



Scenarios

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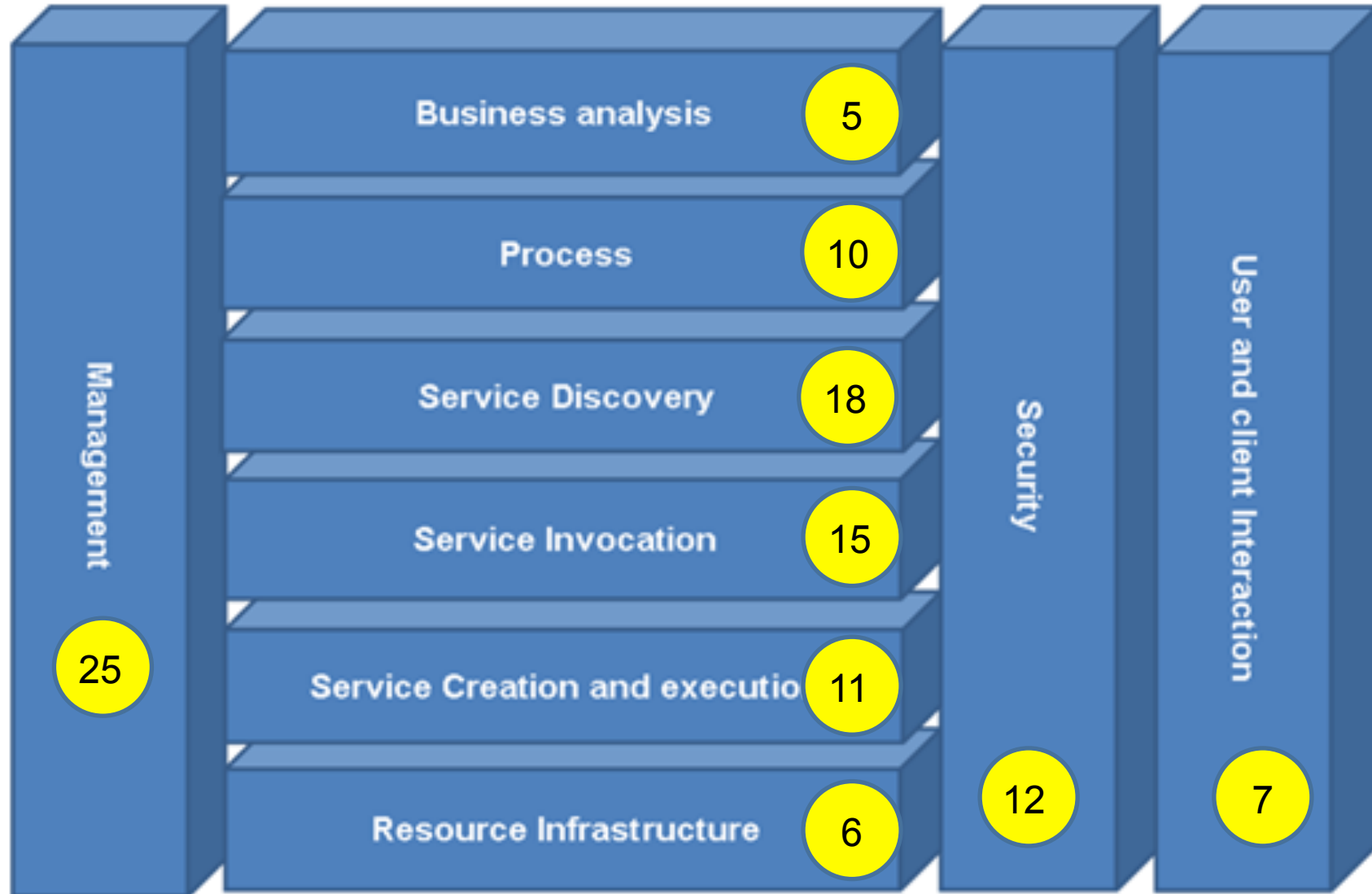


Leader of:
NEXOF-RA Requirements and assessment criteria



- Requirements
 - 17 usage scenarios collected
 - 89 high-level requirements collected
 - Coverage of all the macro elements of the architecture
- The templates for scenarios and requirements collection

