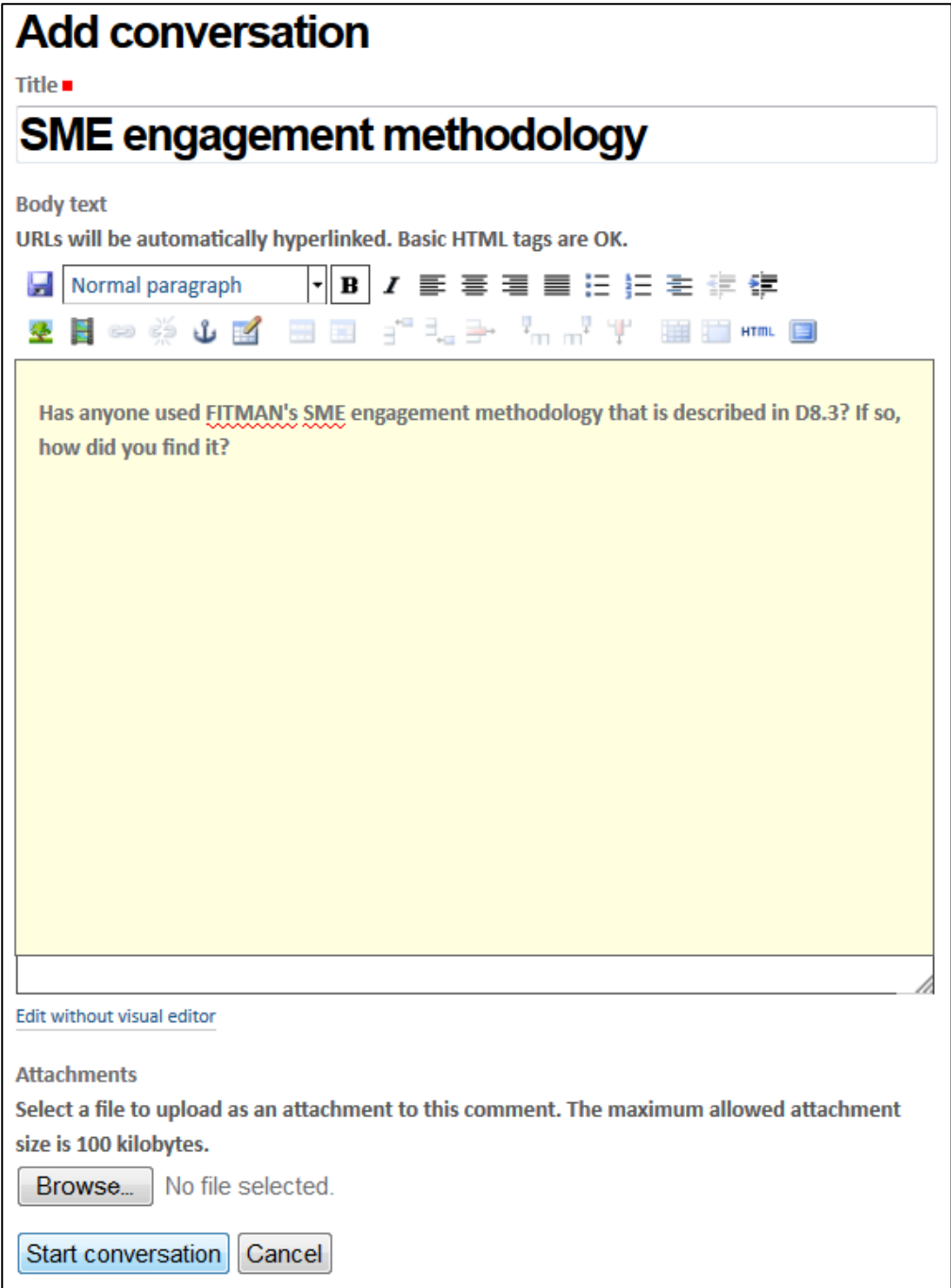
Figure 11. Starting a new discussion

Figure 12. The new discussion thread

To respond to a discussion of interest, click the 'Reply to this' button that appears at the base of the post in question (see Figure 13). You will have a space for writing text, and the option to add an attachment (Figure 14). When your response is ready, press 'Post comment' and it will be made available in the forum (Figure 15).
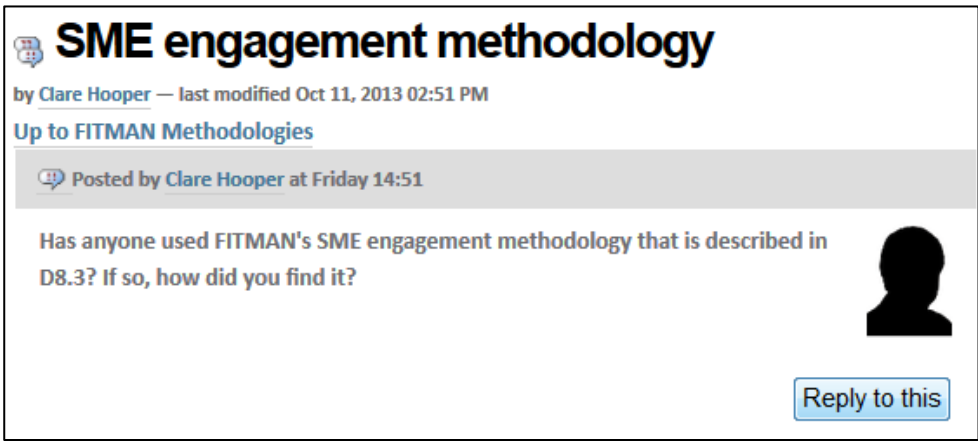
Figure 13. Accessing the form to write a reply

Add comment

Posted by **Clare Hooper** at Friday 14:51

Has anyone used FITMAN's SME engagement methodology that is described in D8.3? If so, how did you find it?

Body text ■

URLs will be automatically hyperlinked. Basic HTML tags are OK.

```
Previously Clare Hooper wrote: <blockquote><p>Has anyone used
FITMAN's SME engagement methodology that is described in D8.3? If
so, how did you find it?</p></blockquote></br>

I haven't used it either, but I'd like to hear about people's
experiences with it. What type of SME engagement are you planning to
do?
```

Attachments

Select a file to upload as an attachment to this comment. The maximum allowed attachment size is 100 kilobytes.

Browse... No file selected.

Post comment Cancel

Figure 14. Replying to a thread
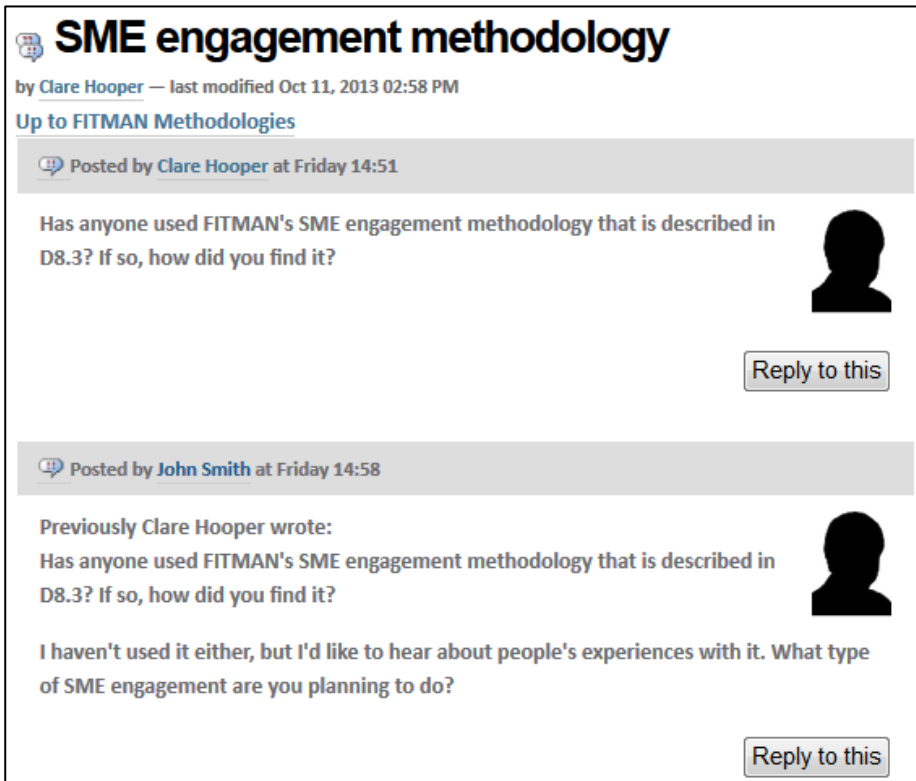
Figure 15. The posted reply

To search the forum, please use the 'search' box provided above the listing of forums (Figure 16). Once you have typed your query and pressed 'search', you will see a listing of relevant results (Figure 17).
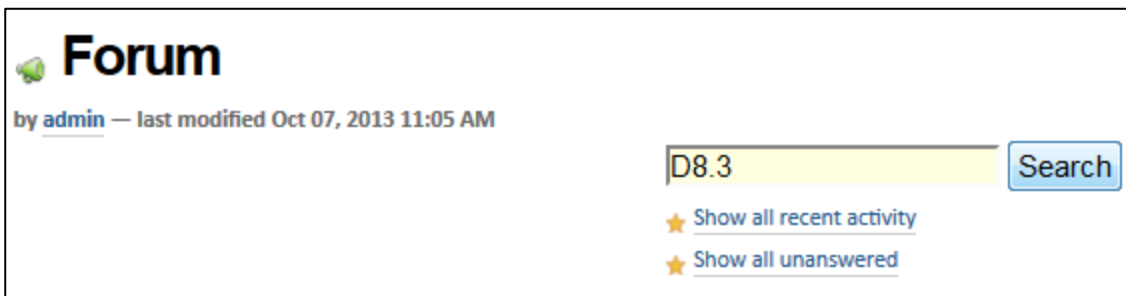
Figure 16. The forum search box

Figure 17. Search results

3. METHODOLOGIES AND TOOLS

This part of the Phase III Package provides methodologies and tools developed and used in the FITMAN project. It includes the Verification and Validation (V&V) method and criteria and the FITMAN Business and Technical Indicators. Next is a summary of the V&V generic assessment package and the V&V assessment package instantiation per trial. Finally, this section includes a summary of the first FITMAN SMEs innovation preparation deliverable.

3.1 FITMAN Verification & Validation Method and Criteria

This section summarises FITMAN Deliverable 2.1.

To ensure high quality outcomes, an intense FI-PPP phase II project like FITMAN has defined an all-inclusive framework for verifying, validating and evaluating a software product from its conception to final release and implementation in real-life, industrial settings. As Deliverable D2.1 ("FITMAN V&V Method and Criteria") states, the goal is to provide FITMAN with the appropriate methodology in order to verify that the FI-WARE generic and FITMAN specific enablers (as well as Trial Specific Components) satisfy the technological, platform and architectural integration requirements imposed; validate that the FI-WARE generic and FITMAN specific enablers (as well as Trial Specific Components) satisfy the requirements of Smart-Digital-Virtual use case trials; and identify the evaluation and assessment criteria to be used in all Use Case Trials, taking into account sustainability (STEEP) and future business benefits.

In accordance with ANSI/IEEE Std 1012-2012 [6], the definition of V&V that has been adopted indicates that:

- Verification is the process of providing objective evidence that the software and its associated products conform to requirements (e.g., for correctness, completeness, consistency, accuracy) for all life cycle activities during each life cycle process (acquisition, supply, development, operation, and maintenance); satisfy standards, practices, and conventions during life cycle processes; and successfully complete each life cycle activity and satisfy all the criteria for initiating succeeding life cycle activities (e.g., building the software correctly).
  Verification answers the question: Are we building the product right?
- Validation is the process of providing evidence that the software and its associated products satisfy system requirements allocated to software at the end of each life cycle activity, solve the right problem (e.g., correctly model physical laws, implement business rules, use the proper system assumptions), and satisfy intended use and user needs.
  Validation answers the question: Are we building the right product?

The FITMAN V&V methodology introduces a new and innovative way of performing V&V activities in various ways by:

- Bringing together and getting the best of breed of the agile and waterfall software engineering philosophies which have been essentially dealt as contradictory trends and schools of thought until now.
- Infusing a crowd assessment mentality within the V&V activities, under each methodological step from code verification to business validation.
- Balancing and bridging the business and technical perspectives in an effort to assess the software and the "fit for purpose" requirements of trials and to evaluate the overall software's added value.
- Providing proper sets of business and technical criteria covering all the verification and validation steps described in the developed methodology.

- Elaborating on a set of guidelines to assist all actors involved in implementing the FITMAN V&V methodology in practice.

From a business perspective, the methodology is general enough to be implemented in applications beyond the FITMAN trials use cases and goes hand-in-hand with the Business Performance Indicators (BPI) Method for FITMAN elaborated in D2.2 ("FITMAN Verification & Validation, Business and Technical Indicators Definition").

FITMAN V&V Methodology Description

In order to develop the FITMAN V&V method the major stakeholders, their roles and involvement had to be identified. These roles are diversified in three layers: pure IT roles (that if not exclusively, mainly involve themselves in IT V&V activities), higher level business roles (who assess the product in terms of the business requirements) and a wider community constituting the external environment for crowd assessment purposes.

The developed V&V method is essentially divided into two perspectives:

- The trial specific perspective (T) which assesses whether the IT and business requirements and domain's needs are met, and
- The product-specific perspective (P) which describes how to verify and validate the product (i.e. the Generic Enabler (GE), the Specific Enabler (SE) or the Trial Solution Component (TSC)) during its development.

In particular, the FITMAN V&V method is elaborated step-by-step, providing, apart from the general description of the procedure, the potential techniques to be employed, the stakeholders to be engaged, and the potential crowd engagement methods to be applied. For each step of the FITMAN V&V method, one technique retrieved from the international bibliography and the practical approaches is recommended while alternative techniques are also proposed in case they are considered more appropriate for some trials according to criteria like expertise of personnel or available time. In detail, the steps of the V&V method include:

- **Business Validation (T-2)** to assess whether the overall trial solution eventually offers sufficient added value to the trial.
  - *Recommended Technique*: Simplified ECOGRAI Methodology, as defined in D2.2.
- **Trial Solution Validation (T-1)** to guarantee that the overall trial solution satisfies intended use and user needs.
  - *Recommended Technique*: User Acceptance Testing
- **Product Validation (P-5)** to examine whether the product satisfies intended use and user needs.
  - *Recommended Technique*: Black Box Testing for Validation
- **Release Verification (P-4)** to determine whether the requirements of the final product release are met.
  - *Recommended Technique*: Regression Testing
- **Backlog Verification (P-3)** to determine whether the requirements of the product after each sprint are met.
  - *Recommended Technique*: Regression Testing
- **Model Verification (P-2)** to coordinate the alignment between design and requirements, as well as between design and code.
  - *Recommended Technique*: Traceability Analysis
- **Code Verification (P-1)** to ensure functionality, correctness, reliability, and robustness of code.
  - *Recommended Technique*: White Box Testing

FITMAN V&V Criteria Definition

In parallel with the methodology definition, the **business and IT criteria were elaborated** in order to be part of the V&V methodology as well as to prepare the ground and give a fruitful background to elaborate on IT and Business Performance Indicators (BPIs) in D2.2 ("FITMAN Verification & Validation: Business and Technical Indicators Definition").

The business validation criteria are categorized in two sets: i) the generic criteria based on SCOR and ii) the specific criteria based on the trials business requirements. The former concern customer reliability, agility, responsiveness, cost and assets, while the latter concern cost, sustainability, innovation, efficiency, flexibility and quality.

IT V&V criteria involve FITMAN-relevant categories (including openness and versatility) and more generic categories like functionality, maintainability, usability, reliability, efficiency, and portability based on the ISO 9126 standard.

FITMAN V&V Guidelines

Following the development of the V&V methodology, preliminary *guidelines were prepared* with a view to providing concrete directions to the trials on how to implement the methodology in their applications. Timing perspectives, V&V checklists and recommendations are provided in order to help stakeholders understand and perform the V&V activities properly. In addition, in order to infuse a very practical and applicable philosophy of the V&V steps to all stakeholders, a "V&V decalogue" has been constructed which includes the following recommendations:

I.   Have a deep knowledge of the requirements and the ends sought in each trial.
II.   Support a V&V culture in your trial.
III.   Create a concrete V&V plan to be followed in each step.
IV.   Engage from the very beginning the required stakeholders, assigning them with appropriate responsibilities and decision power.
V.   Draw on the power of data to effectively conduct V&V activities.
VI.   Proceed with each V&V step on the basis of at least 1 recommended technique.
VII.   Keep the balance between business and technical V&V aspects.
VIII.   Invest on crowd-sourcing techniques aligned to the trial philosophy.
IX.   Document in detail the V&V findings.
X.   Treat V&V as an iterative procedure.

Summary of the V&V Method and its usefulness for Phase III proposers

The FITMAN V&V method introduces a new and innovative way of performing V&V activities in order to verify and validate a software product. As already mentioned, it constitutes a general, all-inclusive framework that brings together both the technical and the business viewpoints and can be applied throughout the whole lifecycle of the software product. It describes the necessary steps, the techniques to be applied for each step, the roles to be involved, and suggestions for crowd assessment.

The FITMAN V&V method is reusable beyond FITMAN to any project that has software development tasks and follows either the traditional waterfall method or invests on agile software building patterns. As it is domain-agnostic, it may be applied both to the manufacturing domain, as it happens with the FITMAN trials, and to any other domain to which FI-PPP Phase III projects may target. The driving principles of the V&V method are completeness and applicability: it provides all interested stakeholders with the baseline framework and the theoretical background to effectively undertake any V&V activity; it is then up to each trial and each development team to streamline the method according to their own needs.

The guidelines which accompany the V&V method shall also facilitate the FI-PPP Phase III projects to apply the method correctly and easily, to the extent that it is possible, in real cases. The FITMAN V&V Package that incorporates the V&V method shall also be particularly helpful to this end.

3.2 FITMAN Business and Technical Indicators

This section summarises FITMAN Deliverable 2.2.

The goal of the WP 2 "FITMAN Verification & Validation (V&V) Method" is "to develop a method for the evaluation and assessment of the FITMAN Trials, regarding various aspects".

The goal of the deliverable D 2.2 is to identify and define a selection of Business Performance Indicators and Technical Indicators for the "FITMAN Verification & Validation Method".

Deliverable 2.2 has to evaluate two kinds of performance:

- The performance of Generic Enablers (GE), Specific Enablers (SE), Trial Specific Components (TSC), and also the various platforms developed in FITMAN project based on GEs and SEs. The nature of the systems is "Technologic" in that the criteria of evaluation are more oriented on the technical performance. The method used is "V&V method" (Validation and Verification), correctly adapted to the technical domain.
- The performance of a "Business System": the Use case trials. This System has a different behavior and the criteria of evaluation are different. It is necessary to combine Economic, Social and Human behavior with Technics. This evaluation is based on Business Performance Indicators (BPI).

The main results of this deliverable are the following:

- Definition of concepts connected with Business Performance Indicators and Technical Indicators.
  - For Performance Indicators: Criterion, Performance, Performance Indicators (PIs), Key Performance Indicators (KPIs), Key Success Factors, Objectives, Mission, Vision, Strategy, Process, Decision Variable and Action Variables, Constraints.
  - For Technical indicators: Validation, Verification.
- Concerning Performance Indicators, a large survey on the BPI approaches developed during the last 20 years (more than thirty) has been performed. They have been classified in four categories: approach with a basic architecture of performance measurements (A), approach to define Performance Indicators System (B), approach with diagnosis for improvement (C), approach based on organisational models to support the selection of performance dimensions (D),
- From this survey, four approaches has been selected and described: BSC (Balanced Score Card) (A), ECOGRAI (B), TOPP SYSTEM (C), ENAPS (D),
- The possibility of SCOR/VCOR and the work developed by the ECOLEAD project in the domain of Performance measurement, has been also analysed.
- At the beginning, BSC and ECOGRAI were selected because they are most used and have common characteristics. Then due to the fact that BSC is limited to the definition of KPIs, in a second analysis, ECOGRAI was proposed because it allows one to define the PIs from the strategic level to the tactical and to the operational level. In FITMAN we are more at the operational level of the Use Cases. The link with STEEP has been described.

In the last part of the deliverable, examples are presented in order to determine Technical and Business Performance Indicators. The initial proposition was kept, to consider technical indicators more oriented to evaluate GEs, SEs, TSCs, and IT platforms defined by the V&V method and the

Business Performance Indicators to evaluate trials performance by a simplified version of ECOGRAI.

The simplified version of ECOGRAI has only three phases instead of 6 phases (ref D2.2):

First Phase: Description of the system in which the performance indicators will be defined.
For that we use System Modelling.

To describe a system using System Modelling we need to determine:

- The elements which compose the system and the relations between these elements
- The objectives assigned to the system,
- The functions which allow to reach the objectives
- The processes which support the dynamic transformations
- The boundary which delimits the elements which don't belong to the system.
- The dynamic of evolution of the system.

Second Phase: According to the objective of the system the owner of the system determines the potential actions to reach these objectives (called Decision Variables (DV) or Action Variables (AV)).

In our case, the DV/AV are essentially the use of the platforms developed by FITMAN trials.

