

Describing Case Studies: the S-Cube approach

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1 Introduction

This document aims at providing an approach to describe case studies. The approach suggests a way to describe and classify case studies with the objective to make them comparable and reusable in the context of different projects. It is based on work developed within the S-Cube Network of Excellence¹.

Case studies descriptions can include different material, depending on their purposes. For instance, they can include a specific software solution or proof of concept, or they can simply describe an application case without offering a specific implementation solution. Of course, while in the first case the case study description contains also design, implementation, and even deployment and operation details, in the second case it should be implementation and technology agnostic.

In this document we refer to case study case descriptions of the second kind as they can be reusable assets that could be exploited as reference cases in the context of various projects. As such, the description should focus on *what* expectations the software should address more than on *how* these should be addressed. In other terms, the description should be focusing on eliciting those *goals* and *assumptions* that the software should address. (S-Cube, 2009a). Details about how to describe a case study are given in Section 2.

A proper classification allows us to cluster case studies according to their application domain and the research topics that are relevant for them. For this reason, we introduce two levels of classification:

¹ S-Cube NoE Web site: <http://www.s-cube-network.eu>

- *Domain-oriented classification*: it defines a high level classification that makes possible to identify in which domain a case study applies. This classification proposes a list of macro-areas inspired by the EC Workprogramme. Each case study is associated to one of these areas. (See Section 3.1)
- *Research-oriented classification*: it defines a classification of research challenges that are interesting in a given research area (see Section 3.2). Using this classification, a case study can be associated to research challenges that emerge from the case study or that needs to be addressed in order to develop a solution for the case study.

Based on this methodology, a public repository of case studies can be made available in the future. The projects will take advantage of this facility to publish their case studies. In addition, the proposed classification will be included in the repository to categorize the published case studies and to drive other projects to find the case studies most relevant for their research challenges.

2 Methodology

In order to make case studies comparable and easy to understand, S-Cube has defined a case study description approach based on the classical the Requirements Engineering literature (Jackson, 1995) and that leverages from the results achieved by NEXOF-RA (NEXOF-RA, 2009). S-Cube has also experimented the approach by revisiting a number of cases described in the NEXOF-RA deliverables. This has allowed us to highlight inconsistencies and incompleteness in the previous descriptions. According to the methodology, a case study is described in terms of:

- A list of *Business Goals* and *Domain Assumptions* for the case study.
- A *Domain description*.
- A list of *Scenario descriptions*.

2.1 Business Goal and Domain Assumptions

Business Goals define objectives to be pursued and functionalities to be offered. Domain Assumptions describe properties that are assumed to be true in a certain domain. Table 1 defines a template for describing Domain Assumptions and Business

Goals. The description includes the involved stakeholders, the rationale, the priority and the material supporting the description, if any.

Table 1 – Business Goal and Domain Assumption description template

Field	Description
<i>Unique ID</i>	Give a unique ID for this goal/assumption
<i>Short name</i>	Give a short name for this goal/assumption
<i>Type</i>	One of the following: <input type="checkbox"/> Business goal <input type="checkbox"/> Domain Assumption
<i>Description</i>	Specify the intention of the goal/assumption
<i>Rationale</i>	Give a justification of the goal/assumption
<i>Involved Stakeholder</i>	Stakeholders involved in the business goal/assumption
<i>Supporting materials</i>	Give a pointer to documents that illustrates and explain this goal/assumption (in particular those of domain analysis)
<i>Priority of accomplishment</i>	One of the following: <input type="checkbox"/> Must have: The system must implement this goal/assumption to be accepted. <input type="checkbox"/> Should have: The system should implement this goal/assumption: some deviation from the goal/assumption as stated may be acceptable. <input type="checkbox"/> Could have: The system should implement this goal/assumption, but may be accepted without it.
<i>Tentative scheduling</i>	Tentative scheduling of accomplishment. To be used only if the case study has to be implemented.

