# Open Mobile Platform for Emergency Healthcare Applications

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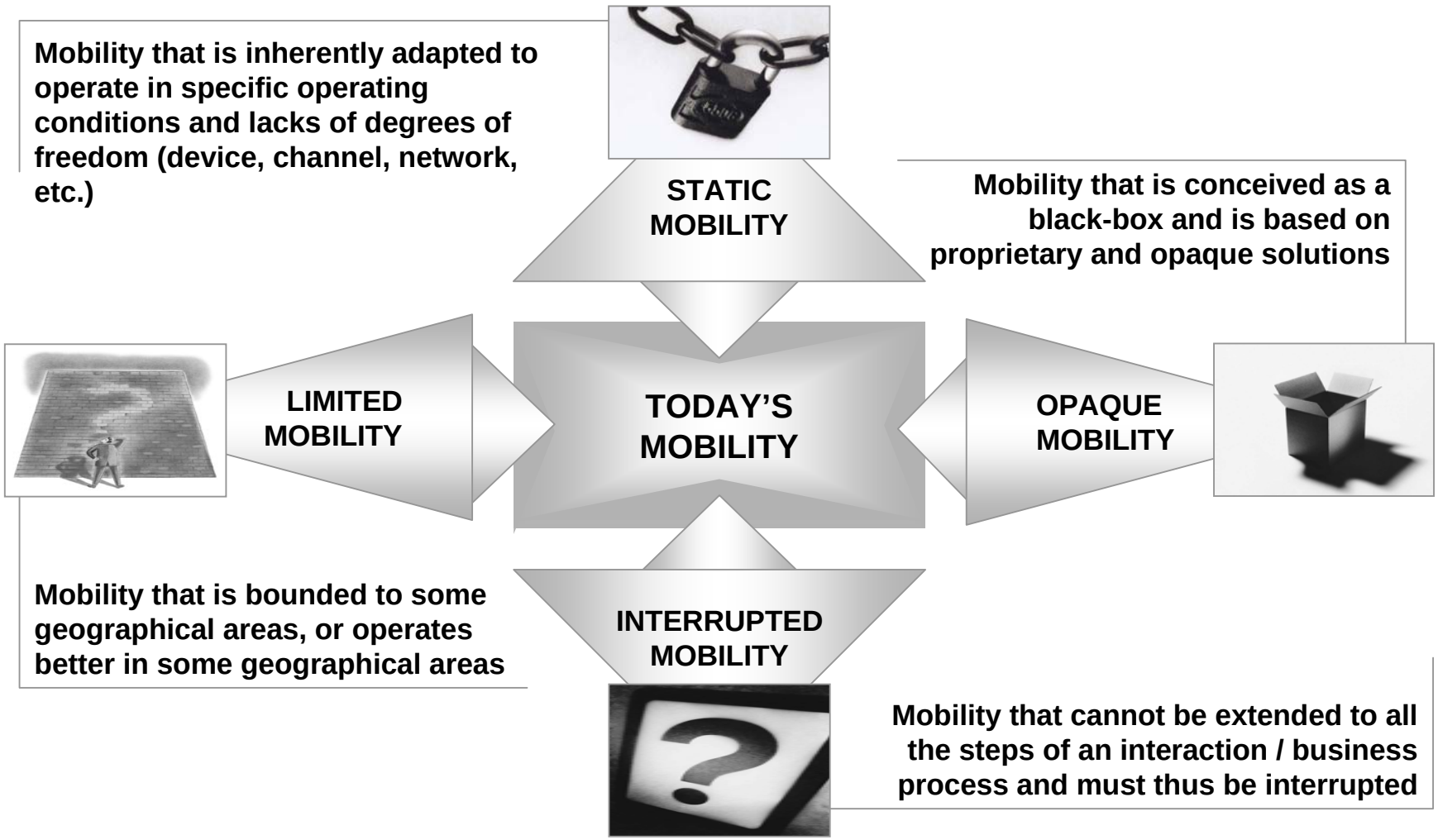
1st International Conference on Applied Technologies in Medicine and Neuroscience (ATMN)
6th to 10th of June 2005 Basel , Switzerland

# 1 X-MOB in a nutshell

## Mobility Today: The Major Drawbacks

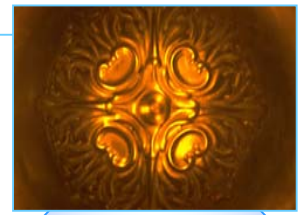
**The AS-IS state of mobility presents important drawbacks: today, mobility is still mostly static, limited, opaque, and interrupted**



# 1 X-MOB in a nutshell

## Mobility Tomorrow: The Real Challenges

**The TO-BE state of mobility must find answers to four main challenges: tomorrow, mobility will need to be full, open, uninterrupted and absolute**



**Mobility that can easily be tailored to variable operating conditions and provides degrees of freedom (device, channel, network, etc.)**