Third Phase: the performance indicators indicate or characterize the reaching of the objectives by using the DV/AV.
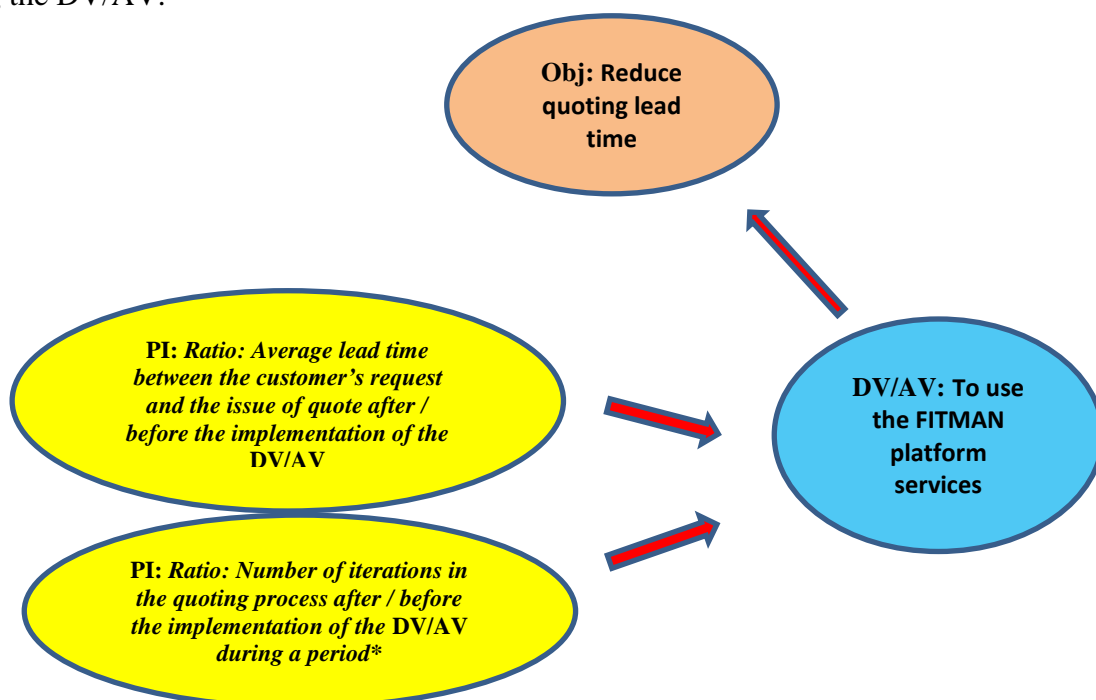
Figure 18. Example of results of application of Simplified ECORAI method on trial GEOLOC System

* Concept of time horizon (A PI is determined for a period of time depending of the dynamic evolution of the system. The PI is calculated for each period.

Link with FITMAN Phase III

The methodology described in the deliverable D2.2 will be useful for SMEs and web entrepreneurships involved in phase III. This methodology is easily applicable and the concepts are not complex. The method allows one to limit the number of Performance Indicators for one system.

The deliverable D2.2 gives a list of generic Performance Indicators. The advantages of the method are the possibility to adapt and customize the determination of performance indicators for new projects. By this way the SMEs and web entrepreneurship involved in Phase III will have the possibility to assess the results of their project(s).

3.3 FITMAN Verification & Validation Generic Assessment Package

This section summarises FITMAN Deliverable 2.3.

The main objective of D2.3 is the consolidation of the developed V&V Generic Method, Assessment Criteria, Technical and Business Performance Indicators into a generic package, the FITMAN Verification and Validation Assessment Package. Taking as inputs the results of the previous D2.1 and D2.2, the final goal of the Task is to integrate all the necessary Performance Indicators and their metadata, to support the application of these Performance Indicators and the documentation and visualisation of the assessment results and to allow the context-based comparison with other Use Case Trials. D2.3 develops, describes and discusses in detail this package both from a methodological and technological perspective. It also constitutes the input for the subsequent D2.4 (FITMAN V&V Assessment Package instantiations per Trial), where the generic FITMAN Verification and Validation Assessment Package is effectively instantiated in each of the eleven FITMAN Use Case Trials.

It constitutes the generic integrated reference model for the practical achievement of the three following objectives:

- the Verification of the already developed Generic Enablers (GEs);
- the Verification of the Specific Enablers (SEs) and Trial Specific Components (TSCs) under development during the FITMAN project;
- the Validation of the complete solution developed for each Use Case Trial in the framework of the FITMAN project.

In order to reach these goals, the following points have been addressed:

1. The 7-Steps FITMAN V&V Methodology developed in D2.1 have been integrated with the IT and Business Performance Indicators established in D2.2 in a common logical framework.
2. The three different kinds of Forms to adopt in order to collect the necessary data for the FITMAN V&V Process, i.e. Self-certification Form, PIs Measurement Form and Community-based Form have been identified, defined and developed from a methodological point of view.
3. The aforementioned three kinds of Forms have been integrated in the generic conceptual framework of the FITMAN V&V Assessment Package. It is composed by three main Sections: the "Technology Section", the "General Information Section" and the "Instructions and Support Section". The first section includes the forms themselves and the last two sections represent the V&V Communication Package, which supports the first one.
4. The whole conceptual FITMAN V&V Assessment Package has been implemented on the FITMAN Website by means of static web pages. The Technology Section has been in particular published by means of the online survey tool (SurveyMonkey software), the tool

effectively used to manage the different Forms. D2.3 explains how to set up a V&V Assessment Package.

The FITMAN V&V Assessment Package's Technology Section's "lifecycle" has been also properly taken into account. In fact, three different chronological phases have been individuated and defined in the exploitation of the FITMAN V&V Package's Technology Section, always both from a methodological and technological point of view:

a. Data Collection, about the correct and efficient gathering of all the kinds of data by means of different kinds of Forms. It is supported by the online survey tool (SurveyMonkey), with appropriate timing, frequency (once or more times) and contributors (target contributors or generic users). Data Collection Process, and in particular PI's Measurement definition, follows two different approaches: Business Indicators are defined for each trial using the ECOGRAI Simplified Methodology and then presented by mean of a paper form; it will be used as the input for on-line data collection form. On the other hand, the whole pool of IT Indicators is developed in D2.2 and taken as input to create generic online form, which is then adapted instantiating the indicators itself.

b. Data Elaboration, about all the aspects related to data analysis and aggregation, such as the definition of the different dimensions of analysis and of the ways to aggregate and compare the data. It is supported by MS Excel and completely integrated with the online survey tool (SurveyMonkey);

c. Data Presentation, regarding the different modalities to report and discuss the final results of the FITMAN V&V Process, such as the different ways to present the final data and the selection of the more representative findings. It is supported by PDF files and completely integrated with MS Excel. Raw data are planned to be available in MS Excel and MySQL format for free customized elaborations managed by each Use Case Trial.

The whole generic FITMAN V&V Assessment Package developed is consistent with the FITMAN Reference Architecture of the FITMAN project. It is hence able to highlight and keep granularity on:

- Reference Architecture levels (i.e. Future Internet Cloud, Business Ecosystem, Individual Factory/Enterprise)
- GEs, SEs, TSCs
- Smart/Digital/Virtual domains
- Small Medium Enterprise/Large Enterprise
- Trials
- Other aggregations thanks to the open format of storing of collected data

Finally, the generic FITMAN V&V Assessment Package also provides, as requested, to WP7 and WP8 feedback information to Use Case Trials at different levels of granularity, i.e.:

- Trials
- Steps
- Verification and Validation Techniques
- Performance Indicators

Why D2.3 is useful for Phase III proposers:
The V&V Package developed in D2.3 constitutes a general framework for the Verification and Validation of Trials' Business Scenarios, and as a consequence can be considered as a solid

methodology that, opportunely modified and customized to the specific situation it will be possible to use during the assessment of the most various manufacturing environments. The V&V Package is in fact strongly innovation-oriented and takes into account both the pure technological (i.e. IT) and business performance's ones. Its strong modularity also allows a partial and selected use of its components according to the specific interests and needs of the users. Finally, it constitutes an integrated and exhaustive map of all the criteria and methodologies necessary for a correct evaluation of highly innovative IT projects in the manufacturing world.

How they should use it:
The V&V Package can be used as a simple methodological guideline for the evaluation of IT innovation in manufacturing or alternatively as a real tool providing the software infrastructure (by means of SurveyMonkey platform) and instruction support (by means of the proper information formalized by means of the V&V Communication section) needed for a practical successful re-use of its main functionalities. In-deep contents and support material is in fact fully supported by the generic V&V Package.

3.4 FITMAN V&V Assessment Package instantiations per trial

This section summarises FITMAN Deliverable 2.4.

As stated before Work Package 2: FITMAN Verification & Validation Method has as an overall purpose to develop a method for the evaluation and assessment of the FITMAN Trials, through:
- The identification and integration of existing V&V methods
- The description of functional and non-functional technical indicators for evaluating openness and versatility of FI-WARE in FITMAN trials
- The description of business indicators for evaluating the business benefits in the trial after the adoption of FI-WARE Generic Enablers (GEs)
- The integration of technical and business indicators in a generic V&V assessment package for FI-WARE evaluation in manufacturing smart-digital-virtual factories of the future
- The instantiation of the generic V&V package into the chosen Use Case Trials and application domains.

The Task T4.2 *Instantiation of V&V Assessment Package Instantiation Per Use Case Trial* covers the last point in the list above. Figure 19 shows the interaction between WP2 tasks.
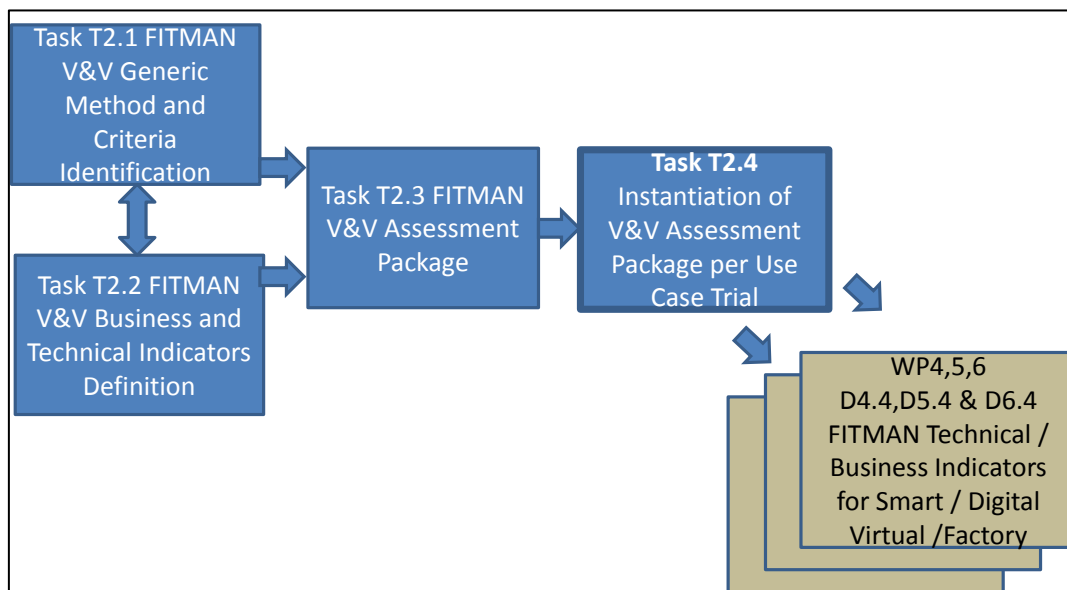
Figure 19. WP2 interaction and contribution to the FITMAN concept

Objectives

The previous task T2.3 has developed and delivered the FITMAN V&V Generic Assessment Package. For more details see chapter 3.4 of this document.

The objectives of Instantiation of V&V Assessment Package are to provide each trial the needed support and tools to apply the FITMAN V&V Assessment Method, including;

- Arrange regional training & instantiation sessions for Trial support partners
- Define and select the performance indicators (business and technical) with end user involvement. Usage of ECOGRAI simplified methodology.
- Transform the Generic FITMAN V&V framework into customized and directly usable tools for all the specific eleven Trials, including; Data collection, evaluation and presentation tools
- Give continuous support to Trials

Results of instantiation

Each trial has defined the scope of V&V assessment, selected the performance indicators to be evaluated (according to PI methodology); selected the people to be involved in the assessment, identified the source of data for the indicators, collected and prefilled the PI templates and sheets.

As the results of the instantiation process each trial has

- access to regional training sessions and specific training package.
- selected the people to be involved in the assessment (stakeholders)
- initially defined IT and business PIs to be used in the Trial and scenarios
- identified the source of data for the indicators
- individually created Data Collection forms

The instantiation is performed per trial. This means that the scope, metrics and data collection forms are created at the trial level and for the trials. This means that the product-specific V&V phases, optionally performed by the development teams, should be performed using a trial specific view to the V&V package.

The Overall Instantiation process of the generic V&V package

The main steps involved in the instantiation of the generic V&V package, shown in Figure 20, are

- Communication and Training support to Trials
- Preparation for Instantiation
- Instantiation of data collection process
- Continuous support to Trials

Figure 20. Overall Instantiation process

Instantiation of Data Collection forms

The Data Collection Setup Process for a Trial's Business Scenario will involve four different sub-processes:

- Quantitative Business Performance Indicators Sub-process
- Quantitative IT Indicators Sub-process
- Self-certification Sub-process
- Community-based Sub-process

These are shown in Figure 21.
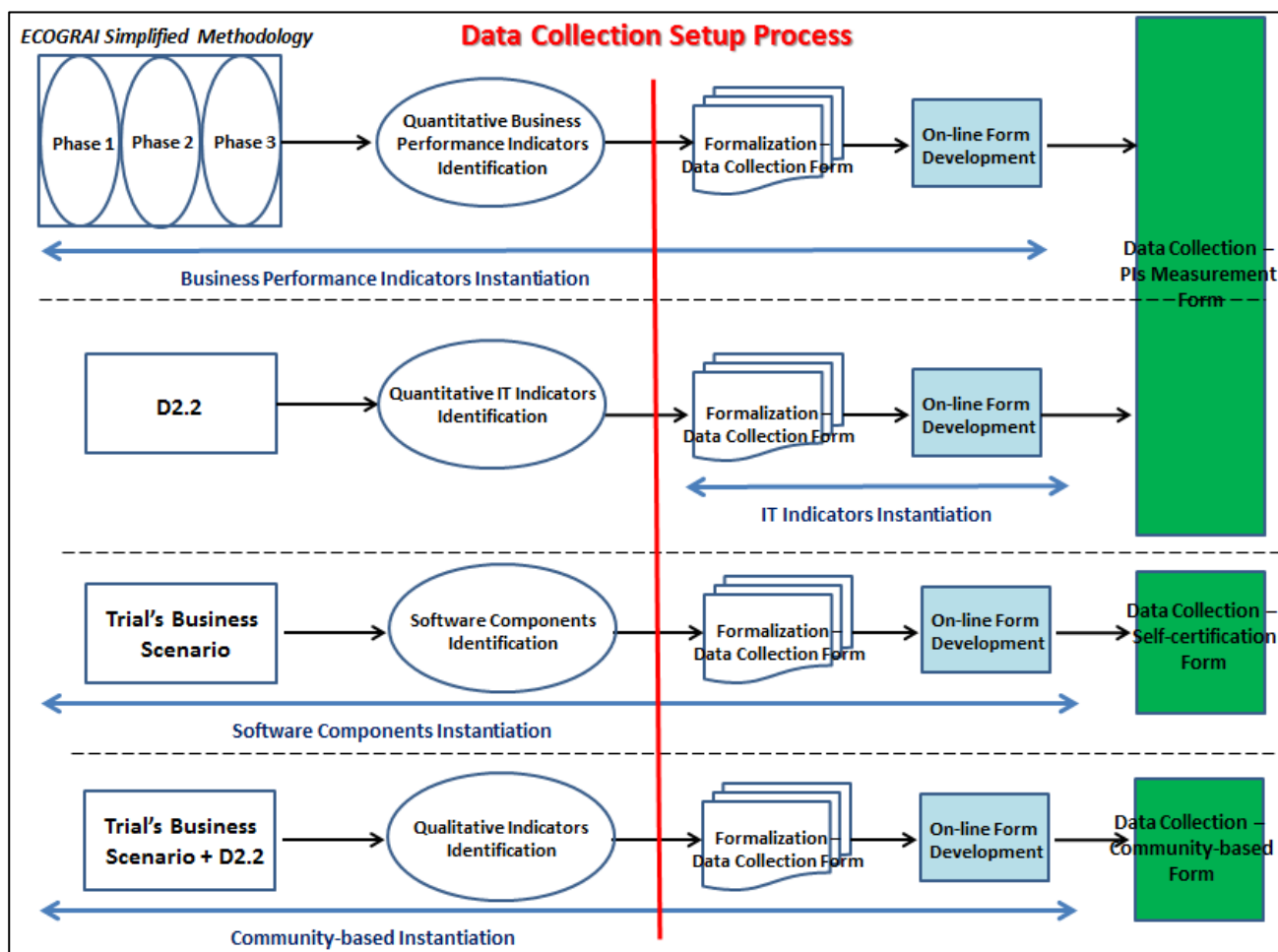
Figure 21. Data Collection Setup Process

Instantiation of training package

Regional training and instantiation sessions for Trial Solution Owners will be organised as following: Training & first instantiation with trial support organisations:

- Region Italy: <u>POLIMI</u>, TXT, Softeco
- Region Spain + Portugal: <u>NTUA</u>, ATOS, Uninova, UPV
- Region France: <u>IVLAB</u>, Lyon2, UBX1
- Region Germany + UK: <u>VTT</u>, IPK, Coventry

<u>(Training organizer underlined)</u>

The regional training session will be provided with suitable training package including the ECOGRAI simplified methodology.

Usage of the FITMAN V&V Assessment Package instantiations in FI-PPP Phase III projects

The consolidated FITMAN Verification and Validation Assessment Package, including the V&V Generic Method, assessment criteria, technical and business performance indicators provides the necessary methodological background for the assessment of any Phase III trial and use case. The methodology is generic a can thus be applied to most types of Phase III trials. The scope of the Phase III trials and use cases determine the outcome of the instantiation process. Thus it is important for each user of the FITMAN V&V Generic Method to specify what the main scope of

the trial is and instantiate only the data collection process and forms needed in the Phase III trials. An assumption is that less focus will be put on the verification aspects (self-certification process). The provided Communication Package and training material will give guidance and support for the instantiations. If queries remain after consulting this material, please contact FITMAN for further support on fitman-phase-iii-info@txtgroup.com.

3.5 FITMAN SMEs Innovation Preparation First

This section summarises FITMAN Deliverable 8.3.

D8.3 FITMAN SMEs Innovation preparation First provides methodologies aiming at facilitating the SME engagement in FI-PPP Phase III. These methodologies are addressed to consortia bidding for FI-PPP Phase III Call 3 as well as SMEs and web entrepreneurs participating in the Open Calls to be issued under the Phase III call. Thus, this summary provides an overview of the methodologies that will facilitate Phase III proposers and projects to issue Open Calls. Specifically, the provided methodologies are addressed to the following target groups:

- **SMEs** including **start-ups** and **web entrepreneurs** in ICT for manufacturing
- **Intermediaries for SMEs**, including venture capitalists, regional authorities, incubators, and SME associations.
- **Innovation/Entrepreneurship networks** and **Clusters**.
- IT companies specialized in **software** and **applications**, platforms, ICT infrastructures for manufacturing companies.
- **Public institutions** and **Regional development Agencies.**

The D8.3 methodologies objectives are twofold:

- **Create technology awareness** in EU innovation and entrepreneurship networks, exploiting their capillarity and scale.
- **Support SME service and application development** and produce an environment for continuous application development with business impact that can serve the innovation practices of SMEs in Phase III.

D8.3 starts off by providing methodologies for identifying **best practices and lessons learned**. They consist of three parts: the first part provides an overview regarding the identification of best practices in general and for FITMAN specifically; the second part provides early examples of best practices from other Future Internet initiatives; the third part describes a method for extracting lessons from FITMAN at month six of the project.

The first set of methodologies provided for **creating technology awareness** is mainly addressed to FI-PPP Call 3 winning consortia and consists of five main stages:

- The **first** stage defines the overall scope of the technology awareness activities, as well as the target groups to which the activities will be addressed.
- The **second** stage identified the relevant European networks that could be used in order to exploit their capillarity and scale and reach the desired objectives as set out under stage 1. The different communication means that each of the networks has available are also identified.
- The **third** stage proposes a ranking system in order to prioritise networks and first contact the ones having a higher likelihood in creating bigger impact among SMEs and web entrepreneurs. Also, they are matched with appropriate communication means.
- In the **fourth** stage, the methodology for establishing an active dialogue with the identified and ranked networks for their best and efficient exploitation is presented.

- In the **fifth** stage, the methodology proposes the continuous monitoring of the technology awareness activities for efficiently reaching all the objectives set and following up whenever necessary.

Figure 22 below illustrates the overall methodological approach for creating technology awareness.
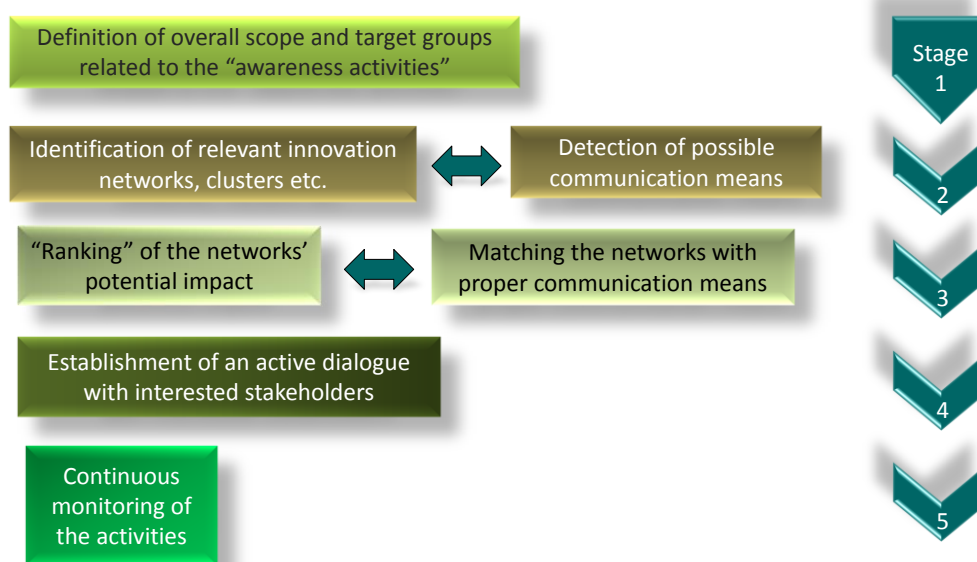
Figure 22: Overall methodological approach for creating technology awareness

The second set of methodologies aims at supporting SMEs and web entrepreneurs in the service and application development.