2.2 Case study Domain description

The set of phenomena occurring in the world together with the laws that regulate such world (e.g., physical laws, social rules, conventions that need to be respected) define the application domain. In the case a software system (a machine) is needed in order to fulfil certain goals, such machine needs to have an impact on the world. Thus, the two corresponding domains have to partially overlap. The phenomena that are at the intersection between the world and the machine are called shared phenomena. These

can be either controlled by the world and observed by the machine, or, conversely, controlled by the machine and observed by the world. The study of such phenomena is particularly important since they define the interface between the machine and the world. Of course, shared phenomena (and therefore scenarios) can be understood in the context of the world in which the machine will work and of the laws governing the world. Also, the boundaries between the world and the machine have to be clearly identified. In order to address these aspects we suggest to include in the case study domain description the following items:

- A glossary that defines the main terms of the world.
- A description of the relationships between the terms of the glossary. The glossary alone does not highlight the relationships between the various terms nor their relative importance. Thus we need to build a model that highlights these aspects. Class diagrams are usually a good tool for this purpose since they allow the engineer to identify main entities as classes and to express several kinds of relationships between these. Entity-relationship diagrams as well as semantic networks for our purposes have an expressive power that is similar to class diagrams and therefore can be used as well.
- A description of any law that is relevant in the world. Such laws can be expressed in any form that is typical of the application domain that we are considering: mathematics, logics, natural language, ...
- Strategic Dependency Diagrams (SDDs) (I*). These are used to model the dependencies between the different actors in the organisational context. They especially help to model user (roles) together with their relations. Dependency edges in the diagram link the actors with needs (dependers) to actors with the capability of meeting those needs (dependees). The needs are expressed in terms of goals (positioned on the edges).
- Context Diagrams (CDs) (Jackson, 1995). These identify the agents that operate in a certain context as well as the machine that needs to be developed. Moreover, they highlight the phenomena shared between agents and machine. Figure 1 shows the notation of context diagrams. In a context diagram, any active entity on the case study to be modeled is represented as a box, while a directed arrow describes phenomena between agents. Both the SDDs and the CDs represent the

agents/actors involved in the domain, but while the SDDs show the dependencies among them, CDs highlight also other kinds of relationships among them. Moreover, they clearly identify the boundaries between the machine and the world.

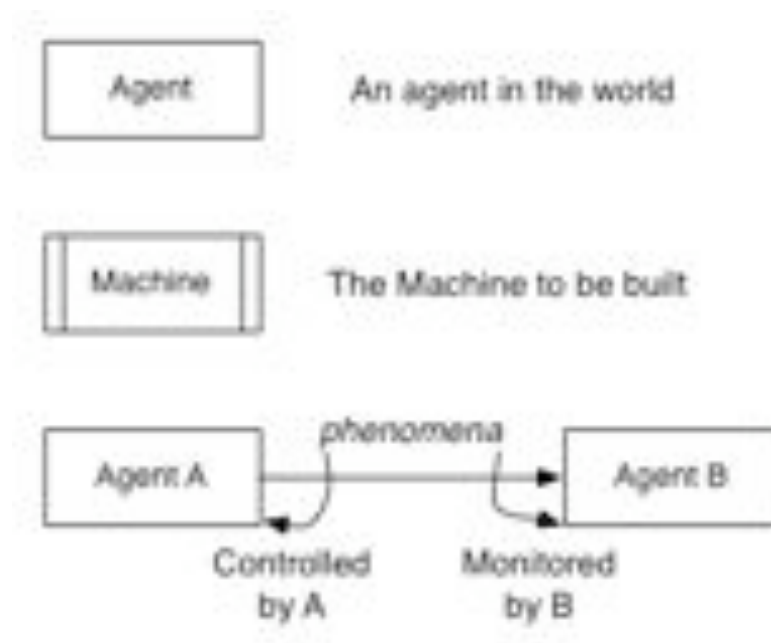


Figure 1 - Context Diagram notation

2.3 Scenario description

The phenomena shared between the world and the machine can be detailed through scenario descriptions. Scenarios have an operational flavour in the sense that they describe the steps that need to be followed by the machine and the world entities in order to accomplish a certain task.

Table 2 describes how scenarios should be detailed and described, and it should be used as a template for any single scenario description. Here, a scenario is described using information about the business goals or the domain assumptions they refer to, the operational description of the scenario, the possible problems involved and the supporting material.

