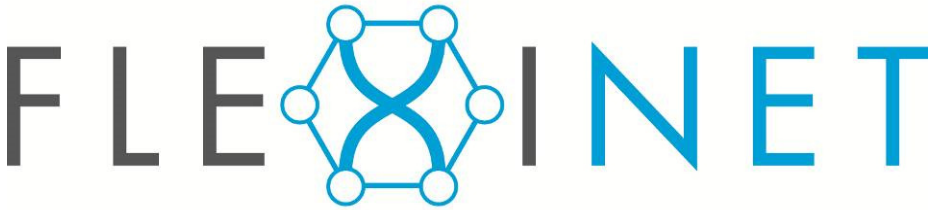
FLEXINET

FP7-2013-NMP-ICT-FOF (RTD) Project 608627



Deliverable D6.1

Test Bed Specifications

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FLEXINET Project Profile

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FLEXINET Partners

Loughborough University	Loughborough University, UK
Coventry University	Coventry University, UK
ITI INSTITUTO TECNOLÓGICO DE INFORMÁTICA	Instituto Tecnologico de Informatica, Spain
Fraunhofer IPK INSTITUTE PRODUCTION SYSTEMS AND DESIGN TECHNOLOGY	Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung E.V., Germany
ainia centro tecnológico	Asociacion de Investigacion de la Industria Agroalimentaria, Spain
CONTROL 2K total solutions provider	Control 2K Limited, UK
University of St.Gallen	Universitaet St. Gallen, Switzerland
INDESIT company	INDESIT Company S.P.A., Italy
KSB	KSB AG, Germany
custom drinks container + beverage solutions	Customdrinks SL, Spain
	Highfleet INC, United States
HOLONIX LIFECYCLE KNOWLEDGE SOLUTIONS	Holonix S.r.l., Italy
technische universität dortmund	Technische Universität Dortmund

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Executive Summary

This deliverable contains the specifications of the FLEXINET 'testbed', it is presented here as the settings for executing initial testing activities by technological staff in FLEXINET within a shielded environment (considering the real data, IT and processes of our three end users) before it is finally deployed and ready for evaluation in real environments in WP7.

The main aim of the testing activities in WP6 is to evaluate if the technology developed in previous workpackages performs properly, thus the scope of WP6 testing is limited to functional and system testing. By contrast, WP7 testing is focused on the evaluation of how useful the technology is for the end users, comparing the situation of these early-adopters of FLEXINET technologies with regard to their baseline by means of KPIs.

The testbed specifications within this document contain the blueprint for testing activities, hence, the testing phases, specifications and test cases are provided so as to guide testing activities during Task 6.3. The templates for test scenarios and test cases will be accordingly filled in, together with customisation activities in Task 6.2 so as to include commissioned required conditions, parameters, steps and expected outputs for the given users.

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1 Introduction

1.1 Purpose and Scope

This technical report sets out the testbed specifications required to produce the customised test environments for each industry sector (white goods, valves and pumps, and food and drinks), taking into account the current user environments at both process and IT levels. The document provides a high-level description of the FLEXINET testbed (testbed hereafter) and specifies the architecture of the testbed, matching its components with the deployment requirements coming from the various FLEXINET technology chapters (WP2, WP3, WP4, WP5) and the user needs expressed in the analysis phase (WP1). In the above context, this document focuses on the infrastructure (process and IT levels) needed to set-up the testbed and the specifications to customise (Task 6.2) and run an initial service testing in Task 6.3. The results of this testing will be used in WP7 to support the final customisations for deployment and evaluation.

This document is a living document and it describes the status of the testbed at the moment the document is published. Further testbed evolutions, based on changes at this point unforeseeable, might occur and will be duly reflected in further releases of the document if necessary. These will be uploaded to the portal flexinet-fof.eu under the private section for partners.

1.2 Objectives

The testbed is the FLEXINET tangible asset that is responsible for making possible all relevant experimentation activities around FLEXINET and for making FLEXINET's technical implementation a reality. The testbed is of critical importance as it allows the developers to detect potential inconsistencies and modify or adapt them before the full deployment for end user validation in WP7.

Ultimately the testbed is devoted to allow the testbed team to perform tests of the FLEXINET technologies in the context of use cases.

1.3 Definitions, Acronyms, and Abbreviations

Term	Definition
Application	A computer program designed to help end users to solve specific activities. In FLEXINET, applications are built on top of the services and can be both desktop applications and web applications. As they offer configuration and personalisation capabilities, the applications are independent from a specific area or company. An example can be an MES.
Functions (F)	Expected behaviour for a given piece of software or application. Functions have been defined in D1.3 per use case.

Mock-up	A mock-up in FLEXINET is a demonstration of an application. The mock-up illustrates or emulates the expected functionality of the application. The main targets of the mock-up are the involvement of the end users and an early check of functionalities. Also workflows and interconnections of applications can be experimented with using the mock-ups
Requirement (R)	A condition or capability needed by a user to solve a problem or achieve an objective (ANSI/IEEE Std. 610.12-1990). The aim of the development team is to fulfil requirements by developing the services and applications.
Service	A software support feature, programmed via web services. A set of services can be orchestrated in order to provide more complex and powerful web services. A service is usually designed to provide independence of the end user platform, and has the possibility to be combined with others, so that they can be directly integrated in third party applications. An example can be the order scheduler of an MES.
Functional and System testing	System testing is performed on the entire system in the context of a Functional Requirement Specification(s) (FRS) and/or a System Requirement Specification (SRS). System testing tests not only the design, but also the behaviour and even the believed expectations of the customer. It is also intended to test up to and beyond the boundaries defined in the software/hardware requirements specification. The design will not be tested in FLEXINET.
Test cases	Test cases are individual sets of operations performed over an application to see if it behaves accordingly to expected functions/end user expectations. Test cases will follow the workflow set per application in D5.2 and will check if the given functionalities match the expected functions. Test Scenario = Workflow, it will test a series of test cases.
Test scenario	It is the real life situation in which the end-user/customer uses/interacts with the system and came across various failures (if there are any). Hence we generally used to say Real world scenario. When a user uses the system, then it becomes a scenario. Scenarios will be the context on which the FLEXINET applications are used so as to solve specific activities (searching similar ideas, understanding risks of a new business model, looking for GPN alternatives…).
Testbed	It consists of the settings for executing testing activities in a shielded environment considering real data, processes and IT perspectives of end users.
Unit testing	Unit testing is a software development process in which the smallest testable parts of an application, called units, are individually and independently scrutinized scrutinised for proper operation. Unit testing is often automated but it can also be done manually. The unitary testing will be developed at service/application level in WP5.

Use Case (UC)	An end user use case provides an end user perspective of an aspect of their business that the systems solution should support, including key performance indicators related to the evaluation of the solution. This aids both the system development and system evaluation processes.
BMAA	Business Model Accelerator Application
BRAA	Business Rules Authoring Application
CEA	Collaborative Environment Application
EWNA	Early Warning Notification Application
GPNCA	GPN Configurator Application
IRASA	Initial Risk Application Specification Application
KPI	Key Performance Indicators
OBMCA	Operational Business Model Configurator Application
PSCA	Product Service Configurator Application
PSIMA	Product Service Idea Manager Application
SAA	STEEP Analyzer Application
SBMEA	Strategic Business Model Evaluator Application
SRAA	Strategic Risk Assessment Application
STEEP	Social, Technological, Economical, Environmental and Political
TEAA	Technology Effect analyzer Application
UEEAA	User Experience Analyzer Application

Table 1-1: Definitions, Acronyms, and Abbreviations

1.4 References

List all of the applicable reference documents. The references are separated into "external" references that are imposed external to the project and "internal" references that are imposed from within to the project.

Ref	Title	Version
[D1.1]	As-Is Models of Industrial Partners Covering Recorded Requirements	1.1
[D1.2]	Requirements Handbook for FLEXINET and FLEXINET General Architecture	2.0

[D.1.3]	Use case descriptions for FLEXINET	1.0
[D.2.1]	Conceptual-model for business model innovation	1.0
[D.5.1]	Specifications of the PND configuration tool and its services	2.0
[D.5.2]	Functional and Modular Architecture of the PND configuration tool	Final reduced

Table 1-2: References

1.5 Approach for Work Package and Relationship to other Work Packages and Deliverables

WP6 is aimed at testing for a given purpose, i.e. testbed in context. For that reason, in WP6 we will focus on system testing (functional perspective) more than unit testing, which will be the focus of WP5 (see Figure 1-1). In WP6 the starting point is that if an application has been customised and delivered, it is working properly and free of technical errors, and ready for functional testing in an isolated fashion, customised for the context of the final end users.

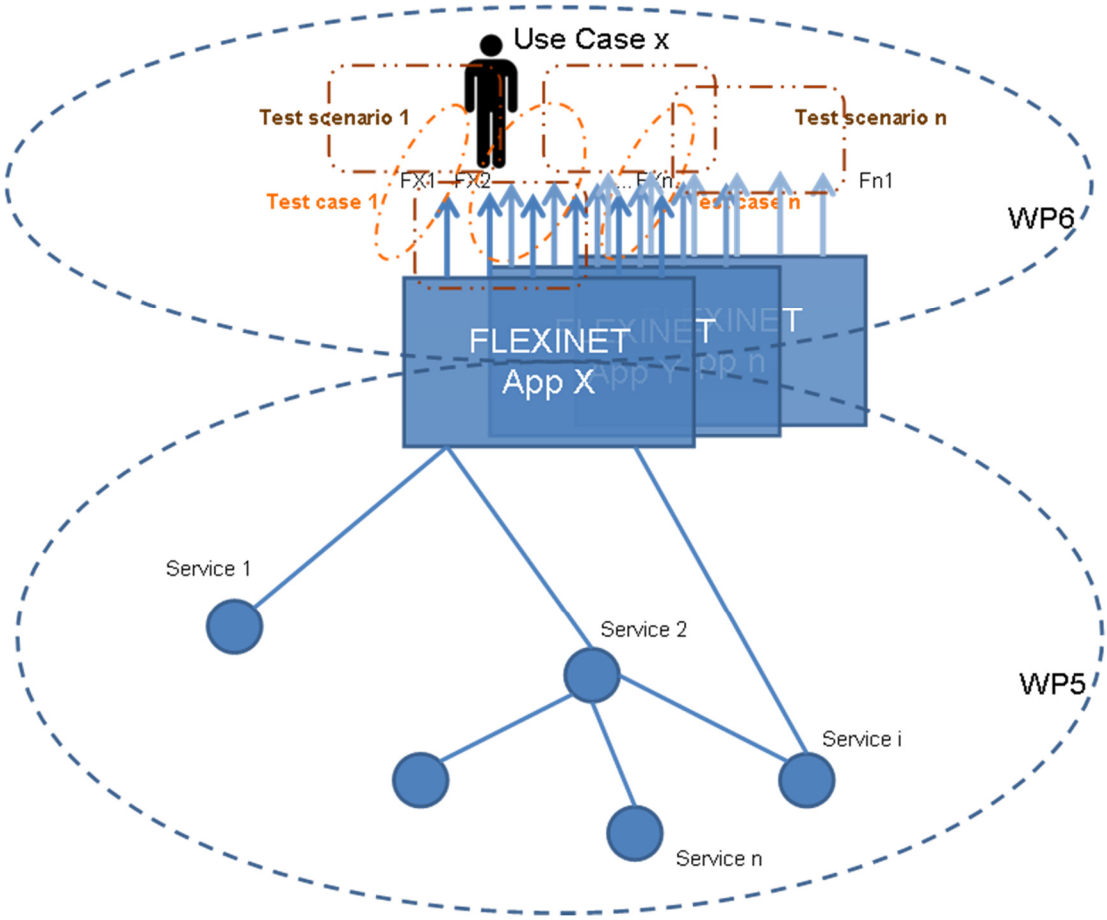

Figure 1-1: Remark on the difference between WP5 (unit) and WP6 (system) testing approach

The FLEXINET testbed serves two functions:

- It defines the roadmap, methodology and templates to carry out the experimentation with FLEXINET technologies and gather results and give feedback for refinement and adaptation to perform specific domain experimentations.
- It establishes the environment to verify the developments of the FLEXINET project, to perform the required application functional testing, and to test FLEXINET integrated packages, contextualised for end users.

Figure 1-2 illustrates the relationships between WP5, WP6 and WP7.

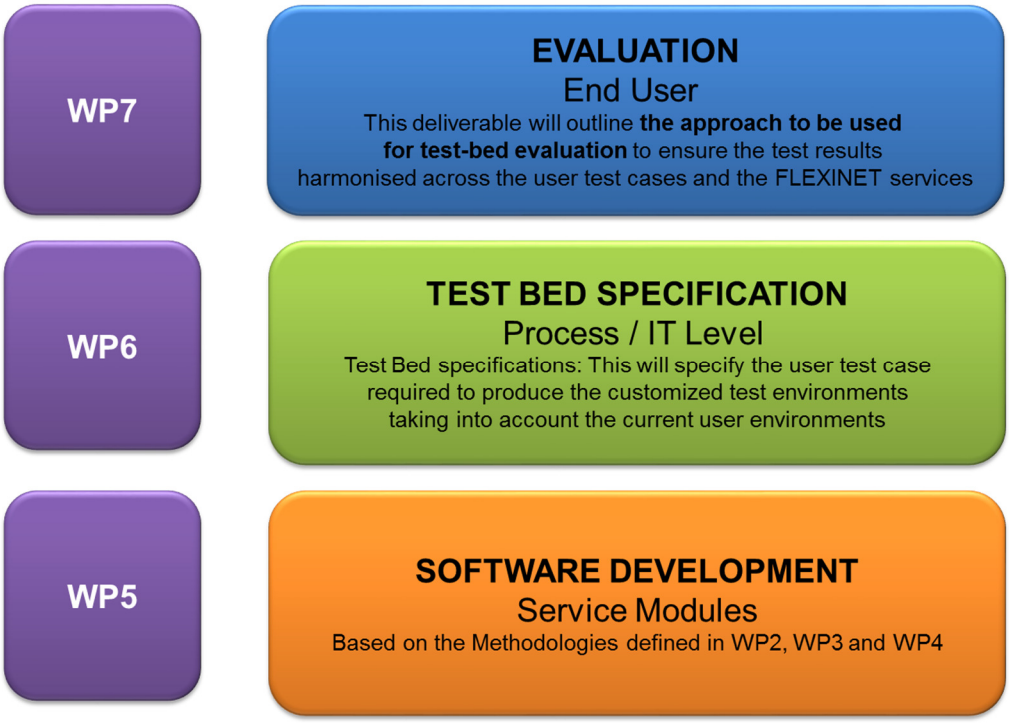

Figure 1-2. Relation between WP6 and previous and subsequent WPs

2 The FLEXINET testbed: overall description

2.1 What is the FLEXINET testbed

The FLEXINET project will generate concrete FLEXINET instances (methods, applications and services) operated by technological partners that will be initially customised and put in context of real end users, enabling them (technological partners) to test their proof-of-concept prototypes in terms of functionality.

The testbed is aimed to be iterative since two deliveries are foreseen for FLEXINET applications, the initial one for M18 and the final one for M24 as detailed in section 5.3. The testbed from WP6 will be refined and modified in WP7 Task 7.2 prior to final deployment of the FLEXINET services, and subsequent end user evaluation during Task 7.3 in WP7.