The **lean start-up principle** and the **Minimum Value Product** (MVP) concept help the SMEs and web entrepreneurs to maximise costumer value while minimising waste. More specifically, these concepts will facilitate the SMEs and web entrepreneurs to develop their idea, test it with some costumers, get a feedback from them and finally develop their product, having used a limited amount of resources and without depending on external funding. Thus, by making use of these concepts, SMEs and web entrepreneurs will have a better chance of success without requiring outside funding.

The **co-creation** concept is also described on how it can support the service and application development from SMEs and web entrepreneurs. In the framework of the co-creation concept, requirements are developed in order to determine the needs or conditions to meet for building up or redesigning a product or a service. In the context of FITMAN, the focus is on software requirements and high-level business needs as the candidate Phase III end-users will aim to develop new services or applications through the enablers and frameworks provided by FITMAN. In D8.3, two definitions of co-creation are provided:

- The first refers to the collaboration among different stakeholders in order to define and analyse a clear and complete set of software requirements
- The second refers to a group of stakeholders who wish to address their business needs by building on top of a similar case already developed, by getting the existing set of requirements and in cooperation with the original creators they fine-tune it in order to cover their particular needs.

D8.3 also provides a methodology for **local service hypothesis and trial** to support the development of service and application from SMEs and web entrepreneurs. This methodology is twofold:

- The FITMAN approach based on the FI-WARE Platform, using FI-WARE Generic Enablers.
- Exploitation of other "external" different solutions such as: Business incubators; Infrastructure and network providers; Internet Service Providers; Ad-hoc agreements with Universities; Creation of start-ups; Technology Platforms.

In addition to this methodology, a three step methodology is developed in order for **local FITMAN ICT infrastructure deployment** to support the development of services and applications from SMEs and web entrepreneurs:

- Design of the infrastructure to support FITMAN instantiation
- Identification of the FI-WARE components to instantiate in the Private Cloud
- Deployment on the Private Cloud

Linked to the two previous methodologies, D8.3 provides a methodology for **data gathering and feedback** in order to gather and understand the experiences of SMEs during FITMAN service and application development to be used as:

- Feedback within FITMAN
- Input to the last methodology on proactive communication of achievements and innovations generated by SMEs in Phase III.

Last but not least, D8.3 provides a methodology for the **proactive communication for achievements and innovation** generated by SMEs in Phase III. The methodology consists of five steps:

- **Step 1**: Liaison with the FI-PPP Phase III projects
- **Step 2**: Direct, bilateral communication with FITMAN-relevant projects
- **Step 3**: Online real-time alerting for achievements and innovations of FI-PPP Phase III
- **Step 4**: Diffusion of achievements and innovations of FI-PPP Phase III through Conventional Means of Communication
- **Step 5**: Monitoring of Impact

This five step methodology is developed to provide proactive support to SMEs and web entrepreneurs who are building services/applications which are relevant to the project concept and/or are building their services/applications utilizing (a subset of) the FITMAN results. Figure 23 below illustrates the overall methodological approach for the proactive communication of the achievements.
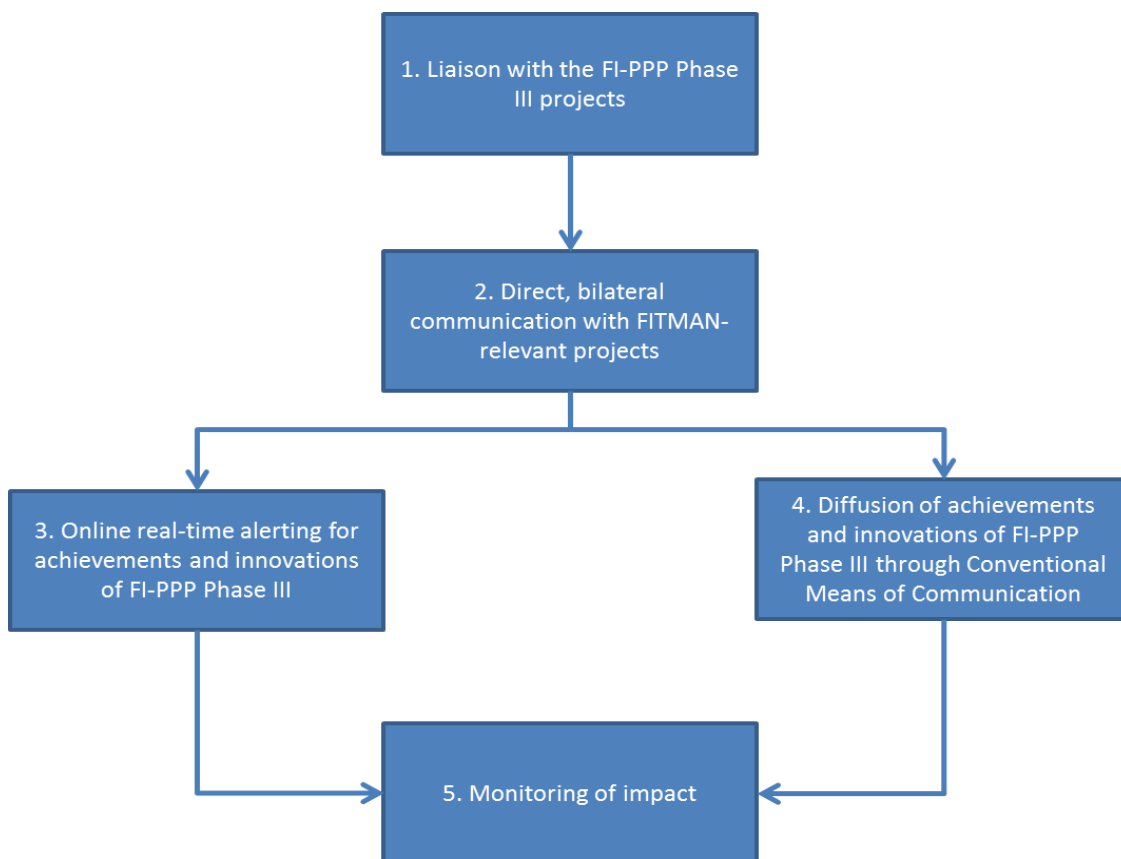
Figure 23: Overall methodological approach for proactive communication of achievements

The methodologies that are developed and provided in D8.3 can be used from FI-PPP Phase III bidders and SMEs and web entrepreneurs participating in the Open Calls in order to create technology awareness and support the application and service development, thus facilitating the SME engagement.

4. FITMAN ARCHITECTURE AND TRIALS

This chapter describes the M1 - M6 technical FITMAN deliverables, and is divided into nine sections derived from two FITMAN work packages. The first six sections describe outputs from FITMAN WP1, which concerns the FITMAN baseline system, while the final three sections describe outputs from WP3, which focuses on the design and development of the FITMAN experimentation sites. Both work packages are on-going, so the present section describes a static snapshot at Month 6.

The deliverables reported upon from WP1 are: the use case scenarios and business requirements; the trials IT requirements; the FI-WARE Generic Enablers Selection; the Generic Enablers and their Use Cases in Manufacturing; the FITMAN Reference Architecture; the FI-PPP Capacity Building Analysis.

The deliverables reported upon from WP3 concern: current existing IT infrastructures; the FITMAN trials business cases; the trials competencies and capabilities gap analysis and open call specifications.

4.1 Use Case Scenarios and Business Requirements

This section summarises FITMAN Deliverable 1.1.

Current factories are nowadays going through a transformation that should respond to major megatrends taking place worldwide. To address such challenges, future enterprises are developing new capabilities in their three dimensions smarter, digital and virtual factories. These advanced business capabilities can be achieved providing improved technologies for interoperability, connectivity, mobility and intelligence, which make enterprises smarter, more agile, mobile and collaborative. Future Internet technologies present enterprises with a new instrument to implement highly efficient business processes that leverage a competitive advantage for the enterprise.

The document carry out an insight into the business processes and business requirements that have been identified in the eleven trials defined in FITMAN to trigger the use of Future Internet technologies in the factories of the future, focusing on the production, engineering and technical support as the main departments within the enterprise that will provide the business requirements.

The document provides a clear understanding of which are the business processes (and the value behind), use cases that are driven by Future Internet technology adoption and the business requirements that drive the adoption.

The document provides a good vision into the motivation for companies of different sizes, departments within such companies and different sectors to engage in a digital business transformation and summarises the results taken when comparing the main studied values (business objectives, bottlenecks and weaknesses, and business requirements), among trials, regarding type of factory (Smart vs. Digital vs. Virtual).

The results obtained in this document have been obtained following an adaptation of the Wellington methodology, which is an iterative methodology based on 4 steps. FITMAN has defined 4 major phases to realise the analysis (1) Conceptual design. Approach discussion and agreement (2) Classifying and categorising the content (3) Creation of the template / interview (4) Template and Interview schedule. The complexity of the analysis (eleven trials and up to 44 processes) demanded an agile and parallel approach. To address this issue, the FITMAN methodology has combined the use of a questionnaire, an interview process and the notion of trial handbook to perform two analysis iterations. The most challenging aspect has been the realisation and communication of the methodology and the coordination of the surveys in eleven sites with the short period of time available (3 months to complete methodology definition and perform two iterations of analysis).

This document presents a comprehensive introduction to business activity of the company involved in the trial, the current IT systems, the weaknesses to be addressed in the current operation and the foreseen innovative FITMAN solutions. The focus is also on the formulation of business objectives and business drivers for FITMAN and FI-WARE technology adoption.

FITMAN findings reveal that the general business objectives behind FI technology adoption seek to (1) Improve communications/collaboration (2) Reduce production costs (3) Reduce time to market (4) Improve the usefulness of the information (5) Increase production capacity. The main business drivers; i.e. business cases, behind FITMAN technology adoption are related to (a) reduction of costs and (b) improvement in efficiency. FITMAN has also found that the main rationale to start or propose the adoption of innovative ICT technology in the manufacturing context is related to the ability to show improvement in the areas of data interoperability, removal of rigid and static procedures and inefficient data processing methods. This rationale is fully supported by manufacturing, technical support and management departments in the factories that are the areas that are most represented among the divisions involved in the FITMAN trials.

One of the most interesting findings relates to the different interests that move Large enterprises and SMEs, which are sensible to different aspects of the business processes. While LEs have a larger interest in increasing the production capacity and improving work safety and security, LEs find it less significant than SMEs to improve communication and collaboration.

Finally, the three types of trials FITMAN has analysed (smart, digital and virtual) coincide in identifying efficiency as the main improvement that could be leveraged by FITMAN platforms. FITMAN has also derived some recommendations for further work from the analysis of the results obtained. In particular, it is important that FI-WARE GEs, FITMAN SEs/TSCs are not perceived as isolated modules in the FITMAN context, but as a source of competitive advantage generation. Hence, it is recommended that the business requirements, business processes defined in D1.1 are further traced down to GE, SE and TSC implementation in future project developments. Thus, FITMAN should be able to present the value proposition of the GEs to the different domains (Smart, Digital and Virtual). This contextual information is critical to foster future adoption of the GEs, since potential users will better understand which value the use of a particular GE, SE or TSC is bringing to the customer.

The main conclusions obtained from D1.1 are the following: (1) Drivers for digital business transformation through ICT in manufacturing differ from SMEs and LEs (2) Business value perceived from GEs, SEs and TSCs will differ based on the category considered (Smart, Digital and Virtual) (3) Industry perceives FI-WARE enablers as a contributor in their business strategy implementation (particularly LEs). (4) Infrastructures for manufacturing innovation go beyond IT and connectivity infrastructures, as they should be realistic but decoupled from real production shopfloor / engineering departments / supply chains. (5) Business requirements for the enhanced business processes defined by FITMAN could be addressed by complementary actions.

In summary, the document D1.1 is useful to Phase III proposers as it introduces the business scenarios and business objectives that drive the FITMAN trials; defining the business process requirements and expectations from FITMAN trialing. As a result, the document defines the requirements on new business processes to gain relevance and acceptance by industry, as well as serves as a good indication of industrial (SME and Large Enterprise) motivations for implementation of FITMAN business process.

Phase III proposers should use the document – D1.1 in order to have a deep knowledge about the wide variety of departments taking place in the different FITMAN trials, as well as the information about Business Process improvements expected from of FITMAN applications, solutions (Specific Enablers) and services.

4.2 Trials IT Requirements

This section summarises FITMAN Deliverable 1.2.

European Industrial sectors and specifically manufacturing domain are facing transformations that should respond to major challenges coming from evolving megatrends taking place worldwide. These megatrends have been identified by various road mapping and strategic research activities (e.g. Factories of the Future PPP FoF 2020 Roadmap [7]) and they encompass not just technical, industrial and economic aspects, but involve as well Socio-economic megatrends as Demographics and consumption, Global competition and Innovation, Sustainability.

To address such challenges, enterprises have to structure their organisations and business/operational models developing new capabilities in the 3 dimensions: smarter, digital and virtual factories. Such development of the enterprise capabilities is enabled by innovative application of ICT technologies. With this respect FI-PPP (the Future Internet Public-Private Partnership Programme) launched a number of projects aiming to this objective, and specifically FI-WARE is aiming to provide "an innovative infrastructure for cost-effective creation and delivery of services, providing high QoS and security guarantees".

FITMAN Project (Future Internet Technologies for MANufacturing industries) (a phase 2 FI-PPP project) has the mission to provide the FI PPP with a set of industry-led use case trials in the Smart Digital and Virtual Factories of the Future domains in order to test and assess the suitability openness and flexibility of FIWARE Generic Enablers. In order to accomplish the mission statement the FITMAN project delivers one FITMAN Generic Platform for manufacturing industries as a collection of several Generic Enablers Implementations belonging to most of the identified technological Chapters of FIWARE probed. The platform addresses the Smart, Digital and Virtual Factory areas for eleven companies (LEs and SMEs) operating in the manufacturing sector in different areas.

D1.2 analyses the FI-WARE platform from an IT perspective. The Task proceeds from a scenario description for the trials in terms of AS-IS and desired TO-BE conditions for the operation of FITMAN services and applications. Such activities have been carried out from the Business Perspective in T1.1 (D1.1) and from the operational and IT Perspective in ad hoc Industry Focused Task Forces.

The final aim of D1.2 FITMAN Trials IT Requirements for FI-WARE is to implement what stated above by following a three-step approach:

1) Study and define the coverage of FI-WARE GE open specs and reference implementations versus FITMAN trials IT needs. This analysis took into account the FI-WARE GEs technical roadmap, including the possibility to identify possible additional requirements for extension / customisation of FI-WARE GEs to improve this coverage
2) Identify and classify manufacturing-specific, trial-generic functional IT gaps between the FI-WARE offering and FITMAN IT requirements, to be covered by additional software components to be developed as FITMAN Specific Enablers.
3) Identify and design trial-specific IT requirements which in general support integration between selected GEs and SEs, and their interoperability with pre-existing IT infrastructures and components in the trials. The detailed specification and implementation of such components (to be implemented in WP4-5-6) will also consider the existing IT infrastructure and envisaged new business processes.

For a such complex project (eleven trial environments under development) a rework process need to be supported, for that reason the adopted methodology for the definition of the IT requirements follows an iterative agile approach, with a continuous adaptation to the emerging needs (even during the Trial implementation and namely following the T4/5/6.2 - Continuous Adaptation of

System for Trials). For that reason the first version of the D1.2 deliverable represents the better understanding of the IT requirement to FIWARE for FITMAN trials, but it is a "living document" following the evolution of the trials, the availability and maturity of available GEs and the characteristic of deployed FITMAN platform and infrastructure.

As a result of these activities, the deliverable analyses and defines for each individual trial the high-level interfaces for FITMAN SE and FI-WARE GE. Based on this initial definition of FITMAN and FI-WARE interfaces, the IT infrastructure for the trialed application and the trialed FI-WARE infrastructure is defined. This comprehensive description will be revised and evolved in Task T1.4 as the FI-WARE platform is instantiated per trial.

The document also pays specific attention to existing technological megatrends and namely the key initiative that at EU level are supported and presented in specific roadmaps, e.g. Factory of the Future Roadmap [7] and FInES Research Roadmap 2025 [8]. That will ensure a coherent development of IT strategies in FITMAN trials are aligned with main technological trends.

Activities have been conducted in tight connection with the following taskforces:

1. Eleven FITMAN trials (and with ad-hoc domain task forces in the 3 Smart, Virtual and Digital Factory sectors)
2. Twelve General Enablers Task Forces having the specific objective to investigate the FI-WARE Chapters GEs to identify the supported functionalities, availability and maturity.
3. Ten Specific Enablers Task Forces having the objective to identify a FITMAN Catalogue of SEs, issuing the "open specs" of all the selected SEs and their available existing reference implementations of the SEs and the "open call specs" for the Enablers not currently available and where is needed the issuing a call for new partners.

The collected IT Requirements have been classified as follows:

1. Functional Requirements divided in the following categories:
    a. Application: What are the key functions to be supported by the selected GE/SE in the trials,
    b. User Interface (if any): What are the characteristics of GE user interfaces (considering different types of devices) and associated requirements
    c. Data sources: What are the requirement and constrains for required data (Databases, data streams and data repositories). In this category are also included field devices (PLC, OPC, …)
    d. Interfaces and Interoperability: What are the requirements for integration and interoperability of the component (EAI, protocols, etc.)
2. Non-Functional requirement (including for example: Security, Availability, Scalability, Look&Feel, etc.)

Key contribution to other tasks and deliverable of the project are to:

D1.3 Providing indication about GEs requirements and so influencing GE selection.

D3.3/D3.4 Providing indication about SEs requirements and so influencing SE selection

D3.6 Defining Specification for Open Calls issuing.

- This deliverable will be useful to PHASE III Projects as it defines a methodological approach to IT Requirement definition for a project that is not a "classical" software development process, but it needs to consider user and business objectives and General Enablers/Specific Enablers availability and maturity. The classification of the IT Requirements is also allowing to analysis their structure identifying key needs and open issues.

- In order to utilize the information contained in the document it is important to gain confidence with the proposed methodology for IT Requirement classification and the Agile data collecting process. A continuous collaboration with Trials and Tasks in charge of GE analysis and SE analysis is required.

4.3 FI-WARE Generic Enablers Selection for FITMAN

This section summarises FITMAN Deliverable 1.3.

The aim of Task 1.3 is to identify the set of GE to be used by Smart-Virtual-Digital Trials and to investigate what facilities of the FI will be able to support the different trials presented in the FITMAN project. The D1.3 provides the results of the work done in the task, and expose the final selection of the FI-WARE GEs which will be part of the FITMAN Reference Architecture is here reported.

Following, it is given a brief description of the content of the main different chapters:

- **Chapter 2 - "Roadmap to Generic Enabler Selection"**: This section is an explanation of the work process carried out in FITMAN project in order to achieve the objective of FI-WARE GE selection for FITMAN system deployment.
- **Chapter 3 - "FI-WARE Chapters Descriptions"**: It was considered interesting to include a small introduction of each FI-WARE chapter, where a brief description is given and how it can be applied in FITMAN.
- **Chapter 4 - "Generic Enablers Analysis"**: This section provides an analysis of the G.E. release I grouped by chapters, for each GE it is identify the main information gathered from FI-WARE specifications and this information is analyzed looking for their applicability to FITMAN trials. In this chapter, it is also provided some preliminary analysis of the Generic Enablers from Release II. In those specific cases, it is given a briefly assessment based on Open Specifications, on the FI-WARE Technical Roadmap and the Webinars attendance.
- **Chapter 5 - "Selected Generic Enablers by Chapter"**: Due to the analysis done by the GETFs, some GEs are decided to be taken into the platform design. A list of the main features of each selected GE is also given in this chapter.

Figure 24 shows the roadmap followed in T3.1 for GEs selection.
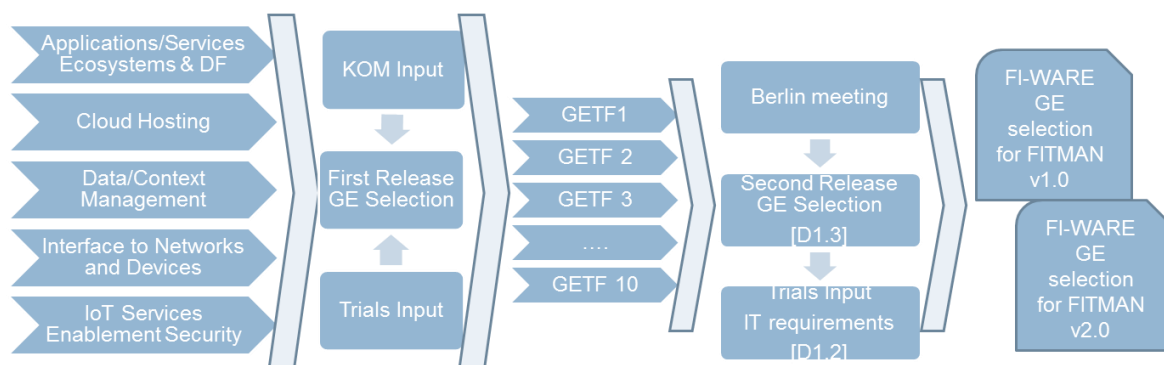
Figure 24. T3.1 roadmap for GEs selection.

To understand the selection done on the FI-WARE Generic Enablers, it is important first to give a very brief idea of the objectives of the trials. The different Trials involved in FITMAN can be organized into three different domains: Smart, Digital and Virtual.

- Smart Factories trials aim at reducing production costs, increasing production capacity and managing and optimising various aspects of production. In this manner, Smart factories will be more focused in the use of GEs from the Internet of Things (IoT) Services Enablement Chapter for data collection from the shop floor and enterprise applications.
- Digital Factories trials are more focused in product development and reducing time to market. So, to achieve its objectives, Digital Factories will be concentrated in the use of GEs from the Applications/Services Ecosystem, Delivery Framework and the Data/Context Management Chapter.
- Virtual Factories trials are more concentrated on the improvement of the communications and collaboration in the supply chain. To meet their objectives, Virtual Factories will focus in the use of the Applications/Services Ecosystem and Delivery Framework Chapter. And, in a minor manner, it will also be used the Data/Context Management Chapter.

To resume, 15 Generic Enablers from the First Release were selected. That selection was accomplished thanks to the definition of a set of criteria for the selection, some of those criteria are mandatory and other optional.