Table 2 - Scenario description template

Field	Description
<i>Unique ID</i>	Give a unique ID for this scenario
<i>Short name</i>	Give a short name for this scenario

<i>Related to</i>	Specify the goal/assumption ID to which the scenario is related
<i>Involved actors</i>	Specify the actors involved in the current scenario
<i>Detailed operational description</i>	Give a textual description of the scenario
<i>Problems and challenges</i>	Describe the specific problems that each scenario addresses or that consumers and providers face
<i>Additional material</i>	UML diagrams supporting the understanding of the scenario

2.4 Applying the methodology

The description of Business Goals, Domain Assumptions, Domains, and Scenarios are not necessarily obtained through a sequential process that starts from the identification of the goals then moves to the analysis of domain, and, finally, to the description of scenarios. Instead, as in many other highly intellectual processes, it is more likely to proceed iteratively, starting from any of the three points and compiling them more or less in parallel. What we can do is to provide a non-exhaustive list of simple rules that allow us to understand when we can decide that our case study description has reached a reasonably good form:

- The terms used in the scenarios and in the identification of the business goals and of the assumptions are properly described in the glossary and they are related to the other terms in the domain model.
- The entities identified in the domain model are used in some scenario or in some business goals and domain assumptions description.
- All actors that have been identified in the scenarios appear also in the context diagram (and/or in the Strategic Dependency diagram) and vice versa.
- From each scenario there exist at least one related business goal and vice versa.
- Scenarios are not overlapping. Relationships are possible but they should be explicitly identified.
- Goals are not overlapping. Relationships are possible but they should be explicitly identified.

3 Classification

3.1 Domain-oriented classification

As a first level of classification, each case study needs to be associated to an application domain. A list of possible application domain includes, and it is not limited to, the following topics:

- Business Application
 - Small Medium Enterprise
 - Large Enterprise
- E-Government
 - Government to Government
 - Government to Citizen
- Utilities
 - Transportation
 - Power supply

3.2 Research-oriented classification

An orthogonal classification considers the research topics that could have potential impact on a case study. In more detail, research topics are organized in two layers (S-Cube, 2009b):

- *Research challenges*. They define long-term research goals w.r.t. to the goals of research project in which the case study had been defined. For instance, in S-Cube, several research challenges around the life cycle of Service Based Applications are defined. As an example we have:
 - QoS Aware Adaptation of Service Compositions
 - Proactive Adaptation and Predictive Monitoring
- *Research questions*. Associated to a research challenges, a set of research questions may exist identifying specific short-terms research objectives. For instance, referring to the “QoS Aware adaptation research” challenge listed before, the following research questions can be identified:
 - Adaptation of QoS-aware Service Compositions based on Influential Factor Analysis and Prediction.

- How can cost-based derivation of data-aware QoS for a service composition be used to drive adaptation?
- Linkage between Business Transactions and Service Compositions.

Relationships between a case study and one or more research questions should be defined and the rationale behind each of these associations needs to be properly described. In particular, a relationship exists if the case study will be used to give a valid answer to a research question, or a research question is highlighted by a typical situation as described in the case study.

4 Bibliography

(Jackson, M. 1995). *Software requirements & specifications: a lexicon of practice, principles and prejudices*. New York, NY, USA: ACM Press/Addison-Wesley Publishing Co. .

(I*) "i-star software formalism," http://www.ics.uci.edu/_alspauh/software/istar.html.

(NEXOF-RA, 2009). *NESSI Open Framework - Reference Architecture (NEXOF-RA): Scenarios and Requirements for Open Framework Construction*.

(S-Cube, 2009a). *Deliverable CD-IA-2.2.2 - Collection of Industrial Best Practices, Scenario and Business Cases*.

(S- Cube, 2009b). *Deliverable CD-IA-3.1.1 - Integration Framework Baseline*.

Appendix A Win production case study

A.1 Context

This case study describes the management of a complex diagnostic workflow in a EHealth environment. The case study has been derived from the EU Project NEXOF (<http://www.nexof-ra.eu/>), and adapted to the different description format, methodology and case study requirements described previously in this document. The companies within NEXOF that proposed it are Siemens (<http://www.siemens.com>) and Thales (<http://thalesgroup.com>). The typical scenario of this case study essentially involves a consultation in a hospital, in a care centre or at a local doctor, where typical activities are carried out when the doctor examines the patient. Thereby, the overall focus is either on determining the patient's complete health status, which enables the doctor to recommend further actions, or on integrating useful services in the workflow once the complete health status is determined and the doctor is about to take diagnostic measures. This case study becomes generally relevant due to the demographic change and to increasing costs, which enables IT-integrated healthcare (EHealth) to become more effective by using its resources more efficiently. Therefore, IT support is a critical factor in hospital workflows and diagnostic workflows. EHealth seeks to provide new kind of services and a better integration of new and existing ones, thus supporting the work of the overall healthcare staff. In particular, this case study takes the viewpoint of medical staff and the patient during a diagnostic workflow. It does not address administrative hospital workflows like patient admission, accounting and the like, though integration would be very reasonable. The actors involved in this case study are individuals including patients, doctors, experts and other medical staff, such as nurses, pharmacists, physical therapists. We also include the EHealth Organization as an actor, which represents hospitals including laboratories, pharmacies, nursing facilities and more generally, all health services and clearinghouses.