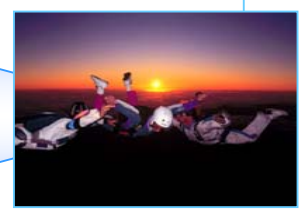
**FULL MOBILITY**

**Mobility that is conceived as a transparent box and based on open and standard solutions**

**ABSOLUTE MOBILITY**

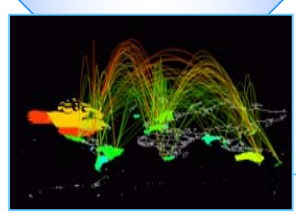
eXtreme mOBility

**OPEN MOBILITY**



**Mobility that is not bounded to geographical areas, and can fit different geographic scenarios (European, national, regional, local; city, road, countryside, …)**

**UNINTERRUPTED MOBILITY**

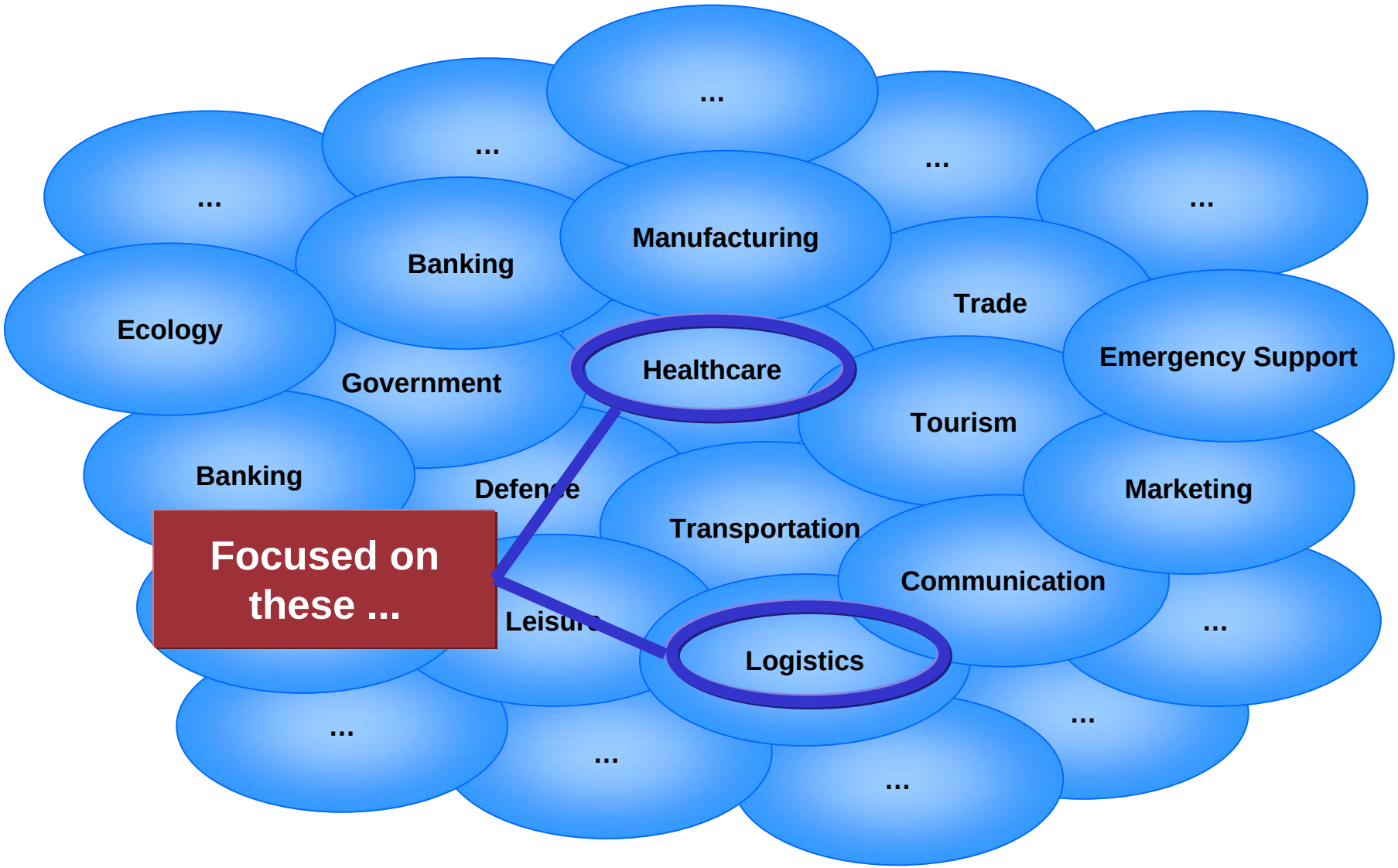


**Mobility that can be extended to all the steps of an interaction / business process and can thus be uninterrupted**

# 1 X-MOB in a nutshell

## Mobility Tomorrow: The Results

**The answer to these challenges will broaden the applicability and added-value of mobile solutions, enabling a wide coverage of real-world applications**