NEXOF-RA Draft architecture



1. Service procurement
2. Service lifecycle support
3. Management services for grid and service platforms
4. PhiMas: personal health information monitor and alert service
5. Collaborative e-learning scenario
6. Deployment and configuration of a generic platform (e.g. an e-Learning one)
7. e-Health: complex diagnostic workflow
8. e-Health: assisted living
9. Traffic management: large scale emergency handling
10. Crisis management system of systems
11. Effective and efficient collaborative decision making
12. e-Commerce information sharing
13. Mobile office for an owner of a micro-enterprise
14. Safety at work in the construction sector
15. e-Government online application submission service
16. e-Government online fee visualization and payment Service
17. Assisted Industrial Maintenance (using 3D virtual environments)

Provider	#
BT	2
Siemens	4
Thales	4
SMEs	9

- Structure
 - Description
 - Rationale
 - Applies to
 - Challenges
 - Architectural considerations



Scenario 1

e-Health: assisted living (Siemens/Thales)



- **Assisted living systems** are supposed to support persons with a chronic illness or those with a need for **constant medical surveillance** (as, for instance, elderly people) in a way that they can live at home.
- This **scenario refers to devices** such as, for instance, blood pressure units or blood glucose meters that are operated either by the patient, by a nurse, by a paramedic or by another member of an ambulance crew.

- A doctor may even **operate those devices remotely**. Also appliances continuously surveying essential vital functions of the patient may be utilised.
- Each **device transmits its measurement results to a PC** that provides instant analysis but also long term monitoring.
- Via the Internet, the PC can also **access environmental information**.

- From the data gathered, a **diagnosis can be derived** either in the **home** of the patient **or remotely** in the doctor's practice or in the hospital
- Nurses or physiotherapists may also use the data to, for instance, provide remotely recommendations for physical exercise or to give detailed dietary advice based on the day's health condition of the patient – and without contacting the patient personally every day.

- The **data is also made available** to a doctor during a regular check up.
- The development of the patient's health condition is stored in an **electronic patient record** that will also be accessible during a possibly future stay at a hospital or in case of an emergency.
- If the vital functions degrade in a dramatic way, the **assisted living system can trigger an alarm**; the arriving ambulance crew can, of course, access the patient's healthcare record as well.

- **To face the demographic change**, society has to improve healthcare for elderly people.
- **Healthcare at home** will see major changes especially in the field of prevention and monitoring, as these are drivers for cost reduction in the health system while at the same time they help improving the quality of life for elderly people.
- The term “assisted living” has been coined for IT-based solutions that allow the elderly to stay independent while receiving optimal healthcare.

- **Service consumers:** there are various user roles:
 - The assisted person (patient) who may operate some of the services by him- or herself
 - The medical personnel (nurses, doctors, diet advisors, etc.)
 - An ambulance crew which may use the services of the assisted living system in case of an emergency

(The access to the services and data of the assisted living system is restricted by the respective user role.)

- **Service providers:** most services run on devices, some run in a hospital or care centre involved in monitoring the assisted person, some external services may be integrated, for instance a weather forecast with information about the pollen count (if the patient is allergic and needs this kind of information).

- **Service integrators/developers:** a healthcare centre offering an “Assisted Living Service” may be confronted with the need to configure selected services.
- For instance, **services** providing pollen count may differ according to the geographic region.
- It may also be the case that **different monitoring services** of different hospitals have to be used.
- Or the **services related to patient health records** are different in different regions depending on, for instance, governmental regulations.