A.2 Business Goal and Domain Assumptions

In the following sections the Business Goals and the Domain Assumptions for the current case study will be reported.

Field	Description
<i>Unique ID</i>	EHEALTH-BG1
<i>Short name</i>	Ubiquitous and immediate access to patient data
<i>Type</i>	Business Goal
<i>Description</i>	The system shall be able to reduce the overall duration of healthcare activities through ubiquitous and immediate access to patient data. Patient data shall be recorded from any activity of the medical staff, that is, Doctors directly involved in the patient's diagnosis, but also staff persons performing only examinations or treatments prescribed by the Doctor. Moreover, any data coming from consultations of experts shall be recorded and made available. Patient data shall be ubiquitously available for the Doctor for further examinations.
<i>Rationale</i>	Improve the effectiveness and reliability of healthcare activities. Reduce costs of healthcare activities.
<i>Involved stakeholders</i>	Doctors, Patients, Other medical staff
<i>Conflicts</i>	None
<i>Supporting materials</i>	None
<i>Priority of accomplishment</i>	Must have

Field	Description
<i>Unique ID</i>	EHEALTH-BG2
<i>Short name</i>	Ubiquitous access to expert consultancy
<i>Type</i>	Business Goal
<i>Description</i>	The system shall facilitate the ubiquitous access to expert consultancy whenever a doctor working for a diagnosis for a specific patient needs it. The system shall provide easy access to expert address books, facilitate phone calls and should even provide mechanism to automatically manage full collaborative environments for medical experts.
<i>Rationale</i>	Improve the effectiveness and reliability of healthcare activities. Reduce costs of healthcare activities.
<i>Involved stakeholders</i>	Doctors, Experts
<i>Conflicts</i>	None
<i>Supporting materials</i>	None
<i>Priority of accomplishment</i>	Must have

Field	Description
<i>Unique ID</i>	EHEALTH-BG3
<i>Short name</i>	Easier planning of examinations and treatments
<i>Type</i>	Business Goal
<i>Description</i>	The system shall be able to improve the reliability of healthcare activities through easier planning of examinations, therapies and any kind of treatments. The system shall be able to prevent, avoid or reduce human errors by facilitating medical expert interactions.
<i>Rationale</i>	Improve the effectiveness and reliability of healthcare activities. Reduce costs of healthcare activities.
<i>Involved stakeholders</i>	Doctors, Patients, Other medical staff, EHealth Organization
<i>Conflicts</i>	None
<i>Supporting materials</i>	None
<i>Priority of accomplishment</i>	Must have

Field	Description
<i>Unique ID</i>	EHEALTH-DA1
<i>Short name</i>	Device integration and vertical integration
<i>Type</i>	Domain Assumption
<i>Description</i>	<p>The system shall consist of devices fully integrated in service-oriented architectures, that is, it shall be vertically integrated. For different kind of devices different embedded SOAs have to be developed including respective standards. The system shall provide a dependable device integration which will enable the data from different devices to be accessible in a dependable way. The complex diagnostic workflow system shall provide dependable access when the devices are used during a diagnosis or for monitoring a patient's health status, that is, after the health data is integrated into application specific workflows, it shall be accessible in a dependable way.</p> <p>In practice, there exist domain specific standards or best practices for device handling, such as the Microsoft Connected Health Framework (CHF) or the Eclipse OpenHealthFramework. Such standards are of great importance to the developers of applications for devices. These standards often contain domain specific information models and/or protocols and hence substantially facilitate the application development and interoperability.</p>
<i>Rationale</i>	Enforce overall system integration, dependability, and adaptability
<i>Involved stakeholders</i>	Doctors, Other medical staff
<i>Conflicts</i>	None
<i>Supporting materials</i>	None
<i>Priority of accomplishment</i>	Could have