2.2 FLEXINET testbed description

The FLEXINET testbed consists of the commissioned environment for executing testing activities in a shielded environment considering real data, processes and IT perspectives of our three end users. Once as-is models and use cases have been developed in WP1 and functional description for services and applications have been provided in WP5, test scenarios have been prepared here as a description of a potential future situation for end users resulting from the incorporation of expected improvements thanks to the FLEXINET results. Test scenarios will serve as real life situations in which our end users use/interact with FLEXINET and come across various failures (if there are any).

Thus, scenarios will be the context in which the FLEXINET applications are used so as to solve specific activities (searching similar ideas, understanding risks of a new business model, looking for GPN alternatives).

In order to guide the testing activities across the scenarios, test cases have been prepared as an individual set of operations performed over an application to see if it behaves accordingly to expected functions/end user expectations. Test cases will follow the workflow set per application in D5.2 and will check if the given functionalities match the expected functions as illustrated in Figure 2-1.

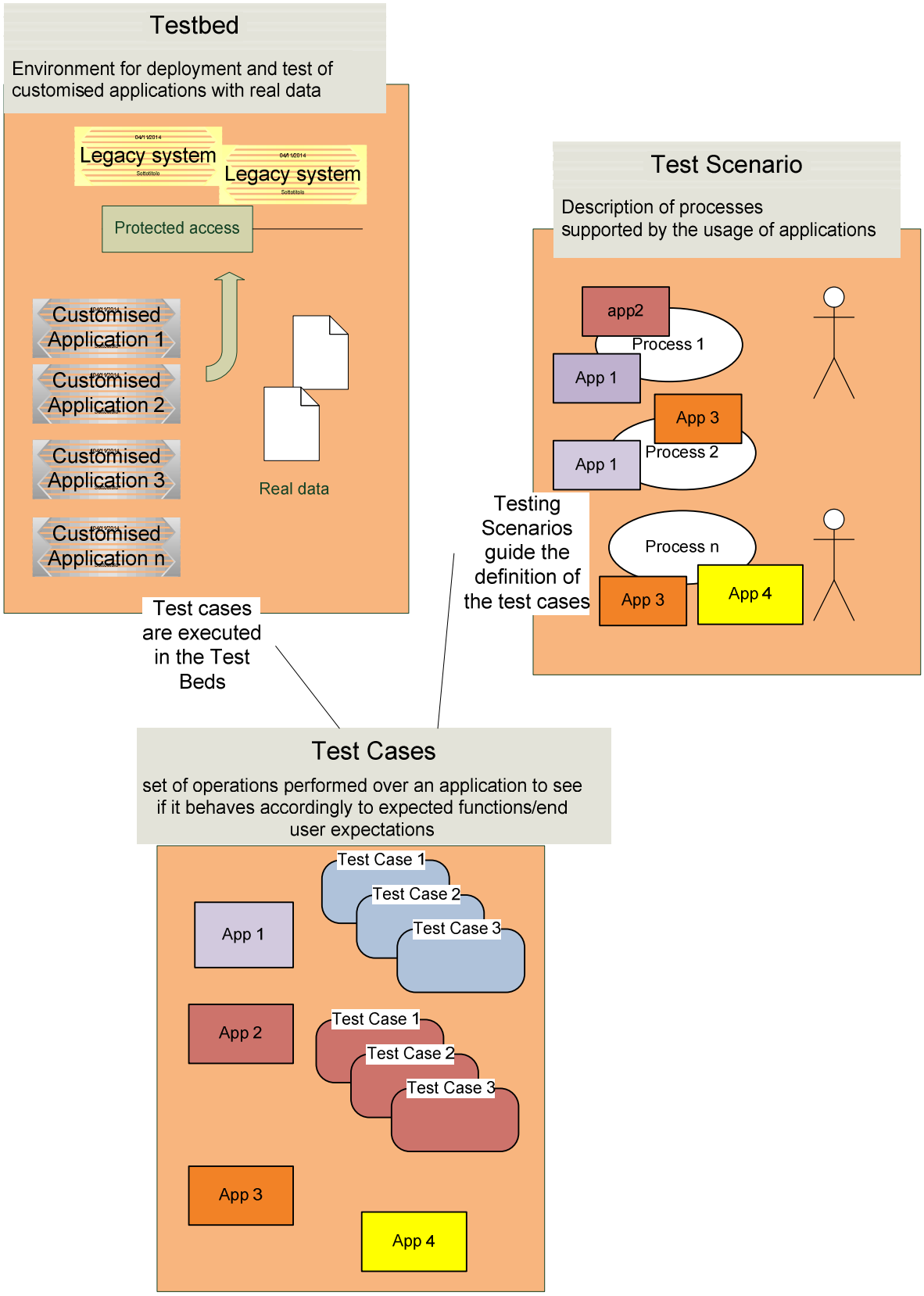

Figure 2-1. Testbed, test scenarios and test cases

2.3 Operation of the FLEXINET testbed

Implementers in WP5 will deliver the PND platform integrating the applications from the three FLEXINET packages (ERAS, PNES and PSCOMS) in two deliveries at month 18 and 24.

It is the responsibility of the FLEXINET Testbed Team to configure and customise it according to the findings in the customisation phase (Task T6.2). End users and their interlocutors (IPK, Holonix and ainia) will provide support to technological partners for the customisation of applications (see figure 2-2).

In Task T6.3 the testbed team will test the customised version of the FLEXINET applications. Tests run by the testers will be based on the test cases produced here and will be executed in the test scenarios depicted here.

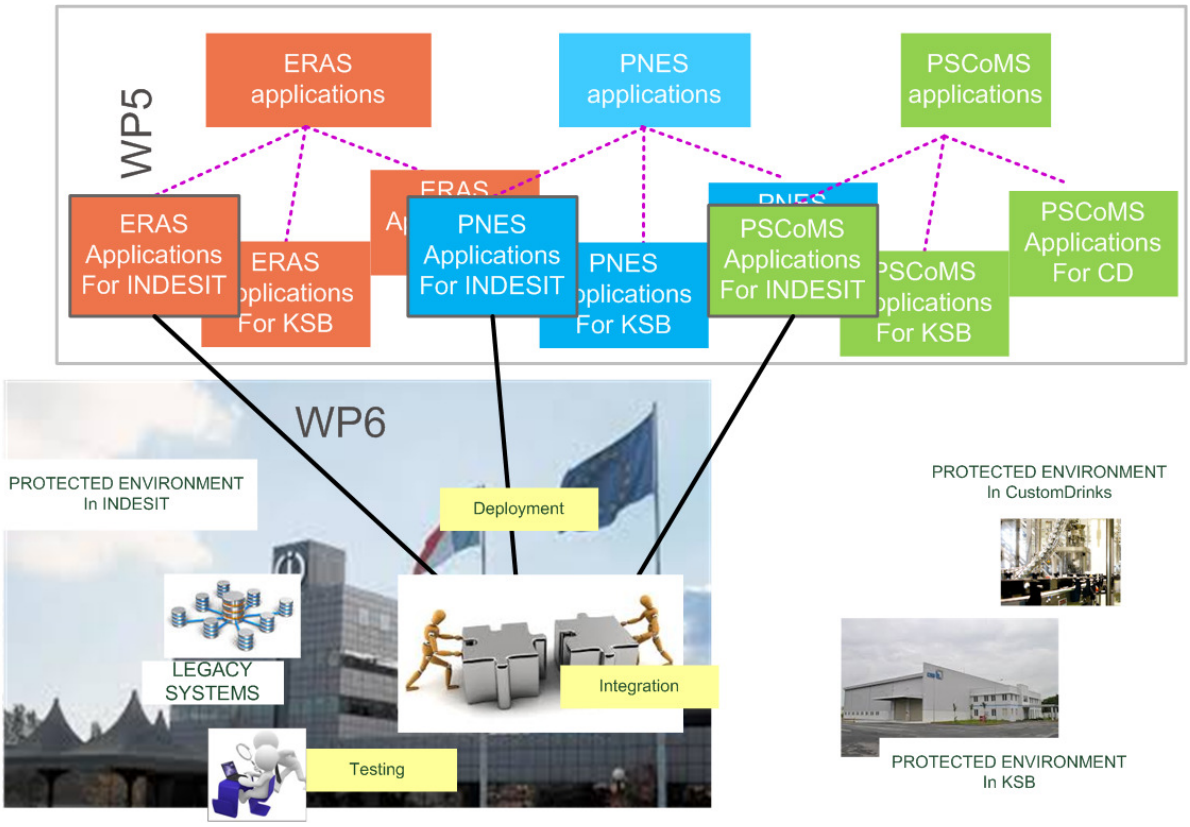

Figure 2-2. FLEXINET testbed customisation

2.4 Overall topology of the FLEXINET testbed

The following pictures exemplify the overall topology of the testbed for its two iterations (see Figure 2-3 and Figure 2-4):

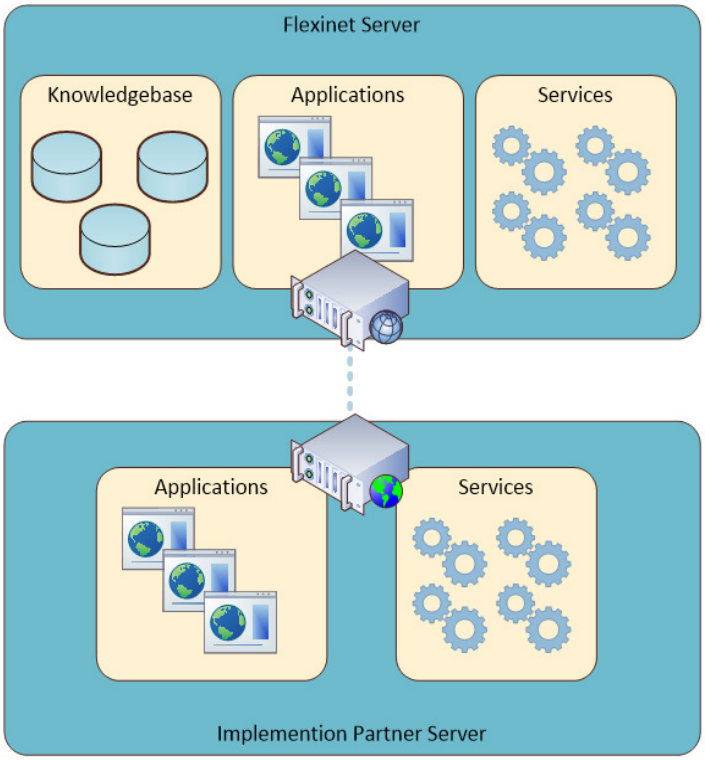

Figure 2-3. M18 topology (3 instances: 1 instance per testbed)

At the first release of the FLEXINET Services and Applications, each implementer will produce an instance of a FLEXINET server, that will host the knowledgebase containing the prototypical knowledge base structures, which may apply to the end user cases and will provide the ontology structure for the Services and Applications to use. Each implementation partner will also host their Application or Service on their own server for the sake of the application or services stability.

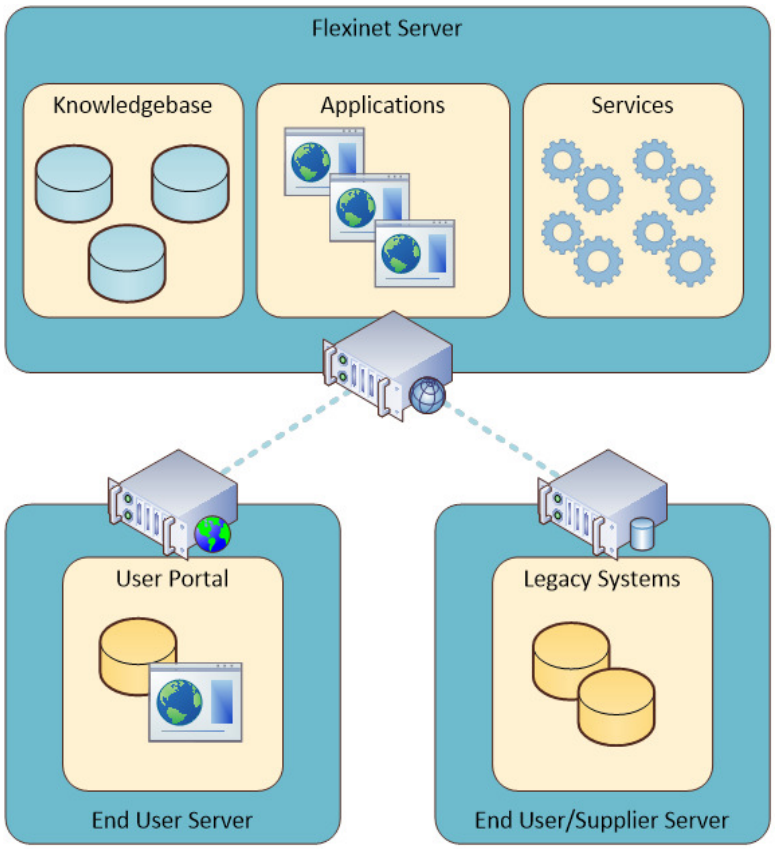

Figure 2-4. M24 topology (C2K FLEXINET server)

At the second release of the FLEXINET Services and Applications a single FLEXINET server will host the knowledgebase with an instance of the knowledgebase per end user for the Services and Applications to use. All FLEXINET Services and Applications will also be hosted on the FLEXINET server and should no longer be on any private server. This server may communicate with the End Users Legacy system to provide data for the knowledgebase. The server may also allow End User Servers to communicate if the End User wishes to use a custom interface external to FLEXINET, this may be preferable in the case that sensitive company information needs to be used by the interface but not inputted into the knowledgebase. The End User also has the option to host their customised interface on the FLEXINET server.

3 Overall FLEXINET testbed Roadmap

FLEXINET will adopt an agile and phase-based approach to support relevant experimentation, design and setup of the FLEXINET Testbed for the complete project. Table 3-1 relates the major testbed milestones and respective phases (whenever a project deliverable is indicated please note that M16 is October 2014).

Since two deliveries of software services are being provided by WP5, further refinement and modification to the testbed is anticipated within WP7, beyond the end of WP6.

Month	Phases	Testbed internal milestones	Related and major FLEXINET deliverables
M16	**Testbed design phase**		FLEXINET Architecture (D5.1) + Technical specifications (D5.2) + Use Cases (D1.3)
M16		Testbed Design for testbed V1 due at M16 (early conceptual prototypes: paper pilots)	Test bed specifications (D6.1)
M16-21	**Initial service customisation phase**		
M18		Initial FLEXINET Testbed Customisation Plan	
M18		1st release of the FLEXINET Testbed	1st FLEXINET release, including: -PSIMA[1] -CEA -BRAA -IRASA -SRAA -BMAA -OBMCA -TEAA -SAA -EWNA -GPNCA
M21		Initial FLEXINET customised test applications and environments	Initial service customisation M21 (D6.2)
M18-	**Initial service**		

[1] See the acroynms at first pages section 1.3.