- **On a technological level:** Integration of devices with enterprise software while providing availability
- **On a business process level:** Coordination (orchestration) of the different workflows of the involved stakeholders (doctors, nurses, physiotherapists, ambulance crews, etc.); furthermore, provision of a secure access to a potentially distributed patient record

- **On a management level:** Collaboration of different public and private institutions with different responsibilities across boundaries; in particular public institutions belong to different administrative areas (local, regional, national and European) with usually different regulations
- **On the compliance level:** Compliance with privacy and security rules as, for instance, posed by the US-Congress-enacted Health Insurance Portability and Accountability Act (HIPAA), which, in the context of this scenario, particularly addresses healthcare providers

- Heterogeneous platforms
- Device integration



Scenario 2

Traffic management: large scale emergency handling (Siemens)



- This scenario assumes a **large area with loosely coupled traffic management systems**, operated by local and regional authorities. The scenario distinguishes the “normal situation” and the “emergency case”

Initial (normal) situation

- In a certain area, **various municipal and regional traffic systems** are available and they guide (long distance) highways as well as village, township and city traffic.
- They are **tailored to the respective local conditions**, depending on the time of the day.
- According to the **known and expectable traffic situations**, they **control and direct the traffic** control devices (traffic lights, directions of multi-line highway lanes, lane and street closures, etc.), optimising probably throughput or other set parameters (as for instance air pollution or noise reduction).

Initial (normal) situation

- The local traffic control systems **integrate the needs of pedestrians, bikers, car driver, etc.** and take into account school hours or other factors, which alter, traffic demand.
- There is a host of **distributed devices providing input** on traffic density, car speed, air pollution, traffic light status, congestion indicators, etc.

Initial (normal) situation

- The **devices** used in the various traffic systems are **rather diverse**, even if they perform the same or similar functions (this is due to the devices' longevity and that they are provided by various firms during the life time of a traffic system; their diversity is also largely caused by the independence and the lacking co-operation of the political institutions involved in the acquisition and maintenance of the respective traffic systems).

- Due to a **serious accident**, a highway has to be closed. This means that
 - **rescue forces** have to be directed to the location of the accident and their arrival has to be facilitated;
 - the **traffic has to be deviated** through places not intended for heavy traffic.
- Consequently, **conflicting and unforeseen situations** will occur. The control has to be reconfigured according to **unplanned control patterns**, which perhaps have been already used at other locations where they are offered for re-use.

- Those **available or retrievable control patterns** have to be configured to optimise the local situation, taking into account the changed conditions and the still remaining local settings (the local theatre, for instance, will – notwithstanding the emergency situation – still close at the announced time).
- **Deviation roads have to be selected accordingly.** Signalling patterns (traffic light phases) have to be adapted in order to reduce stop & go traffic (that should help to kept air pollution low).

- Decisions have to be integrated in order to keep “**feature interactions**” with undesirable results at bay (that is, two actions, each being strictly goal directed and effective itself, may result in a disaster if applied together).
- **Return to the “normal situation”**: There is probably a slow evolution back to the “normal”.
- If measures have to be taken immediately in the emergency case, to revert to the normal situation may require a slow process that has to be is carefully reacting on the various inputs from the traffic sensors.

- In large urban agglomerations, an **appropriate traffic management** is imperative in order to ensure the quality of life for the residents.
- Since traffic does not stop at administrative boundaries, **traffic management systems have to integrate across cities, townships and rural districts** (at least in those nearby to urban areas).
- There are many different **strategies adapted to the respective local situations**. In case of emergencies, when the traffic pattern changes drastically, these optimal local strategies may become problematic and be probably even a reason for congestions themselves.

- In particular, if **ecological objectives are also pursued** (for instance, to keep air pollution low), these strategies have to be adapted swiftly.
- Traffic management is a complex task. It has to cope with a **large amount of different sensors** and their data, a large number of rules, many algorithms and various mechanisms.
- The need for **federation in hetherogeneous** settings makes things even more complex.
- The scenario deals with unexpected change in such an environment.

- **Service consumers:**
 - the consumers of the outcome of the traffic management system in the scenario are the traffic participants, that is, primarily the **citizens**, the drivers of cars, motor bikes and bicycles, but also the **drivers and users of public transport**, and of course, the **rescue forces** which need to get to the site of the accident.

Scenario applies to

- The problems to be solved are manifold: any **traffic congestion should be avoided** or at least minimized; additional pollution of the environment (due to a high traffic volume) should be reduced; access of the emergency area should be facilitated for emergency vehicles (ambulances, fire brigade, police).
- The traffic management system has to **react rather quickly to emergencies**. Other regulations may be performed at a lower pace.
- Managing traffic is an administrative task that has to be performed by the local authorities. Thus, the consumers (that is, the citizens) support it with their tax money.