Mandatory criteria for GEs selection are:

- <u>Relevance to Manufacturing Domain</u>. These Criteria will help to exclude GEs which are not useful in the manufacturing domain.
- <u>GE Specifications meet FITMAN Trials' requirements.</u> Based on GE open specifications, available at FI-WARE wiki page, a deep analysis was performed to study how the GEs can be used into the business processes identified by the trials.
- <u>Implementation Availability and Technical Roadmap</u>. There will be considered GEs only from the First Release which is implementation is ready to be used. A revision of this criterion will be implemented after Release II.
- <u>Implementation Release is available and is interoperable with existing IT systems.</u> Webinars attendance was important to be able to see a Live Demo given by the GE owner. In this way, those webinars were useful as some doubts could be directly asked to the owner of the GE.
- <u>Terms and Conditions acceptable by FITMAN Trials</u>. Although precise definition of SLAs and prices are not in the scope of FI-WARE, GE T&C should be compliant with FITMAN Trials policies and IT suppliers' selection rules.

Optional criteria to take in consideration for GEs selection are:

- <u>Ease of combining the GEs with other GEs.</u> In some cases, a GE alone might not be interested for FITMAN, but if it is combined with other GEs it can implement a FITMAN IT Requirement.
- <u>Hands-on Experimentation with GEs.</u> As all the GEs were not available to be freely downloaded, it was not possible to proceed with hands-on testing with all of them. In fact, some proprietary GEs were only available for FI-PPP members, as long as FITMAN is finalizing the signature of the FI PPP CA by all its beneficiaries. Thus, this criteria is not compulsory to be matched. Whenever the GEs were available, GETFs should be able to make some experiments on them to decide whether the GEs are functional or not.

As a summary of the GEs selected per chapter:

Applications/Services Ecosystem and Delivery Framework (5 GEs). The five GE will be exploited mainly in Virtual Factories trials to facilitate the collaboration among different organisation partners and/or different companies departments, throughout the facilitating the interoperability and the

exchange of knowledge between the partners. And the Digital trials will exploit them for data integration from the different digital applications, UI components, etc. The five GE selected are:

- Apps.LightSemanticComposition
- Apps.ApplicationMashup
- Apps.Repository
- Apps.Marketplace
- Apps.Mediator

Cloud Hosting (4 GEs). Cloud Hosting GEs will be exploited by Trials using the infrastructure provided by some external player (Testbed/OIL in the experimentation phase, XiFi to run pilot applications). Additionally, FITMAN partners are also investigating the possibility of deploying a private cloud. As part of this experimentation, most of the Cloud Hosting GEs will be of interest:

- Cloud.DCRM
- Cloud.SM
- Cloud.ObjectStorage
- Cloud.SelfServiceInterfaces

Internet of Things (IoT) Services Enablement (4 GEs). Smart Factory trials can benefit from the real time monitoring of the shop floors and handle real-time or close real-time events and decision process management based on the data exploitation. Also Digital Factory trials are interested in knowledge extracted from different data sources. The four selected GEs are:

- IoT.Gateway.DataHandling
- IoT.Gateway.ProtocolAdapter
- IoT.Backend.IoTBroker
- IoT.Backend.ConfMan

Data/Context Management (2 GEs). Digital Factory Trials will exploit the Data/Context management GEs to analyze, classify and query in a proper and flexible ways the knowledge extracted from data sources, while semantic annotation is a very important issues due to the trials are already using ontologies and have specific semantic vocabularies at use. On the other side, Virtual Factory trials will exploit these GEs for collaboration and knowledge exchange and matching of knowledge between different parties (e.g. semantics and/or ontology matching). The selected GEs are:

- Data.PubSub
- Data.SemanticApplicationSupport

The next steps aimed at the analysis and selection of GEs from the Second and the Third Release. Once those GEs are available, the final selection will be completed. At the beginning of August 2013, FI-WARE announced that the FI-WARE Testbed V2 was ready to be used. In that announcement it was also explained the availability of a set of GEs implementations including totally new GEs and also new releases of the existing ones. Next efforts will be concentrated on the analysis of those new implementations available.

Useful information for Phase III proposers.
The deliverable D1.3 is useful to Phase III proposers as it explains which FI-WARE GEs have been considered for inclusion in the FITMAN architecture, and explains how the GEs will be used in the manufacturing domain in the Smart – Virtual – Digital factory trials. This deliverable provides a synthetic, easy to use way to understand the main characteristics of the GEs. Information is given in a table format where the main characteristics of the GEs are shown; a similar structure will be followed by each chapter although in some cases some information might not be shown. Figure 25 shows the main characteristics of GEs.

G.E. name	
General Information	It includes the description, the functionality that covers, the components and other interesting information related to the G.E. Information is based on the specification provided by the GE, attendance to webinars, directly communication with GE responsible, etc.
Possible uses in FITMAN Trials	Based on the General Information form the GE, it is provided a description of how the GE could be used in FITMAN
Provider	GE provider name and contact person when available
Implementations available	Whenever implementation is available, it is provided the name of the implementation. In some cases, implementation is not available yet and in other cases, there a two different implementations for a GE.
Distributed as	There are different possibilities of distribution of the GE, i.e. as installable software, software as a service through the Testbed or source code only
License	Type of license. Whenever it is available, it will be given the internal (FI-PPP) and external license.
Testbed availability	Indication whether the G.E. is available in the Testbed or not
Technology used	Indications of the different technologies used to develop the GE and to use it.
Communication protocols	Identification of the communication protocols as REST, RESTlike ContextML/CQL and other.
Input and Output interfaces	Identification of data formats to interchange information, i.e. XML, JSON, etc.
Dependencies from other GEs.	Indication if this GE must be used join with other GE components.
OS supported and other software needed	Operating system and any other software requirement to use the GE.
Additional Information	This information is not mandatory in the description of a GE. So, in some cases it might not be shown. It will be included in case some additional information is necessary to be given, i.e. a GE that belongs to the Second Release.

Figure 25. Description of the main characteristics of GEs.

4.4 GEs and their Use Cases in Manufacturing

This section summarises FITMAN Deliverable 1.4, FI-WARE Platform Instantiation for FITMAN.

One of the goals of the FITMAN project is to assess the suitability, openness and flexibility of the FI-WARE Generic Enablers (GE) within the European Manufacturing Industry domain. FITMAN is setting up eleven Trial experimentations to test the FI-WARE Platform on real IT and business cases in all the Factories of the Future (FoF) domains: Smart Factory (SF), Digital Factory (DF) and Virtual Factory (VF).

To this end, task T1.4 defines one specific FITMAN Platform for each FoF domain, plus an additional FITMAN Environment providing meta-platform functionality. These 3+1 packages fulfil business and IT requirements originating from the eleven FITMAN Trials and aggregated at the domain-level, while still maintaining a flexible and open approach.

D1.4 FI-WARE Platform Instantiation for FITMAN, represents the instantiation of FI-WARE GEs in the FITMAN context - i.e., the detailed description of how and why selected GEs from the FI-WARE catalogue are grouped into three FITMAN Platforms and one FITMAN Environment, which represent more coarse-grained functional units. The analysis and selection process of the individual GEs, which took place in the T1.3 task, and the mapping of Trial requirements to GE capabilities, of which task T1.2 was responsible, are not detailed here, but references are given to the relevant documentation.

A prototype implementation of the three FITMAN Platforms is also provided as a set of **Virtual Machines (VM)** which, in the scope of the FITMAN project, can be downloaded and deployed off-the-shelf in any IT infrastructure which supports the KVM virtualisation technology [9] (even if not FI-WARE-enabled). The actual goal of these prototypes is to support FITMAN Trials in overcoming any deployment constraint which, at least in the initial phase of their experimentation, may hinder the exploitation of FI-PPP cloud infrastructures like the FI-WARE testbed, the FI-LAB open cloud and, in the near future, the outcome of the XiFi capacity building project. Examples of such Trial-specific constraints may be data and/or network management policies which effectively prevent - or make extremely difficult - existing IT systems to connect to externally deployed applications and services.

No prototype of the FITMAN Environment was implemented, as these GEs are extremely specific to the building of virtualisation/cloud infrastructures, and as such they are not suitable to be embedded into a VM themselves.

Finally it should be noted that, as the FI-WARE project is constantly evolving at the time of this writing, the FPs and the FE here described are evolving as well: as new GEs become available, they will be analyzed, assessed, and possibly integrated into the existing prototypes. To this purpose, a second iteration of the relevant FITMAN tasks - T1.2, T1.3 and T1.4 - and consequently a second release of the corresponding deliverables, is expected in the second half of Y1.

The public results of the T1.4 task - i.e., the documentation of the three FITMAN Platforms and of the FITMAN Environment - may be useful for FI-PPP Phases III projects as they synthesize several months of work on the analysis and the assessment of the FI-WARE Platform, matching manufacturing IT requirements to GE features and capabilities. New projects which need to go through a similar selection process may use this document as a tool to validation their own results.

In the following sub-sections, the current design of three FITMAN Platforms and of the FITMAN Environment is briefly described.

FITMAN Platform Definition for Smart Factories

The SF Platform resulting from the GE selection is displayed below. This representation highlights connection and collaboration between components. When deployed in the context of some specific Trial experimentation, the baseline Platform will be enhanced by FITMAN Specific Enablers and by Trial Specific Components, resulting in a Trial Platform which fully supports the implementation of the target FITMAN business processes.
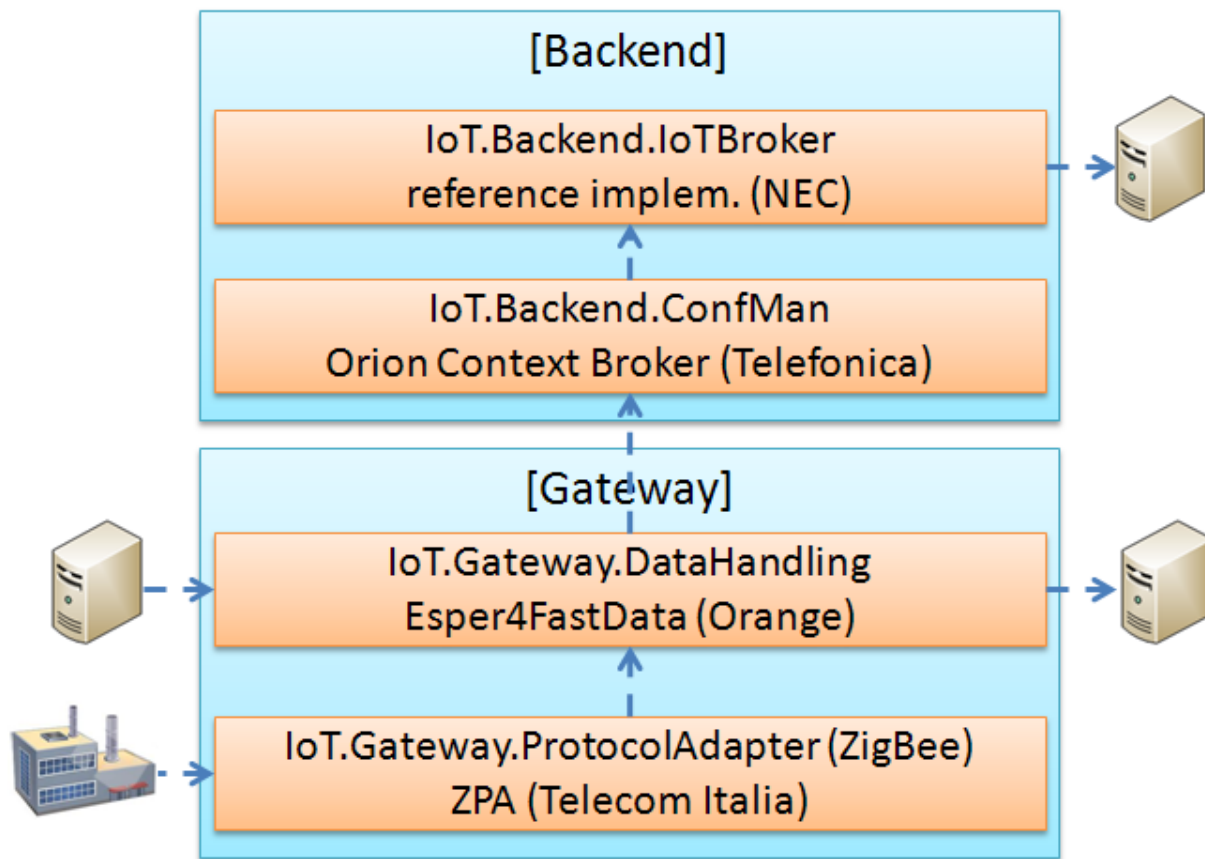
Figure 26 – GEs used in the FITMAN Platform for SFs overview

As the above diagram shows, two distinct logical blocks are defined, which reflect the architecture of the FI-WARE Internet of Things Services Enablement chapter:

- The Backend: GEs that are typically deployed on the cloud
- The Gateway: GEs that are typically deployed on local premises - i.e., in proximity to devices

FITMAN Platform Definition for Digital Factories

The DF Platform resulting from the GE selection is displayed below. This representation highlights connection and collaboration between components. When deployed in the context of some specific Trial experimentation, the baseline Platform will be enhanced by FITMAN Specific Enablers and by Trial Specific Components, resulting in a Trial Platform which fully supports the implementation of the target FITMAN business processes.
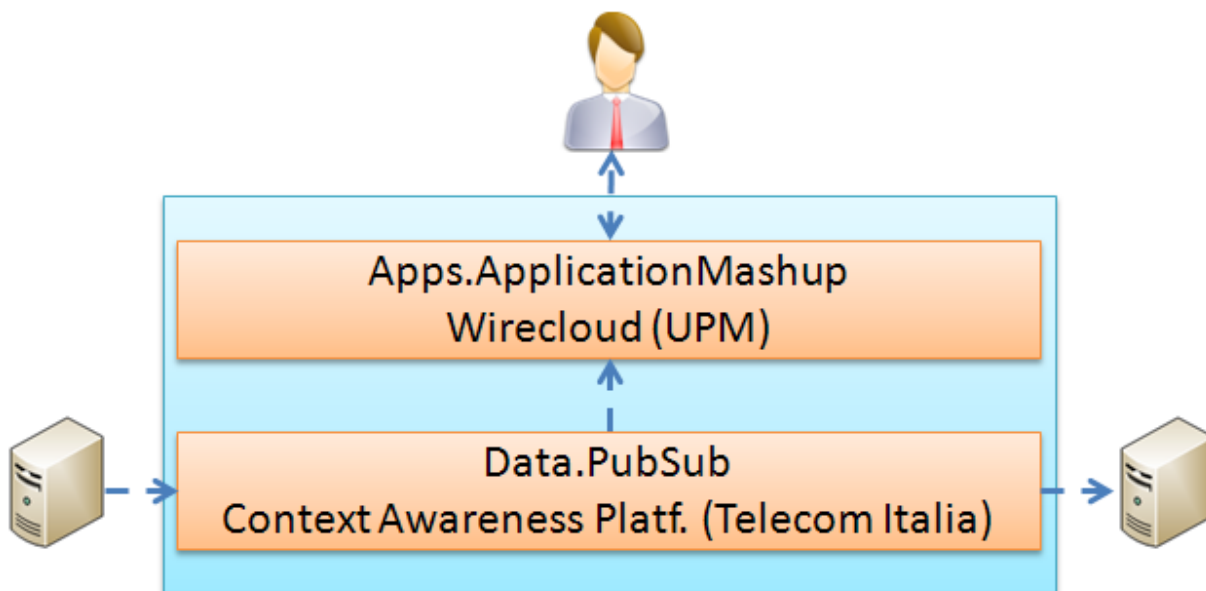
Figure 27 – GEs used in the FITMAN Platform for DFs overview

As shown in the above diagram, the functionality offered by this baseline Platform is very generic, due to the lack of GEs specifically targeted at the demanding requirements of the DF domain. It is expected that in the Trial Platforms that will be developed on top of the baseline DF Platform, higher-level components (SEs and/or TSCs) will implement more complex functionality around the context broker (Data.PubSub), and more advanced user interfaces to complement the web mash-up.

FITMAN Platform Definition for Virtual Factories

The VF Platform resulting from the GE selection is displayed below. This representation highlights connection and collaboration between components. When deployed in the context of some specific Trial experimentation, the baseline Platform will be enhanced by FITMAN Specific Enablers and by Trial Specific Components, resulting in a Trial Platform which fully supports the implementation of the target FITMAN business processes.
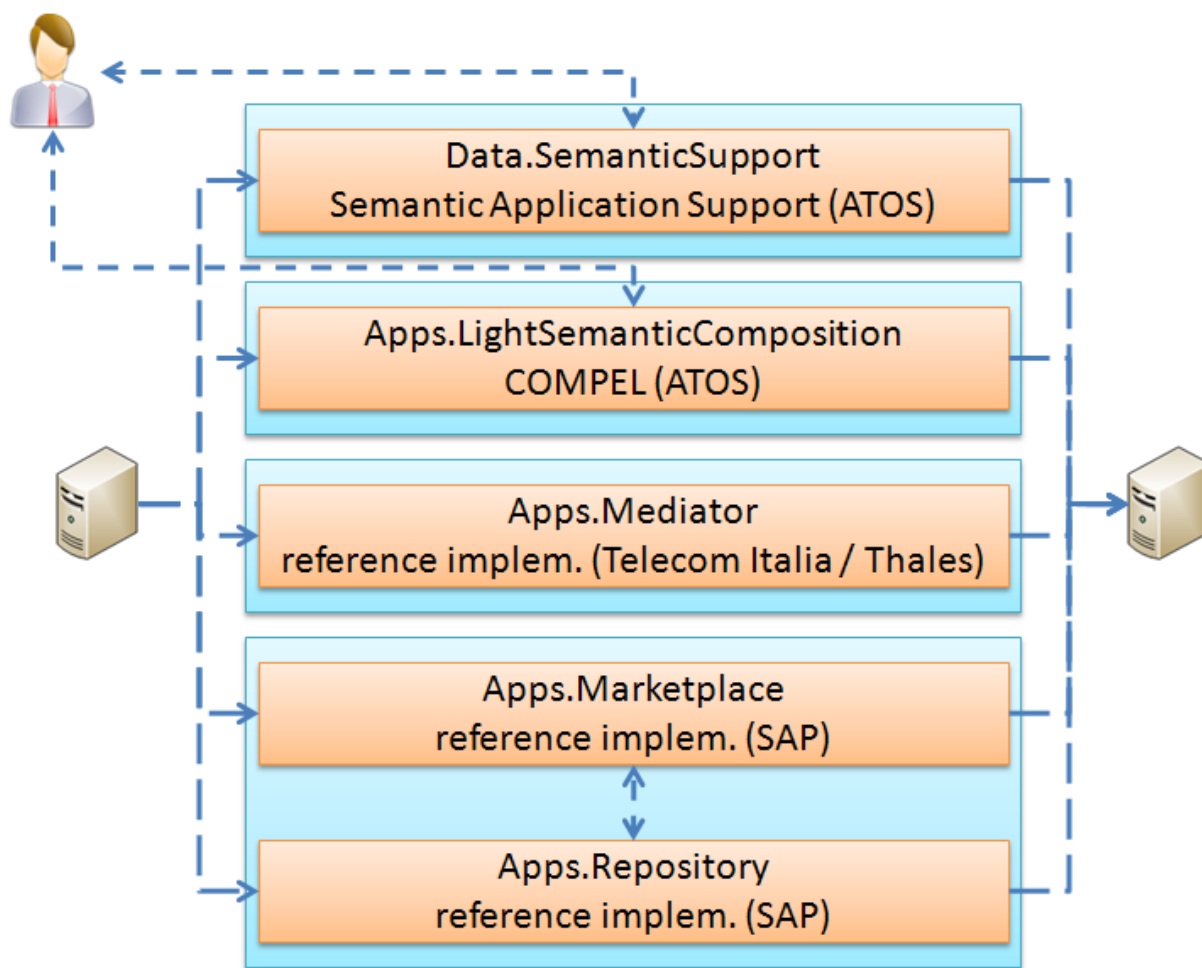
Figure 28 – GEs used in the FITMAN Platform for VFs overview

As shown in the above diagram, four distinct, independent functional blocks are available: only the Marketplace and Repository GEs are a collaborating unit, while the others play their own role with no direct interconnection. It is expected that in the Trial Platforms that will be developed on top of the baseline VF Platform, higher-level components (SEs and/or TSCs) will implement more complex functionality by wiring multiple GEs together.

4.5 FITMAN Reference Architecture

This section summarises FITMAN Deliverable 1.5.

The D1.5 deliverable is focused on analysing and describing the FITMAN Reference Architecture taking into the overall European scenario and the following elements:

- the draft FITMAN architecture as reported in the DoW;
- the IT requirements collection and analysis performed in the start phase of the FITMAN project and reported in the FITMAN D1.2 (FITMAN Trials IT Requirements) deliverable;
- the analysis performed and reported in the FITMAN D1.3 deliverable (FI-WARE Generic Enablers Selection for FITMAN) regarding the FI-WARE GEs and their functionalities.

To address the challenges envisaged by the *Europe 2020 Strategy*, the European manufacturing sectors have to undergo the following structural transformations[4]:

- manufacturing the products of the future, addressing the ever-changing needs of society and offering the potential of opening new markets;
- economic sustainability of manufacturing, combining high-performance and quality with cost-effective productivity, realising reconfigurable, adaptive and evolving factories capable of small scale production in an economically viable way, herewith facing better and promptly the uncertain evolution of the market or the effect of disruptive events;
- social sustainability of manufacturing, integrating human skills with technology;
- environmental sustainability of manufacturing, reducing resource consumption and waste generation.

From an ICT point of view, the EFFRA roadmap envisages the following major challenges:

- **Collaboration**: as a way to support:
  - *collaborative manufacturing* where ICT has to support a constant feedback loop among product designers, engineers, state-of-the-art production facilities and customers;
  - *collaborative supply networks* where ICT has to support OEMs to offer value-added services (e.g., maintenance, upgrade) or even sell their "products as a service"
  - *customer collaboration* where ICT solutions must enable extraction of customer and after-sales information from disparate sources (e.g., social networks) and feed the manufacturing process to develop personalized or highly customized products;
- **Connectivity** to support seamless, bi-directional interactions with real-world objects and environments (e.g., IoT) on a global scale, across different application domains and stakeholders. The manufacturing Enterprise Information Systems (EIS) must be opened adopting widely used standards and be able to inter-operate across multiple organisations, as well as manufacturing systems and devices must become more intelligent and have advanced self-configuration, self-monitoring, and self-healing features to support the dynamics and the large and growing number of devices and data of future manufacturing processes;
- **Mobility** to provide workers, supervisors and managers with critical data at their fingertips and foster the development of next-generation of mobility assisted manufacturing applications;
- **Intelligence** to support the processing of the huge amount of data manufacturing processes generate.