M24	**testing phase**		
M21		Testbed Design for testbed updated (test scenarios and cases templates developed)	1st running proof-of-concept prototypes finished (1st set of customised applications)
M21		Start execution of tests	
M24		Finish execution. Report on Validation Process	Feedback to implementers (D6.3)
M24-M27	**Testbed refinement and modification (T7.2)**		
M24		Final FLEXINET Testbed Customisation Plan	T7.2: Deployment of the FLEXINET services
M24		2nd release of the FLEXINET Testbed	2nd FLEXINET release, including: -PSIMA (v2) -CEA (v2) -BRA (v2) -IRASA (v2) -SRA (v2) -BMAA (v2) -OBMCA (v2) -TEAA (v2) -SAA (v2) -EWNA (v2) -PSCA -UEAA -SBME -GPNCA (v2)
M27		FLEXINET Final customised test applications and environments	T7.2: Deployment of the FLEXINET services
M27-M30	**Deployment phase**		T7.2: Deployment of the FLEXINET services
M27		Testbed Design for testbed updated	2nd running proof-of-concept prototypes finished (2nd set of customised applications)
M27		Start execution of tests	
M29		Finish tests and internal report on validation Process	Feedback to implementers
M30-	**Evaluation WP7**		T7.3. Evaluation of the

M35			FLEXINET Intelligent Production Network Configuration Services

Table 3-1: FLEXINET testbed Roadmap

4 Roadmap for internal testbed setup

The flow of activities that will lead the testbed setup and availability of technology assets is illustrated in Figure 4-1 below.

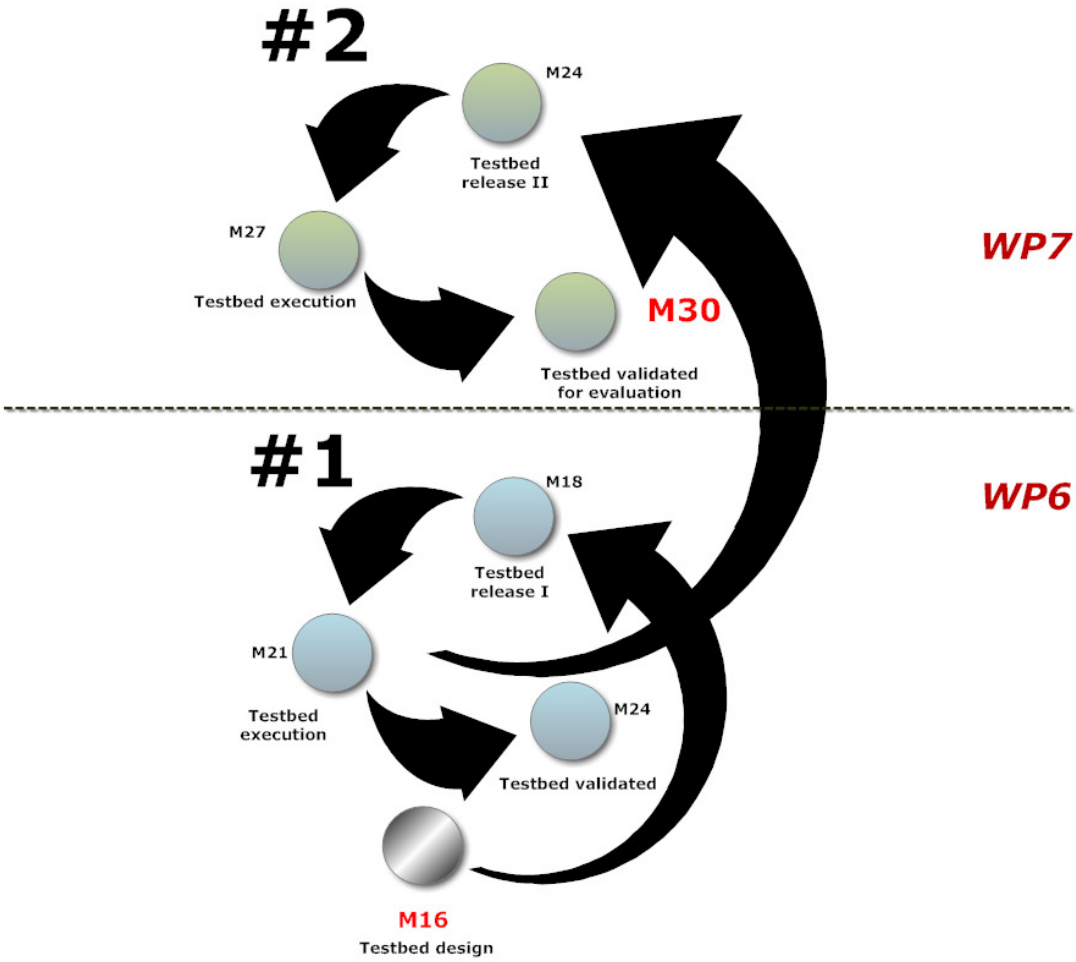

Figure 4-1: Testbed phases

4.1 Main phases for internal testbed setup

Aligned with the milestones outlined in the previous sections the testbed work package operates according to different phases, namely specification, customisation and validation phases. The following sections will briefly introduce each phase and the main tasks outlined within these phases. The outlined tasks and responsibilities are relevant for the complete project life time and might be changed and reviewed according to the feedback received during execution of this plan.

4.1.1 Testbed Specification Phase

During the **Testbed specification phase** the requirements from use cases and end users environments are gathered and analysed. The deliverable is this document D6.1 where the test scenarios and test cases templates are developed. As commented upon in the roadmap, further refinement and modification to the testbed is anticipated within the deployment activities in WP7 Task

7.2. The testbed design document incorporates information on applications and services availability and end user information in order to setup and operate the testbed.

4.1.2 Testbed Customisation Phase

According to the various FLEXINET stakeholders the **testbed customisation phase** includes the following tasks:

Testbed Team (C2K, AINIA, LU, CU, ITI, IPK, HX, HF, HSG, TUDO, INDESIT, KSB, CD)

- Supervision of integration process, executed by implementers
- Gather user environments at both process and IT levels requirements and usage scenarios from use case projects for customisation and validation phase
- Design of customisation plan together with end users and technology providers
- Adapting test cases and scenarios and prepare final filled-in templates
- Execute test cases (each test case will be executed three times)
- Gather testing results and giving feedback to implementers

Technological providers (implementers: C2K, ITI, IPK, HX, HF)

- Propose/Check methods/ applications/ services to be integrated in a specific testbed version
- Implementation of technology and methodological assets, according to the customisation plan
- Packaging of software artefacts for delivery/deployment
- Provisioning of testbed hardware and software infrastructure
- Deployment and unit test of artefacts (before the system testing)
- Configuration and minimal integration
- Provide input for possible validation criteria (at technical level[2]) for validation by Testbed team

End users (INDESIT, KSB, CD)

- Help to define test scenarios
- Provide real data, IT systems details and real processes workflow

4.1.3 Testbed Service Testing Phase

The **Testbed service testing Phase** will be dedicated for the execution of the test cases by the testbed team to test the expected behaviour of the technological artefacts. Deliverable D6.3 will incorporate the results of the testing and the suggestions for improvement before the final deployment and evaluation in WP7.

[2] These technical criteria for validation will feed *parameters* (see Test Case template) to check for a test case during its execution, i.e. response time.

4.2 Testbed Planning

The Testbed will release 2 versions to be used by the respective consumers of the Testbed within the overall project time frame respectively at M18 and M24. Releases are limited to the defined conditions (end users' environment, end users' availability, technical partner resources) which influence the content and the scope of the releases.

Version 1 (M18) will incorporate contributions from all the FLEXINET Packages (ERAS, PNES, PSCOMS) and compile a first preliminary version of the Testbed. Main usage scenarios are built bottom-up from the use cases available. They are composed of a set of "guided tours" in order to allow use case projects to explore and understand the capabilities of the FLEXINET technologies. During initial service testing Testbed V1 operation main focus is on gathering feedback and requirements engineering in order to design and enhance the services and applications according to future evaluation.

A detailed second integration plan will be derived for Testbed Version 2 and new validation scenarios will be defined. Version 2 (M24) of the Testbed will incorporate new updated versions of preliminary services, applications and final versions for those missing in V1. This version of the Testbed should support the predefined use cases.

5 Testbed overall architecture and design

5.1 Introduction

The FLEXINET architecture is built on top of two pillars: (i) an underlying ontology that gives coherence and reasoning capabilities to the whole structure and, (ii) a set of services that will serve as the building blocks for different applications. Although not all the services developed and deployed in FLEXINET are meant to rely on the underlying ontology, many of them will take advantage of the Knowledge Management Framework (KMF) that conceals it. In these cases, the KMF will provide consistency to different models and reasoning capabilities for the different applications.

All FLEXINET applications are grouped under three big umbrellas. Each umbrella is a different Package in FLEXINET, grouping a set of related applications represented in Figure 2-1. These packages are:

- Product/Service Co-evolution and Management Service (PSCoMS)
- Production Network Evaluation Service (PNES)
- Economic and Risk Assessment Service (ERAS)

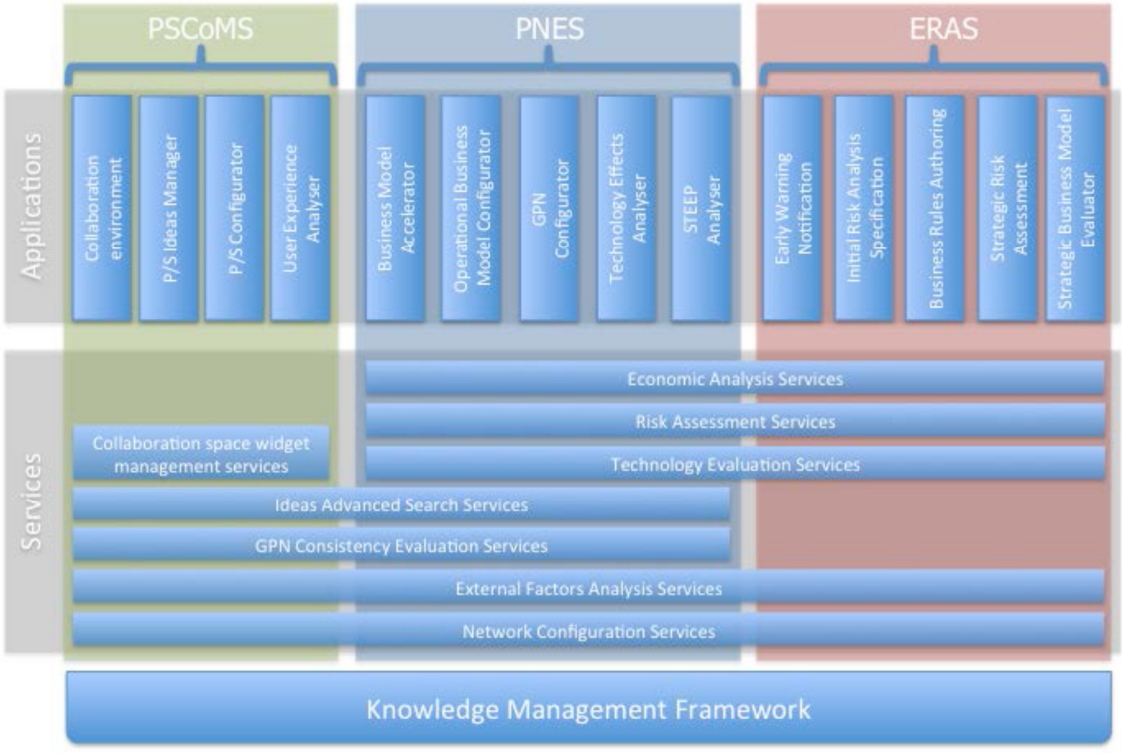

Figure 5-1: FLEXINET applications

As depicted in Figure 5-1, PSCoMS include the following **14** applications:

- Product/Service Ideas Manager
- Collaboration Environment
- Product Service Configurator

- User Experience Analyser

From the PNES side, the following applications will be provided:

- Business Model Accelerator
- Operational Business Model Configurator
- GPN Configurator
- Technology Effects Analyser
- STEEP Analyser

Finally, the ERAS package will include the applications listed below:

- Early Warning Notification
- Initial Risk Analysis Application
- Business Rules Authoring
- Strategic Risk Assessment
- Strategic Business Model Evaluator

5.2 Definition of testbed scenarios

The testbed scenarios exemplify the real life situation in which the end-user will use FLEXINET technologies and will interact with provided applications so perform daily operations related to manufacturing activities at strategic and tactical level, either a new business model definition or an analysis of GPN alternatives for instance.

Scenarios are depicted here representing real environments where the end users will use the system and could come across various failures. Hence the following scenarios have been extracted from the use cases analysis carried out in T1.4 as workflows to follow in experimentation activities that the testbed team will go through the execution of a set of testcases to anticipate these potential failures before the final deployment.

Table 1 - Scenarios List

- Test Scenario 1. P/S Idea generation at INDESIT
- Test Scenario 2. P/S Idea Management at INDESIT
- Test Scenario 3. Defining new P/S business model at INDESIT
- Test Scenario 4. Check P/S Configuration at INDESIT
- Test Scenario 5. Design P/S Configuration at INDESIT
- Test Scenario 6. Design P/S business model at INDESIT
- Test Scenario 7. Identify optimal suppliers' GPN Network Configuration at INDESIT
- Test Scenario 8. Check feasibility of GPN at INDESIT
- Test Scenario 9. Define strategy for new business models at KSB

- Test Scenario 10. Search for new applications at KSB
- Test Scenario 11. Define GPN alternatives at KSB
- Test Scenario 12. Effects of selected GPN configuration at KSB
- Test Scenario 13. Early cost –risk assessment for new products at Customdrinks
- Test Scenario 14. Alternatives for GPN configuration at Customdrinks
- Test Scenario 15. Register customer request at Customdrinks
- Test Scenario 16. Technology Effect analysis of GPN configuration at Customdrinks
- Test Scenario 17. Register decisions made at Customdrinks
- Test Scenario 18. Evaluate user experience at Customdrinks

For the execution of the test cases in the test scenarios, a set of FLEXINET applications will be used. The applications will be customised for the real case of end user. Commissioned data will be fed into the knowledge base for the given end user as depicted in Figure 5-2.