- **Service providers:**
 - basically, the **local authorities** can be assumed to be the provider of a traffic management system.
 - However, provision may be **outsourced** to a private firm, which acts on behalf of the local authorities.

- **Service integrators/developers:**
 - Local authorities **cannot be expected to develop a traffic management system themselves.**
 - There will be an IT system provider; actually, it can be assumed that there are **several providers with different systems.**

- Also, the **sensors** that enable the traffic management system to identify certain situations will presumably be **provided by different enterprises**.
- However, local authorities have to decide about the **traffic management strategies**, which mirror the political goals (for instance with respect to ecological ambitions of a certain city council, etc.).

- Integration of **several traffic management systems** with different strategies (cities, rural areas)
- Integration of many **heterogeneous devices** (traffic control devices like traffic lights and variable direction signs, traffic monitoring devices, etc.)
- **Acquisition of adequate new strategies** (control algorithms) in order to react upon an unexpected situation
- **Constant evolution**
- **Dependability, performance** (emergency reactions), **security** and **trust** (in particular with respect to the acquisition of new strategies)

- The **devices involved** in this scenario have to be manifold: desktop PCs, handheld computers, diagnostic devices, etc. They are connected either peer-to-peer, through the hospital intranet or via Internet, including wireless communication.

QUESTIONS?



Overview of the 17 scenarios



- Describes a service procurement scenario, in which a potential consumer can query a search engine for services corresponding to his needs.
- Advantages
 - flexibility,
 - reduced costs (particularly in pay per use environments) and
 - ability to switch between suppliers as the need arises, to benefit from either better pricing or better service.

- Describes a facility that supports the entire life cycle of a service.
- This starts from defining a service concept and then goes right through to ultimate withdrawal and decommissioning.
- As services in the ecosystem envisaged by NESSI may have complex relationships with each other, which are not under the sole control of a single party, it is important that the Reference Architecture ensures that services are manageable throughout their whole life

Management services for grid and service platforms

- Describes services to manage and maintain grid and service networks.
- As a concrete example, the Large Hadron Collider computing Grid in CERN is discussed.

- Describes the services involved with PhiMas, a personal monitor and alert system for
 - elderly people;
 - people who need personal care while recovering from injuries or
 - people that are disabled.

- Describes the services used within a collaborative learning approach based on the definition and execution of a learning experience.

- Describes the services used for the deployment of a platform.

- Describes services useful in the workflow of determining the patient's complete health status

- Describes services used in assisted living systems, systems that support persons with a chronic illness or those with a need for constant medical surveillance.
- This scenario refers to devices such as, e.g., blood pressure units or blood glucose meters that are operated either by the patient, by a nurse, by a paramedic or by another member of an ambulance crew.

- This scenario describes services used in the traffic management domain to handle emergency cases, like the direction of rescue forces to the location of the accident as well as the deviation of traffic through places not intended for heavy traffic.

- Describes services used for the necessary interactions between different organizations in order to mitigate the crisis and reduce the impact of a crisis situation occurring at for example an airport.

- Describes services used in collaborative decision making applications, i.e.
 - the sharing of business operation (e.g. flight plan operation) information between multiple and different systems, and
 - implementation of new collaborative components and services to improve the efficiency of the operations based on a “system-wide” approach.

- Describes the services used in the commercialization of Software-As-A-Service (SAAS) solutions.

- Describes the services used in a business involving the placement and maintenance of vending machines in different locations, all supported by a national or international franchise network.

- Describes the services used for a wireless enabled device moving around a work site in order to verify that all the safety requirements are fulfilled.

- Describes the services used in an e-Government service portal to submit applications and receive replies online.

- Describes services used in an e-Government portal to review and to pay taxes and fees online.

- Describes services used in an industrial maintenance environment using 3D virtual environments.
- The 3D visualization and the corresponding data transmission have very high dependability requirements.
- They must be assigned enough computational and communication resources to allow operating.
- In the emergency case, they must be given priority over other computations and communications that take place at the same time on a regular basis but have not a critical dependability.