The FITMAN D1.5 deliverable reports the above figures, trends and strategies to properly characterize the relevance of the FITMAN project from an economical and societal point of view, and to provide a more general framework to frame its analysis and outcomes related to the architectural elements for the three manufacturing domains:

- **Smart Factory** (or Smart Manufacturing): deals with the optimisation of the production processes through the monitoring and management of its components, tangible (energy, productivity, throughput, waste), as well as intangible assets (customer sentiments, workforce wellness, comfort and safety). Smart factory therefore deals with processes and elements at the level of the shop floor, management of the supply chain, integration with enterprise production management and ERP systems.

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[4] EFFRA, "Factories of the Future PPP FoF 2020 Roadmap", July 2012

- **Digital Factory**: envisages the integration of digital methodologies and tools in the field of production engineering spanning from modelling, simulation, 3D/Virtual Reality visualisation, continuous data management, etc. The aim of the Digital factory is to set up an efficient and comprehensive environment able to support and optimize the design, modelling, simulation, and evaluation of products, processes and systems before a new factory is built or any modification are made on existing systems, as well as to in order to improve quality and reduce time.
- **Virtual Factory**: deals with the realisation and management of complex, end-to-end, collaborative production environments therefore including complex and extended supply chain, collaborative design and production, M2M communication, etc. In this domain ICT solutions are integrated end-to-end and across company boundaries, with the aim to support the exchange and integration of data and physical assets, to provide clear insight and exact and useful knowledge, and facilitate or support decision making and creating value from global networked operations.

After the introductory section, which aims at properly position the FITMAN architecture within the factory automation scenario, the D1.5 deliverable consolidates the elements reported in the DoW, D1.2 and D1.3 documents, summarises and analyses the eleven FITMAN trials needs in terms of trials' objectives, requirements and constraints.

Afterwards it describes the envisaged architecture for each FITMAN trials in terms of functional elements, their relationships, how the proposed architectures meet the trials' objectives, requirements and constraints.

Finally the D1.5 document structures the Reference Architecture for the three factory domains on the basis of the "to-be" of the eleven FITMAN trials and identifies and characterizes the ICT infrastructure for each of the three manufacturing domain, highlighting the general interconnection needs with legacy systems, external systems, ICT constraints, sensitivity of the managed information, reliability and timing constraints. Finally, the three depicted factory automation domains architectures are put in relationship with the FI-WARE GEs and SEs identified in the first semester of activity.

D1.5 is relevant to Phase III bidders in two ways. Firstly, it provides a framing of the state of the European manufacturing sector, how FITMAN fits with this, and the relevance of SMEs in European manufacturing. Secondly, it provides an analysis of the FITMAN trials' needs, the envisaged architecture for each trial, and the Reference Architecture for the three factory domains. Phase III bidders can use D1.5 as a source of information for contextualising their bids, both in terms of the EU manufacturing landscape and major challenges, and to show the groundwork that FITMAN has laid in the context of ICT for manufacturing trials.

4.6 FI-PPP Capacity Building Analysis

This section summarises FITMAN Deliverable 1.6. Please note that this summary concerns the first iteration of D1.6. The release of the second iteration of D1.6 within the Phase III Package will be announced by the channels described in the package overview.

FITMAN's FI-PPP Capacity Building Analysis reports on the interconnections between FITMAN and the FI-PPP Capacity Building projects. Two main threads of analysis are considered: A) achievements of the INFINITY project and their connection with the FITMAN Trials; B) FITMAN requirements targeted at the XIFI project.

As stated, this version of the FI-PPP Capacity Building Analysis is divided into two threads, the first of which considers the connection between the INFINITY project and the FITMAN trials. In this thread, the INFINITY database of European IT infrastructures has been explored, in order to

select those data centres that may support FITMAN Trials beyond the scope of the FITMAN project and of the FI-PPP programme - i.e., after the research and experimentation phase is over. Using a specific methodology described in Section 3.1, three infrastructures of relevance to FITMAN were identified: iMinds iLab.t, FOKUS Smart Communications Playground, and BonFIRE. Of these, only BonFIRE seems potentially suitable for a production-level FITMAN environment, while the others have different declared missions and objectives. The next step, out of the scope of this task, is to contact these three infrastructures to ascertain whether they can support FITMAN end-user partners in extending their experimentations with the FITMAN Platform to FI-PPP Phase III, and beyond.

Some additional points about INFINITY facilities are worth noting:

1. A significant number of infrastructures (10) were not taken into consideration only because they were still under development. These will be assessed again in the second release of D1.6.
2. Data centres are generally not FI-WARE-enabled. The only known exception to this rule is the FOKUS Smart Communication Playground, which is one of the 3 infrastructures in the final selection list.
3. BonFIRE, the *top-scoring* item of the final selection, is an advanced cloud infrastructure that does not rely on the FI-WARE Cloud Hosting chapter's Generic Enablers for management, but still supports KVM virtualisation and the *standard* OCCI API (Open Cloud Computing Interface). This means that applications developed for the FI-WARE Testbed or for XIFI should be portable on BonFIRE with limited effort - provided they are self-contained and do not depend on infrastructure-level (shared) FI-WARE GEs.

The second thread of this FITMAN output aims at contributing to the XiFi requirement collection phase with a relevant set of information from FITMAN Trials. As discussed, a major difficulty with this is the limited availability of such information at the time of writing: to solve this issue a second release of this report has been scheduled for a later stage of the FITMAN project. In the current issue, the composition of the 3 different instantiations of the FITMAN Platform (Smart Factories / Digital Factories / Virtual Factories) and the high-level requirements from each of them have been analyzed and reported. This quite generic view on FITMAN Trials will be detailed in the next release, meaning that each Trial will probably customize the Platform and/or introduce specific deployment requirements.

In addition, a FITMAN-centric long-term vision of the XiFi project is presented, exploring how the relationship may evolve over time, and how the two project may work together to create a launch pad for FI-PPP Phase III and beyond. An example future scenario is described, showing how the building of a Virtual Enterprise may be achieved, from the technical side, by linking several Future Internet applications on a common platform. This section of the deliverable describes the way in which manufacturing may be integrated into the Future Internet, across Smart, Digital and Virtual Factories, considering three broad steps (common platform; external engagement; cross-sector aspects).

The part of this deliverable that aims to contribute to the XiFi requirement collection task is currently little more than a placeholder for further content, to be provided in the second version of the deliverable. However, the current state of the art of FITMAN IT requirement analysis already offers some useful information to XiFi: specifically, the composition of the three instantiations of the FITMAN Platform (Smart Factories / Digital Factories / Virtual Factories) and the high-level requirements from each of them. This quite generic view on FITMAN Trials will be detailed in the next release, meaning that each Trial will probably customize the Platform and/or introduce specific deployment requirements, to the extent that some might not use external cloud facilities at all, due to data confidentiality policies and/or real-time performance constraints.

4.7 FITMAN Trials IT Infrastructure and Platforms

This section summarises FITMAN Deliverable 3.1.

The main goal of the FITMAN project is to carry out a set of Use Case Trials in the Factories of the Future (FoF) domains of Smart, Digital and Virtual Factory (SF / DF / VF), in order to assess the suitability, openness and flexibility of the FI-WARE Platform in the context of the European manufacturing industry. The aim of task 3.1 is to set up the IT infrastructure for the eleven FITMAN Trial experimentation sites, as a baseline system for the Trials to build upon. D3.1 implements eleven Trial Platforms (TPs), are each tailored to the needs and the characteristics of a given trial experimentation site. TPs are materialized as customized, integrated deployments of a FITMAN Platform of choice in the IT environment of a specific trial. (For more on FITMAN Platforms, see Section 4.4, which summarises D1.4 "FI-WARE Platform Instantiation for FITMAN".)

The definition of each TP includes: A) selection of one or more FITMAN Platforms from the portfolio offered by deliverable D1.4; B) selection, from the chosen FITMAN Platform(s), of the FI-WARE Generic Enablers (GE) that are actually exploited by the experimentation; C) identification, in the existing IT infrastructure of the Trial, of the Trial Specific Components (legacy TSC) to be integrated with the selected GE; D) where needed, design of Trial Integration Components (TIC) that are required for achieving the goal mentioned by previous point.

After M8, thanks to the availability of the FITMAN SE Implementations, it could be possible to integrate the relevant SEs. After M12, with the injection of new components coming from the Open Call, the TPs will finally become complete (in WP 4 Smart, WP 5 Digital, WP 6 Virtual).

The eleven TP definitions are presented in D3.1 together with the relevant details regarding the Trial experimentation sites hosting them. Once defined, the eleven TPs are released as a prototype - i.e., the selected GEs are deployed for the target Trial experimentation site (either on local premises or on the cloud, depending on the specific constraints for the site), and integrated with the legacy TSCs. Any required TIC is implemented and deployed as well. The technical details of each prototype, and of any ad-hoc application that is developed for demonstration purposes, are provided as an annex factsheet.

The work performed in the T3.1 task will be valuable for FI-PPP Phases III projects, as it provides a wide set of concrete example use cases for the exploitation of the FI-WARE Platform in the manufacturing context. This document may be used as a **blueprint** for similar projects.

In the following sub-sections, the current design of some baseline Trial Platforms is briefly described. At the time of this writing, not all FITMAN Trials have completed the definition of their Platforms, so only **a sample** of the work-in-progress is presented here. For additional details on business scenarios and goals, refer to the FITMAN D1.1 deliverable.

Trial #1 - The Volkswagen Platform (Digital Factory)

In Automotive Industry the production planning process includes some very important decisions in an early stage of process, but it can't rely on clear and detailed data. VW wants to improve this process in order to improve the decision making. Therefore VW has defined two business scenarios:

- The "inquiry service" for supporting the process by providing information and evaluation reports for the management
- And the "Management of the Machinery Repository (MR)" for supporting the handling of the MR, which provides the data needed for the reports

The business goals are:

- Increase reliability of evaluation results.

- Speed-up the evaluation process.
- Reduce the effort (in person-days) required to do an evaluation.
- Reduce the effort (in person-days) required to manage the MR.

Trial #2 - The TRW Platform (Smart Factory)

In the domain of risk analysis, TRW adopts the traditional occupational risk prevention methods which are relying on the prevention technician to observe, evaluate and design prevention plans based on the data of medical examination for workers, regulations of manufacturing in shop floor, records from self-diagnosed equipment. Therefore, the new risk prevention system aims at improving and enhancing the running mechanism of occupational safety and finding technologies, methodologies for monitoring and management for the human factor in risk modelling scenario and risk detection and information scenario accordingly.

In addition, a critical aspect for the factories of the future is to provide an ecosystem that relies on data for better decision making process. This goal of the Smart Factory Platform of TRW is to offer functionalities that will make easier to personalize the data coming from the different sources across the factory. The key is to take into account the heterogeneous nature of the format in which the data will be stored. Furthermore the control of the communication between the protocols that will be used to transfer the data is also to be considered. Finally it is critical that the information between the systems is updated and consistent during all the life cycle management.

Trial #3 - the AgustaWestland Platform (Smart Factory)

It is extremely important to avoid foreign objects in aeronautic environments, making Foreign Object Detection (FOD) a central concern. Various procedures and methodologies are used during helicopter operation to avoid foreign objects, and workers are trained in conducting operations for the detection and avoidance of foreign objects.

AgustaWestland will support workers conducting FOD with the adoption of a smart system, to be used in two places. The first place is the Helicopter Final Assembly Line (FAL). High reliability and efficiency are required here, both in the supply and management of materials and in the quality assurance conducted during assembly and delivery of helicopters. The second place is the Helicopter Service Stations, where scheduled maintenance is conducted in addition to unscheduled maintenance, line and/or base maintenance, repairs, modifications and upgrades. The smart system will be used to track tool usage, with the resulting information used in ways that vary according to context.

Trial #4 - The Whirlpool Platform (Smart Factory)

The current Whirlpool business scenario is characterized by a sub-optimized decision process at the shop floor level, in which workers acting at different levels of the organisation are expected to make timely decisions, but can count on a poor IT support.

Despite a huge quantity of events being detected and recorded, few of these are effectively used by decision makers. Users have no tools to correlate events.

In the FITMAN-enhanced business scenario, a robust correlation between event and data is introduced, so that rules can be applied and warning conditions can be automatically detected and notified to the appropriate decision makers. Notifications are timely, contain a rich information set are pushed to their targets without being solicited, possibly with the use of mobile devices.

Trial #5 - the Piacenza Platform (Smart + Virtual factory)

The textile sector is described as representative of sectors with highly flexible production systems, either flexible machines (with various set-up possibilities in processes such as weaving) or flexible processes (with specialised machines in flexible sequences, also done in plastics production). Production will be done either in complex assembling processes (such as weaving), in mechanical forming processes (such as spinning), in batch processes (dyeing) or in continuous processes (fulling or raising).

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

Textile and clothing production steps can be grouped into three main ones: spinning (from raw materials to yarn), fabric production (from yarn to fabric) and clothing production (from fabric to finished product). Fabric production will be the object of the Piacenza FITMAN Trial. In relation with the product expected fabric (fantasy, malange or solid colours) it can be divided into 3 main production flows.

The FITMAN trial will focus on yarn dyeing, weaving (warping, weaving and raw control) and finishing (wet finishing, raising and dry finishing). Each of the phases can be object of the trial by itself or as a part of a group (for example raising, wet finishing and raising, or the complete finishing process).Trial #6 - The APR Platform (Virtual Factory)

This Trial aims to implement new six business processes in order to standardise the APR collaboration capabilities. The targeted processes should be synchronised with the existing business ones in order to preserve the coherence of the information flow. Figure 29 illustrates the synchronisation problem at business task realisation and the connection with payload.
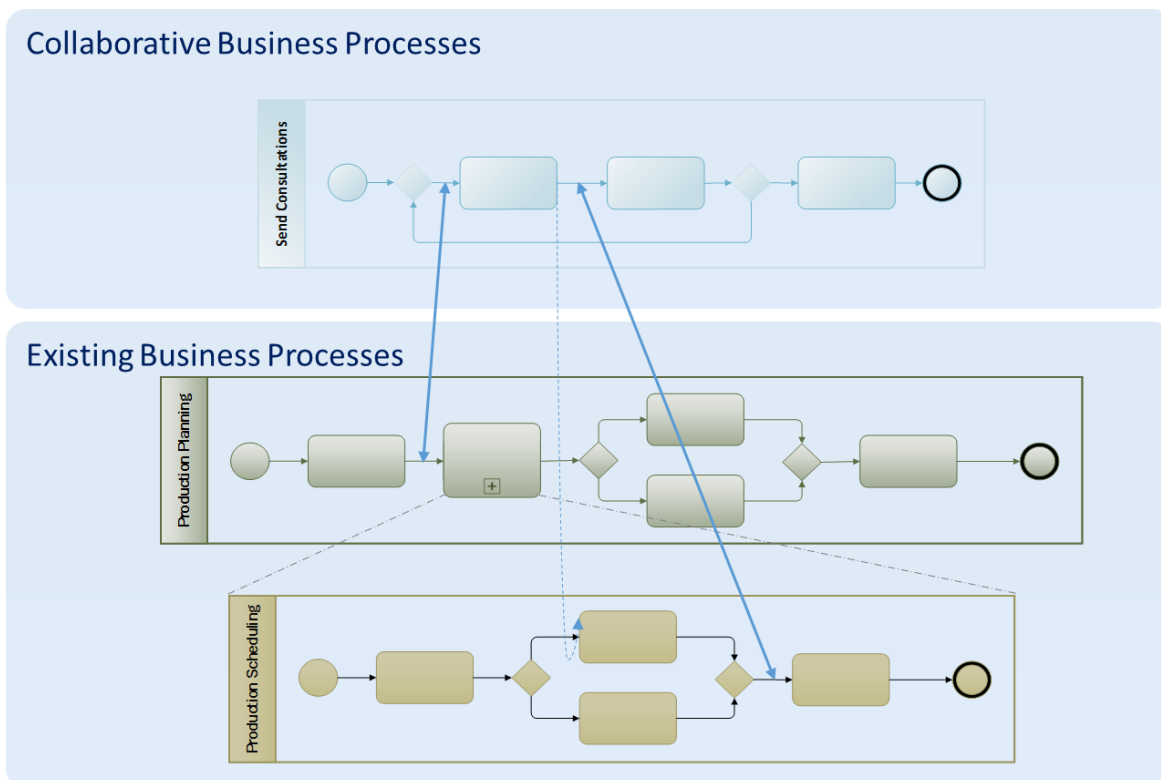

Figure 29 - APR business processes

Trial #7 - The Consulgal Platform (Digital Factory)

Consulgal trial is focused on the management aspect of construction industry with the focus on concrete handling. Concrete handling and testing is an essential part of any construction project, as concrete is one of the components that ensures resistance and durability of any constructed item. Concrete testing intends at ensuring that the design characteristics set for this component and for the item in which it will be applied are met by each load arriving at the work site. These design characteristics are related to structural resistance and durability, structural safety, resistance to environmental conditions, etc.

In the specific case of a dam, like the Baixo Sabor Dam, the whole structure (the dam wall) is divided into sections and concrete is applied to each section separately, according to a concreting plan defined by the Works Contractor. Each section may involve several truck loads and all of them need to be tested, which means this is one of the cases that generates thousands of test results.

In such a structure, abnormal results or noncompliance with the design parameters may have tremendous consequences, leading eventually to demolishing noncompliant sections or, in extreme cases, to compromising the dam's structural resistance.

It is, thus, of critical importance to be able to relate, quickly and unequivocally, the test results to specific areas of the dam and to quickly understand the impact of one or more abnormal results in the overall dam wall resistance.

In summary, benefits are expected on what concerns:

- Access to information: quicker access to more detailed information and improvement on information processing;
- More efficient decision process: a quicker access to information and an improved information handling versatility, will allow decisions to be taken quicker and in a way that is known to all interested parties

Trial #8 - The TANet Platform - Scenario A (Virtual Factory)

Sematronix is the Facilitator for SMECluster and is responsible for operating the portal on behalf of its members. This involves the activity of finding business opportunities for its members which combines both automated search facilities to find Calls for Tender and manual identification and input of business opportunities.

In the current SME Cluster system tender opportunities are created via a manual process. Additionally many B2B services do not present a human accessible interface so many tender opportunities are being missed.

The aim of the Trial is to leave the ways in which the IT appears to and is used by end-users and Sematronix unchanged, as far as is possible, whilst re-structuring the underlying system architecture as depicted below to exploit the FI-WARE architecture in general, and selected GEs in particular. The commercial benefits to be achieved through this include:

- making platform and service maintenance faster, and more cost effective, and more reliable, since less custom code is used;
- making the service offering more flexible, and adaptable to technology developments, since evolving technology embedded in GE instances will provide access seamlessly.

Thus the future business scenario from the perspective of Sematronix and its end-user clients, is characterised by unchanged procedures, but

- costs of use of IT may be reduced as a result of reduction in costs of maintenance and support to the IT provider (Control 2K);

- IT service quality and functionality will evolve continuously through adoption of evolving GEs.

From the perspective of Control 2K:

- Cost and complexity of maintenance and support of the platform is reduced;
- By passing on some of this benefit to end-users, the potential market for new cluster clients is expanded;

Introduction of new advanced IT software service technology, and indeed introduction of entirely new products through the platform, is simplified by adoption through evolving selected GEs.

Trial #8 - The TANet Platform - Scenario B (Smart Factory)

Manufacturing processes operate most efficiently when disruptions to normal operation are minimised. Monitoring of machine tools can give indicators of when a system begins to develop abnormal output, and allows early planning and responses to mitigate the consequences of reduced capacity.

Industreweb Collect gathers condition monitoring data from the Drilling Assembly with a key manufacturing process. It does this firstly using the current drawn by the drill motor which is sampled at regular intervals, and secondly by recording the subsequent data from the gauging station. The combined condition and gauging data allows the situation where the tooling condition is impacting upon the quality of the finished product to be identified.

This scenario proposes a situation whereby a machine drilling assembly detects that its drill bit is showing signs of wear, which could lead to decreased performance if left unchecked.

The aim of the Trial is to make as few changes as possible to the manufacturing process, while improving data collection and tool monitoring in order to provide an uninterrupted workstream.

Trial #9 - The COMPlus Platform (Virtual Factory + Private Cloud)

The process of decision making in supply networks gains in complexity as the number of enterprises, enterprises' capabilities, and relations between them grows. Furthermore, the distributed nature, the dynamic of the supply networks and the requirements for a holistic approach challenge the management of the supply networks. In such networks, decisions about economic and production feasibility need to be made on the fly based on a variety of configurations during the early design and configuration phase. Herewith, the existing solutions are challenged by this task beyond the single SME considering the information from the networked SMEs. In order to support this process it is important to bring all related aspects into one common model that can be deployed for the improvement.

The LED User Trial focuses on the concept of Front-end Loading as a process for a conceptual development of a product and manufacturing at the early stage. The Front-end Loading aims for development of sufficient strategic information with which the manufacturer can address risks and make informed decisions about the commitment of further resources.In FITMAN, the LED User Trial focuses on two aspects of the front loading facilitating the decision making process in the early design phase:

1. Network Transparency for a more efficient Supplier Network Configuration
2. A Communication Platform for better transparency and coordination, leading to improved transparency regarding used IT Tools and best practices within business processes.
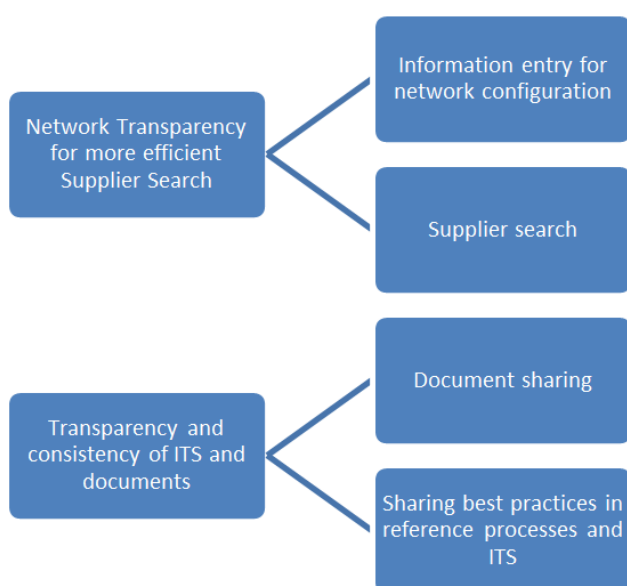
Figure 30. The Private Cloud environment of the LED lighting user trial.