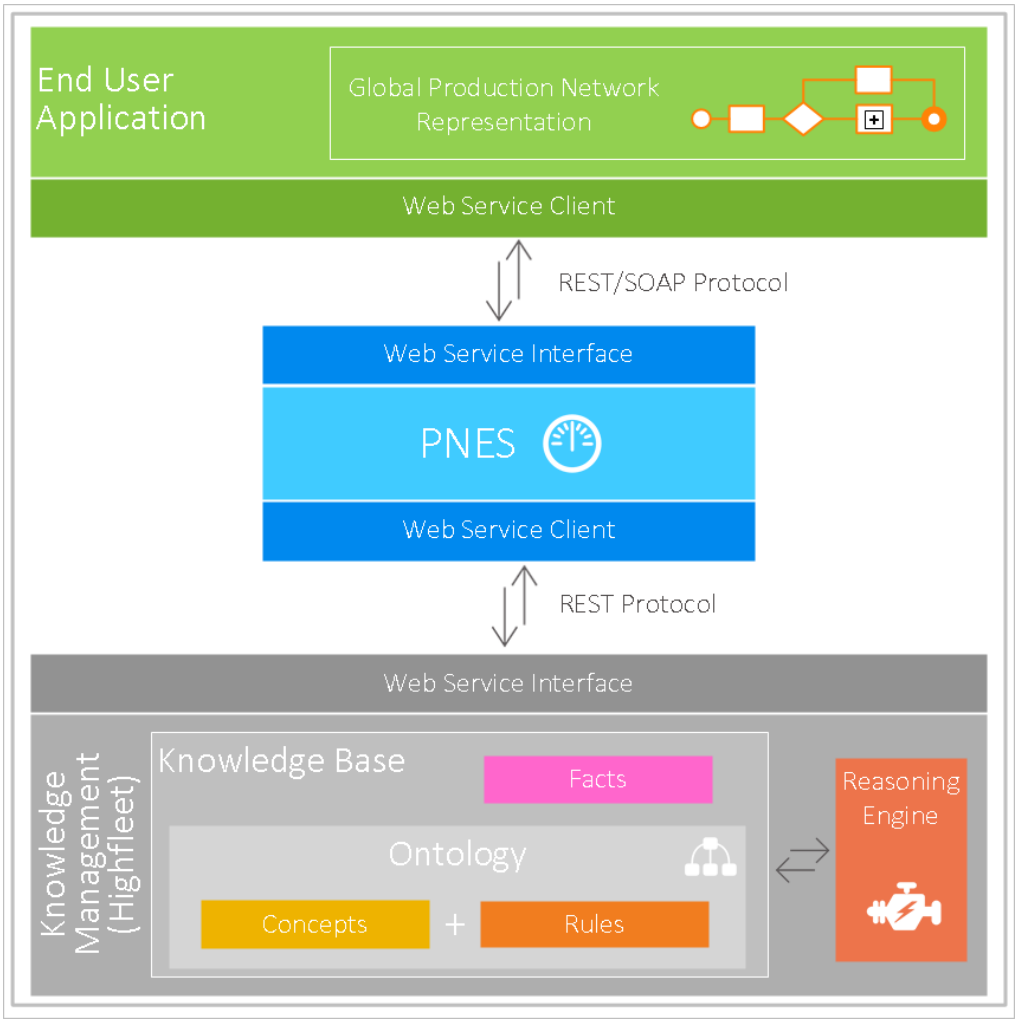

Figure 5-2: FLEXINET application customised for end user

5.3 Overall descriptions

5.3.1 Delivery framework

A testbed should be always under the control of the Testbed Team. Future online versions of this document may incorporate any updates on this matter. Table 5-1 details the methods applications available for testing and its plan for delivery.

PACKAGE	Application	Delivery Responsible	Details	Delivery	Testing Responsible
PSCOMS	Idea Manager (IM)	Holonix	Preliminary collection of rough descriptions of new ideas	M18/M24[3]	ainia-HSG
	Collaboration Environment (CE)	Holonix	Configuration of virtual spaces for brainstorming and decision making, amalgam of mashups	M18/M24	ainia-HSG
	P/S Configurator (PSC)	Holonix	Definition of the architecture for new product/services	M24	ainia-HSG
	User Experience Evaluation Application (UEEA)	Holonix	Gathering user feedback on his/her own experience	M24	ainia-HSG
ERAS	Business Rules Authoring (BRA)	C2K	Input of new facts in preparation for business rules	M18/M24	LU-HSG
	Initial Risk Assessment Document Application	C2K	Define scenarios for risk assessment	M18/M24	LU-CU

[3] M18 means a first running prototype will be ready to include in the first testbed. The last version will be finally deployed at M24 for the second testbed.

	(IRADA)				
	Strategic Risk Assessment (SRA)	C2K	Risk assessment based on scenarios form IRADA	M18/M24	LU-CU
	Strategic Business Model Evaluator (SBME)	C2K	Specification and reasoning of indicators for STEEP analysis	M24	LU-TUDO
	Early Warning Notification	C2K	Allows user to specify scenarios that represent potential risks and monitor in real time in a GPN	M24	LU-CU
PNES	GPN Configurator	ITI	Configuration, characterisation and visualisation of a GPN	M18/M24	IPK
	STEEP Analyzer	ITI	Reasoning capabilities for STEEP analysis	M18/M24	IPK-HSG
	Technology Effect Analyzer (TEA)	ITI	Simulation of the effects of new complex technologies on the business	M18/M24	IPK
	Business Model Accelerator (BMA)	IPK	Provide reference models to implement new business models	M18/M24	IPK-HSG
	Operational Business Model Configurator	IPK	Set of models describing functional changes at network level	M18/M24	IPK-TUDO

Table 5-1: Delivery framework

6 Specification for the implementation of each testbed

The testbed will illustrate the use of the FLEXINET solution from the idea to the global production network design including ERAS, PNES and PSCoMS methods and applications. The following specifications intend to illustrate how the FLEXINET applications will be used in the real user environments aligned with their processes, managed data and IT infrastructure.

6.1 Use of FLEXINET at INDESIT

INDESIT has created 4 detailed use cases in T1.4 that are sequential fragments of the overall Product ideation process. Such descriptions, contained in D1.3 (see Figure 6-1 for a high level visual presentation of these use cases) provides also an initial idea of how the FLEXINET tool can be used to transform and improve the current process, overcoming some of the barriers and difficulties that the end user has identified as penalising its business, from different perspectives

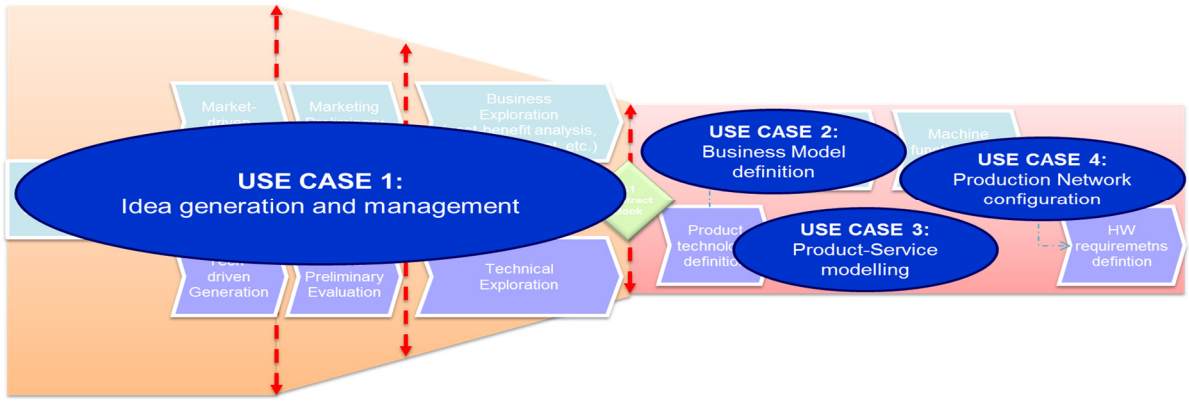

Figure 6-1: INDESIT use cases presented in D1.3

6.1.1 FLEXINET Test Scenarios for Idea Generation and Management

Use Case 1 – short description[4]: The generation and collection of new ideas in INDESIT could happen with the contribution of external users, following an Open Innovation approach. Ideas are proposed in a sketchy way; others' ideas can be commented and voted upon by others. These initial sketches are collected by the Innovation department, refined and analysed with the support of Marketing and R&D departments. Teams of people contribute to the promotion/rejection of these ideas, after preliminary technical and economic evaluations (see Figure 6-2).

Test Scenario 1: P/S idea generation at INDESIT

- **PSCoMS.Idea Manager** customised for INDESIT, with ad-hoc interfaces for external and internal users, offering different views and access to the information. The external user will access a website with a page inviting to take part to the Open Innovation initiative and to promote new ideas. Internal users will access pages accessible only from the INDESIT intranet.

[4] For this and for the following use cases, a short description has been reported. For more details, please refer to the complete presentation in D1.3.

Test Scenario 2: P/S idea management at INDESIT

- **PSCoMS Collaboration Environment** with templates to run Operative Workshops, Idea Days, Screening meetings and other collaboration sessions. Each template contains the widgets to access those FLEXINET applications (e.g.: Idea Manager, Technology Effects Analyser) that are used to support the discussions.

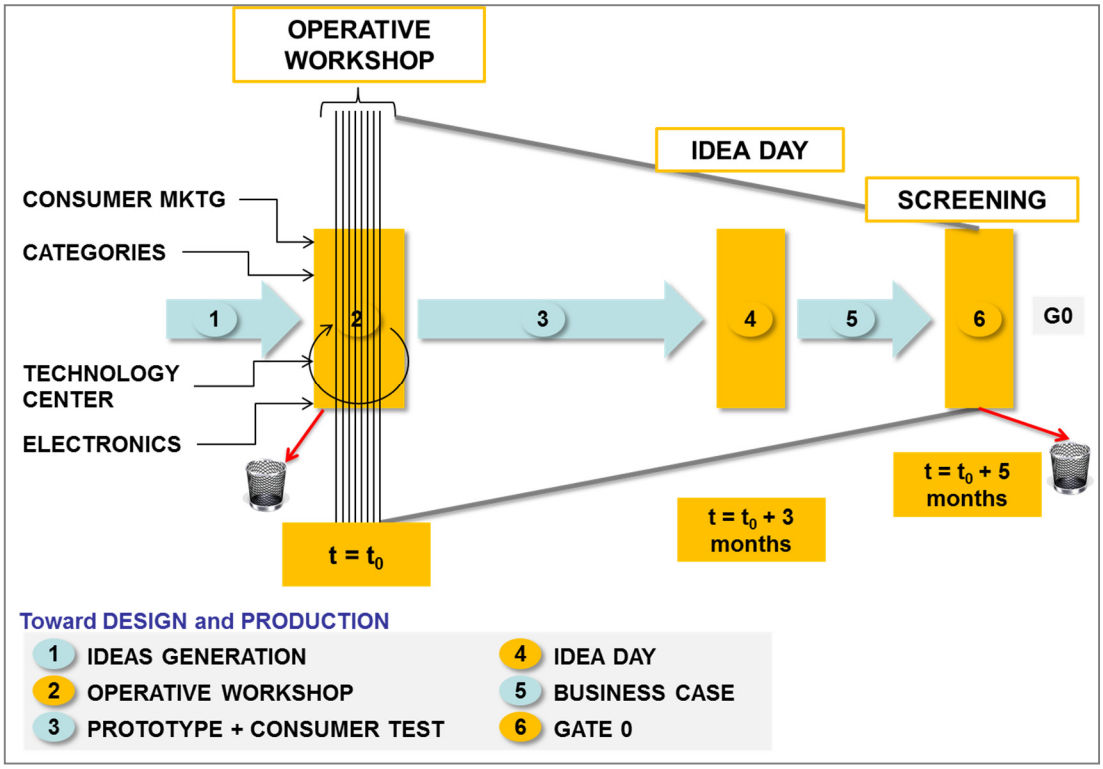

Figure 6-2: Test Scenario 2

6.1.2 FLEXINET Test Scenarios for Business Model definition

Use Case 2: when a new Product/service idea has passed preliminary checks, INDESIT Marketing Department starts the definition of a Business Model, adopting a canvas-based approach. Several elements (value proposition, key partners, etc.) need to be correctly described (see Figure 6-3). Support is expected from an IT tool to guide this activity and to store the information in a digitalised and therefore sharable format.

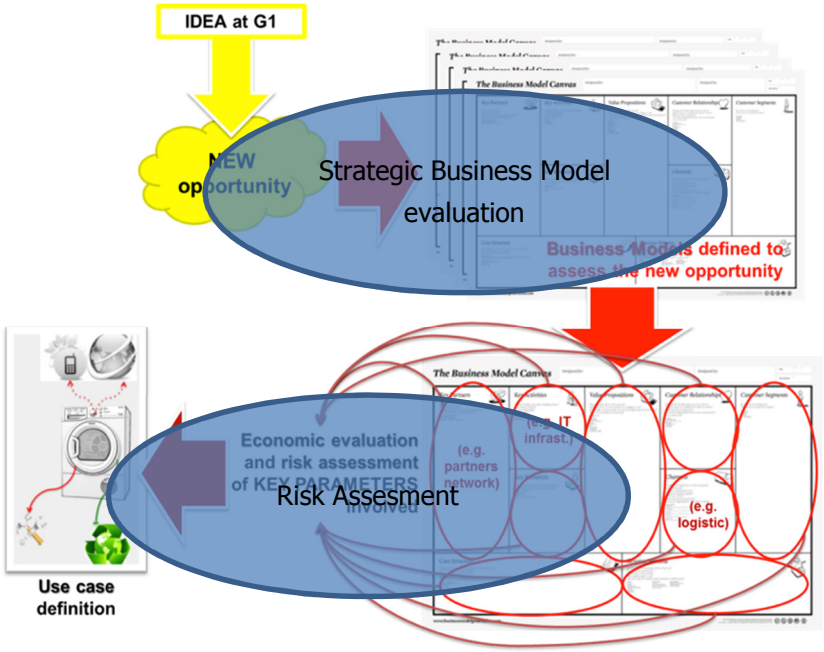

Figure 6-3: Test Scenario 3

FLEXINET Test Scenario 3: Defining new P/S business model at INDESIT

- **ERAS Strategic Business Model Evaluator** allows INDESIT to define possible scenarios for delivery of the Product/Service idea and define factors which would affect the potential Product/Service idea. This will evaluate based on indicators which are important to the constraint of the Product/Service and highlight issues such as compliance of standards to INDESIT.

6.1.3 FLEXINET Test Scenarios for Product-Service Architecture Design/Check

Use Case 3: When a new idea is promoted to G1, it is ready to be produced and commercialised. This requires that the R&D department has elaborated the preliminary descriptions and the requirements produced in the previous phases. The technical high-level solution for the idea then has to be configured, also taking into account the concrete use by the final consumer. (see Figure 6-4).

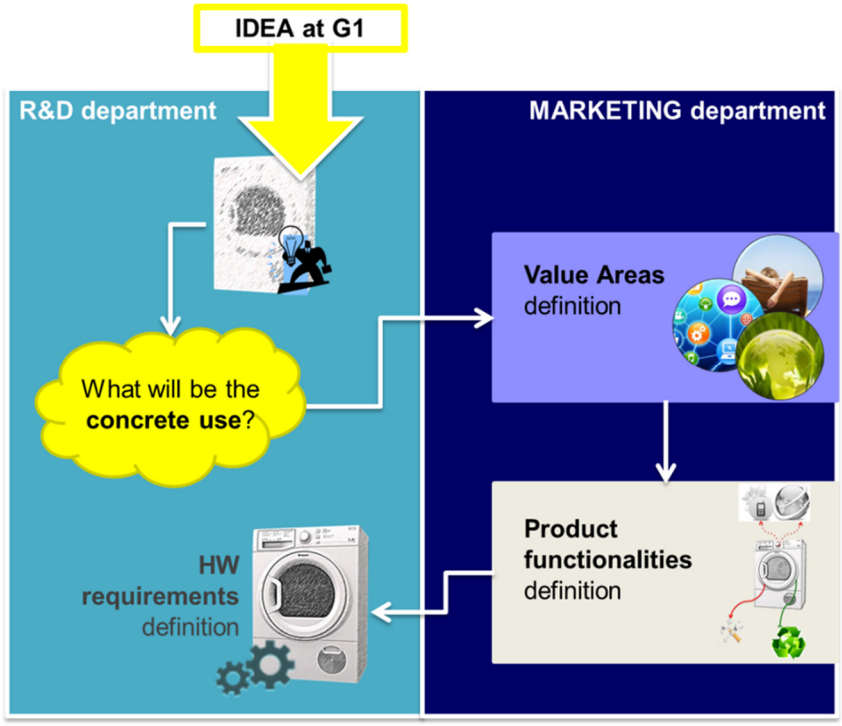

Figure 6-4: Test scenarios 4 and 5

FLEXINET Test Scenario 4: Check P/S configuration at INDESIT

- **PSCoMS. Idea Manager**: using this application, the technicians can consult the description of the product to configure and the service to deliver: if some key information is missing, or requirements are not clear, the description can be improved.

