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Author:	*Valentina Mazza, Barbara Pernici*
Editor:	*POLIMI*
Reviewers:	*Andreas Gehlert (UniDue)*
	Zsolt Nemeth (SZTAKI)
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Management Summary

The current document aims at presenting the pilot case studies that we have been collecting so far and we consider most relevant to S-Cube. In particular, in this deliverable we harmonize and document the refinements of the case studies of deliverable CD-IA-2.2.2 with the scenarios proposed for validation as a joint effort with IA3.2. The aim is to provide a definition of the pilot cases that will be used as reference by the research work-packages. For each pilot case the related abstract scenarios are reported and their relationships with the Integrated Research Framework are highlighted.

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Members of the S-CUBE consortium:

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Tilburg University	Netherlands
City University London	U.K.
Consiglio Nazionale delle Ricerche	Italy
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The S-Cube Deliverable Series

Vision and Objectives of S-Cube

The Software Services and Systems Network (S-Cube) will establish a unified, multidisciplinary, vibrant research community which will enable Europe to lead the software-services revolution, helping shape the software-service based Internet which is the backbone of our future interactive society.

By integrating diverse research communities, S-Cube intends to achieve world-wide scientific excellence in a field that is critical for European competitiveness. S-Cube will accomplish its aims by meeting the following objectives:

- Re-aligning, re-shaping and integrating research agendas of key European players from diverse research areas and by synthesizing and integrating diversified knowledge, thereby establishing a long-lasting foundation for steering research and for achieving innovation at the highest level.
- Inaugurating a Europe-wide common program of education and training for researchers and industry thereby creating a common culture that will have a profound impact on the future of the field.
- Establishing a pro-active mobility plan to enable cross-fertilisation and thereby fostering the integration of research communities and the establishment of a common software services research culture.
- Establishing trust relationships with industry via European Technology Platforms (specifically NESSI) to achieve a catalytic effect in shaping European research, strengthening industrial competitiveness and addressing main societal challenges.
- Defining a broader research vision and perspective that will shape the software-service based Internet of the future and will accelerate economic growth and improve the living conditions of European citizens.

S-Cube will produce an integrated research community of international reputation and acclaim that will help define the future shape of the field of software services which is of critical for European competitiveness. S-Cube will provide service engineering methodologies which facilitate the development, deployment and adjustment of sophisticated hybrid service-based systems that cannot be addressed with today’s limited software engineering approaches. S-Cube will further introduce an advanced training program for researchers and practitioners. Finally, S-Cube intends to bring strategic added value to European industry by using industry best-practice models and by implementing research results into pilot business cases and prototype systems.

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Contents

Chapter 1

Introduction

1.1 Context

S-Cube is a network of excellence aiming to produce innovative research results in the area of service engineering. For its nature of a network of excellence, it does not involve industrial partners though trying to create links with the industry in order to take into account the requirements arising from it. The purpose of the workpackage (WP) IA-2.2 is the identification of the alignments needs with industry in order to evaluate the industrial relevance of S-Cube and the presentation of the research results to the industrial partners, trying the benefit from the industrial experience.

To improve the links with the industry several activities have been proposed; among them it is noticeable the workshop proposal IE4SOC (Industrial Experience for Service-Oriented Computing) (detailed in Section7) accepted by the ICSOC Conference. The goal of this workshop is the possibility to have a discussion forum to analyze the industrial experience and retrieving important feedback to guide the research in S-Cube. In this interaction with the industry, WP-IA-2.2 acts as mediator between the industry and the other workpackages gathering their results to reduce the gap with the industry. In particular, inputs from all the research workpackages are used to refine the scenarios of the proposed case studies [1], in order to achieve a definition of common pilot cases; the scenarios are used by the WP JRA1 and JRA2 to validate their research results. For what concerning the interactions with the workpackage IA-3.1, such WP is aimed at providing an integrated view of the S-Cube framework. The scenarios and the challenges arising from them will be used to create a link among the framework and the reported case studies.

In concrete terms, the workpackage IA-2.2 has started addressing the objective of construction of the link with the industry, trying to collect from industry case studies, challenging problems to address and best practices, trying to exploit collaborations on specific problems. Moreover, the aim of the workpackage is the transfer of the application of research results on challenges to the interested organizations.

1.2 Purpose of the deliverable

The aim of the current deliverable (CD-IA-2.2.4) is the definition of the common pilot cases (please refer to the Section 1.3 for the meaning we give to the term) that will be used by the workpackages as reference to refine them into scenarios used for the validation of existing research results. The aim of pilot cases is the definition of a practical context to be used to gather specific requirements from industrial collaborators, to exemplify how the S-Cube results would work in practice, and to define reference cases for the entire community. The work in this deliverable consists in the homogenising of the additional scenarios for the S-Cube case studies reported in [1], provided by each partner on the basis of the research each one is pursuing. In the present deliverable, such pilot cases will be described in terms of abstract scenarios (please see Section 1.3 for the meaning of the term) that could be found in each case study; an abstract scenario is a high level description of a particular interaction with the system. Each abstract scenario is evaluated in terms of the challenges addressed in it and of the coverage of the research framework; the reference set of challenges and the definition of the integration research framework (IRF) are provided by the WP IA-3.1. IRF constitutes an important element to ensure the overall integration, consistency and harmonization of the research effort in the network. In such deliverable it will be performed a systematic analysis of the proposed abstract scenarios to analyze their ability to provide a good coverage of research needs emerging from the pilot case studies. Since the IRF is aimed to be a framework guaranteeing the alignments and the coordination of the results of the joint research, it appears important to classify each case study in terms of coverage of the framework.

Such deliverable is intended to give a harmonized view and a documentation according to the guidelines defined in [1], of the deliverables CD-IA-2.2.2[1] and PO-IA-3.2.1 [2]. In particular, [1] contains the detailed definition of the case studies; they are described using the methodology proposed in S-Cube highlighting the business goals and the domain assumptions arising in them and the scenarios they involve. In addition to the scenarios defined in [1], [2] gathers all the additional innovative scenarios provided by the partners. As a consequence, the current deliverable provides a definition of some abstract scenarios able to cover all the detailed scenarios described in [1, 2]; moreover, due to their nature to be abstract and general scenarios referring mainly to the interactions among the actors and the application, we could image that, even further scenarios, not yet considered, could be classified as belonging to this individuated set of abstract scenarios. [1] reports the description of five case studies proposed by different industries:

- Wine case study
- Automotive case study
- E-Health case study
- E-government case study
- Traffic case study

In the appendixes, each abstract scenario is reported in the form of a table (see the template in Table 1.1) containing a textual description of the scenario, the reference to the business goals and the domain assumptions related to it, the reference to the IDs of the detailed scenarios (please refer to [1, 2] for a detailed description of such scenarios) covered (even partially), and, finally, the challenges addressed. Such research challenges are provided by each work-package and collected and detailed in the deliverable CD-IA-3.1.3 ([3]). The references to the business goals and the domain assumptions have the form of an identifier, whose description can be found in [1].

Table 1.1: Abstract scenario template

Field	Description
Unique ID	ID of the Abstract Scenario; it has the form of *casestudy*_AS_*typeOrNumberoftheAS*
Short Name	The name of the abstract scenario
Related to	The list of the Business Goals and the Domain Assumptions related to the abstract scenario.
Involved Actors	The actors of the case study involved in the abstract scenario.
Detailed Operational Description	Textual description of the abstract scenario.
Scenarios covered	IDs of the scenarios covered by the abstract scenario. Such IDs are defined in the deliverable CD-IA-2.2.2 [1] and PO-IA-3.2.1 [2].

Challenges	List of the challenges addressed by the abstract scenario (please refer to the deliverable CD-IA-3.1.3[3] for a detailed description of each challenge).

In [2], partners provided some additional validation scenarios for all the case studies except for the Traffic case study. The current deliverable is intended to provide a homogeneous view for the case studies on which the partners are currently focusing on, not considering, for the moment, the description of the Traffic case study, considered as a challenging case study on which we will focus later. As the analysis performed in the deliverable will reveal, the case studies on which we are focusing on are able to cover all the main points of interest within S-Cube.