Different to the present situation, establishment of a private cloud infrastructure for this network is envisaged by this trial. This Private Cloud environment will be controlled an operated by the LED network and can be adapted to the commercial processes of the LED network, where:

- Exclusively authorised users (employee of the network enterprises, supplier) have access to the private Cloud
- The communication on the network can completely occur about the private Cloud
- Data are „on the" network, because the Cloud provider is a part of the network
- High safety standards or security technologies can be kept and be applied
- Principal goal is the use of Cloud technologies in a private Cloud for the LED network to standardise the IT landscape on the network and to eliminate with it the interfaces between the network partners, with the background, to accelerate the processes.

Trial #10 - the Machinery for Wood Platform (Virtual Factory)

The challenge addressed in the engineering SMEs is the need to perform rapid and appropriate business collaboration between final customers, product engineers and suppliers.

The current business scenario involves types of internal actors (Internal Services, Buyers) in frequent interaction with numerous external providers/suppliers. Collaborative solutions are updated manually with output from SAP Business One and Microsoft SharePoint, and various communication means and formats are used. Price and item databases are not up to date. Subsequently, the quoting activity is not efficient in terms of productivity, delay and accuracy.

A global approach to automated data management and collaborative solutions in the context of an SME is often not realistic. One of the objectives of the trial is to validate the relevance of FI-WARE technology to implement a middleware able to enhance the functionalities of SME's IT system at a lower cost.

Trial #11 - the AIDIMA Platform (Digital Factory)

The AIDIMA Trial aims to: capture fashion trends and turn them into designs quickly and frequently; make varied products that follow the trends very quickly and with very competitive prices; and understand users' responses quickly in order to modify or remove unsuccessful products from the market.

Main business objectives:

1. New product design based on customer demand and fashion trends. For manufacturers, being able to design a new configuration based on final user trends (adaptation for the market). Design based on customer needs and living habits. Number of new product designs. For retailer: direct information to manufacturer for a better service. Number of new consultations for new requirements.
2. New means of direct access to the final customer. Market analysis. Real time information from final users. Number of real time consultations.
3. Improve competitiveness for agile manufacturing. For manufacturer: new ways for improved manufacturing processes and for a better customer satisfaction. Number of new manufacturing processes incorporating in the normal way of manufacturing. For retailer: quicker response to final customer based on shorter PLC. Saving percentage time in response (media).

4.8 FITMAN Trials Business Cases

This section summarises FITMAN Deliverable 3.2.

D3.2 provides a deeper understanding about the business cases and the business processes driven by Future Internet technology adoption, and the business requirements that drive the adoption. Furthermore, the document provides insight into the controlled environments for the GEs, SEs and TSCs prototypical implementation assessment in the various trials. It also provides business process models and workflows from a static and dynamic point of view, giving an accurate picture of the different business processes and their business requirements.

Characterisation of the prototypical implementation assessment environment is highly important, in order to ensure that results are representative and understandable. The deliverable therefore presents the Living Labs that will be used to test the business processes, checking the IT tools, processes and methodologies on a real shop floor and facilitating the participation of real workers in the experimentation.

D3.2 provides ethical assessment of business case needs, analysing the use cases with a reliable methodology. This assessment of the ethical aspects yields recommendations and actions that will be deployed to assure data confidentiality and privacy, data protection, and user trust of the system.

The final sections of D3.2 focus on visualisation and comprehension of results at the level of smart, digital and virtual factories.

The document presents socio-economic impact of the business cases, analysing their potential impact in different areas: governance and sustainability, assets, people, and financial flows. The document also shows the effects of social innovation in the different business cases, and discusses the introduction of telecommunication operators' business cases in some trials.

D3.2 presents an analysis of the different business cases from the technological point of view, focusing for each case on the developed IT solutions (related to the GEs specified in FI-WARE) and the IT infrastructures (related to the infrastructure provided by XIFI).

The results in this document have been obtained with an adaptation of the Wellington methodology, which was used in D1.1. This methodology yielded a high level of detail in a large number of the use cases. A combination of questionnaire, interview and use of the 'trial handbook' were adopted, yielding better results in addition to the adapted methodology itself.

The document specifies the relationship between the business processes' requirements and the scenarios and resources for the prototypical implementation assessment.

In summary, the main objectives of D3.2 are to:

1) produce mature business process work based on D1.1 outputs
2) align Business Processes with the FITMAN Platform instantiation
3) provide a traceable view from Business Scenarios to Business Process Requirements to FITMAN instances, Key Performance Indicators and evaluation infrastructures
4) consolidate the view on business processes and links to other FITMAN focus
5) assess the impact of new Business Processes on society (entrepreneurship), economy (STEEP) and telecommunication businesses.

D3.2 provides a consolidated view of business cases, requirements, Verification and Validation Key Performance Indicators, and selection and operation of GEs, SEs and TSCs at a trial level.

The document is useful to Phase III proposers as it can support them in understanding how business process requirements meet FITMAN components, workflows and Key Performance Indicators at a business level, i.e. the alignment between FITMAN IT resources and processes and the real business value of the trial. Phase III proposers should use the document as a tool for a deeper vision about GEs, SEs and TSCs technical capabilities mapped to specific business scenarios and business objectives to understand the FITMAN IT relevance to business operation.

4.9 Trials Competencies / Capability Gaps and Open Call Specifications

This section summarises FITMAN Deliverable 3.6.

The goal of Task 3.6 is to identify functionality, competencies / capabilities gaps to which the Open Calls might respond in order to improve the proposed solutions and extend the application of FI in the trial. Based on the Business Requirements (D1.1) and Technical Requirements (D1.2) the topics of the Open Call were determined regarding Smart-Digital-Virtual factories. D3.6 defines an Open Call with six topics for the three domains (Smart-Digital-Virtual Factories), with two topics per domain.

Smart Factory topics

The main aim of FITMAN Smart Factory Trials is to monitor shop floor's resources (humans, machines, products, materials), to capture the data generated, to transform them into meaningful events, to extract knowledge from them and to channel the relevant actions back to the shop floor's physical and human resources through actuators, alert systems and human-computer human-machine interaction devices.

The following two topics fall within the domain of Smart Factories:
- **OC1: SF monitoring and diagnosis** (Advanced Intelligent Manufacturing), including dynamic and re-configurable filtering and processing of real world events, coming from sensor networks embedded in machinery and workplaces, shop floor smart objects and tools, in-bound logistics of tagged products and materials, manual operations and workers wellbeing monitoring and control.
- **OC2: SF next generation, attractive human-machine interaction** (Human-centered Manufacturing), including devices and software components for an advanced automation of the shop floor efficiency and safety as well as a user-friendly, ergonomic and intuitive interaction between workers and machines, including data access on the move.

The expected impact of the first topic is to relay more precise and detailed information back to the shop floor following an event. The ability to cope with very dynamic multi-source events must also be reinforced, improving reaction times and observing policy-based security constraints.

The goal of the human-machine interaction services is to put the worker at the centre of the manufacturing process.

Digital Factory topics

The main aim of FITMAN Digital Factory Trials is to provide several diverse stakeholders engaged in the Product Life Cycle with harmonised access, intuitive query and advanced decision visualisation facilities to the large and disparate set of information, documents and data related to the product along its whole lifecycle. This information is stored in highly heterogeneous and distributed repositories of multimedia data produced independently by several different Enterprise Systems.

The following two topics fall within the domain of Digital Factories:

- **OC3: DF product data and knowledge in product life cycle** (standard-based access to PLM and product-item data), including definition and adoption of standard metadata systems for Product Data and Knowledge representation, semantic interoperability transformation services from heterogeneous systems and/or available or de-facto standards, browse and query facilities and web-based modular intuitive decisional and collaboration environments for blue collar's workers, managers and engineers.
- **OC4: DF collaborative product data 3D visualisation** (Collaborative and Mobile PLM), based on a collaborative multi-task project management environment and including devices and software components for a web enabled rendering and interaction with 2D-3D complex manufacturing objects, e.g. CAD solids, points of clouds, large unstructured datasets including real-time data repositories.

The product data and knowledge platform will enhance dynamic collaboration on large manufacturing projects which involve numerous stakeholders. The components in this topic will create more efficient and effective access to multimedia data repositories generated along the Product Life Cycle.

The 3D visualisation services developed through this topic will provide an innovative method for displaying data. They will reduce paper load and improve timely access to information, allowing more effective decision making.

Virtual Factory topics

The main aim of FITMAN Virtual Factory Trials is to manage and harmonise the value networks within manufacturing, from hierarchical supply chains to peer-to-peer business ecosystems.

The following two topics fall within the domain of Virtual Factories:
- **OC5: VF manufacturing assets semantic discovery** (Cloud Manufacturing, Manufacturing as a Service), including extension of existing business-oriented service description languages (such as USDL and LinkedUSDL) to encompass manufacturing tangible and intangible assets, their semi-automatic generation and clustering from unstructured and semi-structured enterprise resources (such as people CVs and products catalogues) and their dynamic discovery and composition in advanced business applications in the domains of "production network" and "project team" design.
- **OC6: VF semantic interoperability** (Product-Service Manufacturing Ecosystem), including platforms and software components for dynamic, semantic data formats transformations (e.g. unified interoperability form by means of a common model schema), in the view to achieve ERP (and other Enterprise Systems) compatibility in the supply chain.

The purpose of the manufacturing assets platform is to allow dynamic collaboration by reducing the delays in business activities such as creating a quote for a customer or submitting a purchase request to a supplier. A reduction in manual data entry with more intuitive and user friendly service composition throughout many of these business processes will enable collaborative networks of manufacturers to work together more effectively.

The semantic interoperability services component will enable dynamic collaboration between manufacturers. The use of common ontologies and light annotation mechanisms will ensure improved data transformation services, enhancing the supply of information.

Benefits for Phase III

The primary benefit of D3.6 to Phase III participants is that anyone who wants to build on FITMAN results must know what FITMAN plans to cover through its Open Call. The information provided in D3.6 lets Phase III participants build on FITMAN results while avoiding duplicating the work of respondents to the Open Call.

Phase III participants may also be interested in D3.6's description of the latest trends in projects and other actions within manufacturing, which is based on an exploration of the results and activities of clusters such as FInES, EFFRA and ActionPlanT. Finally, the deliverable also focuses on useful insights on domains like the business innovation, market potential and the social innovation.

5. TERMS AND CONDITIONS FOR THE ENVISAGED FITMAN SPECIFIC ENABLERS

FITMAN is in the process of producing eight Specific Enablers (SEs), which are due in November 2013. This section documents their terms and conditions and open specifications. It will be updated with more information about SEs as this information becomes available.

The eight FITMAN Specific Enabler Implementations are:

- SE1 Shopfloor Data Collection
- SE2 Secure Event Management
- SE3 Unstructured and Social Data analysis
- SE4 Collaborative Assets Management
- SE5 Supply Chain and Business Ecosystem Apps
- SE6 Metadata and Ontologies Semantic Matching
- SE7 Collaboration Platform Business Process Management
- SE8 Data Interoperability Platform Services.

Provisional (draft) information is currently available on SE4, SE5, and SE6. Again, please note that this provisional information is subject to change. In due course, further information on all SEs will be made available.

5.1 Terms and Conditions for FITMAN Open Source SE Implementations

At the time of writing, proposed Open Source Software licenses exist for four of the Specific Enablers. Please note that proposed software licenses are subject to change: the interested reader can follow updates to this information by following the FITMAN Twitter stream or LinkedIn group (described in the Executive Summary), or by emailing fitman-phase-iii-info@txtgroup.com to register interest in updates to some or all of this package. The proposed licenses are:

- SE3 Unstructured and Social Data analysis: MIT License
- SE4 Collaborative Assets Management: Apache License
- SE6 Metadata and Ontologies Semantic Matching: MIT License
- SE7 Collaboration Platform Business Process Management: Apache License

Two examples of such T&C are listed here below:

SE4 Collaborative Assets Management

General Information	
Implementation	MSEE Innovation Ecosystem Platform
Owner	Engineering Ingegneria Informatica SpA
URL for more information	Not available at this time
Licensing terms within FITMAN	Apache Licence
Licensing terms within FI-PPP	Apache Licence
Licensing terms externally	Apache Licence
Status	Operational, work in progress

Specific Enabler Services	
Front-end UI	Yes
Back-end services	Yes
Desktop application	No
Multi-tenant	One single Ecosystem, multiple Enterprises
Distributed as	Installable software
Source code available	Y
Distribution URL	Not available at this time
Demo availability	Not available at this time
Technology Used	
Programming Languages	Java
Communication Protocols	HTTP/REST
Requirements	
Hardware specs	Recommended: 4+ CPU cores, 8GB RAM, 500GB free disk space
Operating system	Any with Java 7 SE support, 64-bit OS recommended for extended RAM support
Dependencies from GEs	Marketplace (SAP) Repository (SAP)
Dependencies from other SW	Liferay Portal CE MySQL RDBMS Jasig CAS

Table 3. Collaborative Assets Management

SE6 Metadata and Ontologies Semantic Matching

General Information	
Implementation	Windows Application (Extention of COMA 3.0) and Back-end Service
Owner	NTUA
URL for more information	Not available at this time
Licensing terms within FITMAN	Open Source – MIT License (COMA 3.0 subjected to its own license)
Licensing terms within FI-PPP	Open Source – MIT License (COMA 3.0 subjected to its own license)

Licensing terms externally	MIT License (COMA 3.0 subjected to its own license)
Status	Work in progress
Specific Enabler Services	
Front-end UI	Yes
Back-end services	Yes
Desktop application	Yes
Multi-tenant	No
Distributed as	Installable software for matching and through REST-API for retrieving existing information based on matched results
Source code available	Yes
Distribution URL	Not available at this time
Demo availability	Not available at this time
Technology Used	
Programming Languages	Java
Communication Protocols	RESTful API
Requirements	
Hardware specs	Recommended: 2+ CPU cores, 4GB RAM, 500GB free disk space
Operating system	Windows with Java 1.6 support
Dependencies from GEs	Semantic Application Support (ATOS)
Dependencies from other SW	COMA 3.0 Community Edition MySql server FI-PPP Semantic Application Support GE (for ontology matching)

Table 4. Metadata and Ontologies Semantic Matching

5.2 Terms and Conditions for FITMAN Proprietary SE Implementations

Proprietary SE Implementations will follow the indications given by Fi-Ware GEs subdividing the T&C section into two parts: within the scope of FI-PPP and External Availability for Commercial Purposes.

More precise indications about a possible FITMAN-Lab (see the Fi-Ware FI-LAB) or Availability for non-Commercial purposes will be studied and provided in due course.

One example of Proprietary SE Implementation is given here below.

SE5 Supply Chain and Business Ecosystem Apps

Experimentation/testing within the scope of the FI-PPP

TXT e-solutions Specific Enabler "SEI_5 - Supply Chain & Business Ecosystem Apps" asset is available to the Parties signed to the FI-PPP program under the conditions established in the FI-PPP Collaboration Agreement.

External availability

TXT e-solutions Specific Enabler "SEI_5 - Supply Chain & Business Ecosystem Apps" asset is not yet available for external use. It is planned to be released under paid licenses in compliance with FRAND (Fair Reasonable And Non-Discriminatory) terms.

However, TXT e-solutions is open to negotiate bi-lateral commercial agreements with companies willing to commercialize and/or support the "SEI_5 - Supply Chain & Business Ecosystem Apps" product, or develop products/services based on it. Please contact the TXT Research & Innovation business unit, via fitman-phase-iii-info@txtgroup.com, to obtain further information about commercial liaisons.

6. CHECKLISTS AND EXTERNAL RESOURCES

This section provides two different checklists and a listing of external resources. Section 6.1 is a checklist of legal issues that are relevant in the context of advanced manufacturing that uses Future Internet Technologies. Section 6.2 specifies various business models of relevance in the same context. Finally, Section 6.3 lists other resources of relevance for Phase III proposers who are working in ICT for manufacturing.

6.1 Checklist of Legal Issues

This section provides a high-level overview of the legal issues that are relevant in the context of advanced manufacturing that uses Future Internet technologies. The first section of the document discusses which legal areas are of particular importance in the context of Digital, Smart and Virtual factories, while the subsequent sections enumerate, for each legal area, the relevant issues to be considered.

This section is intended to be used as a checklist of legal issues, and does not constitute legal advice. Readers should consult their lawyers if they are in any doubt how to address any legal issue that may be relevant to their planned Phase III activities.

Mapping of Legal Areas to Factory Types

This section discusses what issues are most relevant to particular factory types, and why this is the case. Subsequent sections provide an overview for each legal area.

All Factories

All factory types process data from various sources. These sources might result in the handling of personal data (e.g. customer addresses or payment details), or confidential information. As such, the legal spheres of "data protection" and "confidential information" are relevant to all factory types.

Some factories will be more involved in personal data management than others; smart factories that monitor employees are an exemplar of this and they will need to consider data protection in greater depth.

Digital Factories

Digital factories focus on manufacturing design and product lifecycle management. Digital factories aspire to use 'cloud manufacture' to conduct customer-centric design and manufacture. According to FITMAN D1.1[5]: "The Digital Factory challenge aims at improving the time-to product and time-to-market of products and services of various kinds. FITMAN trials within the Digital Factories will manage more efficiently the product life-cycle information to impact productivity and the new trends and paradigms like an increasing demand for sustainable manufacturing and mass customisation."

A digital factory scenario may use analytics over social networks to discover and assess trends of relevance to the design and manufacture of its products. In such a scenario, the system operators must be aware of issues around data protection and the processing of personal data, as well as possible future changes to legislation around the data mining of social networks. Other digital factory scenarios might involve the sharing or disclosure of confidential information. In addition to this, a digital factory scenario may involve a data exchange which can lead to co-creation or passing of intellectual property between contractors who may make additions or developments on the work.

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[5] FITMAN D1.1 FITMAN Use Case Scenarios and Business Requirements, Section 1.3

It is therefore important for digital factory operators to consider the areas of data protection, confidential information and intellectual property rights management.

Smart Factories

Smart factories aim to support agile manufacturing and customisation through the instrumentation and monitoring of the shop floor. According to FITMAN D1.1[6]: "The Smart Factory challenge aims at being able to deliver ICT solutions that make production systems more sustainable (greener, safer and more resource efficient). FITMAN trials within the Smart Factories will significantly improve the registration process of industrial sensors and services, facilitating a simpler deployment of smart objects in the factory shop-floor and more intelligent production practices."

A smart factory may develop documents that are passed between multiple entities, with the possibility of changes, additions or improvements being made. In this situation, it is important for the intellectual property rights of all partners to be understood. A smart factory scenario may also exist where information is being passed to the consumer, or customer, as regards to the manufacturing chain and its progress. In such a scenario there will likely be a service level agreement (SLA) which covers this information service. Therefore, in addition to data protection and confidential information, intellectual property rights management and service level agreement considerations may be important.

Virtual Factories

Virtual factories are about supporting global networked manufacturing and logistics and diverse collaboration models. According to FITMAN D1.1,[7] "The Virtual Factory challenge aims at facilitating the collaboration among various organisations involved in industrial supply chains, enabling the efficient flow of information about procurement, inventory, production, delivery, etc. FITMAN trials will demonstrate how basic security functions through FI Security GE can be provided to a large constituency of enterprises, and how collaboration and trust can be constructed over such basic functions inherent to the Future Internet."

In a virtual factory scenario where different parties are interacting with different services, including leasing of services producing outputs and supply of materials etc., SLAs are likely to be in place. Therefore, in addition to data protection, confidential information and IPR management, SLAs and legal responsibility are legal elements worthy of consideration. From an FI perspective, virtual factories should pay particular head to the concept of legal responsibility in situations where a federator has responsibility for any filtering or ranking of information flowing between real factories and their customers.

Data Protection

At the EU level data protection is currently regulated through The Data Protection Directive (DPD).[8] As of August 2013, there exist proposals for substantial change to the European Union Data Protection Framework, so readers should check for any changes before applying the following checklist, consulting their lawyers as appropriate.
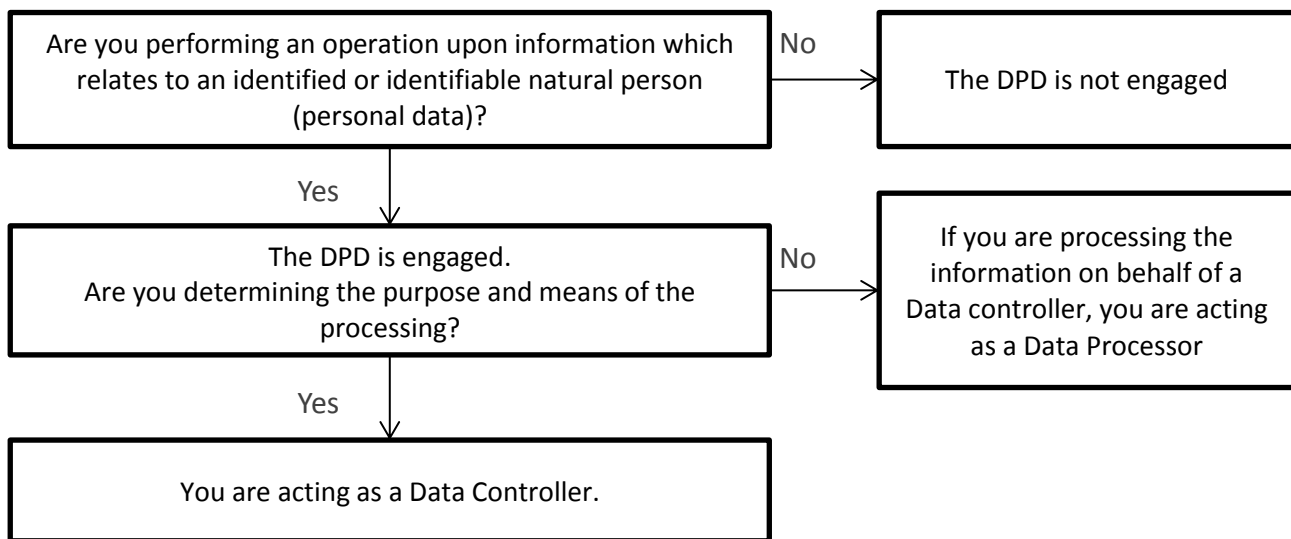
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[6] FITMAN D1.1 FITMAN Use Case Scenarios and Business Requirements, Section 1.3

[7] FITMAN D1.1 FITMAN Use Case Scenarios and Business Requirements, Section 1.3

[8] Council Directive 95/46/EC of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data (1995) OJ L 281/31

Initial Considerations

Figure 31: Data Protection considerations

Data Controllers must ensure that the personal data is:

- Processed fairly and lawfully (i.e. that the data subject has unambiguously given consent)

- Collected for specified explicit and legitimate purposes and not further processed in a way incompatible with those purposes

- Adequate, relevant and not excessive in relation to the purposes for which they are collected and/or further processed.