FLEXINET Test Scenario 5: Design P/S configuration at INDESIT

- **PSCoMS Product Service Configurator**: ideas promoted to G1 are visualised and can be selected to start the configuration. Information on each one of these ideas can be retrieved through a link with the Idea Manager. The user is supported in the high-level design of the product, of the software and of the communication infrastructure along several pages where possible choices are displayed and some possible inconsistency across performed choices are checked automatically.

6.1.1 FLEXINET Test Scenarios for Production Network configuration

Use Case 4: The engineers at the R&D department, after the successful approval of a new P/S concept and its detailed elaboration prepare a Technical communication and despatch it to the Purchase Office. The Purchasing office and the Marketing departments select and compare several suppliers to identify the optimal supplier's network for the new product (see Figure 6-5).

FLEXINET Test Scenario 6: Design P/S business model at INDESIT

- **PNES - Operational Business Model Configurator** (BP model). The Technical and Marketing Department are supported in the definition of what is needed to correctly configure the production network for the new P/S.

FLEXINET Test Scenario 7: Identify optimal suppliers' GPN configuration at INDESIT

- **PNES - Technology effect analyser:** It is configured to access the description of product and services of INDESIT suppliers. It is used by the R&D department to detail the design of the P/S solution, by searching for products, components, software applications etc., that can be provided by the existing suppliers or by entering new ones (see Mock-ups in D5.2 along with their explanation). It is also used by the Purchasing Department to verify if the technology necessary for a P/S can be provided by the qualifies suppliers or new ones have to be searched

FLEXINET Test Scenario 8: Check feasibility of GPN at INDESIT

- **PNES - Global Production Network Configuration and visualisation:** It is used in INDESIT to reason in terms of supplier "facilities" each one offering systems that can be connected among them; also a service can be represented as a system: it is a process able to deliver a new SW service; inputs are the data coming from the machine and the users, and the output is the set of new information, alerts and suggestions that will provided. The resources might be the user's devices and the HW infrastructure to deploy the services. This service also offers a visual presentation of the geographical distribution of the facilities to calculate the possible configurations of production networks for a new Product/service and to check the feasibility of each solution, in terms of estimated costs. Each facility is a group of systems (delivering products or services).

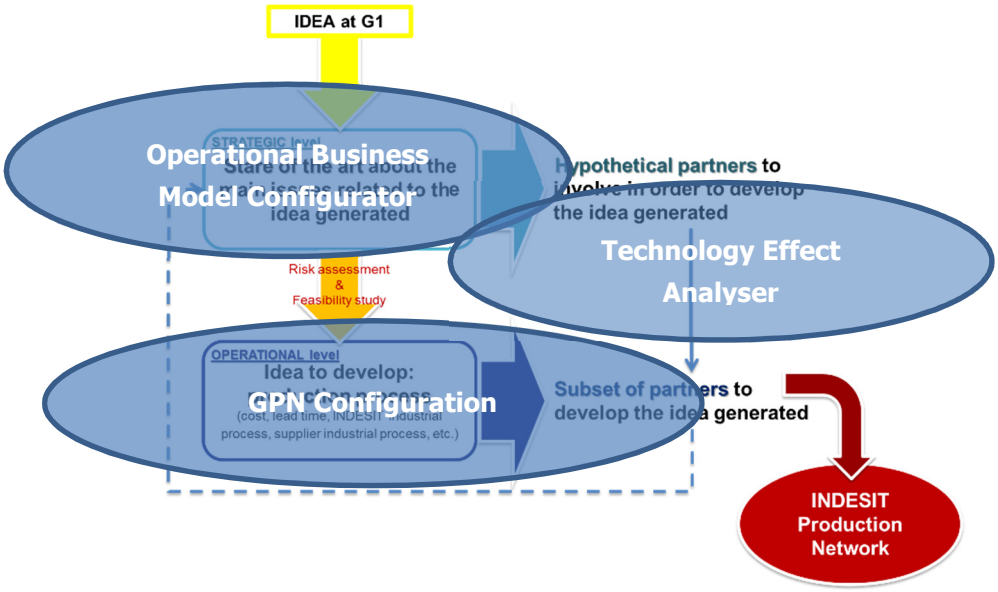

Figure 6-5: Test Scenarios 6, 7 and 8

6.2 Use of FLEXINET at KSB

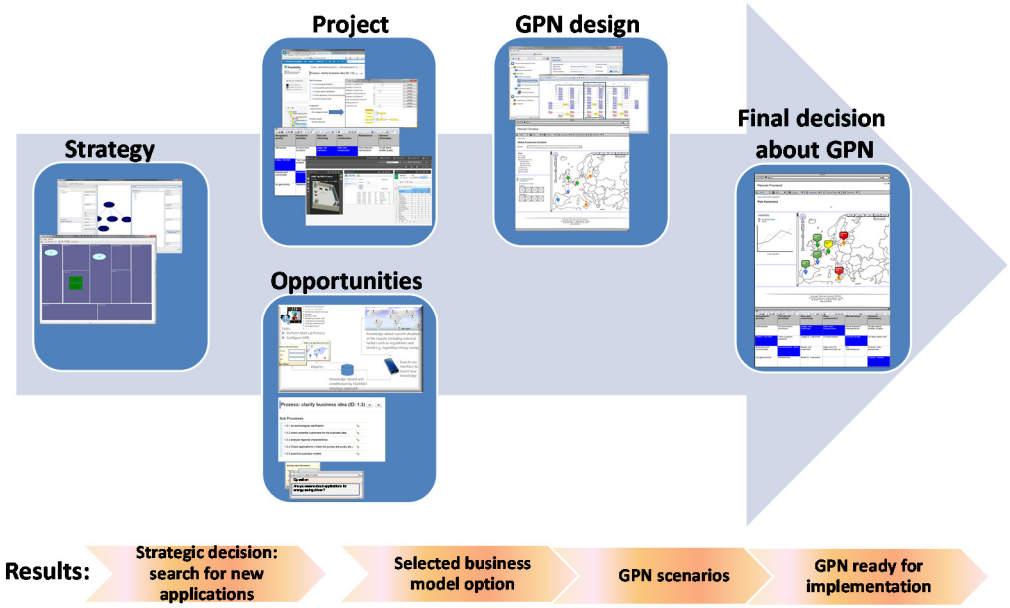

Figure 6-6: FLEXINET Test Scenarios 9, 10, 11 and 12

The definition of use cases has been provided in D1.3 by the end users. Now the use of the different applications within the use cases needs to be drafted in test scenarios (see Figure 6-6). The KSB case starts with the strategy definition. This can be applied at different levels such as:

- Strategy of the holding,
- Strategy of the company,
- Strategy related to products and services.

It requires a feature that allows the documentation and tracking of the targets across the different levels. In case of new technologies as well as global production network changes it has to be compliant with the higher level targets. On the other way around changes in these targets can directly influence the development of business models and networks. An example is expressed in the KSB use case:

1. A new smart drive was patented by KSB.
2. A holding target is the "technology leadership"
3. The drive provides a good opportunity related to the target.
4. A sub target is the search for new applications for the drive.
5. New applications call for new business models.
6. New business models require updates or new GPN scenarios.

Across all these points information flows, loops and knowledge bases are required to archive a seamless correlation between the strategic targets and the final business model and GPN. Therefore scenario 8 starts with the **Definition of the strategy for new business models at KSB** ("Business Model Accelerator"). It provides the features to document the structure of targets, indicators and drivers as well as their interrelation with other components of an enterprise model of KSB. Moreover, the management and project managers can use predefined structures which are specified for KSB. This applies especially for the indicators and how they will be evaluated (see D5.2).

After fixing the targets the principle business model needs to be defined. FLEXINET provides a CANVAS view on the model which is interrelated with the objectives defined before. Also a morphologic box with predefined parameters and options can be used to draft a business model. This approach will provide a strategic decision which is in the current scenario "**search for new applications**". Now a project needs to be created and a detailed set of business options will be defined in relation to the information provided from the fields (see Figure 6-7).

The project leader uses the business model implementation assistant of the "Business Model Accelerator" to have a guideline and a data space for the project. This allows the project leader to analyse step-by-step the business model and potential alternatives. The "Morphologic box" is used to check the impact of these alternatives. In addition the project leader analyses the FLEXINET knowledge storage if information about further application for drives are already documented (see Figure 6-7).

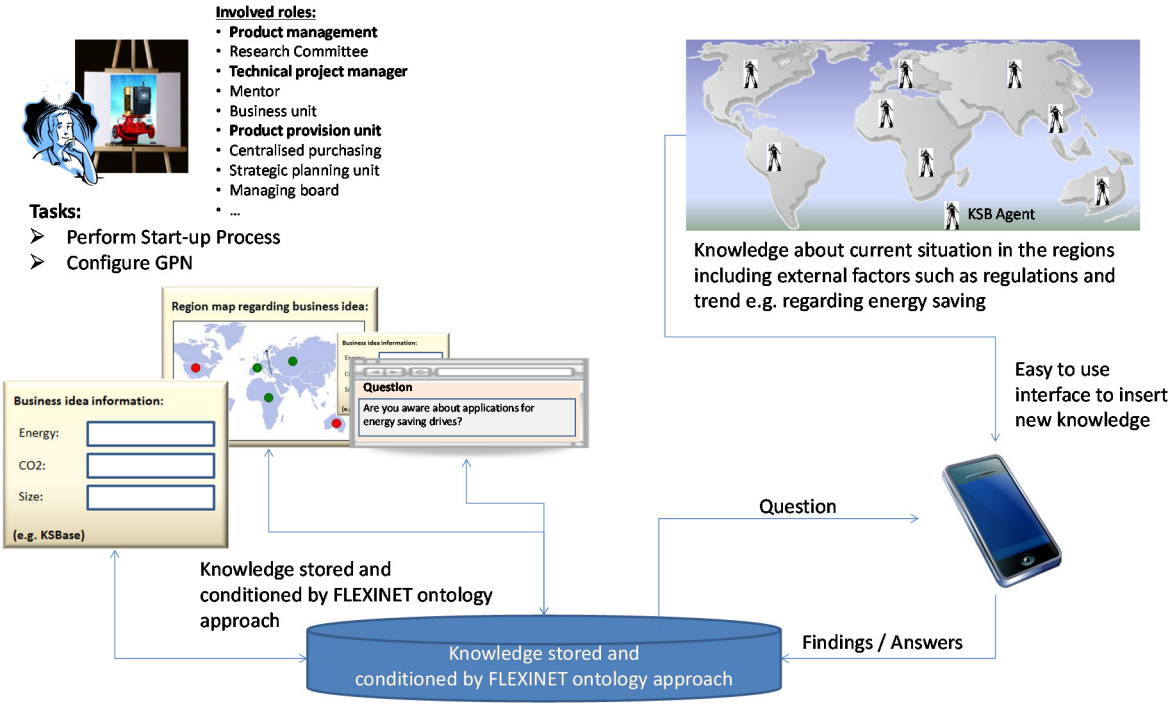

Figure 6-7: Getting and using knowledge from the fields (regions, countries, markets)

The project leader can identify within the FLEXINET knowledge storage energy saving regulations and environmental strategies related to the different regions but not directly about new applications. Therefore the project leader checks the guideline in the assistant and finds the step "check further applications". The project leader investigates this step and finds a specific application to place questions. He activates this feature and can directly insert a question (see Figure 6-8). Afterwards he can select the group of recipients. He selectes all agents in regions with regulations of energy saving.

The project leader checks the answers and finds a message from an agent in USA saying that this drive might be a good opportunity for air-conditioning in USA. The project leader takes this information and starts the business model analysis on the basis of finding potential businesses for air-conditioning in USA. He checks different alternative options using the "Morphologic box". Potential options are "sourcing air-conditioning and add the new drive", "provide the patent to a company" but he also finds an option of "provide air-condition service". This option has had good results before and

therefore it is used. He realises that concerning "service" the guideline proposes a further application to analyse the product / service relationship. This he uses to get the conditions for the global production network alternatives. The next step involves the GPN design (**scenario Define GPN alternatives at KSB**).

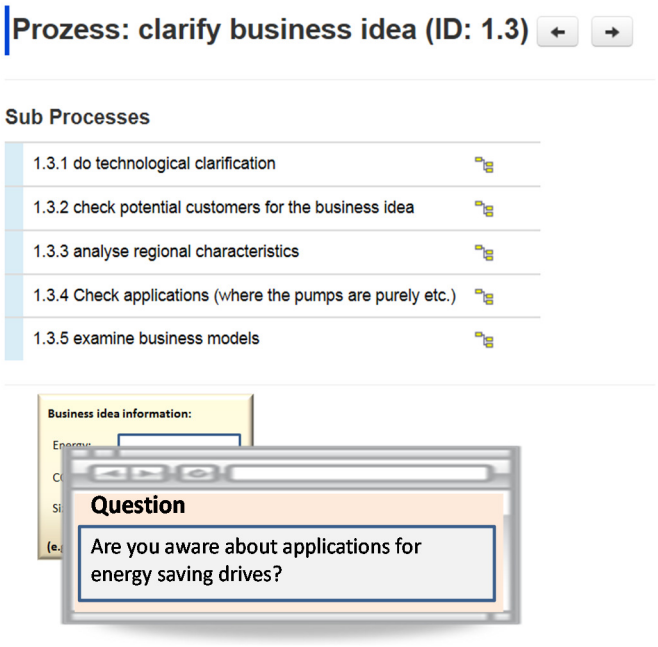

Figure 6-8: Dialog to communicate with agents (automatic generated)

On the basis of the decision for a specific business model the Operational Global Business Model Configurator is used to define initial alternatives for the GPN (this also implies initial analyses). After the alternatives are clarified the project leader changes the view and opens the GPN representation to check the specifics especially in terms of logistics but also to better understand potential risks in the scenario **Effects of the selected GPN at KSB**. The project leader uses this information to create a report (management proposition) for the responsible managers to get a "GO" for one alternative. After this "GO" he starts a detailed simulation of the specific effects in the selected alternative using the Technology Effect Analyser and the Simulation of the GPN. Afterwards he creates a report for the company board with the opportunities of these new GPN.

The reports addressed in the alternative are expected as an outcome of the analysis and are expected to be generated automatically.

Test Scenario 9. Define strategy for new business models at KSB

At the strategic level, the company strategy will be defined in terms of objectives, indicators and drivers. This will be supported by predefined indicators already prepared for the measurement of the indicator against the GPN organisational and process structure. This will be the basis for the operationalisation of the strategy by defining a project. Within the project the objectives will be further detailed and monitored. The next step is the definition and evaluation of business models to be covered by the project. Therefore related business options will be selected by the project manager and analysed. A set of resulting business models will be prepared for final decision at board level.

After the board decision the selected models are marked to be in consideration for the GPN design. The other models are stored in an archive.