The work performed in this deliverable is mainly relevant to Task T-IA 2.2.2: Establishing Pilot Industrial Cases, in which the aim is to establish common pilot cases between the industrial collaborators and S-Cube beneficiaries. Pilot cases are used for the definition of a basis for the gathering of specific requirements and challenges from industrial collaborators.

1.3 Case study, abstract scenario, pilot case: definitions

Since the terms case study and scenario are often used as synonyms or with different meanings, here we report the definitions of the terms in order to avoid misunderstanding during the reading of the deliverable. In particular, the meaning we give to each term is the following:

- *Case study* (synonyms in DoW: use cases): Case studies are real life problems contextualized within the corresponding application domain. A case study description introduces the relevant vocabulary of the domain (glossary), the business goals and domain assumptions the considered problem is based on, the actors involved in the scenario, their relationships and dependencies, and a number of coarse-grained scenarios or situations that show how the actors interact in order to fulfil the business goals, given the domain assumptions. We aim at developing case study descriptions that are completely independent from specific technological solutions so that the case study can be flexibly used to identify, develop and evaluate different technological solutions [2].

- *Abstract Scenario* The term abstract scenario, introduced in this deliverable, refers to a high level description of possible interactions among the actors and the system of the case study. Abstract scenarios refine case studies and describe possible ways the actors in a case study behave. While in the deliverables [1, 2] scenarios were described in a detailed way, representing a specific interaction with the system, the high level description for the abstract scenario makes possible that one or more scenarios from [1, 2] could be classified as belonging to one or more abstract scenarios. An abstract scenario is able to refer to one or more specific situations detailed in the scenarios reported in [1, 2]. As a consequence, an abstract scenario could be able to cover one, or more, detailed scenarios proposed in [1, 2] .

- *Pilot Case* (in some contexts used as a synonym of case studies): Pilot cases within the project will be defined as consolidated case studies, in which validation scenarios have been integrated and harmonized, to be released as reference cases to be used by the research community as a basis for analysis and comparison of methods and techniques. The aim of pilot cases is to define a practical context to be used *(i)* to gather specific requirements from industrial collaborators, *(ii)* to exemplify how S-Cube results would work in practice, and *(iii)* to define reference cases for the entire community [2].

1.4 Structure of the deliverable

This document is structured as follows: the Chapters 2, 3, 4, 5 contain a description of the pilot cases and a list of the identified abstract scenarios, while the Chapter 6 outlines the links of the pilot cases with the Integration Research Framework. The chapter 7 reports the results of the workshop IE4SOC, and the chapter 8 draws the conclusions. At the end of the deliverable, the appendix A contains the list of the acronyms used during the description of the pilot cases and the appendixes B, C, D, E contain the tabular descriptions of the individuated abstract scenarios for the considered pilot cases.

Chapter 2

Wine Production Case Study

2.1 Context

The wine production case study was proposed by *Donnafugata* [4]. It describes the world in which the Wine Producer, the Quality Manager, the Agronomist and the Oenologist operate. While the Wine Producer is aimed at maximizing the production, the Quality Manager, the Agronomist, the Wine Grower and the Oenologist have to monitor the quality of the vineyard trying the correct recovery actions in order to address critical events. For example, they have to handle occurrences of harmful animals in the vineyard, or react to environmental critical conditions. The case study also shows the processes involving the harvesting of the grapes and the logistics to deliver the product to retailers.

2.2 Abstract Scenarios

In this section, some abstract scenarios are listed (please refer to appendix B for their detailed description). Each abstract scenario is able to cover one or more scenarios detailed in [1] and [2]. The abstract scenarios identified for this pilot case refer to the Business Goals and the Domain Assumptions introduced in the reference deliverable [1], so there is no need to define new ones. Analyzing the scenarios in [1, 2] proposed for the wine case study, the following abstract scenarios could be identified.

- **Cultivation handling** (referred in the deliverable as **WINERY-AS-CH**): Cultivation handling requires the management of the activities related to the cultivation of the vineyard and the management of all the critical conditions that may happen. Critical conditions could be determined by the observation of the functional parameters (such as *temperature, wind speed, light, humidity*) or by the detection of the presence of harmful animals in the vineyard that could compromise the quality of the final product.

- **Managing the market needs** (referred in the deliverable as **WINERY-AS-MN**): The Wine Producer has to observe the market needs in order to adjust the wine production accordingly to them. In particular market could influence the wine production providing information to deduct the quality of the wine and the amount of grapes to produce. Information about forecasts for the current year, in terms of sales volume, preferences for wine kind and quality, will be analyzed to determine the right amount of grapes and wine to produce and the most suitable quality.

- **Harvesting and Fermentation** (referred in the deliverable as **WINERY-AS-HFM**): The quality manager should control the quality attributes during the phases of harvesting and fermentation in order to guarantee the desired wine quality. During the harvesting phase some quality parameter might have been guaranteed, for example, the time interval between the harvesting and the grapes processing might have been minimized, or, for example, harvesting should have been executed, if needed for the expected wine quality, only if particular climatic conditions occur. After harvesting, fermentation could start; this is a critical phase influencing the wine quality: chemical analyses are needed to control the wine parameters. If some critical condition is detected, recovery actions should happen (such as alerting the quality manager).

- **Distribution and Sales** (referred in the deliverable as **WINERY-AS-SD**): During the sales phase, the Wine Producer interacts with the Retailer to stipulate contracts; the related orders are delivered by the Delivery Company during the distribution phase. During such phase, some quality parameter should be assured to not compromise the wine quality. For example, it could be required that, during the transportation, the temperature for the wine bottles should meet strict requirements (temperature should no have wide fluctuations and should be constrained within a specific range).

Chapter 3

Automotive Case Study

3.1 Context

The automotive case study provides a description of the automotive production domain. This case study is focused on a complex and geographically distributed supply chain in the automotive sector and has been proposed by the companies 360Fresh and IBM [5]. Automobile Incorporation (Auto Inc), located in South East Asia, is a local branch of a large enterprise in the automobile industry in Europe, comprising a regional headquarter in Singapore, a manufacturing factory in Vietnam, several regional distribution and logistics provider, and several warehouses located in different countries in South East Asia. Auto Inc sells automobile products to retail customers in the surrounding countries. The main business tasks of the manufacturing factory include importing and assembling automobile body parts from the EU headquarter supplier, importing and assembling other parts (like wheels, brakes, seats, etc.) from regional suppliers, painting, integrating accessories (e.g. air conditioner, CD player, etc), testing and releasing the final products. Other material and (semi-finished) products can be ordered from the regional suppliers in surrounding countries. Depending on the product specifications, the assembling, integrating and painting tasks use varying materials and products, and might be executed in disparate ways as well. Different distribution logistics providers participate in the incorporation to provide the transportation of finished products from the manufacturing factory to the warehouses, and from the warehouses to the retail customers. The providers are selected according to the transportation routes and rules.

3.2 Additional Business Goals and Domain Assumptions

In addition to the set of business goals and domain assumptions reported in [1], one new business goal and one new domain assumption are needed for the description of the abstract scenarios. They are described below.

Table 3.1: Reliability of the processes

Field	Description
Unique ID	IBM_BG_05
Short Name	Reliability of the processes
Type	Business Goals
Description	Processes have to be reliable. Dependability of the processes could be improved by testing process or by the simulation of them using virtualized environments.
Rationale	Improve the effectiveness, reliability of the adaptation activities for the processes.

Involved Stakeholders	All
Conflicts	None
Supporting Materials	None
Priority of accomplishment	Must have

Table 3.2: Information Sharing

Field	Description
Unique ID	IBM_DA_03
Short Name	Information Sharing
Type	Domain Assumption
Description	The actors should have a mechanism to send and receive messages, in order to communicate with the other partners. Moreover, the system should be able to notify some problems or critical condition that could happen. Message exchange could be performed automatically or manually.
Rationale	Information is shared among the actors.
Involved Stakeholders	All
Conflicts	None
Supporting Materials	None
Priority of accomplishment	Must have

3.3 Abstract Scenarios

In this section the abstract scenarios are reported: they are derived on the basis of the detailed scenarios reported in [1] and the additional validation scenarios proposed by the partners in [2] for the automotive case study. The abstract scenarios related to this case study are the following:

- **Resource Planning (IBM_AS_1)**: Such abstract scenario comprises all the activities performed in order to align the resources to meet expected demand requirements. The estimations of the products to delivery, for the near and for a long-term future, guide the planning. On the basis of the information collected in the past periods and of the estimation for the future, plans for the supply chain or for the manufacturing or even tactical planning should be defined to maximize the production.