Field	Description
<i>Unique ID</i>	EHEALTH-DA2
<i>Short name</i>	Compliance to Health Privacy and Security requirements
<i>Type</i>	Domain Assumption
<i>Description</i>	The system should be compliant to security and privacy functions regarding treatments, services, workflows and individual services interactions. For example, in the Health domain the US-regulations are defined within the HealthPortability and Accounting Act (HIPAA) Privacy and Security rules. This standard covers all health stakeholders: individuals including doctors, nurses, pharmacists, physical therapists and organisations including hospitals, laboratories, pharmacies, nursing facilities and more generally, all health services and clearinghouses. The privacy and security rules require safeguarding all PHI (e.g. Protected Health Information).
<i>Rationale</i>	Effectively manage security and privacy policies, by relying on recognized standards in the world of healthcare. Without this requirement, a specific security and privacy policy will have to be defined.
<i>Involved stakeholders</i>	Doctors, Patients, Other medical staff, EHealth Organization
<i>Conflicts</i>	None
<i>Supporting materials</i>	Some documents that illustrate and explain this requirement: <ul style="list-style-type: none"> • http://www.hipaa.org/ • http://www.hhs.gov/ocr/hipaa/finalreg.html • http://privacyruleandresearch.nih.gov/resources.asp • http://www.hipaacomply.com/ • http://www.ioma.org/pdf/iomahipaahelp.pdf
<i>Priority of accomplishment</i>	Should have

A.3 Domain analysis

Strategic dependency model and context diagram

Figure 1 illustrates the strategic dependency diagram of the case study. The diagram puts in evidence the business goals shared among the related actors. For example, in the diagram we can note that the Doctor makes a diagnosis for the Patient, and plans examinations and treatments, which are managed by the EHealth Organizations. He/She can also request a consultancy to some experts. Moreover, the medical staff can monitor patient's data.

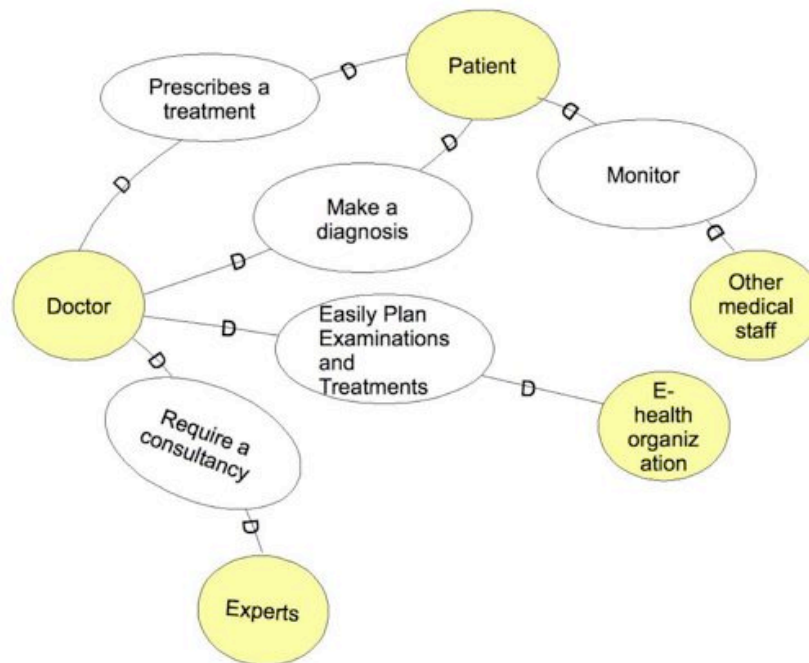


Figure 1 - Strategic dependency diagram

Figure 2 illustrates the context diagram of the current case study. In the context diagram, all the actors that appear in the business goals and scenarios are agents.

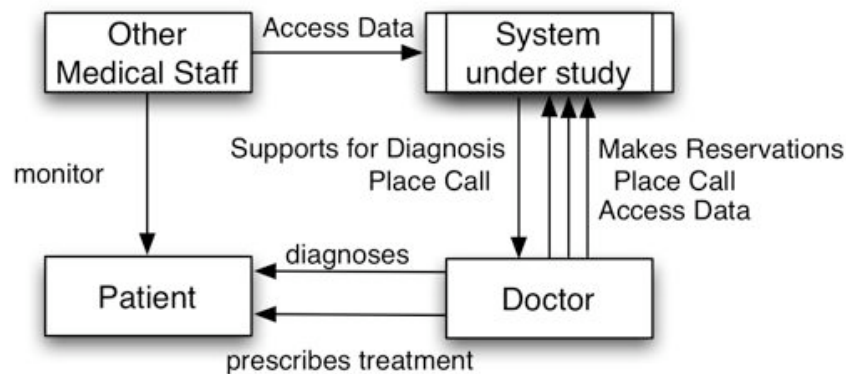


Figure 2 - EHealth context diagram

Domain model

Figure 3 illustrates the domain model of the current case study. The model is represented using a UML notation. In particular the model shows the entities of the scenario, the actors and the relationship among them.