- Accurate and kept up to date

- Kept in a form which permits identification of data subjects for no longer than is necessary for the purposes of collection

Data Controllers must:

- Implement appropriate technical and organisational measures to protect the personal data against accidental or unlawful destruction or accidental loss, alteration, unauthorised disclosure or access. Taking note of the state of the art these measures must be proportionate to the risks represented and the nature of the data.

- Notify the data protection supervisory authority within your jurisdiction that you are processing personal data.

- Be aware that, where you are responsible for the event causing the damage, you can be held liable for damages to any data subject who has suffered damage following unlawful processing or any act incompatible with the laws of your jurisdiction.

- Consider any further obligations imposed by national law.

Data Processors:

- Must not process personal data in a way which would exceed the instructions of the Data Controller unless that processing is required by law.

Relevant Legislation

Council Directive 95/46/EC of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data (1995) OJ L 281/31

Confidential Information

Initial considerations
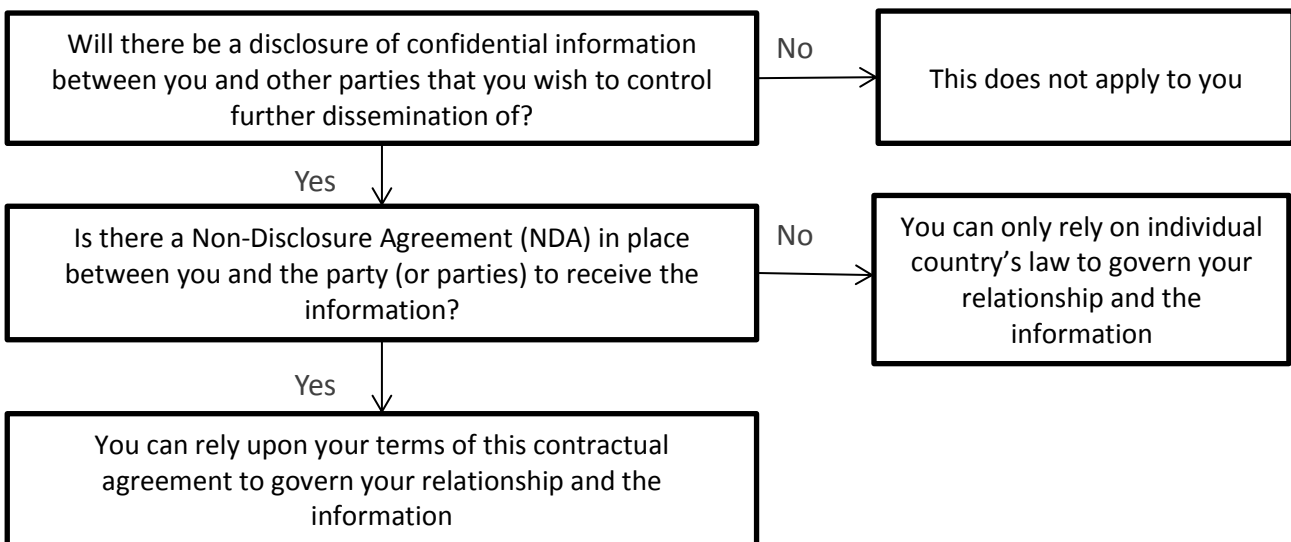
Figure 32: Confidential Information considerations

NDA exists:

- Your NDA should define "confidential information" in such a way that it includes all information you wish to control further dissemination of.

- If the other parties involved are in a foreign country, you should include "choice of law" and "choice of forum" clauses in the NDA: these define, in the case of a dispute arising, which country's laws should be used, and which courts can apply that law.

- Your NDA should define its limitations (time, objects of control etc.)

NDA does not exist:

- You must rely on individual country's laws. Each EU Member State protects confidential information in different ways.

- It will be good practice, and help you generally in the law, if you can mark information as confidential information, and can prove that you have gone to measures to protect or earmark such information in this way.

- Where there is an issue that needs litigating, the jurisdiction will be decided by "conflict of law" rules. In this scenario it will likely to be governed by the Regulation (EC) No 864/2007 of 11 July 2007 on the law applicable to non-contractual obligations (A.K.A. Rome II Regulation).

Relevant Legislation

Regulation (EC) No 864/2007 of 11 July 2007 on the law applicable to non-contractual obligations OJ L 199/40

Intellectual Property Rights (IPR) Management

Initial considerations
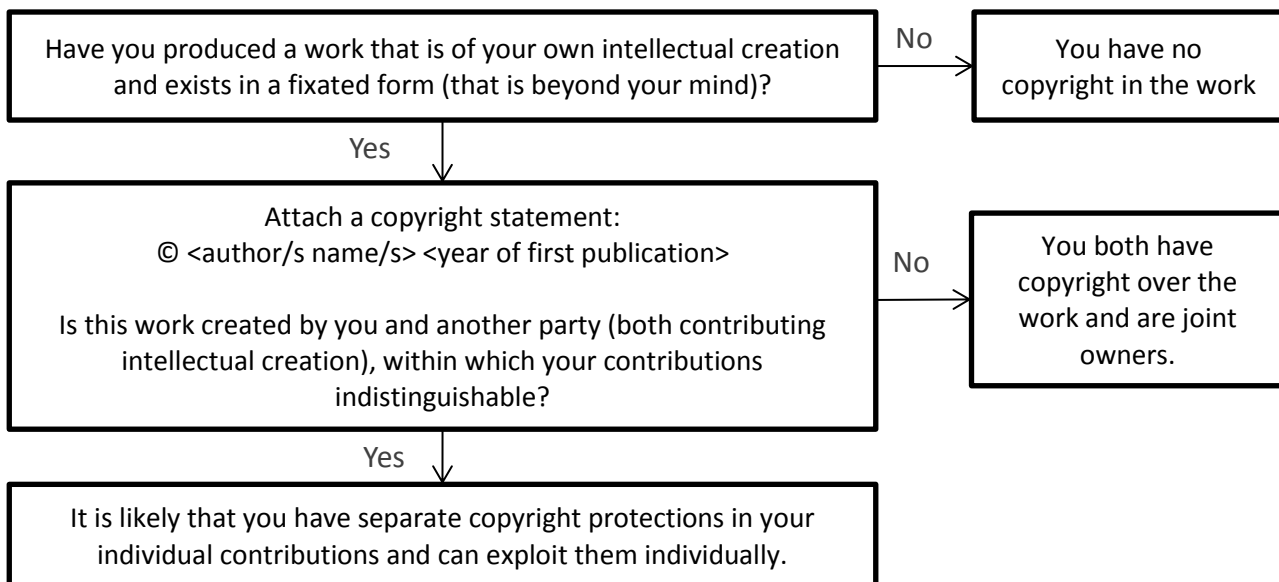
Figure 33: IPR considerations (initial)

Considerations for a joint work
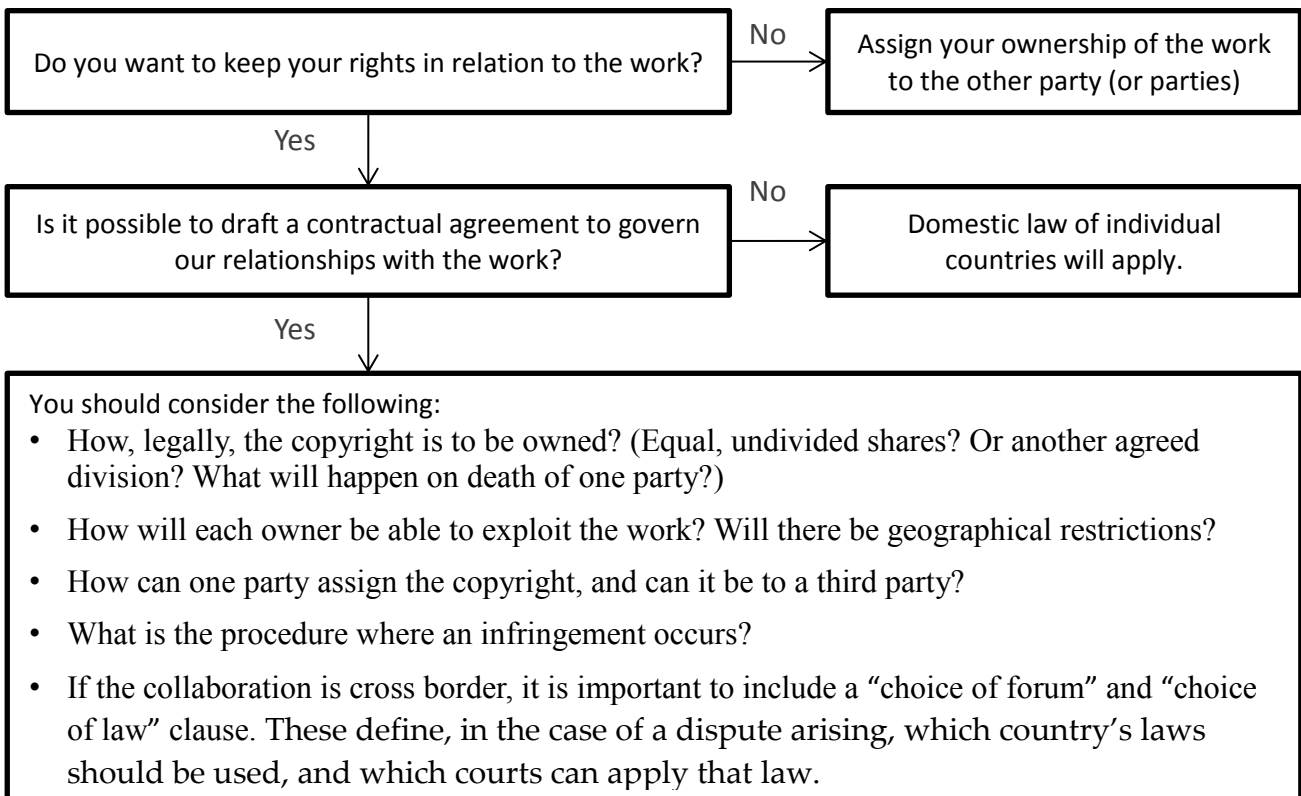
Figure 34: IPR considerations (joint work)

If it is not possible to draft a contractual agreement, domestic law of individual countries will apply.

Generally speaking, in a civil law legal system:

- Each joint owner can assign their interest to a third party.

- Any exercise of rights over the work is subject to consent of all authors.

- In the case of one party's death, their interest will pass to the others.

- In the case of the insolvency of one joint owner, their interest can be transferred to creditors.

Generally speaking, in a common law legal system:

- Each joint owner can assign their interest to a third party, but only with consent of the other authors if that transfer would affect more than just the owner looking to transfer the interest.

- Any exercise of rights over the work will be subject to the consent of all authors.

- In the case of one party's death, their interest will pass via their estate.

In the case of insolvency of a joint owner, the share passes into the insolvent estate to be distributed in accordance with any valid will or the law on intestacy or insolvency as applicable

Considerations for work passed on

```
┌─────────────────────────────────┐        No    ┌─────────────────────────────────┐
│ Do you have consent (generally  │ ──────────→  │ You cannot legally modify the   │
│ via a licence) to modify the    │              │ work; therefore you cannot      │
│ work that has been passed on to │              │ create a derivative.            │
│ you?                            │              │                                 │
└─────────────────────────────────┘              └─────────────────────────────────┘
              │ Yes
              ▼
┌─────────────────────────────────┐        No    ┌─────────────────────────────────┐
│ Have your                       │ ──────────→  │ You have not produced a work    │
│ additions/developments/         │              │ capable of independent          │
│ encapsulation within another    │              │ copyright protection            │
│ document produced a new work    │              │                                 │
│ which has its own intellectual  │              │                                 │
│ creation?                       │              │                                 │
└─────────────────────────────────┘              └─────────────────────────────────┘
              │ Yes
              ▼
┌─────────────────────────────────┐
│ You have an independent         │
│ copyright in that new work      │
│ which exists alongside the      │
│ copyright found in the work     │
│ before modification.            │
└─────────────────────────────────┘
```

Figure 35: IPR Considerations (work passed on)

If you are passing a work on, consider:

Do you have permission/the right to pass the work on?

Relevant Legislation

Council Directive 2001/29/EC of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society OJ L 167/10

Service Level Agreements

Consider what your SLA says about:

Your content and the service

- What licences are you granting to your content and in what circumstances?
- How long do these licenses last?
- Do you assign any ownership rights through providing your own content?
- It is also worth considering whether, if you are using third party content, you have the permission to use this content within the service.

Data Retention/Deletion

- Is your data in the service retained, and if so for how long?
- What happens when you stop using the service?

Data sharing

- Are you placing confidential information within the service environment?

Assurances of security

- If the service is cloud based, what statements are made as to information security
- Is the cloud private, public or hybrid?

The location of the service

- What is the location where the service operates?

- How will changes to the SLA be implemented, will you be informed, and if so, how will you be informed?

Other considerations:

If you are a data controller, and process personal data using the service:

- Does the service provide sufficient guarantees in respect of the technical security measures and organisational measures which govern the processing carried out.

- Will the personal data being processed be transferred out of the EEA? If so, has the destination country been assessed as not providing adequate protection by the European commission? If yes, you cannot use personal data within this service. If no, if they provide adequate protection you can use personal data within the service.

Generally:

- What law governs the SLA, and what courts will have jurisdiction over any disputes arising from it?

How does the SLA interact with any licenced work you may use within it?

Legal Responsibility

Figure 36 provides a flow chart of considerations regarding legal responsibility.

Initial Considerations:

Are you a legal person?

- Only natural or legal persons can have legal responsibility – legal persons are normally formed via the establishment of companies. If these companies meet certain requirements they can produce a separate legal entity (SLE); this entity exists separate to the employee's legal entities and has legal responsibility.

- If your company establishment has not created an SLE, you will be held personally liable for all breaches of contract etc.

What does your contract say?

- If a contract exists between you and another party as regards to your relationship with them, this will govern and regulate all issues that arise.

Are you processing personal data? If so, see 1.1 Data Protection to consider your liability.

- Data Processors are not liable to the data subject, but can be liable to the Data Controller.

- Data Controllers are liable to the data subject and the supervisory authority.

Are you acting as a carrier network? If so, see below. The information is taken from the e-Commerce Directive.[9]

Relevant Legislation

Council Directive 95/46/EC of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data (1995) OJ L 281/31

Council Directive 2000/31/EC on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market [2000] OJ L 178/1

Regulation (EC) No 864/2007 of 11 July 2007 on the law applicable to non-contractual obligations OJ L 199/40

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[9] Council Directive 2000/31/EC on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market [2000] OJ L 178/1
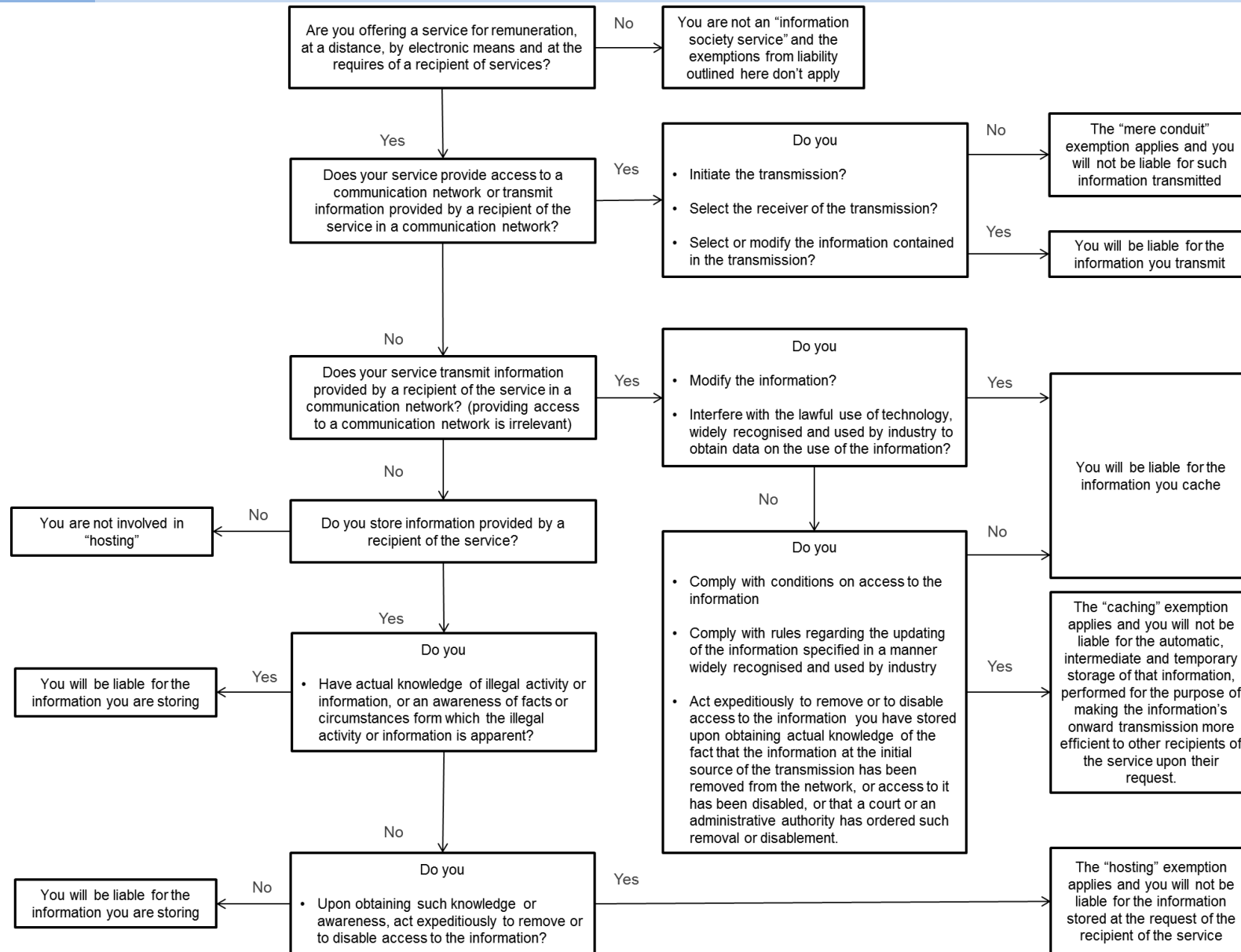
Figure 36: Legal Responsibility considerations

6.2 Checklist of Business Models

One important aspect that must be considered in any trial is the need to evaluate the business sustainability of the proposed innovation under test. In the manufacturing sector, the business value is often grounded in improving the business efficiency of production processes. However, even where the value arises in the physical domain, attention should be paid to the sustainability of information flows on which this depends.

The key elements of a sustainable proposition are as follows:

- Business roles: logical groups of (necessary) business functions that may be fulfilled by stakeholders. In a typical Future Internet scenario, there are data sources, analysts, and consumers who produce and use information generated by the scenario(s). There may also be some infrastructure roles that facilitate the operation of the scenario, e.g. identity providers, software vendors, compliance authorities, equipment operators, etc.
- Business stakeholders: organisations or (in some cases) individuals that care about the envisaged scenario(s) and can fulfill the required business roles.
- Business relationships: define how the stakeholders interact to provide/use business functions, and how stakeholders compensate each other for value generated on their behalf by other stakeholders.
- Business models: describe the way in which the stakeholders create and capture value by fulfilling business roles and engaging with other stakeholders in the scenario(s)[10].

To analyze and understand whether a proposition is sustainable, two business modelling methods are usually needed:

- analysis of individual stakeholders, to identify their inputs and outputs, and their costs and value from functions provided and their relationships to other stakeholders;
- analysis of the business ecosystem, to understand which roles are needed, how they are fulfilled by different stakeholders, and whether they are incomplete or conflicting in the envisaged scenario(s).