- **Stock parts and material (IBM_AS_2)**: Such scenario comprises all the activities to stock parts and materials needed to the phase of manufacturing. After the planning of the stock level, the Headquarter could suggest to the Manufactoring Factory to increase the stock of the parts or of the material. The activities of such abstract scenario refer to the interactions between the Warehouse and the Manufactoring Factory in order to achieve the suitable level of stocks, or it could be related to the stocks of the Suppliers.

- **Make to Stock (IBM_AS_3)**: Such scenario comprises all the activities needed for the production of the final goods and for their stock in the Warehouse. In particular all the actors of the production phase are involved; such phase comprises other than the specific manufacturing activities needed to obtain the final product, the related activities needed to guarantee its quality (for example the testing of the whole process or of the final product).

- **Purchase Order Processing (IBM_AS_4)**: Such scenario comprises all the activities to process the order and delivery the products to the customers. Usually the customer sends a purchase order request with details about the required products and the needed amounts to the reseller that checks if all the products are in the stock. If some products are not available, they are ordered by the supplier. If the purchase order can be satisfied, the customer receives a confirmation, otherwise the order is rejected.

- **Manage Supply Chain (IBM_AS_5)**: Such scenario is related to the management of the whole supply chain. It comprises the activities concerning monitoring, testing of the activities during the supply chain, and the possibility, for each partner, to communicate and interact with each other. Interaction could be guaranteed, for example, also in terms of coexistence of more versions of the same services in order to permit to each partner to adapt adequately itself to the new service. Note that not all the information exchange automatically occur, but in some case manual communications happen; for instance, using fax, ordinary mail, phone calls and so on. So, in some cases employees are in charge of manually inserting data in the related information systems. The management, monitoring and adaptation of the supply chain should consider all these aspects and depend on the actors involved in it.

Chapter 4

E-Health Case Study

4.1 Context

The e-Health case study proposed in S-Cube has been derived from the EU Project NEXOF [6] adapting it to the methodology described in [1]. The companies that, within NEXOF, proposed such case study are Siemens [7] and Thales [8]. The involved activities are, essentially, the ones related to a consultation in an hospital, in a care centre or at a local doctor, when a doctor examines a patient. At the end of the consultation, the health status of the patient is known and the doctor could prescribe some treatment or some other specific action to perform. E-Health provides new kind of services, trying to integrate the existing ones; in such a way it is able to support the work of the overall healthcare staff. The actors involved in the case study are patients, doctors, experts and other medical staff. We identified a further actor, that we called E-Health Organization representing laboratories, pharmacies, nursing facilities and, more in general, all the health services and clearinghouses.

4.2 Abstract Scenarios

Starting from the scenarios detailed in the [1] and from the extensions proposed in [2] we have identified four main abstract scenarios able to cover all of them.

- **Access health data (EHEALTH_AS_1)**: At anytime, a doctor could have the need to access to the health data (blood test results, X-ray images and so on) of a patient. During medical examination, or during a consultation with a colleague or an expert or even during an emergency, the doctor or anyone in the staff could access the data recorded online. Data might have been recorded in the same place or at a different place (for example at a different hospital) and the operators could have different devices to access them.

- **Treatment Prescription (EHEALTH_AS_2)**: The current abstract scenario, is about the prescription of a treatment for a patient. In particular, a doctor could decide that, on the basis of the results of a medical examination, a patient could need some treatment. In such case, the doctor, could reserve the required medical device and schedule an appointment.

- **Planning and Execute a treatment or examination(EHEALTH_AS_3)**: The current abstract scenario, is about the execution of a treatment or an examination. After the prescription of a treatment, the E-Health organization is responsible for the organization and the planning of the treatment. We could image that the organization would to simulate the treatment in order to determine the level of expertise and resources required. Otherwise, we could image a scenario in which a patient, remotely could have the need to access to some devices to communicate the results of some examination (we can think about the patient who want to communicate the results of the self-monitoring of blood parameters).

- **Expert Consultation(EHEALTH_AS_4)**: A doctor could have the need to consult a colleague or an expert to make a diagnosis, for a consultation or simply, to have an opinion. Using the PDA or a computer, the doctor has to access to the directories and make a phone call to contact the suitable expert. The need to have an expert consultation could be even a scenario happening during an emergency.

Chapter 5

E-Government Case Study

5.1 Context

One of the S-Cube pilot cases is the e-government case study; it has been proposed by Engineering Ingegneria Informatica [9] and TIS [10] for the EU project NEXOF[6]; we have adapted its description to the methodology proposed in [1] for the analysis of the case studies. As reported in the deliverable CD-IA-2.2.2, the e-Government case study reports the possibility for a citizen to use the services of the public sectors made available online, without reaching physically the delegated office. In such a way, a citizen can avoid to spend a lot of time for the queues in the various offices. We can image that the e-Government system should offer some other services the citizen could access. If the citizen desires to exploit a service made available by the e-government application as for example the provisioning of a certain document, he would be guaranteed about the trust of the output; as a consequence output might be authenticated. Moreover, for the submission of a request, confidential data are exchanged between the parties, so a mechanism of encryption should be offered to protect the transmission by intrusion.

5.2 Abstract Scenarios

The following abstract scenarios are identified for this pilot case.

- **Exploit services provided by the e-government organization (TIS-ENG-AS1)**: Such abstract scenario involves all the activities performed by a user accessing to a service made available by the e-government organization. After the login the user could choose among all the services the e-government organization offers. In particular he could require a document without reaching physically the delegated offices, or for example he could exploit other kind of services, as explained in the detailed scenario in [1, 2]. Moreover different services could be offered depending on the kind of user is accessing. Incorporating knowledge about end users in the engineering of SBAs is important for the development of applications suitable for use in varied, evolving environments. Related challenges include considering users diverse needs, skills and abilities, and translating them into corresponding sets of operations and qualities at the level of the SBA for a good user experience.

- **Pay requested services (TIS-ENG-AS2)**: Some of the services offered by the e-government service could require the payment of a fee. So, if needed, after the submission of the request, the user has to insert the needed payment data that are validated by the e-payment service.

- **Output Authentication (TIS-ENG-AS3)**: Some of the services offered by the e-government service could require the authentication of the output provided by it. We could think that if the user wants a document, he would be assured about its authenticity. To this aim, the application should provide a mechanism to certify the output.

Chapter 6

Relationships with the Research Framework

The goal of this section is to perform a systematic analysis of the abstract scenarios reported in the previous sections to analyze their ability to provide a good coverage of research needs emerging from case studies. While in [11] a similar analysis was conducted on the additional innovative scenarios proposed by the partners, in such deliverable the abstract scenarios identified for the common pilot cases are analyzed in terms of research framework coverage.

6.1 Integrated Research Framework relationships

The appendixes B, C, D, E provide a description of the abstract scenarios reporting the challenges addressed by each of them. Challenges referred by the description of the abstract scenarios are detailed in the deliverable [3] in which they are described, also, in terms of the involved elements of the Integrated Research Framework (IRF). IRF is intended to be a holistic and coherent framework for the S-Cube research, which allows for integrating the principles, techniques, methods and mechanisms studied in S-Cube. In particular, the IRF should encompass those aspects of the research that are cross-cutting. The scope of this section is to provide a view of the relationships among the S-Cube pilot cases and the IRF outlining the coverage for each abstract scenario. Four different views of the IRF have been identified, which provide different perspectives of the integrated research efforts. The first view is given by the conceptual research framework,which provides a high-level conceptual view of the S-Cube research activities. The three additional views provide different perspectives to the definition and integration of the research efforts of the project; they are the following:

- conceptual research framework: it provides a high-level conceptual view of the S-Cube research activities
- reference life cycle: it shows how different researches contribute to support a coherent design and run-time life-cycle of an SBA
- logical run-time architecture: it illustrates the research efforts in terms of contributions to a hypothetical infrastructure for the execution of SBAs
- logical design environment: its purpose is similar to that of the run-time architecture, but addresses the design phase

6.1.1 Conceptual Research Framework

The conceptual research framework is the core element in the definition of the S-Cube Integrated Research Framework (IRF). Its aim is to organize the joint research activities within S-Cube by providing a high-level conceptual architecture for the principles and methods for engineering service-based applications, as well as for the technologies and mechanisms which are used to realize those applications. The framework consists of six components, which are in 1-to-1 relation with the six research work packages of the network. Moreover, the framework distinguishes between the horizontal components corresponding to the traditional domain layers of a service based architecture, i.e., Service Infrastructure, Service Composition and Coordination, and Business Process Management and the vertical components, which correspond to the cross-cutting issues addressed by the project, namely Engineering and Design, Adaptation and Monitoring, and Quality Definition, Negotiation and Assurance. The following table puts in evidence the relationships among the abstract scenarios and the conceptual research framework. Such relationships are better highlighted in the Figure 6.1.