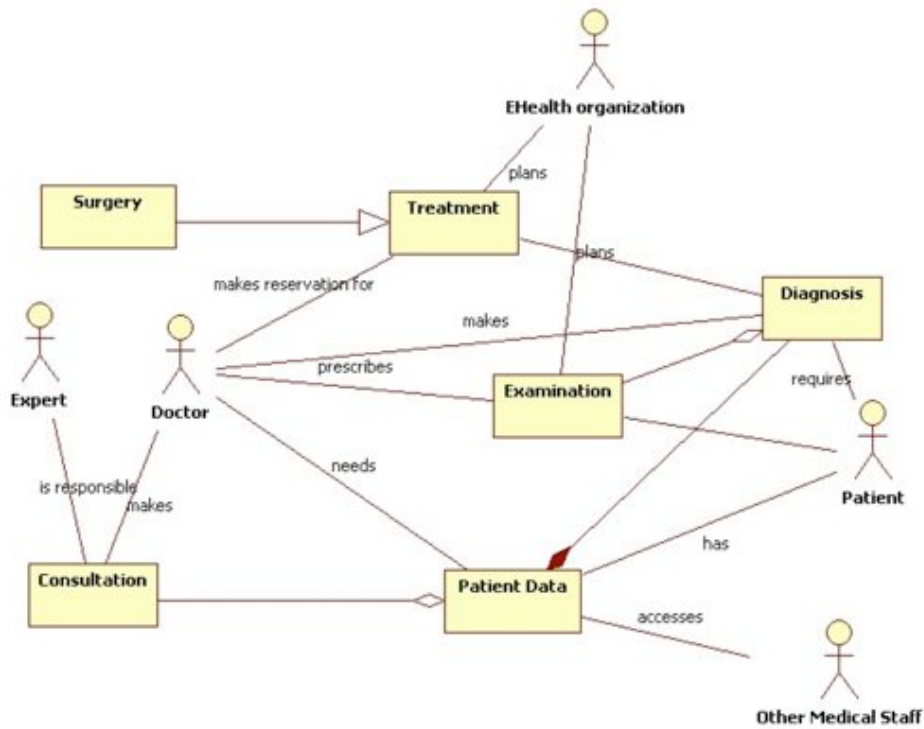


Figure 3 - Domain model

A.4 Scenarios

Figure 4 shows the general use-case diagram for the EHealth case study.

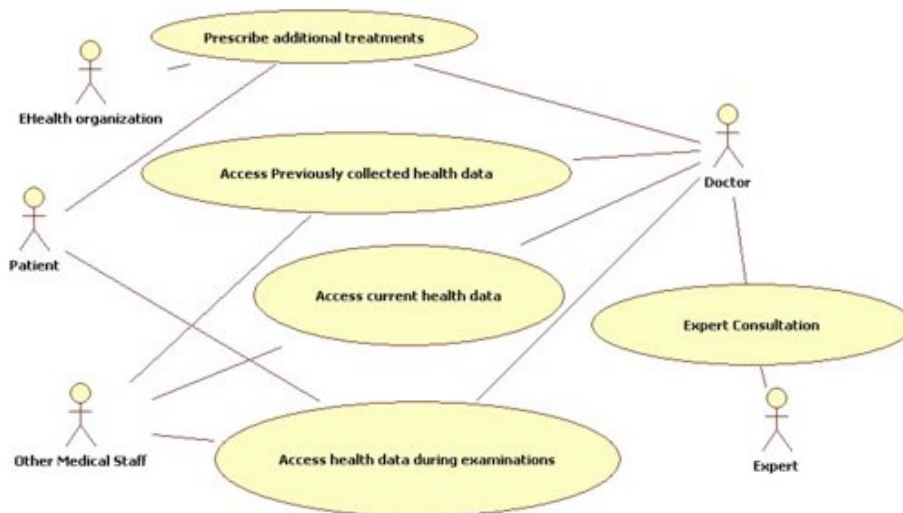
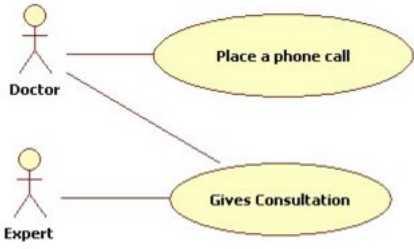