The scenario will be supported by the "Business Model Accelerator". It will support:

- Definition of objectives, indicators, drivers,
- Interrelation between business model as well as GPN and objectives,
- Executable reference processes for the project,
- The design and evaluation of business models (morphologic box),
- Monitoring of indicators related objectives.

The scenario will also be supported by the "Initial risk analysis specification", "Strategic risk assessment", "Strategic business model evaluator" and "Business Rules Authoring". It will support:

- Early evaluation of the strategic decisions,
- Definition of potential risks to be care of.

These applications will be also integrated in the executable reference process for the project.

Test Scenario 10. Search for new applications at KSB

A potential strategy for new business models is to open further markets by new application areas for products and services. This requires specific knowledge about opportunities and restrictions in different regions and markets. Large companies usually have incubators and staff in the different regions or countries. The idea is to support the usage of the knowledge of these people (agents). The project manager will use the knowledge about opportunities and restrictions from the FLEXINET ontology but also directly ask these agents.

The scenario will be supported by the "External factor analysis service".

Test Scenario 11. Define GPN alternatives at KSB

After the clarification of the business model, different global production network alternatives will be designed. This will be supported by building blocks (fragments) which will include all the information concerning suppliers, logistic providers, etc. from KSB but also reference structures for new partners which are not modelled as a fragments so far. The GPN design will also tackle aspects of product/service decisions.

The scenario requires models of GPN partners as fragments depending of the defined granularity. This will be developed in WP4 (D4.1 and D4.2). It also will profit from reference fragments of real KSB partners. The resulting GPNs will be stored in the FLEXINET ontology.

The scenario will be supported by the "Operational business model configurator":

- Conceptual modelling of the GPN by modelling fragments,
- Adaptation of the fragment as defined in WP4,
- Definition of specific model fragments,
- Provide a Management system covering risk, product quality and infrastructure information,
- Initial analysis of indicators,
- Interface with the ontology.

The scenario will be also supported by the "GPN configuration":

- Illustrates a logistic view of the GPN,
- Provides adaptations about product flows.

The scenario will be also supported by the "Initial risk analysis specification", "Strategic risk assessment", "Strategic business model evaluator" and "Business Rules authoring".

It also will make use of the "P/S Ideas Manager" and the "P/S Configurator".

Test Scenario 12. Effects of selected GPN configuration at KSB

The final presentation of GPN alternatives requires a deep analysis of one or two candidates. It takes into account risk aspects, product aspects, financial aspects, uncertainties, quantities and fallback options. This should be proved by simulation. Finally a report needs to be created which gives a management view on all these aspects to be presented to the holding management board.

The scenario will also be supported by the "Technology Effect Analyser", the "STEEP Analyser" and the "Early Warning Notification".

A further support is expected from the methodologies in WP2 and WP4 related to GPN simulation.

6.3 Use of FLEXINET at CustomDrinks

Scenarios for testing activities with regard to CustomDrinks environment will fit into the management of information along the innovation process, from the request for a new development of a product, to the planning of its development without entering into the manufacturing process (see Figure 6-9).

The following are the test scenarios resulting from the analysis of use cases in CustomDrinks:

- Test Scenario 13. Early cost –risk assessment for new products
- Test Scenario 14. Alternatives for GPN configuration
- Test Scenario 15. Register new product/service demand (customer request)
- Test Scenario 16. Technology Effect analysis of GPN configuration
- Test Scenario 17. Register decisions made along innovation process at tactical and strategic level
- Test Scenario 18. Evaluate user experience with the product

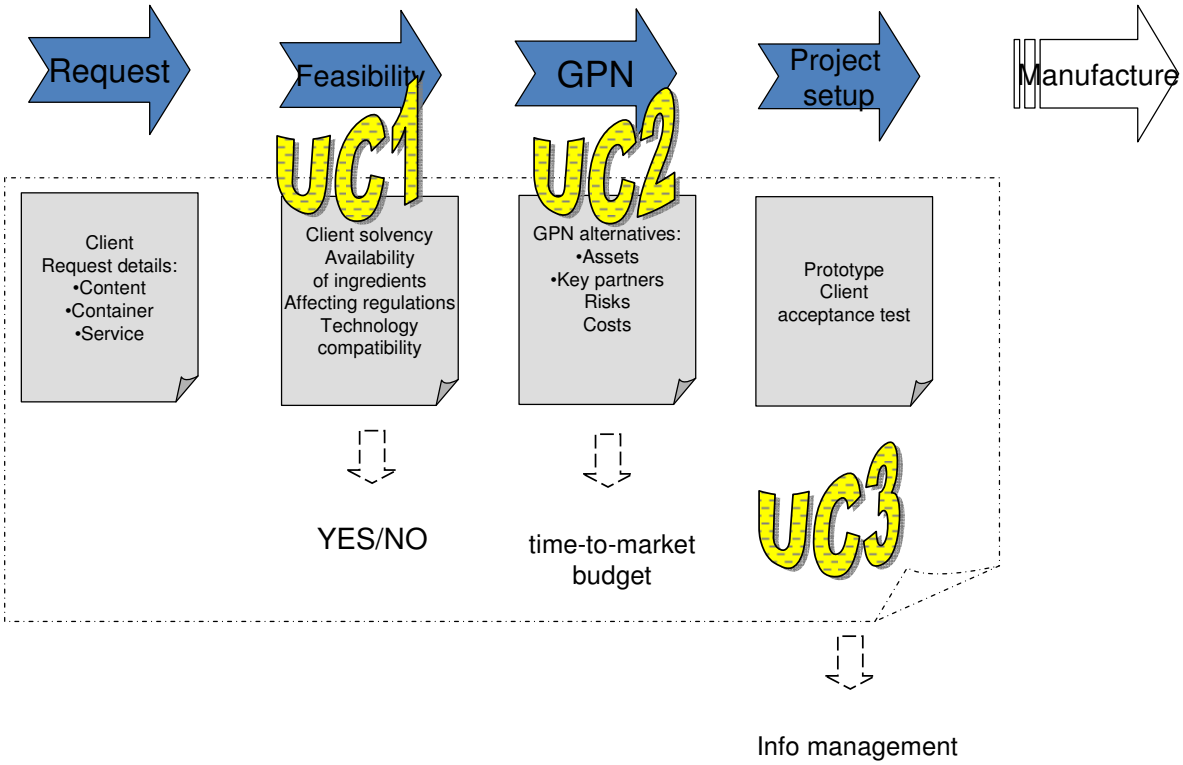

Figure 6-9: CustomDrinks FLEXINET Use Cases

6.3.1 FLEXINET Test Scenarios related to feasibility study

The first use case in CustomDrinks is based on the initial stage carried out by the company when a request from a potential client arrives and they have to analyse its feasibility in order to accept the project or not and to evaluate the reasons of feasibility.

In the current process the information flow is mainly informal and the idea is to anticipate potential risks related to the availability of materials or the existence of external factors that could impact the product development at later stages.

Test Scenario 13. Early cost –risk assessment for new products

The **Initial Risk Analysis Document Application** will be used by CustomDrinks to define potential scenarios for risk assessment in an abstract way regardless the GPN configuration and isolated as a what-if scenario. The application will also allow the recording of incidents which have caused loss of production in the past.

Once a potential scenario has been configured, the **Strategic Risk Assessment Application** will be used to make a static analysis for an existing GPN over the defined scenario to outline the main risks associated with possible loss of production. In the case of CustomDrinks the assessment will take into consideration not only external factors such as availability of ingredients/packaging materials of existing suppliers or a potential regulation in an external market, but also internal factors such as machine compatibility or throughput. To that end, the network nodes and the dependencies will be accordingly configured.

The **Early Warning Notification Application** will be used as support to define risks scenarios that CustomDrinks would like to monitor so as to raise alarms and see details to make the decision about feasibility based on objective criteria. The **PNES – STEEP Analyser** will complement this risk analysis, allowing CustomDrinks to receive support for the reasoning in the STEEP analysis. They will be able to create, remove and edit indicators for later reasoning.

6.3.2 FLEXINET Test Scenarios related to sales study

This use case for CustomDrinks is based on the second stage carried out by the company when a decision facing the project is positive due to its feasibility. The next step is to go deeper into the analysis of results and see if the current GPN is enough to satisfy the demand or instead alternatives should be envisaged. Several alternatives will be evaluated from the point of view of risks and costs and reconfigurations adopted if needed. Once the GPN is selected, the cost for the product development and the deadline for serving to the client are calculated according to the factors involved.

Test Scenario 14. Alternatives for GPN configuration

CustomDrinks is interested in the process of having more knowledge about its GPN configuration and in being assessed about alternative recommendation of potential combinations of components relying upon defined constraints (supply amount, distance, availability, price). Thus, the company will receive crucial support for the selection of providers, estimated deadlines, supply costs.

PNES –Global Production Network Configuration and visualisation: It will be used in CustomDrinks both to represent the GPN and to reason in terms of GPN resources. The resources might for example be the user's machines. This service also offers a visual presentation of the geographical distribution of the facilities to calculate the possible configurations of production networks for a new product/service and to check the feasibility of each solution, in terms of estimated costs. Each facility is a group of systems (delivering products or services).

OBMCA – Operational Business Model Configurator Application

This test scenario case covers the adaptation of a GPN so the user can work on it to adapt it to a new situation. The user can also design a new GPN using the selected GPN model fragments. It will allow CustomDrinks to document potential risks and quality aspects in the global production network. For further use the defined GPN models are stored in the FLEXINET knowledge base. After they are stored, they can be used in other applications such as logistical based GPN representations.

FLEXINET Test Scenario 16: Technology Effect analysis of GPN configuration

PNES –Technology Effect Analyser Application

The application use will be focused on the evaluation of potential configuration and reconfiguration over the current production network so as to satisfy client requirements. The manufacturing assets will be modelled in order to evaluate the impact on performance of alternative configurations (in terms of times, supply availability, manufacturing costs, etc.). Distribution and logistics will also play a role in this scenario.

6.3.3 FLEXINET Test Scenarios related to the whole innovation process

This use case for CustomDrinks is dedicated to the establishment of an objective and reliable link between product and information flow during the whole innovation process, from the request from the client until one step before the manufacturing. In the current situation there is no harmonisation of the data managed nor registration of the information: request, feasibility study, sales study, etc.

This use case focuses on establishing a long term link between product management and manufacturing system management. To this end, a LifeCycle Analysis (LCA) approach will be employed.

Test Scenario 15. Register new product/service demand (customer request)

PSCoMS.Idea Manager customised for CustomDrinks will allow them to register the demand for a new product development in a standardised way. Users could be either the sales manager for entering the initial description of a request from a customer, the marketing department of the Group so as to enquire for new developments or adaptation of technologies, or even the export manager in case he detects a potential market niche and a point for a new product. The Idea Manager would be allowed to group ideas into concepts, relate ideas each other, relate to projects and categorise by means of folksonomies (tags) in order to answer questions such as ideas related with a technology, with a market. The application will be accessible only through the intranet.

PSCoMS Product Service Configurator: concept development ideas that have been approved in an initial step after a feasibility study (Scenario 13/14) are visualised and can be selected to start the configuration. The concept will be related to the existing production assets including references to the ingredients, package types, design features so as to enhance the understanding of the concept by the following innovation steps.

Test Scenario 17. Register decisions made

PSCoMS Collaboration Environment with templates to run Operative Workshops, Idea Days, Screening meetings and other collaboration sessions. Each template contains the widgets to access those FLEXINET applications (e.g.: Idea Manager, Technology Effects Analyser, etc.) that are used to support the discussions and register the decisions made during feasibility studies, sales studies.

Test Scenario 18. Evaluate user experience with the product

With the help of the **User Experience Evaluator Application** CustomDrinks will be supported in the collection and analysis of results of the evaluation of initial prototypes of new products developments carried out together with the customer. The feedback from the client will be collected to enhance or re-engineer the prototypes until the final version is achieved.

7 Testbed specifications (testcases)

Once the test scenarios have been generated, the following step is to include in each one a set of test scripts that cover a specific functional area for a given application of FLEXINET. For example, a given test scenario might cover the generation of an idea for a new P/S at INDESIT, another scenario might cover ideas updated by other users.

By utilising such an approach a series of test-cases as well as one scenario can defined (see Figure 7-1). A test case will be prepared to check a specific functionality of one particular application at a time. Table 7-1 depicts the test cases implemented matching the expected functionalities from FLEXINET applications against the scenarios.

For every scenario and test case the templates provided in the Annexes will be generated accordingly before the execution of test cases with the testbed team. The templates will serve as a guideline to perform the execution (to know what to test, how to test, the criteria to validate the result, the staff involved) and gather the outputs to give feedback to implementers.

For each test case (see Table 7-2), we will include the requirements covered by the test case form the list above, specific requirements to execute the test case such as data to be available, process to be executed first and so on. This will be carried out during the customisation phase.

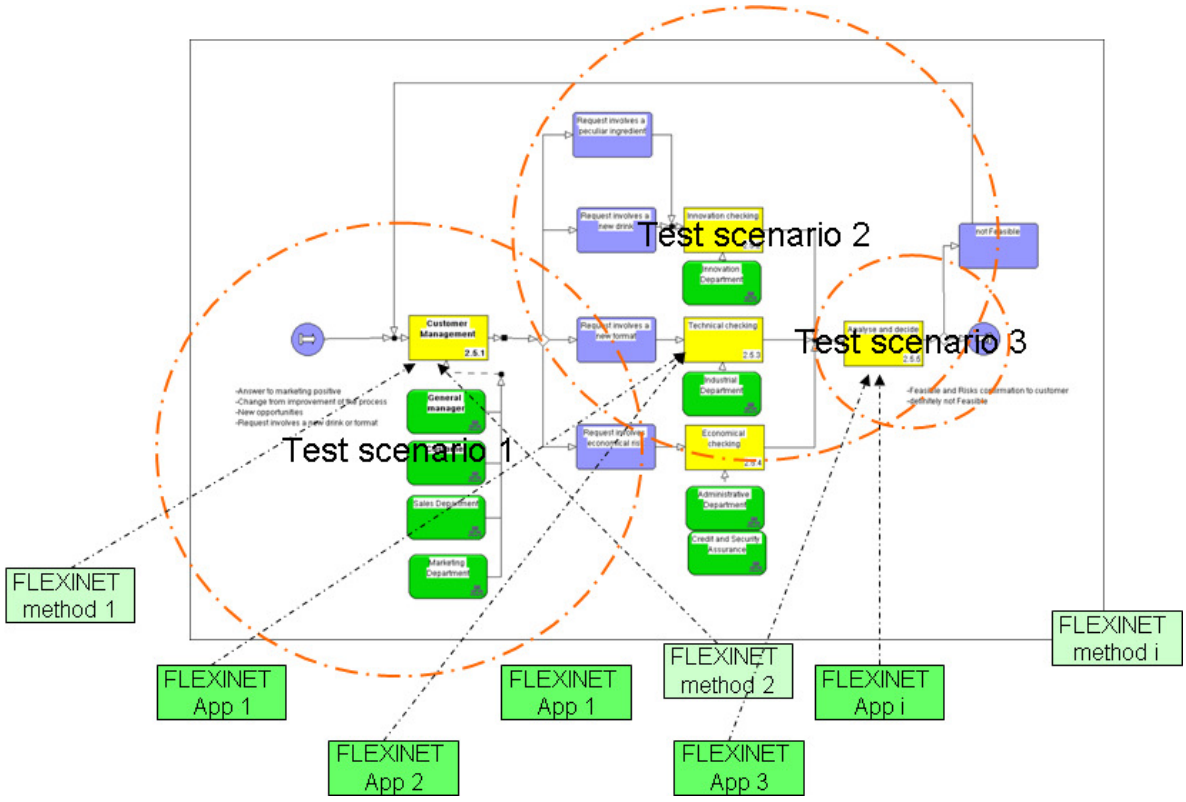

Figure 7-1: Test scenarios and test cases development approach

			Scenario group																	
PACKAGE	**Applications**	**Functional requirements**	Test Scenario 1. P/S Idea generation at INDESIT	Test Scenario 2. P/S Idea Management at INDESIT	Test Scenario 3. Defining new P/S business model	Test Scenario 4. Check P/S Configuration	Test Scenario 5. Design P/S Configuration	Test Scenario 6. Design P/S GPN	Test Scenario 7. Identify optimal suppliers' GPN Network Configuration	Test Scenario 8. Check feasibility of GPN	Test Scenario 9. Define strategy for new business models	Test Scenario 10. Search for new applications	Test Scenario 11. Define GPN alternatives	Test Scenario 12. Effects of selected GPN configuration	Test Scenario 13. Early cost –risk assessment for new products	Test Scenario 14. Alternatives for GPN configuration	Test Scenario 15. Demand for new product development	Test Scenario 16. Technology Effect analysis of GPN configuration	Test Scenario 17. Register decisions made	Test Scenario 18. Evaluate user experience
	1. Idea Manager	1. Create new P/S ideas	T1.1.1[5]														T1.1.15			
	1. Idea Manager	2. Update P/S ideas	T1.2.1	T1.2.2		T1.2.4	T1.2.5										T1.2.15			
	1. Idea Manager	3. Approve/Reject ideas	T1.3.1	T1.3.2													T1.3.15			
	1. Idea Manager	4. Search P/S ideas	T1.4.1	T1.4.2		T1.4.4	T1.4.5										T1.4.15			
	1. Idea Manager	5. Visualise search results	T1.5.1	T1.5.2													T1.5.15			
	1. Idea Manager	6. Consult the description of P/S		T1.6.2		T1.6.4												T1.6.16		
	2. Collaborative Environment	1. Select and instantiate a Design Review template		T2.1.2															T2.1.17	