Table 6.1: Mapping of the abstract scenarios on the Conceptual RF

Nr	**Abstract Scenario ID**	**Conceptual Research Framework Element**
1	WINERY-AS-CH	Service Composition and Coordination, Business Process Management, Adaptation and Monitoring, Service Infrastructure
2	WINERY-AS-MN	Service Infrastructure
3	WINERY-AS-HFM	Service Composition and Coordination, Adaptation and Monitoring
4	WINERY-AS-SD	Service Composition and Coordination, Business Process Management
5	IBM_AS_1	Service Composition and Coordination, Business Process Management, Service Infrastructure, Quality Definition, Negotiation and Assurance
6	IBM_AS_2	Service Composition and Coordination, Business Process Management, Service Infrastructure, Quality Definition, Negotiation and Assurance
7	IBM_AS_3	Service Composition and Coordination, Service Infrastructure and Adaptation and Monitoring, Business Process Management
8	IBM_AS_4	Service Composition and Coordination, Business Process Management
9	IBM_AS_5	Service Composition and Coordination, Business Process Management, Adaptation and Monitoring, Quality Definition, Negotiation and Assurance
10	EHEALTH_AS_1	Service Infrastructure, Engineering and Design
11	EHEALTH_AS_2	Service Composition and Coordination, Engineering and Design, Adaptation and Monitoring
12	EHEALTH_AS_3	Engineering and Design, Service Composition and Coordination, Adaptation and Monitoring, Business Process and Management
13	EHEALTH_AS_4	Business Process Management, Service Infrastructure
14	TIS-ENG-AS1	Engineering and Design, Service Composition and Coordination, Adaptation and Monitoring, Business Process and Management
15	TIS-ENG-AS2	Engineering and Design,Business Process Management, Service Infrastructure
16	TIS-ENG-AS3	Engineering and Design,Business Process Management, Service Infrastructure

6.1.2 Reference Lifecycle

The reference life-cycle (see [12]) is depicted in Figure 6.2 below. It is composed of two main cycles:

- the one on the right hand side corresponds to the classical application design, deployment and provisioning.

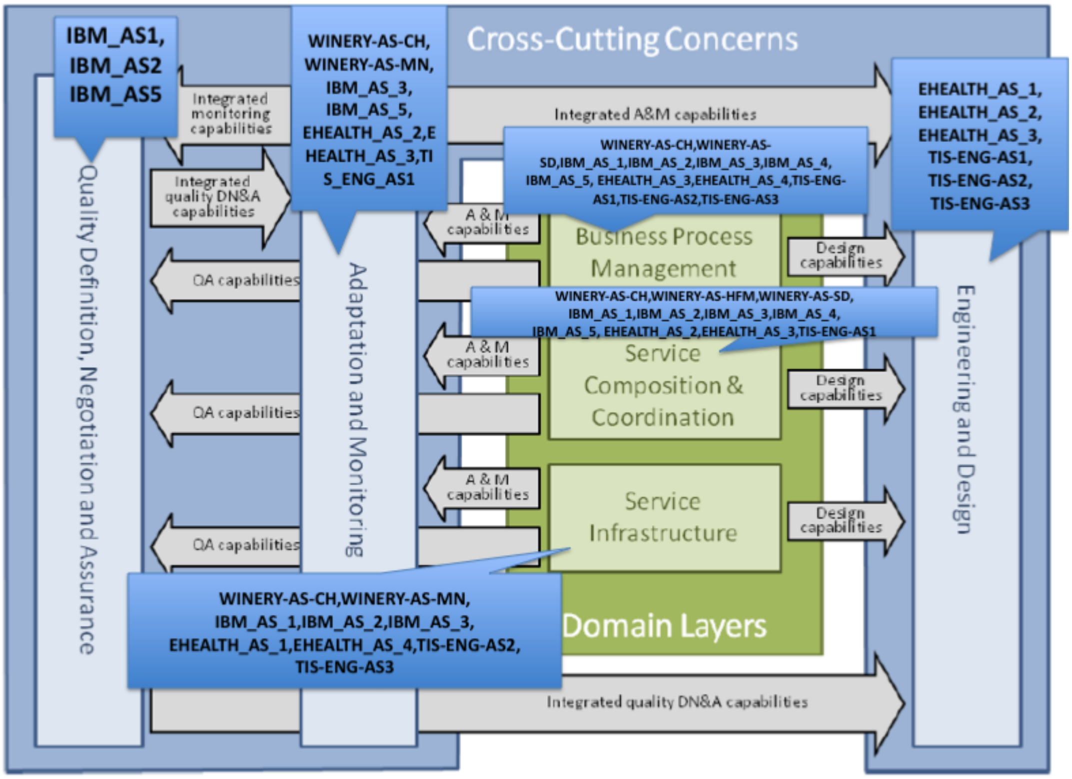

Figure 6.1: Research Framework Coverage

- the one on the left hand side corresponds to the adaptation perspective.

The key purpose of the reference life-cycle view is to complement the static view provided by the conceptual research framework and to relate the research efforts undertaken by the network to the different phases of the life of the SBAs.

One of the key aspects of service based applications is that they need to be able to accommodate and manage various changes at runtime. By adopting this two-cycle approach applications undergo the transition between the runtime operation and the analysis and design phases in order to be continuously improved and updated. But they must provide mechanisms that, during runtime, continuously and automatically a) detect new problems, changes, and needs for adaptation, b) identify possible adaptation strategies, and c) enact them. These three steps are shown in the left hand side of the figure and lead to the deployment and provisioning of the modified application. The identification of the changes in the environment and of the problems in the execution of the SBA (e.g., failures) is obtained through monitoring and run-time quality assurance (they are part of the management activities typically performed during execution). This monitoring activity triggers the iteration of the adaptation cycle, whose effect is to inject changes directly into the application being operated and managed. The table below shows the relationships among the abstract scenarios and the lifecycle. The Figure 6.2 highlights, for each phase of the life-cycle, the ID of the involved abstract scenarios.

Table 6.2: Mapping of the abstract scenarios on the reference life-cycle

Nr	Abstract Scenario ID	Life-cycle Element
1	WINERY-AS-CH	Requirement Engineering and Design, Operation and Management
2	WINERY-AS-MN	Requirement Engineering and Design, Operation and Management
3	WINERY-AS-HFM	Requirement Engineering and Design, Operation and Management
4	WINERY-AS-SD	Operation and Management
5	IBM_AS_1	(Early) Requirement Engineering and Design, Construction, Operation and Management, Identify Adaptation need, Identify Adaptation Strategy, Enact Adaptation
6	IBM_AS_2	Requirement Engineering and Design, Construction, Operation and Management
7	IBM_AS_3	Requirement Engineering and Design, Construction, Operation and Management, Enact Adaptation
8	IBM_AS_4	RE and Design
9	IBM_AS_5	Requirement Engineering and Design, Construction, Operation and Management, Identify Adaptation need, Identify Adaptation Strategy, Enact Adaptation
10	EHEALTH_AS_1	RE and Design
11	EHEALTH_AS_2	Requirement Engineering and Design, Construction, Operation and Management, Identify Adaptation need, Identify Adaptation Strategy, Enact Adaptation
12	EHEALTH_AS_3	(Early) Requirement Engineering and Design, Construction, Deployment and Provisioning, Operation and Management, Identify Adaptation need, Identify Adaptation Strategy, Enact Adaptation
13	EHEALTH_AS_4	RE and Design
14	TIS-ENG-AS1	Requirement Engineering and Design, Construction, Operation and Management, Enact Adaptation
15	TIS-ENG-AS2	Requirement Engineering and Design
16	TIS-ENG-AS3	Requirement Engineering and Design

6.1.3 Coverage of the Architecture

The last view of the IRF that we consider in this deliverable is the runtime architecture. The proposed run-time architecture assumes that all the run-time mechanisms and components are realized as services and are exposed on the same communication back-bone. By adopting a service-oriented architecture, we guarantee that the run-time mechanisms realized in the project can be integrated and exploited in a synergistic way, at least at the conceptual level. We distinguish between core services and application-specific services. The core services are middleware services that the run-time architecture provides to all SBA in order to support the different aspects of the SBA execution. The communication backbone supports the communication among any kind of services, regardless of whether they are core services or application-specific services. In particular, in the case of service containers, the communication back-bone allows accessing both the core service and the application-specific services deployed within the container. The table below and the Figure 6.3 show the relationships among the abstract scenarios and the runtime architecture; in particular for each element of the architecture in figure 6.3, the IDs of the involved scenarios are reported.