Figure 4 - General Use case diagram

Field	Description
<i>Unique ID</i>	EHEALTH-S1
<i>Short name</i>	Access previously collected health data
<i>Related to</i>	EHEALTH-BG1, EHEALTH-DA2
<i>Involved actors</i>	Doctor, Other medical staff
<i>Detailed operational description</i>	During the medical examination, the doctor or other medical staff may need access to the patient's previously recorded and now archived health data (that is, blood test results, X-ray images, etc.) which were either recorded in the same location or at a different place. For instance, this data might have been recorded at a different hospital (which possibly belongs to a different hospital chain).
<i>Problems and challenges</i>	<p>The problems and challenges related to this scenario are the following:</p> <ul style="list-style-type: none"> • Legal and technical issues with distributed and shared patient records • Integration across domains • Horizontal (enterprise information systems) and vertical integration (devices) • Platform heterogeneity, interoperability • HIPAA privacy and security compliance • Patient chart authorization access and protection • Procedure that maintain electronic protected health information to allow access only to those persons or programs that have been granted access rights • Emergency access procedure for obtaining necessary electronic protected health information during an emergency • Dependability, performance, security, and trust
<i>Additional materials</i>	None

Field	Description
<i>Unique ID</i>	EHEALTH-S2
<i>Short name</i>	Access current health data
<i>Related to</i>	EHEALTH-BG1, EHEALTH-DA2
<i>Involved actors</i>	Doctor, Other medical staff
<i>Detailed operational description</i>	The doctor also needs access to the data recorded online during the consultation by either the doctor himself or his assistants. He may, in addition, need data that was recorded shortly before the consultation, or that was collected in the hospital or at home during a long-term monitoring with a mobile diagnostic device like, for instance, an ambulatory blood pressure unit. It is even conceivable that the doctor would use diagnostic data received from nanobots (that is, agent-like devices of nanometre-size brought into a human body for diagnosis or even for therapy). In addition, whatever kind of data he is using, the doctor should be supported in his analysis by expert systems and databases.
<i>Problems and challenges</i>	<p>The problems and challenges related to this scenario are the following:</p> <ul style="list-style-type: none"> • Integrate on demand data from various devices • Store working sessions and allow to move sessions between devices • Integration of distributed workflows, distributed transactions, federated identities • Integration across domains • Horizontal (enterprise information systems) and vertical integration (devices) • Platform heterogeneity, interoperability • HIPAA privacy and security compliance • Use or disclosure of Protected Health information (PHI): Health • Mitigation procedures to address unauthorized user • Patient chart authorization access and protection • Dependability, performance, security, and trust
<i>Additional materials</i>	<p>Sub use case:</p> <pre> graph LR Doctor((Doctor)) --- ACDA([Access Consultation Data]) Doctor --- RCD([Record Consultation Data]) OMS((Other Medical Staff)) --- ACDA OMS --- RCD </pre>

Field	Description
<i>Unique ID</i>	EHEALTH-S3
<i>Short name</i>	Access health data during examinations
<i>Related to</i>	EHEALTH-BG1, EHEALTH-BG4, EHEALTH-DA2
<i>Involved actors</i>	Doctor, Patient, Other medical staff
<i>Detailed operational description</i>	To reach a diagnosis during a complex examination, the doctor may need to use several devices in several locations. The devices could be a general-purpose handheld computer or a specific integrated device for medical diagnostics, for instance, an X-ray device. They are often located in the same hospital, but also their usage in a different place, e.g. the patient's home, is conceivable. For the execution of patient checks a doctor could exploit different devices. In this case, their status has to be properly aligned.
<i>Problems and challenges</i>	<p>The problems and challenges related to this scenario are the following:</p> <ul style="list-style-type: none"> • Integrate on demand data from various devices • Store working sessions and allow to move sessions between devices • Integration of distributed workflows, distributed transactions, federated identities • Integration across domains • Horizontal (enterprise information systems) and vertical integration (devices) • Platform heterogeneity, interoperability • HIPAA privacy and security compliance • Patient chart authorization access and protection • Emergency access procedure for obtaining necessary electronic protected health information during an emergency • Dependability, performance, security, and trust
<i>Additional materials</i>	<p>Sub use case</p> <pre> graph TD Doctor((Doctor)) --- Execute(Execute Examination) Doctor --- Record(Record Examination Data) Doctor --- Access(Access Examination Data) Patient((Patient)) --- Execute OtherMedicalStaff((Other Medical Staff)) --- Access </pre> <p>The diagram illustrates the interactions between three actors and three use cases. The actors are Doctor, Patient, and Other Medical Staff, represented by stick figures. The use cases are Execute Examination, Record Examination Data, and Access Examination Data, represented by yellow ovals. The Doctor is connected to all three use cases. The Patient is connected to Execute Examination. Other Medical Staff is connected to Access Examination Data.</p>