[5] X.Y.Z refers to X for Application, Y for the Functionality, Z for the Scenario

			Scenario group																
PACKAGE	**Applications**	**Functional requirements**	Test Scenario 1. P/S Idea generation at INDESIT	Test Scenario 2. P/S Idea Management at INDESIT	Test Scenario 3. Defining new P/S business model	Test Scenario 4. Check P/S Configuration	Test Scenario 5. Design P/S Configuration	Test Scenario 6. Design P/S GPN	Test Scenario 7. Identify optimal suppliers' GPN Network Configuration	Test Scenario 8. Check feasibility of GPN	Test Scenario 9. Define strategy for new business models	Test Scenario 10. Search for new applications	Test Scenario 11. Define GPN alternatives	Test Scenario 12. Effects of selected GPN configuration	Test Scenario 13. Early cost –risk assessment for new products	Test Scenario 14. Alternatives for GPN configuration	Test Scenario 15. Demand for new product development	Test Scenario 16. Technology Effect analysis of GPN configuration	Test Scenario 17. Register decisions made	Test Scenario 18. Evaluate user experience
	2. Collaborative Environment	2. Access the Obeya and run the Design Review collaboration session		T2.2.2															T2.2.17	
	2. Collaborative Environment	3. Modify an existing Obeya		T2.3.2															T2.3.17	
	2. Collaborative Environment	4. Select invited users		T2.4.2															T2.4.17	
	2. Collaborative Environment	5. Set start/end date		T2.5.2															T2.5.17	
	2. Collaborative Environment	6. Invite by email		T2.6.2															T2.6.17	
	3. P/S Configurator	1. Visualise ideas at G1					T3.1.5												T3.1.17	
	3. P/S Configurator	2. Select idea to start					T3.2.5										T3.1.15			

			Scenario group																
PACKAGE	**Applications**	**Functional requirements**	Test Scenario 1. P/S Idea generation at INDESIT	Test Scenario 2. P/S Idea Management at INDESIT	Test Scenario 3. Defining new P/S business model	Test Scenario 4. Check P/S Configuration	Test Scenario 5. Design P/S Configuration	Test Scenario 6. Design P/S GPN	Test Scenario 7. Identify optimal suppliers' GPN Network Configuration	Test Scenario 8. Check feasibility of GPN	Test Scenario 9. Define strategy for new business models	Test Scenario 10. Search for new applications	Test Scenario 11. Define GPN alternatives	Test Scenario 12. Effects of selected GPN configuration	Test Scenario 13. Early cost –risk assessment for new products	Test Scenario 14. Alternatives for GPN configuration	Test Scenario 15. Demand for new product development	Test Scenario 16. Technology Effect analysis of GPN configuration	Test Scenario 17. Register decisions made	Test Scenario 18. Evaluate user experience
		configuration																	
	3. P/S Configurator	3. Retrieve information for a given idea					T3.3.5										T3.3.15			
	3. P/S Configurator	4. Input details for P/S					T3.4.5										T3.4.15			
	3. P/S Configurator	5. Alert on potential inconsistencies					T3.5.5										T3.5.15			
	4. SBME	1. Manage indicators (Input and weight)			T4.1.3															
	4. SBME	2. Generate results through reasoning			T4.2.3															
	4. SBME	3. Provide results of analysis			T4.3.3															
	5. OBMC (Business Model)	1. Create, update or import BP reference model fragments						T5.1.6												

			Scenario group																
PACKAGE	**Applications**	**Functional requirements**	Test Scenario 1. P/S Idea generation at INDESIT	Test Scenario 2. P/S Idea Management at INDESIT	Test Scenario 3. Defining new P/S business model	Test Scenario 4. Check P/S Configuration	Test Scenario 5. Design P/S Configuration	Test Scenario 6. Design P/S GPN	Test Scenario 7. Identify optimal suppliers' GPN Network Configuration	Test Scenario 8. Check feasibility of GPN	Test Scenario 9. Define strategy for new business models	Test Scenario 10. Search for new applications	Test Scenario 11. Define GPN alternatives	Test Scenario 12. Effects of selected GPN configuration	Test Scenario 13. Early cost –risk assessment for new products	Test Scenario 14. Alternatives for GPN configuration	Test Scenario 15. Demand for new product development	Test Scenario 16. Technology Effect analysis of GPN configuration	Test Scenario 17. Register decisions made	Test Scenario 18. Evaluate user experience
	5. OBMC (Business Model)	2. Configure the process to establish new business models						T5.2.6											
	5. OBMC (Business Model)	3. Generate runtime assistant						T5.3.6											
	5. OBMC (Business Model)	4. Roll out the adapted procedures						T5.4.6											
	6. OBMC 2 (GPN design)	1. Select reference fragments for GPN						T6.1.6								T6.1.14			
	6. OBMC 2 (GPN design)	2. Design/adapt the GPN fragments						T6.2.6								T6.2.14			
	6. OBMC 2 (GPN design)	3. Adapt or design GPN						T6.3.6								T6.3.14			
	6. OBMC 2 (GPN	4. Establish management						T6.4.6								T6.4.14			

			Scenario group																
PACKAGE	**Applications**	**Functional requirements**	Test Scenario 1. P/S Idea generation at INDESIT	Test Scenario 2. P/S Idea Management at INDESIT	Test Scenario 3. Defining new P/S business model	Test Scenario 4. Check P/S Configuration	Test Scenario 5. Design P/S Configuration	Test Scenario 6. Design P/S GPN	Test Scenario 7. Identify optimal suppliers' GPN Network Configuration	Test Scenario 8. Check feasibility of GPN	Test Scenario 9. Define strategy for new business models	Test Scenario 10. Search for new applications	Test Scenario 11. Define GPN alternatives	Test Scenario 12. Effects of selected GPN configuration	Test Scenario 13. Early cost –risk assessment for new products	Test Scenario 14. Alternatives for GPN configuration	Test Scenario 15. Demand for new product development	Test Scenario 16. Technology Effect analysis of GPN configuration	Test Scenario 17. Register decisions made	Test Scenario 18. Evaluate user experience
	design)	systems for risk, product quality																	
	6. OBMC 2 (GPN design)	5. Store the GPN in FLEXINET infrastructure						T6.5.6								T6.5.14			
	7. TEA	1. Identify effects on the GPN							T7.1.7			T7.1.10						T7.1.16		
	7. TEA	2. Check risks							T7.2.7			T7.2.10						T7.2.16		
	7. TEA	3. Check indicators							T7.3.7			T7.3.10						T7.3.16		
	7. TEA	4. Evaluate impact							T7.4.7			T7.4.10						T7.4.16		
	8. GPNC	1. Configure GPN								T8.1.8			T8.1.11			T8.1.14				
	8. GPNC	2. Visualise GPN								T8.2.8			T8.2.11			T8.2.14				
	8. GPNC	3. Manage facilities								T8.3.8			T8.3.11			T8.3.14				
	8. GPNC	4. Characterise facilities								T8.4.8			T8.4.11			T8.4.14				

			Scenario group																
PACKAGE	**Applications**	**Functional requirements**	Test Scenario 1. P/S Idea generation at INDESIT	Test Scenario 2. P/S Idea Management at INDESIT	Test Scenario 3. Defining new P/S business model	Test Scenario 4. Check P/S Configuration	Test Scenario 5. Design P/S Configuration	Test Scenario 6. Design P/S GPN	Test Scenario 7. Identify optimal suppliers' GPN Network Configuration	Test Scenario 8. Check feasibility of GPN	Test Scenario 9. Define strategy for new business models	Test Scenario 10. Search for new applications	Test Scenario 11. Define GPN alternatives	Test Scenario 12. Effects of selected GPN configuration	Test Scenario 13. Early cost –risk assessment for new products	Test Scenario 14. Alternatives for GPN configuration	Test Scenario 15. Demand for new product development	Test Scenario 16. Technology Effect analysis of GPN configuration	Test Scenario 17. Register decisions made	Test Scenario 18. Evaluate user experience
	8. GPNC	5. Visualise facilities								T8.5.8			T8.5.11			T8.5.14				
	8. GPNC	6. Characterise systems								T8.6.8			T8.6.11			T8.6.14				
	9. BMA	1. Select the CANVAS template									T9.1.9									
	9. BMA	2. Input/Edit data for business model aspects (objectives, indicators, drivers)									T9.2.9									
	9. BMA	3. Interrelate data									T9.3.9									
	9. BMA	4. Perform evaluation									T9.4.9									
	10. IRASA	1. Define Risk													T10.1.13					
	10. IRASA	2. Record Incidents													T10.2.13					

			Scenario group																
PACKAGE	**Applications**	**Functional requirements**	Test Scenario 1. P/S Idea generation at INDESIT	Test Scenario 2. P/S Idea Management at INDESIT	Test Scenario 3. Defining new P/S business model	Test Scenario 4. Check P/S Configuration	Test Scenario 5. Design P/S Configuration	Test Scenario 6. Design P/S GPN	Test Scenario 7. Identify optimal suppliers' GPN Network Configuration	Test Scenario 8. Check feasibility of GPN	Test Scenario 9. Define strategy for new business models	Test Scenario 10. Search for new applications	Test Scenario 11. Define GPN alternatives	Test Scenario 12. Effects of selected GPN configuration	Test Scenario 13. Early cost –risk assessment for new products	Test Scenario 14. Alternatives for GPN configuration	Test Scenario 15. Demand for new product development	Test Scenario 16. Technology Effect analysis of GPN configuration	Test Scenario 17. Register decisions made	Test Scenario 18. Evaluate user experience
	10. IRASA	3. Define custom Risk Factors within KB													T10.3.13					
	11. SRAA	1. Define Risk Scenario												T11.1.12	T11.1.13					
	11. SRAA	2. Execute analysis												T11.2.12	T11.2.13					
	11. SRAA	3. Examine Scenario												T11.3.12	T11.3.13					
	12. BRAA	1. Browse Business Rules										T12.1.10			T12.1.13					
	12. BRAA	2. Configure Business Rules										T12.2.10			T12.2.13					
	13. EWNA	1. Define Scenario									T13.1.9				T13.1.13					
	13. EWNA	2. Define Alarms									T13.2.9				T13.2.13					
	13. EWNA	3. Raise Alarms									T13.3.9				T13.3.13					
	14. STEEP	1. Indicators									T14.1.9						T14.1.5			

			Scenario group																
PACKAGE	**Applications**	**Functional requirements**	Test Scenario 1. P/S Idea generation at INDESIT	Test Scenario 2. P/S Idea Management at INDESIT	Test Scenario 3. Defining new P/S business model	Test Scenario 4. Check P/S Configuration	Test Scenario 5. Design P/S Configuration	Test Scenario 6. Design P/S GPN	Test Scenario 7. Identify optimal suppliers' GPN Network Configuration	Test Scenario 8. Check feasibility of GPN	Test Scenario 9. Define strategy for new business models	Test Scenario 10. Search for new applications	Test Scenario 11. Define GPN alternatives	Test Scenario 12. Effects of selected GPN configuration	Test Scenario 13. Early cost –risk assessment for new products	Test Scenario 14. Alternatives for GPN configuration	Test Scenario 15. Demand for new product development	Test Scenario 16. Technology Effect analysis of GPN configuration	Test Scenario 17. Register decisions made	Test Scenario 18. Evaluate user experience
	Analyzer	Configurator																	
	14. STEEP Analyzer	2. Rating indicators									T14.2.9						T14.2.15			
	14. STEEP Analyzer	3. Evaluate indicators									T14.3.9						T143.15			
	15. UEAA	1. Generate user experience test form																		T15.1.18
	15. UEAA	2. Set users to complete the form																		T15.2.18
	15. UEAA	3. Fill in test form by users																		T15.3.18
	15. UEAA	4. Visualise test results																		T15.4.18
	15. UEAA	5. Preliminary data analytics on test results																		T15.5.18

Table 7-1: Test case matrix

List of test cases

1.	T1.1.1	Create new P/S ideas during idea generation at INDESIT
2.	T1.1.15	Create the demand for a new product development at CustomDrinks
3.	T1.2.1	Update P/S ideas during idea generation at INDESIT
4.	T1.2.2	Update P/S ideas during idea management at INDESIT
5.	T1.2.4	Update P/S ideas during the check of product/service configuration at INDESIT
6.	T1.2.5	Update P/S ideas during the design of product/service configuration at INDESIT
7.	T1.2.15	Update the demand of a new product at CustomDrinks
8.	T1.3.1	Approve or reject idea during idea generation at INDESIT
9.	T1.3.2	Approve or reject idea during idea management at INDESIT
10.	T1.3.15	Approve or reject idea during demand registration at CustomDrinks
11.	T1.4.1	Search P/S ideas during generation at INDESIT
12.	T1.4.2	Search P/S ideas during management at INDESIT
13.	T1.4.4	Search P/S ideas during product/service configuration check at INDESIT
14.	T1.4.5	Search P/S ideas during product/service configuration design at INDESIT
15.	T1.4.15	Search past ideas during demand registration at CustomDrinks
16.	T1.5.1	Visualise the results of searching ideas during generation at INDESIT
17.	T1.5.2	Visualise the results of searching ideas during management at INDESIT
18.	T1.5.15	Visualise the results of searching past requests during demand registration at CustomDrinks
19.	T1.6.2	Consult the P/S description during idea management at INDESIT
20.	T1.6.4	Consult the P/S description when checking the P/S configuration at INDESIT
21.	T1.6.16	Consult the new product description when evaluating the effect in the GPN configuration at CustomDrinks
22.	T2.1.2	Select and instantiate templates during idea management at INDESIT
23.	T2.1.17	Select and instantiate templates during innovation management at CustomDrinks