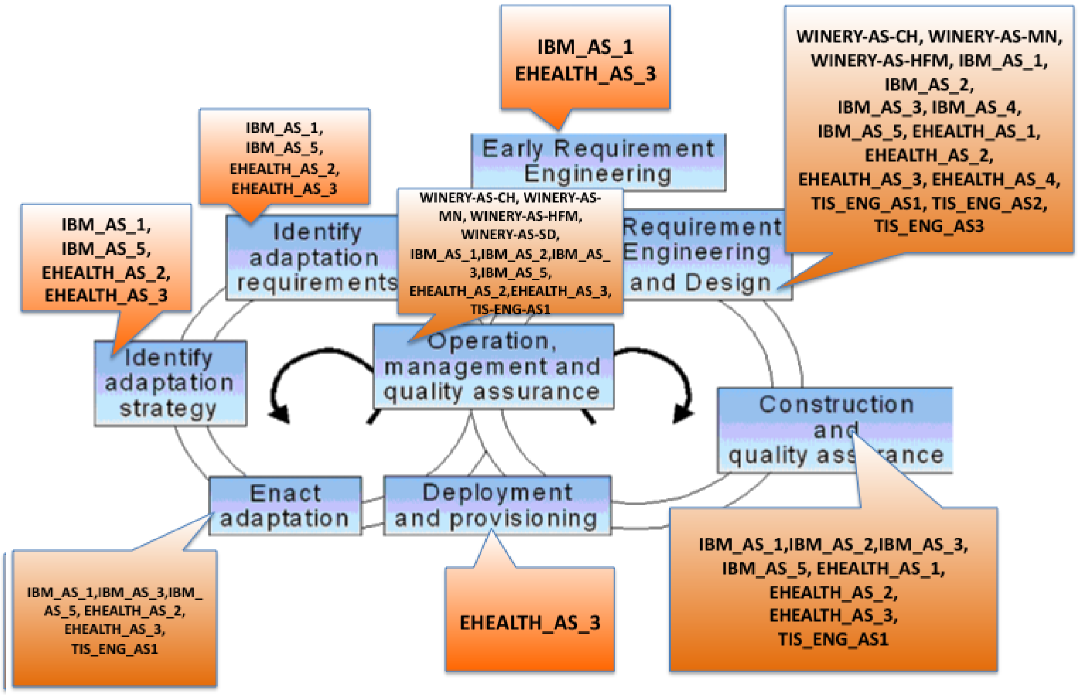

Figure 6.2: Life-cycle Coverage

Table 6.3: Mapping of the abstract scenarios on the runtime architecture

Nr	Abstract Scenario ID	Runtime Architecure Element
1	WINERY-AS-CH	Monitoring Engine, Service Container
2	WINERY-AS-MN	Monitoring Engine
3	WINERY-AS-HFM	Monitoring and Adaptation Engine
4	WINERY-AS-SD	Service Container
5	IBM_AS_1	Adaptation and Negotiation Engine, Discovery and Registry Infrastructure
6	IBM_AS_2	Service Container
7	IBM_AS_3	Service Container
8	IBM_AS_4	Service Container
9	IBM_AS_5	Discovery and Registry infrastructure, monitoring, adaptation and negotiation engine, resource broker
10	EHEALTH_AS_1	Service Container ,Communication Backbone
11	EHEALTH_AS_2	Service Container, Human Service Interface, resource broker, monitoring and adaptation engine
12	EHEALTH_AS_3	Service Container, Human Service Interface, resource broker, monitoring and adaptation engine
13	EHEALTH_AS_4	Service Container
14	TIS-ENG-AS1	Service Container, Human Service Interface, resource broker, monitoring and adaptation engine
15	TIS-ENG-AS2	Service Container
16	TIS-ENG-AS3	Service Container

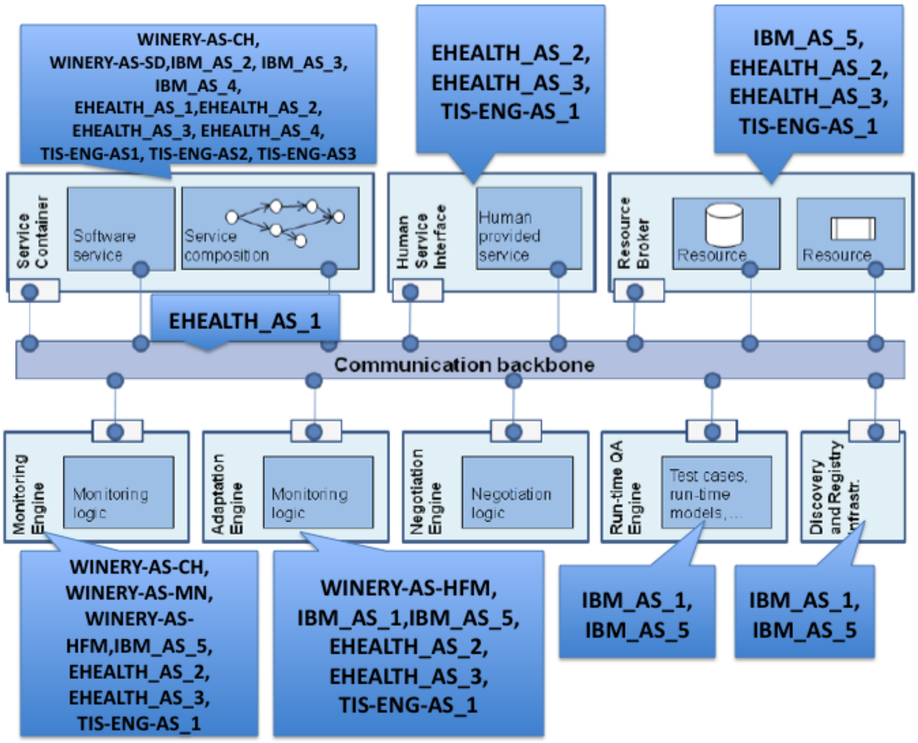

Figure 6.3: Architecture Coverage

As the analysis reveals, no abstract scenario is able to cover all the aspects of the research framework, but each element is covered by one abstract scenario at least.

But, how was the mapping of the abstract scenarios on the IRF performed? Let us consider the abstract scenario defined as WINERY-AS-CH; as reported in the section 2, it refers to all the activities needed for the cultivation handling. So it involves the observation of the state of the vineyard influenced by the environmental parameters (physical conditions of the vineyard such as the temperature, the humidity, the light and so on) and by other aspects (such as the presence of some harmful animals or some fungal disease). Analyzing the gathered data, if some critical condition is detected, recovery actions should be triggered to adapt to the emerging situation. We could image that the observation of the vineyard parameters could be made possible by the presence of a wireless sensor network, in particular the sensors could be accessed as services. Due to this, it could be clear that, in reference to the conceptual research framework, the elements *Service Composition and Coordination* and *Service Infrastructure* are strictly involved in this abstract scenario; moreover the identification of the critical condition and the identification of the recovery actions require the involvement of the *Adaptation and Monitoring* element. For what concerning the relationships with the life-cycle we could say that such scenario is mainly related to the *Requirement Engineering and Design* and *Operation and Management* phases. Finally, analysing the coverage of the runtime architecture, the *Monitoring Engine* and the *Service Container* are the elements directly involved in the scenario. In particular, the Monitoring Engine is the component delegated to the runtime monitoring of the architecture, able to collect and report the relevant information about the execution and the evolution of the SBA, while the Service Container represents the container in which the services are deployed. In a similar way all the abstract scenarios were analyzed.