Field	Description
<i>Unique ID</i>	EHEALTH-S4
<i>Short name</i>	Expert consultation
<i>Related to</i>	EHEALTH-BG2, EHEALTH-BG5, EHEALTH-DA2
<i>Involved actors</i>	Doctor, Expert
<i>Detailed operational description</i>	The doctor might need to call a colleague for consultation or to evaluate a specific result. To this end, the doctor has access to directories and can place a phone call by one mouse-click from just the computer he uses at that moment. This feature may be taken a step further to collaborative environments and expert call centres.
<i>Problems and challenges</i>	<p>The problems and challenges related to this scenario are the following:</p> <ul style="list-style-type: none"> • Legal and technical issues with distributed and shared patient records • Store working sessions and allow to move sessions between devices • Integrate external applications (telephony, reservation, external patient records) • Integration of distributed workflows, distributed transactions, federated identities • Integration across domains • Horizontal (enterprise information systems) and vertical integration (devices) • Platform heterogeneity, interoperability • Procedure that maintain electronic protected health information to allow access only to those persons or programs that have been granted access rights • Emergency access procedure for obtaining necessary electronic protected health information during an emergency • Dependability, performance, security, and trust
<i>Additional materials</i>	<p>Sub use case</p>  <pre> graph TD Doctor((Doctor)) --- UC1([Place a phone call]) Doctor --- UC2([Gives Consultation]) Expert((Expert)) --- UC2 </pre> <p>The diagram shows two actors: Doctor and Expert. The Doctor actor is connected to two use cases: 'Place a phone call' and 'Gives Consultation'. The Expert actor is connected to the 'Gives Consultation' use case.</p>

Field	Description
<i>Unique ID</i>	EHEALTH-S5
<i>Short name</i>	Prescribe additional treatments
<i>Related to</i>	EHEALTH-BG3, EHEALTH-DA2
<i>Involved actors</i>	Doctor, Patient, EHealth Organization
<i>Detailed operational description</i>	If the doctor decides as a result of the medical examination that the patient needs additional treatment, he could easily reserve the necessary medical device or make the respective appointment (by, for instance, just clicking a button).
<i>Problems and challenges</i>	<p>The problems and challenges related to this scenario are the following:</p> <ul style="list-style-type: none"> • Store working sessions and allow to move sessions between devices • Integrate external applications (telephony, reservation, external patient records) • Integration of distributed workflows, distributed transactions, federated identities • Integration across domains • Horizontal (enterprise information systems) and vertical integration (devices) • Platform heterogeneity, interoperability • HIPAA privacy and security compliance • Procedure that maintain electronic protected health information to allow access only to those persons or programs that have been granted access rights • Emergency access procedure for obtaining necessary electronic protected health information during an emergency • Dependability, performance, security, and trust
<i>Additional materials</i>	<p>Sub use case</p> <pre> graph LR Patient((Patient)) --- MakeReservation((Make reservation)) Doctor((Doctor)) --- MakeReservation EHealthOrganization((EHealth organization)) --- MakeReservation MakeReservation --- MakeReservationForExamination((Make Reservation for Examination)) MakeReservation --- MakeReservationForTreatment((Make Reservation for a Treatment)) MakeReservation --- MakeReservationForSurgery((Make Reservation for Surgery)) </pre> <p>The diagram illustrates a use case for 'Make reservation'. It features three actors: Patient, Doctor, and EHealth organization, each connected to a central use case 'Make reservation'. This central use case is further decomposed into three sub-use cases: 'Make Reservation for Examination', 'Make Reservation for a Treatment', and 'Make Reservation for Surgery'.</p>