24.	T2.2.2	Access Obeya runtime during idea management at INDESIT
25.	T2.2.17	Access Obeya runtime during innovation management at CustomDrinks
26.	T2.3.2	Modify an existing Obeya during idea management at INDESIT
27.	T2.3.17	Modify an existing Obeya during innovation management at CustomDrinks
28.	T2.4.2	Select invited users for the idea management at INDESIT
29.	T2.4.17	Select invited users for the innovation management at CustomDrinks
30.	T2.5.2	Set date range for the idea management at INDESIT
31.	T2.5.17	Set date range for the innovation management at CustomDrinks
32.	T2.6.2	Invite by email users for managing ideas at INDESIT
33.	T2.6.17	Invite by email users for managing innovation at CustomDrinks
34.	T3.1.5	Visualise ideas at second stage (approved) during P/S configuration at INDESIT
35.	T3.1.17	Visualise ideas at second stage (approved) during innovation management at CustomDrinks for sales study
36.	T3.2.5	Select ideas for start P/S configuration at INDESIT
37.	T3.1.15	Select ideas for start the sales study at CustomDrinks
38.	T3.3.5	Retrieve information for an idea during the design of P/S configuration at INDESIT
39.	T3.3.15	Retrieve information for a past idea at CustomDrinks
40.	T3.4.5	Input details for the new concept of P/S at INDESIT
41.	T3.4.15	Input details for the new concept of product at CustomDrinks
42.	T3.5.5	Alert on potential inconsistencies during the design of P/S at INDESIT
43.	T3.5.15	Alert on potential inconsistencies during the registration of the new demand for a new product at CustomDrinks
44.	T4.1.3	Manage indicators during the definition of a new BM at INDESIT
45.	T4.2.3	Generate the results thru reasoning during the definition of a new BM at INDESIT
46.	T4.3.3	Provide results of the analysis of the BM at INDESIT
47.	T5.1.6	Create, import or update reference fragments during P/S GPN

		configuration at INDESIT
48.	T5.2.6	Configure the process to establish the new BM for P/S GPN configuration at INDESIT
49.	T5.3.6	Generate runtime assistant during P/S GPN configuration at INDESIT
50.	T5.4.6	Roll out the adapted procedures for the P/S GPN configuration at INDESIT
51.	T6.1.6	Select the reference fragments for the P/S GPN configuration at INDESIT
52.	T6.1.14	Select the reference fragments for GPN configuration for new product developments at CustomDrinks
53.	T6.2.6	Design or adapt the GPN fragments for P/S GPN design at INDESIT
54.	T6.2.14	Design or adapt the GPN fragments for new product developments at CustomDrinks
55.	T6.3.6	Adapt or design GPN for the P/S at INDESIT
56.	T6.3.14	Adapt or design GPN for new product developments at CustomDrinks
57.	T6.4.6	Establish management systems for P/S GPN at INDESIT
58.	T6.4.14	Establish management systems for new product developments at CustomDrinks
59.	T6.5.6	Store the GPN infrastructure for P/S GPN at INDESIT
60.	T6.5.14	Store the GPN infrastructure for new product developments at CustomDrinks
61.	T7.1.7	Identify effects of the GPN for getting optimal suppliers at INDESIT
62.	T7.1.10	Identify effects of the GPN for searching new applications at KSB
63.	T7.1.16	Identify effects of the GPN for the development of new products at CustomDrinks
64.	T7.2.7	Check risks for getting optimal suppliers at INDESIT
65.	T7.2.10	Check risks for searching new applications at KSB
66.	T7.2.16	Check risks for the development of new products at CustomDrinks
67.	T7.3.7	Check indicators for getting optimal suppliers at INDESIT
68.	T7.3.10	Check indicators for searching new applications at KSB
69.	T7.3.16	Check indicators for the development of new products at CustomDrinks
70.	T7.4.7	Evaluate impact for getting optimal suppliers at INDESIT

71.	T7.4.10	Evaluate impact for searching new applications at KSB
72.	T7.4.16	Evaluate impact for the development of new products at CustomDrinks
73.	T8.1.8	Configure GPN to check feasibility at INDESIT
74.	T8.1.11	Configure GPN to define alternatives at KSB
75.	T8.1.14	Configure GPN to check alternatives at CustomDrinks
76.	T8.2.8	Visualise GPN to check feasibility at INDESIT
77.	T8.2.11	Visualise GPN to define alternatives at KSB
78.	T8.2.14	Visualise GPN to check alternatives at CustomDrinks
79.	T8.3.8	Manage facilities when checking GPN feasibility at INDESIT
80.	T8.3.11	Manage facilities when checking GPN alternatives at KSB
81.	T8.3.14	Manage facilities when checking GPN alternatives at CustomDrinks
82.	T8.4.8	Characterise facilities when checking GPN feasibility at INDESIT
83.	T8.4.11	Characterise facilities when checking GPN alternatives at KSB
84.	T8.4.14	Characterise facilities when checking GPN alternatives at CustomDrinks
85.	T8.5.8	Visualise facilities when checking GPN feasibility at INDESIT
86.	T8.5.11	Visualise facilities when checking GPN alternatives at KSB
87.	T8.5.14	Visualise facilities when checking GPN alternatives at CustomDrinks
88.	T8.6.8	Characterise systems when checking GPN feasibility at INDESIT
89.	T8.6.11	Characterise systems when checking GPN alternatives at KSB
90.	T8.6.14	Characterise systems when checking GPN alternatives at CustomDrinks
91.	T9.1.9	Select the CANVAS template to define strategy for a BM at INDESIT
92.	T9.2.9	Edit BM aspects when defining strategy for a BM at INDESIT
93.	T9.3.9	Interrelate data when defining strategy for a BM at INDESIT
94.	T9.4.9	Perform evaluation when defining strategy for a BM at INDESIT
95.	T10.1.13	Define risks during initial assessment of risks and cost at CustomDrinks
96.	T10.2.13	Record incidents during initial assessment of risks and cost at CustomDrinks
97.	T10.3.13	Define and customise risks factors during initial assessment of risks and

		cost at CustomDrinks
98.	T11.1.12	Define risks scenario during the evaluation of effects of a selected GPN configuration at KSB
99.	T11.1.13	Define risks scenario during initial assessment of risks and cost at CustomDrinks
100.	T11.2.12	Execute analysis during the evaluation of effects of a selected GPN configuration at KSB
101.	T11.2.13	Execute analysis during initial assessment of risks and cost at CustomDrinks
102.	T11.3.12	Examine scenario during the evaluation of effects of a selected GPN configuration at KSB
103.	T11.3.13	Examine scenario during initial assessment of risks and cost at CustomDrinks
104.	T12.1.10	Browse business rules when searching for new applications at KSB
105.	T12.1.13	Browse business rules during initial assessment of risks and cost at CustomDrinks
106.	T12.2.10	Configure business rules when searching for new applications at KSB
107.	T12.2.13	Configure business rules during initial assessment of risks and cost at CustomDrinks
108.	T13.1.9	Define scenario when facing new strategy for a new BM at KSB
109.	T13.1.13	Define scenario when assessing initial risks at CustomDrinks
110.	T13.2.9	Define alarms when facing new strategy for a new BM at KSB
111.	T13.2.13	Define alarms when assessing initial risks at CustomDrinks
112.	T13.3.9	Raise alarms when facing new strategy for a new BM at KSB
113.	T13.3.13	Raise alarms when assessing initial risks at CustomDrinks
114.	T14.1.9	Configure indicators for STEEP analysis when facing new strategy for a new BM at KSB
115.	T14.1.15	Configure indicators for STEEP analysis when assessing initial risks at CustomDrinks
116.	T14.2.9	Rate indicators for STEEP analysis when facing new strategy for a new BM at KSB
117.	T14.2.15	Rate indicators for STEEP analysis when assessing initial risks at

		CustomDrinks
118.	T14.3.9	Evaluate indicators for STEEP analysis when facing new strategy for a new BM at KSB
119.	T14.3.15	Evaluate indicators for STEEP analysis when assessing initial risks at CustomDrinks
120.	T15.1.18	Generate user experience test form during trial and error process of prototypes at CustomDrinks
121.	T15.2.18	Establish users during trial and error process of prototypes at CustomDrinks
122.	T15.3.18	Fill in test form during trial and error process of prototypes at CustomDrinks
123.	T15.4.18	Visualise test results during trial and error process of prototypes at CustomDrinks
124.	T15.5.18	Retrieve preliminary analysis of test results during trial and error process of prototypes at CustomDrinks

Table 7-2: Test cases table

8 Integration into the existing business processes and infrastructures

This is an initial set of information at process and IT level to take into consideration when producing the customised versions of prototypes of applications for end users. The customised testbed will be accordingly prepared during T6.2, thus this initial set will be finally gathered and established.

8.1 Integration at CustomDrinks

Type of data

Client; client solvency; market; request details: content, container, design; ingredients; regulations; technology: cap, machine compatibility, format, GPN; production assets: machines, ingredients, accessories; suppliers; delivery times; minimum order amount; price per unit; project budget; project deadline, decision made on feasibility; outstanding risks and costs; GPN configuration selected; product developed; client acceptance test results;

Legacy systems

- ROSS ERP for client management, supplier information;
- Product portfolio;
- Machine datasheets (user's manual);
- CD machine vs. format compatibility sheet (Excel file);
- Request template;
- Formulas and recipes database.

8.2 Integration at INDESIT

Type of data

Related to the new concept submitted into the system:

- Concept name;
- Submission date;
- Concept status;
- Concept description;
- Concept image;
- Person who has submitted the concept;
- Role of the person who has submitted the concept;
- Role of the person able to modify the submitted concept.

Which roles are involved in each decision-making moment (i.e. operative workshop, idea day, G0)

In order to assess different Business Model solution, below shows the main data and information INDESIT needs to define each BM.

Sale Production	TRADITIONAL	PERIODICAL FEE	APP & APP
Going Price			
Content			
Complexity			
Strengths			
Weaknesses			
Communication			

Table 8-1: Business Model solution assessment

Moreover, the Business Model parameters are:

- Partners involved (name, nationality, production place, supply typology, industrial process, supply amount, supply cost);
- Resources needed (activities inside the production process);
- Activities to do;
- What is the value to propose to the customer (name, concept idea to referred);
- What customer segment is involved (typology, % of market share, how affects the turnover);
- What are the channels to reach he/she;
- What is the relation between INDESIT and customers;
- What are the main costs;
- How is it possible to generate revenue.

For product/service configuration:

HARDWARE COMPONENT:

- Devices typology to connect the machine;
- Sensors typology and data collected.

SOFTWARE COMPONENT:

- Communication protocol;
- Database to storage data monitored.

DATA MONITORED:

- Cycle start time [hh:mm:ss];

- Cycle end time [hh:mm:ss];
- Cycle duration [minutes];
- Energy consumed [kWh];
- Cycle cost [€];
- Power profile [rpm];
- Voltage during the cycle;
- Generics faults.

The parameters to assess several suppliers are:

- Cost of supply;
- Time to satisfy the order;
- Distance from the INDESIT production plant/site;
- Quality of the supply;
- Correlated supplier;
- Supplier reliability;
- Production process of supplier.

Legacy systems

Currently, there is not a tool able to manage the entire ideation process, from idea collection to G0. The people that present an idea use a PowerPoint presentation to share their concepts with the top management. Such presentations highlight:

- the concept insight;
- the consumer promise;
- the reason why;
- Excel files to evaluate the cost and benefits of each Business Model proposed, and also to conduct the risk assessment;
- Canvas business model to define each Business Model parameters;
- CAD systems to realise the virtual product;
- File Excel to define the BOM (Bill of Material);
- SAP management system.

8.3 Integration at KSB

Type of data

Strategic Model:

- Objective name;
- Indicator name;

- Driver name;
- Relation between objective, indicator, driver;
- Relation between these elements and other elements of the enterprise model.

Business model:

- Business model parameters;
- Business model options;
- Indicators of options;
- Evaluation function description;
- Values per business model option;
- Business partner (supplier, customer, joint-venture, etc.);
- Logistic.

Information from the fields:

- Laws;
- Regulations;
- Affinities to technologies;
- Policies concerning economic and sustainability.

Values:

- Capacity (amount/day);
- Quality;
- Delivery time.

GPN:

- Business operations;
- Production operations;
- Service operations;
- Capabilities of partners;
- Inputs/outputs in terms of products, orders and resources;
- Interrelations between partners;
- Decisions;
- History of decisions and related data sets;
- Models.

Values:

- Capacity (amount/day);
- Quality;
- Delivery time;

- Total cost;
- Quality image;
- Delivery time;
- Delivery faithfulness;
- One-off costs for transformation;
- Capacity utilisation;
- Stock range;
- Administrative costs, etc.

Legacy systems

- ALEA DB (Controlling);
- CRM data storage about success;
- Capability DB;
- Resource data DB;
- Machine data DB;
- SAP;
- KSB Excel System;
- EXCEL - cost-utility analysis / efficiency analysis;
- DB with competitors;
- Storage of ideas;
- MO²GO (Enterprise Architecture);
- Sciforma (Project Management Software);
- Plant simulation;
- Product configurator - EasySelect® : http://www.ksb.com/ksb-en/KSB-EasySelect/.

9 Annexes

TEST SCENARIO TEMPLATE

Test Scenario ID	*ID#0001*				
Scenario Name or Scenario Description	*Describe the intent of the test scenario* *Test scenarios (aka test set or test suite) are a set of test scripts that cover a specific functional area, business process, use case, etc…* *For example, a given test scenario might cover an order placed on a web site by an existing customer (another scenario might cover orders placed by new customers) – test scripts within the scenario might cover a single item order, a multiple items order, quantity not on hand exception, etc…*				
Use Case Traceability	*List the **Use Cases** covered by this Test Scenario*				
SRS traceability	**15. UEAA**				
IT requirements					
Expected Outcomes					
Version Control					
Test Cases	***Test Case1***	*ID Test Case 1*			
	Test Case1	*ID Test Case 2*			
	…..				
Expected behaviour	*Functions expressed in **use cases** covered and not covered by the Test Scenario*				

TEST CASE TEMPLATE

Test Case Name or ID				
ID	TEST#1001	**Severity):** *1 – Critical?*	**Responsible:**	**Date:**
Test purpose				
Requirement (or part of) to be checked (SRS traceability)	*Requirements covered by the test case*			
General required conditions	*[database available, specific data …, process X beforehand executed, etc]*			
Parameters	*If any, it will include technical parameters to verify during the execution of the test case, i.e. Response time, Workload, Scalability, Platform*			
Steps *(optional)*				
Expected Output				
Execution Results				
No. Execution	*Observed Results in case of failure*	*Pass(OK) / Fail (KO)*		
1st		**OK/KO**		
2nd				
3rd				
Comments				