Chapter 7

Industrial Experience for SOC

While in the previous chapter, the focus was on the analysis of the relationships among the abstract scenarios and the research framework proposed in S-Cube, it would be interesting to analyze how our scenarios are related to the industrial research framework. In order to foster interaction with industry and to evaluate and compare the methodological approach to case study development, a workshop has been proposed to and accepted by the ICSOC Conference as an application workshop to interact with industries and get feedback on the S-Cube approach and validate research directions.

Starting from the research work of S-Cube on analyzing case studies and gaps in current solutions of current research towards the establishment of adaptive and flexible service- based applications, and with the goal of involving industries in the discussion of experiences in using services in real cases, the workshop aim was to collect case studies and perceived gaps in current platforms from industries and from currently running industrial and research projects. The aim of this workshop is to broaden the scope of this gap analysis by collecting industrial scenarios and case studies and by analyzing the industrial needs for research in the next 5-10 years. A systematic basis for analyzing the available material can be set and a contribution can be made towards establishing benchmarks for assessing technologies and new research approaches.

The industries have been involved with the presentation of their experiences and their gap analysis with respect to platforms and solutions being adopted and developed. The goal of the workshop was also to establish a discussion forum to analyze and compare the characteristics of presented case studies and solutions.

A web page has been created within the S-Cube web site on the workshop:
`http://www.s-cube-network.eu/contact/subpages/ie4soc`.
The agenda for the workshop was the following:

- 10.00 - 10.30 Workshop opening: The S-Cube approach to the development of industrial case studies (P. Plebani, Politecnico di Milano)
- 10.30 - 11.00 Research Challenges for Seamless Service Integration in Extensible Enterprise Systems, Matthias Allgaier, Markus Heller, SAP Research
- 11.00 - 11.30 coffee break
- 11.30 - 12.00 Implementing an SOA for a primary telecommunication operator (Giovanni Laudicina, Ferdinando Campanile, Salvatore Giordano, Sync Lab srl)
- 12.00 - 12.30 Improving e-service acceptance by involving researchers, providers and users - The efforts of our research institution in the field of e-service acceptance (Gregor Polancic, Bostjan Sumak Marjan Hericko)
- 12.30 - 13.00 title TBA (Marco Pistore, SayService)

- 13.00 - 13.30 Panel discussion with presenters and all participants to analyze industry-research cooperation towards the development of industrial case studies

Twentysix persons have registered for the event. The proceedings have been published as an internal report of Politecnico di Milano. In the presented case studies, several perspectives on services emerged.

In the presentation of *Research Challenges for Seamless Service Integration in Enterprise Systems* by Matthias Allgaier, SAP Research (Karlsruhe), based on the results of the project Theseus Texo, the vision of Services as tradable goods in a marketplace has been introduced. In this context the challenge is a seamless and smooth adaptation and integration of services into the user environment. Two case studies have been considered: foreseen service integration vs. unforeseen service integration.

A proposal is to integrate services via adaptation points (example shown uses user interface integration). Here several research challenges emerge:

- How can the different stakeholders in a service ecosystem can be supported to allow seamless service integration.

- How to define services and business applications to enable service integration? A proposal is to have a service development environment published with services, this creating a service ecosystem.

The need emerges for an engineering process for integration.

In the presentation on *Implementing an SOA for a primary telecommunication operator* by Giovanni Laudicina, Sync Lab, a system integrator (Telco Market) perspective has been introduced. The question was: how to offer services?

- There is no marketplace

- Webservice is exposed to the customer IT systems (about 100)

The need for service engineering emerges from several perspectives: consumer engineering, ESB engineering, Provider engineering. The data integration problem has also been discussed.

In the presentation *Improving e-service acceptance by involving researchers, providers and users - The efforts of our research institution in the field of e-service acceptance* (by Gregor Polancic, University of Maribor), the focus is on evaluation of services by users (user-provider interaction). Causes for not using services are analyzed, and the need emerges for meta-analysis of existing data sets on causes for not using services by adding them to a knowledge-based system. The goal is to develop a service knowledge system for e-service acceptance.

In *On Exploiting Research Solutions to Build Internet of Services at the City Level* Marco Pistore, SayService, discussed the integration of existing services in a unique platform widely available to users in the territory (Trentino). Obstacles to this approach are:

- Technology: current services do not implement standard protocols and interfaces

- Fragmentation: there is no way to connect the different services, so every step has to be done individually

- Problem handling: What happens a consumer encounters a problem; who helps?

In case of problem, adaptation to use a different real service (e.g. taxi instead of the bus) should be supported.

A lively discussion followed the presentation, coordinated by Pierluigi Plebani. First of all the definition of service appeared to be a challenge by itself. The first question was: Is a service just WSDL (OWL/SAWSDL/WSMO)? Several positions emerged, stressing the differences of approaches to services and the fact that services are not just technological items, advocating a universal service description, underlying the need of version management. Then the role of cloud computing was discussed, where computing becomes a utility (good) like electric power. Finally the role of Internet of Services was discussed: services with different characteristics should work together (e.g. technical service with real-world services), the need for personalized and users can compose services easily and seamlessly.

While some of the challenges mentioned in the discussion are being analyzed within the S-Cube network, some new considerations have been brought to the attention of the S-Cube project by the panel, namely:

- The need of a clear definition of services and their scope. This aspect will be considered in the future versions of the knowledge model.
- The need to further develop engineering aspects with a broad scope of analysis, which can be targeted both in JRA 1 and JRA2 tasks.
- The need of analyzing service provisioning with analogies with utilities provisioning.

Chapter 8

Conclusion

The main objective of this deliverable was the definition of the common pilot cases that will be used as reference by the research WPs for their validation. The pilot cases are a refinement of the case studies proposed in the deliverable [1] analyzed and extended by the partners that have proposed extended innovative scenarios [2]. In such deliverable pilot cases are described in terms of abstract scenarios involved in each of them and are evaluated on the basis of their coverage on the research framework. Since the term abstract scenario appears for the first time in this deliverable, it is defined and moreover, the description format for the abstract scenarios is provided; it summarizes, in a tabular form, the challenges that each scenario addresses and the references with the existing scenarios [1, 2]. As said the case studies are analyzed evaluating their relationships with the research framework. The coverage of the IRF refers to three views defined for the framework, in order to identify some research gaps in the research integration framework. To this aim, the coverage of the life-cycle is expressed in terms of the phases in which each abstract scenario is involved. Moreover the abstract scenarios are classified in terms of the coverage of the six components of the research framework, and finally, of the elements of the runtime architecture. Generally, each abstract scenario does not cover the whole IRF, but each part of the IRF is covered by at least one abstract scenario. The proposed set of the abstract scenario is not fixed, and could be extended, if needed, to refer to validation scenarios not yet considered. In fact, the collection of the validation scenarios is an activity that will occur through the full life of the project; it will involve all the S-Cube partners as part of the research activities undertaken in the research WPs.

Appendix A

List of Acronyms

In the following table the acronyms used during the description of the abstract scenarios are explained.

Table A.1: Acronyms explanation

Acronym	Meaning
WINERY	such prefix for the abstract scenarios, domain assumption or business goal ID means that the term is related to the wine case study
IBM	such prefix for the abstract scenarios, domain assumption or business goal ID means that the term is related to the automotive case study
EHEALTH	such prefix for the abstract scenarios, domain assumption or business goal ID means that the term is related to the e-health case study
TIS-ENG	such prefix for the abstract scenarios, domain assumption or business goal ID means that the term is related to the e-government case study
BG	**Business Goal**- such abbreviation is used in the Business Goal identifier having the form of *casestudy*_BG_*numberoftheBG* (i.e. WINERY_BG_01)
DA	**Domain Assumption**- such abbreviation is used to compose the Domain Assumption identifier *casestudy*_DA_*numberoftheDA* (i.e. WINERY_DA_01)
AS	**Abstract Scenario**- such abbreviation is used to compose the Abstract Scenario identifier *casestudy*_AS_*typeOrNumberoftheAS* (i.e. EHEALTH_AS_01)
CH	**Cultivation Handling**- for the wine case study, it means that we are referring to the Cultivation Handling activities
MN	**Market Needs**- for the wine case study, it means that we are referring to the Manage Market Needs activities
HFM	**Harvesting Fermentation Management**- for the wine case study, it means that we are referring to the activities related to the process of harvesting and fermentation
SD	**Sales and Distribution**- for the wine case study, it means that we are referring to the distribution and sales activities

Appendix B

Wine Case Studies: Abstract Scenarios

The abstract scenarios proposed in the Section 2 for the wine case study are described below.