The methodologies recommended for conducting these analyses within the FI-PPP are the business modelling canvas, and the value network analysis. The business modelling canvas shown in Figure 37 was first developed by Osterwalder et al[11], and provides a framework for identifying the key activities, resources and relationships involved in running a set of business functions, and analyzing the associated costs and revenues:

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[10] R. Bellman, C. E. Clark, D. G. Malcolm, J. Craft and F. M. Ricciardi, "On the Construction of a Multi-Stage, Multi-Person Business Game," Operations Research, vol. 5, no. 4, pp. 469-503, 1957

[11] A. Osterwalder, Y. Pigneur and C. Tucci, "Clarifying Business Models: Origins, Present, and Future of the Concept.," Communications of the AIS , vol. 15, 2005.
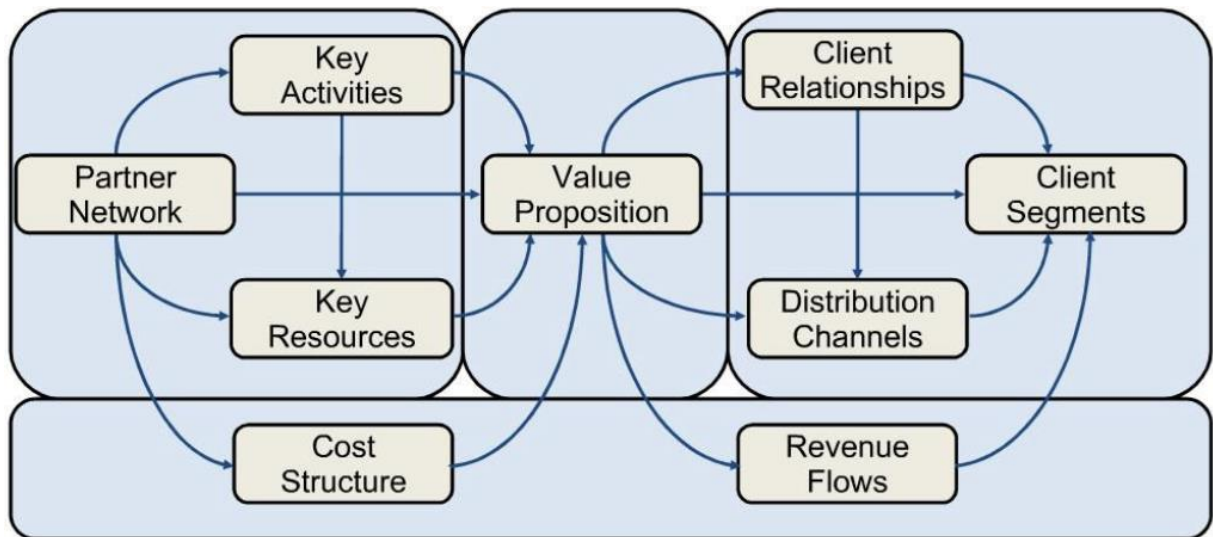
Figure 37. The business modelling canvas

The value network analysis approach connects together individual stakeholder models for each business role and its relationship to others, so capturing the overall network of stakeholders and their relationships. Where a single stakeholder fulfills multiple roles, their roles are grouped together so one can easily identify the relationships, and associated costs and revenues per stakeholder. The resulting graph thus illustrates how revenue from the end customers is distributed among other stakeholders, and how this relates to the distribution of resources in the network. The value network graph allows one to check that:

- every necessary business function is fulfilled by at least one stakeholder (if this is not the case then the proposition may need redesigning to eliminate unfulfilled functions);
- each stakeholder has access to the revenue generated in the network allowing them to sustain their contribution (if this is not the case then business functions may need to be redistributed, or supported as a common good by other stakeholders);
- that there are no conflicts (also known as 'tussles'[12]) over the control or distribution of resources needed (if any exist then business relationships may need to be adjusted, e.g. to compensate losers allowing the conflict to be resolved).

The business model for most manufacturers is relatively simple. The manufacturer produces products which are of value to its customers. The relationship between the manufacturer and each customer includes the payment of a fee (the price) in exchange for receiving the product. The manufacturer typically needs components or raw materials which are combined and transformed to create the product, plus resources such as labour or energy needed to operate the process whereby this is achieved. Tussles often exist when the manufacturing process imposes external costs on other stakeholders, e.g. due to environmental degradation, and they are commonly resolved by imposing compensation schemes through regulation or (in some cases) through taxation.

Manufacturing also involves the capacity to organize the required processes, and manage the supply of inputs in relation to the delivery of outputs. This organisation is based on the acquisition and use of information, which may itself be a costly process. (In fact the existence of corporations is largely due to the fact that to acquire and apply this information is too costly if managed by individual contributors). The role of ICT in manufacturing is often based on its ability to reduce the costs and/or the time spent on these organisational aspects. This in turn implies that the production and management of information is of value to manufacturing

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[12] F von Bornstaedt, DT, SESERV Brussels Workshop (2012), also SESERV D3.2.

stakeholders, and this creates opportunities for stakeholders to create a sustainable business based purely on the flow of information.

As the Internet (and especially of the Web) has eased the flow of information, many such information-centric business models have arisen. While it is possible for new business models to emerge, it makes sense to first assess whether the stakeholders in a trial proposition could make use of existing Internet business models, such as[13]:

Type	Meaning
Merchant model	Operator defines goods or services and offers them to online customers. Customers place purchase orders online. Delivery is usually in the real world, triggering payment.
Manufacturing model	Operator offers capabilities to customers online. Customers define and negotiate their requirements online and place purchase orders if satisfied. Delivery is usually in the real world, triggering payment.
Subscription model	Similar to the merchant model, except the customer does not place separate purchase orders, but pays a subscription to get pre-defined goods or services over a period.
Utility model	Similar to the subscription model, except the customer requests service on demand, and pays periodically depending on how much they actually used.
Advertiser model	Operator provides a channel for customers to advertise their goods and services. Customers pay for inserting their adverts into the channel. Supplier tries to make the channel attractive to consumers, so increasing the value of the channel to customers.
Infomediary model	Similar to advertising, except the operator captures information about consumers, and uses it to target adverts to specific users. Payment is often based on user engagement (pay per click, etc)
Broker model	Similar to advertising, except the operator is not paid for carrying adverts, but receives fees for brokering transactions between suppliers and consumers. Brokers typically try to match offers to consumers, reducing costs and time for consumers, and charging suppliers for the trades.
Affiliate model	Similar to broker model, except the operator conducts rather than brokers the transaction, commissioning a supplier to deliver the product or service and mediating delivery and payment.
Open source	The operator provides products or services for free, based on a loyal community of suppliers/developers and consumers. Revenue is generated by offering auxiliary services for a fee, e.g. support for free, open source software products.
Open content (inc data sources)	The operator provides free access to information services, which are sustained by volunteer or community-based efforts and funding. Sustainability depends on demonstrable value to those providing effort and funding, e.g. community funds (taxes) depend on being seen to provide a common good.

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[13] See, e.g. M. Rappa, "Business Models on the Web". http://digitalenterprise.org/models/models.html.

Type	Meaning
Social networks	The operator provides services for free, designed to facilitate user interactions that users find attractive (especially as they are free). The resulting network provides channels and information that are used for other purposes, e.g. advertising, infomediary, etc.

Table 5. Selected Internet business models

6.3 External Resources

This subsection lists resources of relevance for Phase III proposers working in ICT for manufacturing. For each association, initiative, project or partnership, this subsection provides a brief overview of the group in question, a link to its main website, and links to specific items of interest within that website.

N.B. All links were functional as of 27 September 2013. If you discover a broken link, please inform us on fitman-phase-iii-info@txtgroup.com so that the link can be updated.

EFFRA's roadmaps

EFFRA, the European Factories of the Future Research Association, produces roadmaps for future research. Their roadmap for 2014-2020 is due soon (and should be accessible from the below link when it is released), while the strategic multi-annual roadmap lays out industrial research priority areas for 2010 – 2013.

Links:

EFFRA	http://effra.eu/
Strategic Multi-Annual Roadmap	http://www.effra.eu/attachments/article/72/Report%20of%20the%20Ad-hoc%20Advisory%20Group.pdf
EFFRA Research Priorities Summary	http://www.effra.eu/attachments/article/72/EFFRA%20Research%20Priorities%20-%20Executive%20Summary.pdf
2014-2020 roadmap	http://www.effra.eu/index.php?option=com_content&view=category&layout=blog&id=85&Itemid=133

ActionPlanT's vision and roadmap

ActionPlanT is an EC project that produced a roadmap on the short, medium and long term role of Information and Communication Technology in the European manufacturing industry. It ran from June 2010 – May 2012.

Links:

ActionPlanT	http://www.actionplant-project.eu/
ActionPlanT Vision and Roadmap overview	http://www.actionplant-project.eu/index.php?option=com_content&view=article&id=51&Itemid=56
ActionPlanT Roadmap for Manufacturing	http://www.actionplant-project.eu/public/documents/roadmap.pdf

Other Public Private Partnership roadmaps

The EC has funded a number of PPPs besides the FI-PPP, and some of their outputs may be relevant to manufacturers and ICT partners bidding in Phase III of the FI-PPP. Roadmaps exist for green cars and energy-efficient buildings.

Links:

Research in Public Private Partnerships	http://www.actionplant-project.eu/ http://ec.europa.eu/research/industrial_technologies/research-ppp_en.html
Multi-annual roadmap European Green Cars	http://ec.europa.eu/research/industrial_technologies/pdf/european-green-cars-initiative-ppp_en.pdf
Multi-annual roadmap Energy-efficient Buildings	http://ec.europa.eu/research/industrial_technologies/pdf/ppp-energy-efficient-building-strategic-multiannual-roadmap-info-day_en.pdf

The 'Factories of the Future' PPP's funded proposals

The homepage of the 'Factories of the Future' public private partnership describes the partnership and provides a link to Factories of the Future proposals to be funded in the Industrial Technologies programme.

Links:

Factories of the Future	http://ec.europa.eu/research/industrial_technologies/factories-of-the-future_en.html
Funded FoF proposals	http://cordis.europa.eu/fetch?CALLER=FP7_PROJ_EN&QZ_WEBSRCH=FoF&QM_PJA=&QM_EP_PGA_A=FP7-NMP&USR_SORT=EN_QVD+CHAR+DESC

EURATEX key data and R&D reports

The European apparel and textile confederation represents the interests at the level of the EU institutions of the European textile and clothing industries. They provide analyses of the EU-27 textile and clothing industry in recent years (in 'key data') and related research reports (in 'R&D').

Links:

EURATEX	http://www.euratex.eu/
Key data	http://www.euratex.eu/index.php?id=99
R&D	http://www.euratex.eu/index.php?id=193

European Technology Platforms

Various European Technology Platforms (ETPs) may be of relevance to FI-PPP Phase III bidders. The European Steel Technology Platform (ESTEP) is one such ETP, whose publications include a strategic research agenda, the textile platform, and the smart systems integration platform. Another is the European Technology Platform for the future of textiles and clothing, who have provided a research agenda and roadmaps. Finally, the European Technology Platform on Smart Systems Integration (EPoSS) offers different aspects of relevance, including publications (with strategic research agendas) and working groups (which include: automotive; manufacturing & robotics; communication for smart devices; key technologies). Note that EPoSS membership is required to access the working groups.

Links:

ESTEP platform	http://cordis.europa.eu/estep/
ESTEP publications	http://cordis.europa.eu/estep/publications_en.html
Textile ETP	http://www.textile-platform.eu/
Textile ETP research agenda & roadmaps	http://www.textile-platform.eu/download/keydocuments/research-agenda-roadmaps/
EPoSS	http://www.smart-systems-integration.org/
EPoSS publications	http://www.smart-systems-integration.org/public/documents/publications
EPoSS working groups	http://www.smart-systems-integration.org/public/about/structure/working-groups

Related EC funding

Finally, other related EC funding exists. These sources may, in addition to being of interest of their own right, help Phase III bidders to understand the broader landscape of funding in this area.

'I4MS' (Innovation for Manufacturing SMEs) is an innovation initiative for the manufacturing sector and in particular its high-tech SMEs, to profit from newest advances in ICT. The 'Industrial Technologies' initiative aims to improve the competition, employment, sustainability, innovation, industry and business in this area. 'MANUNET' is an ERA-Net that aims to foster the competitiveness of Europe's manufacturing industry by supporting the funding of manufacturing research projects performed by enterprises (preferable SMEs), universities and research centres.

Links:

I4MS	https://ec.europa.eu/digital-agenda/en/smart-manufacturing-1
Industrial Technologies	http://ec.europa.eu/research/industrial_technologies/index_en.cfm
MANUNET	http://www.manunet.net/

7. INTERMEDIARIES' BEST PRACTICES FOR PHASE III

This section describes best practices for SME engagement based on the public information of relevant organisations.

The approach used to collect the following best practices is described in Section 2.2 of FITMAN D8.3 [10]: in sum, the approach is to review the public information provided by a set of relevant organisations to extract their approaches to SME engagement.

The organisations considered were those organisations that were most highly- ranked by D8.3's technology awareness creation methodology (D8.3 Chapter 3). Seven organisations had a final ranking higher than 85, the threshold recommended for use in this context by the creator of the ranking methodology. The organisations were:

1. European Regions Research and Innovation Network (European network)
2. International Association of Science Parks (global association)
3. International Network for SMES (global network)
4. EUREKA (global-European network)
5. Enterprise Europe Network (European network)
6. European Apparel and Textile Confederation (European confederation)
7. EURIPIDES (French cluster)

The website of each organisation was read, seeking references to best practices. For each reference to a best practice, the following were recording: URL, access date, text of relevance, and best practice. Data were gathered between 30 September and 2 October 2013.

Once the best practices had been extracted, synonyms were identified and merged (e.g. 'expert advice' and 'expert consultation'; 'share best practices'; 'share good practices'). Next, similar best practices were categorised together. For example, 'training' was referred to twice, while 'training for pitching to investors' and 'training for proposal-writing and project management skills' were referred to once each: these were counted in total as four references to the practice of providing training. This yielded 15 items, shown in Table 6:

Best practice (number of references to practice)	Organisations referring to best practice (number of references by organisation to practice)
Support of networking (8)	European Regions Research and Innovation Network (1)
	International Association of Science Parks (1)
	International Network for SMES (2)
	Enterprise Europe Network (4)
Expert advice (5)	International Association of Science Parks (1)
	Enterprise Europe Network (4)
News (5)	International Association of Science Parks (2)
	International Network for SMES (2)
	European Apparel and Textile Confederation (1)
Funding information (5)	EURIPIDES (1)
	European Regions Research and Innovation Network (1)
	International Network for SMES (2)
	EURKEA (1)
Training (4)	International Association of Science Parks (1)
	International Network for SMES (1)
	Enterprise Europe Network (2)
Updates (4)	International Association of Science Parks (2)
	International Network for SMES (2)

Best practice (number of references to practice)	Organisations referring to best practice (number of references by organisation to practice)
Publications library (3)	International Association of Science Parks (1)
	International Network for SMES (1)
	European Apparel and Textile Confederation (1)
Information about good practices (2)	European Regions Research and Innovation Network (1)
	International Network for SMES (1)
Support for running events (2)	International Association of Science Parks (1)
	International Network for SMES (1)
Analysis compared with like organisations (2)	International Association of Science Parks (2)
Events (1)	European Apparel and Textile Confederation (1)
Recognition associated with cluster membership (1)	EURIPIDES (1)
Share knowledge (1)	International Network for SMES (1)
Technologies database with links to the technology owners (1)	Enterprise Europe Network (1)
Working groups (1)	European Regions Research and Innovation Network (2)

Table 6. Best practices observed online, sorted by practice

Table 7 shows the list of best practices sorted by organisation.

Organisation	Best practices per organisation
European Regions Research and Innovation Network	working groups; networking events; information about funding and project opportunities; information about good practices
International Association of Science Parks Association	networking support; conference support; expert advice; news; updates; publications library; statistics about like organisations; analysis compared with like organisations; training
International Network for SMES	share knowledge; share best practices; news; updates; a conference for network members; support for running events; training; news; updates; networking; information about tenders and calls; information about financing programmes; publications library
EUREKA	Information about funding
Enterprise Europe Network	matchmaking events; directory of members for networking; technologies database with links to the related SMEs; business plan evaluation; training for pitching to investors; networking with funders; expert consultation about public funds; expert consultation about tax credits; assess SME's technology to support with EC proposals; training for proposal-writing and project management skills; networking
European Apparel and Textile Confederation	news; events; publication library

Organisation	Best practices per organisation
EURIPIDES	funding information; recognition associated with membership of a known cluster

Table 7. Best practices observed online, sorted by organisation

Clearly, the most universally adopted best practice was the support of **networking**, which was referred to eight times by four of the seven organisations. Provision of networking support was referred to in different ways, from networking and matchmaking events to the provision of conferences or online directories to support member networking. Given the importance of good networks, it is unsurprising that this practice was so strongly adopted. The Enterprise Europe Network focused most strongly on this topic, making four references to networking support in three guises (matchmaking events; a members' directory for networking; networking with funders).

Two organisations offered **expert advice**, and it is again the Enterprise Europe Network that offered the strongest focus with four references (offering: business plan evaluation; expert consultation about public funds; expert consultation about tax credits; assessment of SME technology to support with EC proposals). A related topic is **training**, which was referred to four times by three organisations: clearly, the provision of insight or education by experts has been perceived as an important practice for SME engagement. By definition, SMEs employ fewer personnel than other organisations, and for that reason access to expert insight or education is likely to be attractive.

Provision of information was a theme, appearing in the context of information about funding, publications, and good practices:

Provision of **information about funding** was referred to five times by four organisations: access to relevant funding opportunities is naturally an attractive proposition for an SME, and supporting SMEs in finding relevant funding is likely to be a goal of the networks and clusters who described this practice (the European Regions Research and Innovation Network; the International Network for SMES; EURIPIDES), all of whom display clear links to their resources on this topic from their homepages.

Three organisations offered **publications libraries** (the International Association of Science Parks, the European Apparel and Textile Confederation, and the International Network for SMES). It is perhaps to be expected that more domain-focused organisations are likely to offer this kind of resource, since a publications library must have a clear scope.

Finally in terms of information provision, the provision **information about good practices** was referred to twice by two organisations, the European Regions Research and Innovation Network and the International Network for SMES. This can be regarded as not unrelated to the provision of expert advice and training, relating as it does to best practices.

This plethora of support for the provision of targeted information may itself be viewed as a best practice, with information about specific topics (funding, publications, good practices) as examples of the types of information most useful to SMEs.

News and **updates** were referred to five and four times respectively, by three organisations in total. It seems likely that these items were included as part of the work of fostering a strong community, although such a conclusion cannot be substantiated before conducting interviews with the organisations.

Support for running events was referred to twice by two organisations, and may therefore represent a best practice for SME engagement, but more information is required to confirm this.

The remaining six practices were each referred to by only one organisation, making it difficult to draw conclusions about these practices without contacting the organisations in question. These practices are: analysis by which an SME can compare itself with similar organisations (falling into two approaches to enabling comparison: the provision of statistics about similar organisations, and the provision of analysis compared with similar organisations); events; the recognition of cluster membership; knowledge sharing; a technologies database with links to technology owners, and working groups.

The following common practices were observed among the organisations in question:

- the support of networking, referred to eight times by four organisations
- the provision of expert input (whether in the form of advice or training), referred to three organisations
- the provision of information about various topics (e.g. funding, publications and good practices), referred to ten times by all seven organisations
- the provision of regular news and updates, referred to nine times by three organisations.

The remaining seven best practices were referred to less strongly, and it is therefore difficult to draw conclusions about these without more data. As described in Section 2.2 of D8.3 [10], a second iteration of this work is planned in which interviews will be held with selected organisations in order to gain deeper insights into the use of these practices. Of particular interest are the motivations that led to the use of these practices, and the perceived strengths and weaknesses of the practices.

8. CONCLUSIONS

Motivated by the importance of supporting Phase III bidders working in ICT for manufacturing, this package combines summaries of and links to published FITMAN deliverables with information across a range of topics including SME engagement, legal issues and business models. It includes technical depth and information about non-technical aspects. This package therefore provides deep and broad support to Phase III bidders and other readers interested in learning about FITMAN.

Importantly for readers who do not have prior experience in the FI-PPP, this package includes an overview that describes, in addition to FITMAN itself, the FI-PPP and FITMAN's trial expansion methodology. The FI-PPP is a large, novel programme and a greater understanding of its structure will support anyone who wishes to become involved.

The summaries of FITMAN deliverables, which include links to full versions of public deliverables and public versions of confidential deliverables, fall into two sections:

The first section, 'Methodologies and Tools', summarises outputs from FITMAN's Verification and Validation work package (WP2) and from the FITMAN task focused on SMEs Innovation Preparation (T8.3). Phase III intermediaries will find the SME innovation preparation methodologies particularly relevant, while Phase III trial bidders, who will need clear plans for V&V of their own trials, can be informed by the FITMAN precedent (which may also inform the bid evaluation processes of intermediaries).

The second section, 'FITMAN Architecture and Trials', describes outputs from FITMAN's Baseline System (WP1) and Design and Development of the FITMAN Experimentation Sites (WP3). This technical section provides insight into FITMAN's approach in terms of its outputs, which will eventually include the FITMAN Generic Platform, the three FITMAN Specific Platforms (smart, digital and virtual), and the eleven FITMAN trial platforms.

The information on FITMAN Specific Enablers describes proposed software licenses for some of the SEs. SE terms and conditions are highly relevant to Phase III participants, who may wish to use FITMAN SEs. This information will be updated in the near future.

The section entitled Checklists and External Resources provides checklists of legal issues (and how they map to smart, digital and virtual factories) and business models (with discussion of sustainable business propositions and a list of selected internet business models). It then lists external documents of relevance to Phase III bidders, referring to materials from such organisations such as EFFRA, ActionPlanT and the Factories of the Future PPP. This section will help bidders step back from their proposals and consider the broader landscape, addressing the domain issues included in this section.

The section on Intermediaries Best Practices for Phase III discusses best practices discovered by systematic examination of the practices used by relevant organisations for SME and Web Entrepreneurs engagement, nurturing and management. This set of practices will certainly be relevant to intermediaries in their approaches during their Open calls.

In sum, this package encompasses material of relevance to newcomers to the FI-PPP, Phase III intermediary bidders, and Phase III trial bidders; the information includes technical and non-technical FITMAN outputs, and additional information about areas including business models, legal issues and SME engagement.

Although this package is specifically targeted to participants of Phase III of the FI-PPP, it is of relevance beyond that context. For example, people bidding in response to FITMAN Open Calls will find it an invaluable resource for better understanding FITMAN's goals and how their proposals could bolster FITMAN efforts.

At the time of writing, FITMAN is only six months into its twenty-four month duration. This package will be maintained and updated as FITMAN progresses. The interested reader can find out when updates have occurred by following the Twitter stream[14] or the LinkedIn group[15], or by emailing fitman-phase-iii-info@txtgroup.com to register either general interest, or interest in updates to specific parts of this package.

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[14] https://twitter.com/FitmanFI

[15] http://www.linkedin.com/groups?about=&gid=4986259

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