Table B.1: Cultivation Handling

Field	Description
Unique ID	WINERY-AS-CH
Short Name	Cultivation Handling
Related to	WINERY-S-BG1, WINERY-S-BG2, WINERY-S-DA1, WINERY-SDA2
Involved Actors	Actors involved in such scenario are the ones involved in the cultivation handling. This activity is performed by the Agronomist, the Oenologist, the Quality Manager, and the Wine Grower. Also the market is involved, influencing the quality and the kind of the wine to produce.
Detailed Operational Description	Cultivation handling requires the management of the activities related to the cultivation of the vineyard and the management of all the critical conditions that may happen. Critical conditions could be determined by the observation of the functional parameters (such as *temperature, wind speed, light, humidity*) or by the detection of the presence of harmful animals in the vineyard that could compromise the quality of the final product.
Scenarios covered	WINERY-S-CH-1, WINERY-S-2
Challenges	The following challenges are addressed in this scenario • Definition of a coherent life cycle for adaptable and evolvable SBA • HCI and context aspects in the development of service based applications • Context- and HCI-aware SBA monitoring and adaptation • Exploiting the concept of service-based applications in the internet of things setting • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques • Self-* in service execution, discovery and registries

Table B.2: Managing the Market Needs

Field	Description
Unique ID	WINERY-AS-MN
Short Name	Managing the market Needs
Related to	WINERY-S-BG1, WINERY-S-BG2
Involved Actors	Market and Wine Producer.
Detailed Operational Description	The Wine Producer has to observe the market needs in order to adjust the wine production accordingly to them. In particular market could influence the wine production providing information to deduct the quality of the wine and the amount of grapes to produce. Information about forecasts for the current year, in terms of sales volume, preferences for wine kind and quality, will be analyzed to determine the right amount of grapes and wine to produce and the most suitable quality.
Scenarios covered	WINERY-S-CH-2
Challenges	The following challenges are addressed in this scenario • Definition of a coherent life cycle for adaptable and evolvable SBA • Run-time Quality Assurance Techniques • Self-* in service execution, discovery and registries • Quality Prediction Techniques to Support Proactive Adaptation

Table B.3: Managing Harvesting and Fermentation

Field	Description
Unique ID	WINERY-AS-HFM
Short Name	Managing Harvesting and Fermentation
Related to	WINERY-S-DA1, WINERY-S-DA2, WINERY-S-BG3
Involved Actors	Quality Manager and Oenologist.
Detailed Operational Description	The quality manager should control the quality attributes during the phases of harvesting and fermentation in order to guarantee the desired wine quality. During the harvesting phase some quality parameter might have been guaranteed, for example, the time interval between the harvesting and the grapes processing might have been minimized, or, for example, harvesting should have been executed, if needed for the expected wine quality, only if particular climatic conditions occur. After harvesting, fermentation could start; this is a critical phase influencing the wine quality: chemical analyses are needed to control the wine parameters. If some critical condition is detected, recovery actions should happen (such as alerting the quality manager).
Scenarios covered	WINERY-S-HFM

Challenges	The following challenges are addressed in this scenario • Definition of a coherent life cycle for adaptable and evolvable SBA • HCI and context aspects in the development of service based applications • Context- and HCI-aware SBA monitoring and adaptation • Exploiting the concept of service-based applications in the internet of things setting • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques • Self-* in service execution, discovery and registries

Table B.4: Managing Sales and Distribution

Field	Description
Unique ID	WINERY-AS-SD
Short Name	Managing Sales and Distribution
Related to	WINERY-S-BG3, WINERY-S-DA1, WINERY-S-DA4
Involved Actors	Quality Manager, Wine Producer, Delivery Company and Retailer
Detailed Operational Description	During the sales phase, the Wine Producer interacts with the Retailer to stipulate contracts; the related orders are delivered by the Delivery Company during the distribution phase. During such phase, some quality parameter should be assured to not compromise the wine quality. For example, it could be required that, during the transportation, the temperature for the wine bottles should meet strict requirements (temperature should no have wide fluctuations and should be constrained within a specific range).
Scenarios covered	WINERY-S-DS, WINERY-S-1

Challenges	The following challenges are addressed in this scenario • Definition of a coherent life cycle for adaptable and evolvable SBA • HCI and context aspects in the development of service based applications • Context- and HCI-aware SBA monitoring and adaptation • Exploiting the concept of service-based applications in the internet of things setting • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques • Self-* in service execution, discovery and registries

Appendix C

Automotive Case Studies: Abstract Scenarios

The abstract scenarios proposed in the Section 3 for the automotive case study are described below.

Table C.1: Resource Planning

Field	Description
Unique ID	IBM_AS_1
Short Name	Resource Planning
Related to	IBM_BG_01, IBM_BG_02, IBM_BG_03, IBM_BG_04
Involved Actors	Headquarters
Detailed Operational Description	Such abstract scenario comprises all the activities performed in order to align the resources to meet expected demand requirements. The estimations of the products to delivery, for the near and for a long-term future, guide the planning. On the basis of the information collected in the past periods and of the estimation for the future, plans for the supply chain or for the manufacturing or even tactical planning should be defined to maximize the production.
Scenarios covered	IBM_SC_01, IBM_SC_02, IBM_SC_03, IBM_SC_04

Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • Measuring, controlling, evaluating and improving the life cycle and the related processes • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques • Multi-level and self-adaptation • Self-* in service execution, discovery and registries • Feedback-based service discovery

Table C.2: Stock parts and material

Field	Description
Unique ID	IBM_AS_2
Short Name	Stock parts and material
Related to	IBM_BG_01, IBM_BG_02, IBM_BG_03, IBM_BG_04, IBM_BG_05
Involved Actors	Headquarter, Supplier, Manufactoring Factory, Warehouse.
Detailed Operational Description	Such scenario comprises all the activities to stock parts and materials needed to the phase of manufacturing. After the planning of the stock level, the Headquarter could suggest to the Manufactoring Factory to increase the stock of the parts or of the material. The activities of such abstract scenario refer to the interactions between the Warehouse and the Manufactoring Factory in order to achieve the suitable level of stocks, or it could be related to the stocks of the Suppliers.
Scenarios covered	IBM_SC_01, Purchase_Order_Processing_01

Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • Measuring, controlling, evaluating and improving the life cycle and the related processes • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques • Multi-level and self-adaptation • Self-* in service execution, discovery and registries • Feedback-based service discovery

Table C.3: Make to Stock

Field	Description
Unique ID	IBM_AS_3
Short Name	Make to Stock
Related to	IBM_BG_01, IBM_BG_03, IBM_BG_04, IBM_DA_03
Involved Actors	Headquarter, Manufacturing Factory, Warehouse.
Detailed Operational Description	Such scenario comprises all the activities needed for the production of the final goods and for their stock in the Warehouse. In particular all the actors of the production phase are involved; such phase comprises other than the specific manufacturing activities needed to obtain the final product, the related activities needed to guarantee its quality (for example the testing of the whole process or of the final product).
Scenarios covered	IBM_SC_01, SZTAKI_AUTONOMIC_CAR

Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • Measuring, controlling, evaluating and improving the life cycle and the related processes • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques • Multi-level and self-adaptation • Self-* in service execution, discovery and registries • Feedback-based service discovery

Table C.4: Purchase Order Processing

Field	Description
Unique ID	IBM_AS_4
Short Name	Purchase Order Processing
Related to	IBM_BG_03, IBM_BG_04, IBM_BG_05, IBM_DA_03
Involved Actors	Customer, Reseller, Supplier
Detailed Operational Description	Such scenario comprises all the activities to process the order and delivery the products to the customers. Usually the customer sends a purchase order request with details about the required products and the needed amounts to the reseller that checks if all the products are in the stock. If some products are not available, they are ordered by the supplier. If the purchase order can be satisfied, the customer receives a confirmation, otherwise the order is rejected.
Scenarios covered	IBM_SC_01, IBM_SC_05, Purchase_Order_Processing_01, Purchase_Process_Order_BPM

Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • Measuring, controlling, evaluating and improving the life cycle and the related processes • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques • Multi-level and self-adaptation • Self-* in service execution, discovery and registries • Feedback-based service discovery

Table C.5: Manage Supply Chain

Field	Description
Unique ID	IBM_AS_5
Short Name	Manage Supply Chain
Related to	IBM_BG_01, IBM_BG_02, IBM_BG_03, IBM_BG_04, IBM_BG_05, IBM_DA_03
Involved Actors	all
Detailed Operational Description	Such scenario is related to the management of the whole supply chain. It comprises the activities concerning monitoring, testing of the activities during the supply chain, and the possibility, for each partner, to communicate and interact with each other. Interaction could be guaranteed, for example, also in terms of coexistence of more versions of the same services in order to permit to each partner to adapt adequately itself to the new service. Note that not all the information exchange automatically occur, but in some case manual communications happen; for instance, using fax, ordinary mail, phone calls and so on. So, in some cases employees are in charge of manually inserting data in the related information systems. The management, monitoring and adaptation of the supply chain should consider all this aspects and depend on the actors involved in it.
Scenarios covered	Message_wrapper_1, SZTAKI_AUTONOMIC_CAR, Auto_Crosslayer-1, Auto_Crosslayer-4, Group-Reservation

Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • Measuring, controlling, evaluating and improving the life cycle and the related processes • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • HCI and context aspects in the development of service based applications • Context- and HCI-aware SBA monitoring and adaptation • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques • Multi-level and self-adaptation • Self-* in service execution, discovery and registries • Feedback-based service discovery • QoS Aware Adaptation of Service Compositions • Monitoring and Analysis of QoS-aware Service Compositions

Appendix D

E-Health Case Studies: Abstract Scenarios

The abstract scenarios proposed in the Section 4 for the e-Health case study are described below.

Table D.1: Access Health Data

Field	Description
Unique ID	EHEALTH_AS_1
Short Name	Access Health Data
Related to	EHEALTH_BG_01, EHEALTH_BG_04, EHEALTH_DA_02
Involved Actors	Doctor, Patient, Other Medical Staff
Detailed Operational Description	At anytime, a doctor could have the need to access to the health data (blood test results, X-ray images and so on) of a patient. During medical examination, or during a consultation with a colleague or an expert or even during an emergency, the doctor or anyone in the staff could access the data recorded online. Data might have been recorded in the same place or at a different place (for example at a different hospital) and the operators could have different devices to access them.
Scenarios covered	EHEALTH_S_01, EHEALTH_S_02, EHEALTH_S_03
Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • HCI and context aspects in the development of service based applications • Context- and HCI-aware SBA monitoring and adaptation • Exploiting the concept of service-based applications in the internet of things setting • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques

Table D.2: Treatment Prescription

Field	Description
Unique ID	EHEALTH_AS_2
Short Name	Treatment Prescription
Related to	EHEALTH_BG_03, EHEALTH_DA_02
Involved Actors	Doctor, Patient, E-Health Organization
Detailed Operational Description	The current abstract scenario, is about the prescription of a treatment for a patient. In particular, a doctor could decide that, on the basis of the results of a medical examination, a patient could need some treatment. In such case, the doctor, could reserve the required medical device and schedule an appointment.
Scenarios covered	SZTAKI_SELF-SCHEDULING, SZTAKI_PRESCRIPTION
Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • HCI and context aspects in the development of service based applications • Context- and HCI-aware SBA monitoring and adaptation • Exploiting the concept of service-based applications in the internet of things setting • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques

Table D.3: Planning and Execute a treatment or examination

Field	Description
Unique ID	EHEALTH_AS_3
Short Name	Planning and Execute a treatment or examination
Related to	EHEALTH_BG_03, EHEALTH_DA_02
Involved Actors	Doctor, Patient, E-Health Organization
Detailed Operational Description	The current abstract scenario, is about the execution of a treatment or an examination. After the prescription of a treatment, the E-Health organization is responsible for the organization and the planning of the treatment. We could image that the organization would to simulate the treatment in order to determine the level of expertise and resources required. Otherwise, we could image a scenario in which a patient, remotely could have the need to access to some devices to communicate the results of some examination (we can think about the patient who want to communicate the results of the self-monitoring of blood parameters).

Scenarios covered	SZTAKY_MED, Self-monitoring of blood glucose
Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • HCI and context aspects in the development of service based applications • Context- and HCI-aware SBA monitoring and adaptation • Exploiting the concept of service-based applications in the internet of things setting • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques

Table D.4: Expert Consultation

Field	Description
Unique ID	EHEALTH_AS_4
Short Name	Expert Consultation
Related to	EHEALTH_BG_02, EHEALTH_BG_05, EHEALTH_DA_02
Involved Actors	Doctor, Expert
Detailed Operational Description	A doctor could have the need to consult a colleague or an expert to make a diagnosis, for a consultation or simply, to have an opinion. Using the PDA or a computer, the doctor has to access to the directories and make a phone call to contact the suitable expert. The need to have an expert consultation could be even a scenario happening during an emergency.
Scenarios covered	EHEALTH_S_04

Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • HCI and context aspects in the development of service based applications • Context- and HCI-aware SBA monitoring and adaptation • Exploiting the concept of service-based applications in the internet of things setting • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques

Appendix E

E-Government Case Studies: Abstract Scenarios

The abstract scenarios proposed in the Section 5 for the e-Government case study are described below.

Table E.1: Exploit services provided by the e-government organization

Field	Description
Unique ID	TIS-ENG-AS1
Short Name	Exploit services provided by the e-government organization
Related to	TIS BG 1, TIS BG 3, TIS BG 4, TIS BG 5, TIS BG 6
Involved Actors	User
Detailed Operational Description	Such abstract scenario involves all the activities performed by a user accessing to a service made available by the e-government organization. After the login the user could choose among all the services the e-government organization offers. In particular he could require a document without reaching physically the delegated offices, or for example he could exploit other kind of services, as explained in the detailed scenario in [1, 2]. Moreover different services could be offered depending on the kind of user is accessing. Incorporating knowledge about end users in the engineering of SBAs is important for the development of applications suitable for use in varied, evolving environments. Related challenges include considering users diverse needs, skills and abilities, and translating them into corresponding sets of operations and qualities at the level of the SBA for a good user experience.
Scenarios covered	TIS-ENG-1, Journey planning, Number porting service

Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • HCI and context aspects in the development of service based applications • Context- and HCI-aware SBA monitoring and adaptation • Understand when an adaptation requirement should be selected • Proactive Adaptation and Predictive Monitoring • Quality Prediction Techniques to Support Proactive Adaptation • Run-time Quality Assurance Techniques

Table E.2: Pay the requested service

Field	Description
Unique ID	TIS-ENG-AS2
Short Name	Pay the requested service
Related to	TIS_BG_5, TIS_BG_6
Involved Actors	User, E-payment service
Detailed Operational Description	Some of the services offered by the e-government service could require the payment of a fee. So, if needed, after the submission of the request, the user has to insert the needed payment data that are validated by the e-payment service.
Scenarios covered	TIS-ENG-2
Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • Exploiting the concept of service-based applications in the internet of things setting • Understand when an adaptation requirement should be selected

Table E.3: Output Authentication

Field	Description
Unique ID	TIS-ENG-AS3
Short Name	Output Authentication
Related to	TIS_BG_5, TIS_BG_6
Involved Actors	User, E-Certifier service

Detailed Operational Description	Some of the services offered by the e-government service could require the authentication of the output provided by it. We could think that if the user wants a document, he would be assured about its authenticity. To this aim, the application should provide a mechanism to certify the output.
Scenarios covered	TIS-ENG-3
Challenges	• Definition of a coherent life cycle for adaptable and evolvable SBA • HCI and context aspects in the development of service based applications • Exploiting the concept of service-based applications in the internet of things setting • Understand when an adaptation requirement should be selected

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