# 1 X-MOB in a nutshell

## The objectives

- **Objective A: Develop XMAP**
  - Adaptable to <u>any network</u> (mobile / fixed) (e.g. GSM / GPRS / UMTS, Satellite, Wireless LAN, PSTN / ADSL, etc.)
  - Adaptable to <u>any channel</u> (e.g. Web, WAP, I-MODE, MIDLETS, etc.) / device (PC, Mobile phone, IDTV, PDA, HHT, Medical devices, etc.)
  - Adaptable to <u>any situation</u> (non-stop lifecycle relationship support)
  - Adaptable to <u>any user</u> (usability, ASP, ASP network)
  - Adaptable to <u>any place</u> (Hierarchical Approach – Local, National, European)

- **Objective B: Validate XMAP through the development of two vertical pilot services**
  - Healthcare, Logistics

- **Objective C: Pave the way to cross-sectorial/cross-country exploitation**

# 1 X-MOB in a nutshell

## Benefits

- **Build more and better mobile applications**
  - Increased added-value and scope of mobility (based on X-MOB compliance)
  - Support for Pan European mobile solutions (based on ASP networks)
  - Efficiency and optimisation of costs and resources (based on setting lowest costs XMAP configuration)
  - Reusability of infrastructure and building blocks (based on ASP model)
  - Inherently evolutionary platform (new devices / channels / networks / users)
  - Improved time-to-market (i.e. start from building blocks vs. start from scratch)
- **Empower the European mobile culture**
  - Reduced gap between end users (citizens, companies, etc.) and mobile services (based on user governance and customisation)
  - Acceptance based on better service (win through results)
  - Adaptation of mobile services to end users (versus previous adaptation of end users to mobile services) (based on multi-device, multi-channel, multi-network)
  - Support for non-stop mobile relationships (complete mobile experience)

# 2 XMAP
## The Foundations

### BENEFITS

- The universal access X-MOB platform (eXtreme MOBility) will allow costs reductions and an improvement of the quality of service in multiple and complex business processes that involve remote workers and the use of mobile devices
- It will be specially useful in applications with strong needs of integration and mobility involving several offices and sites.
- It will provide multi-sectorial coverage: it will allow to develop applications involving very different scenarios (industry, distribution, emergency assistance, logistics, etc)

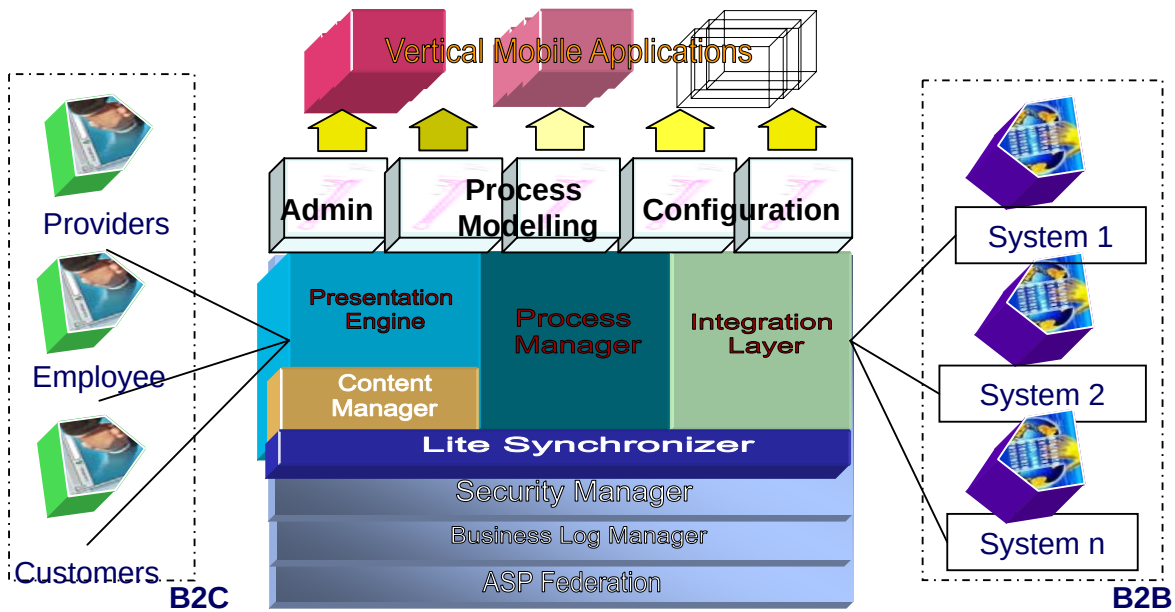
### CHARACTERISTICS

- Business process automation oriented
- Multi-device support (PDA, HHT, mobile, telematics, PC, IDTV)
- Multi-channel support (web, SMS, WAP, etc.)
- Multi-network support (GSM, GPRS, Satélite, Wireless lan)
- Multi-client support (ASP, multi-event billing, etc.)
- Content Management Support

- Multi-platform support (hardware -Intel, Sun, etc-, and software -Microsoft, Solaris, etc.)
- B2Bi integration support reducing costs and time to market for integration with services and content providers

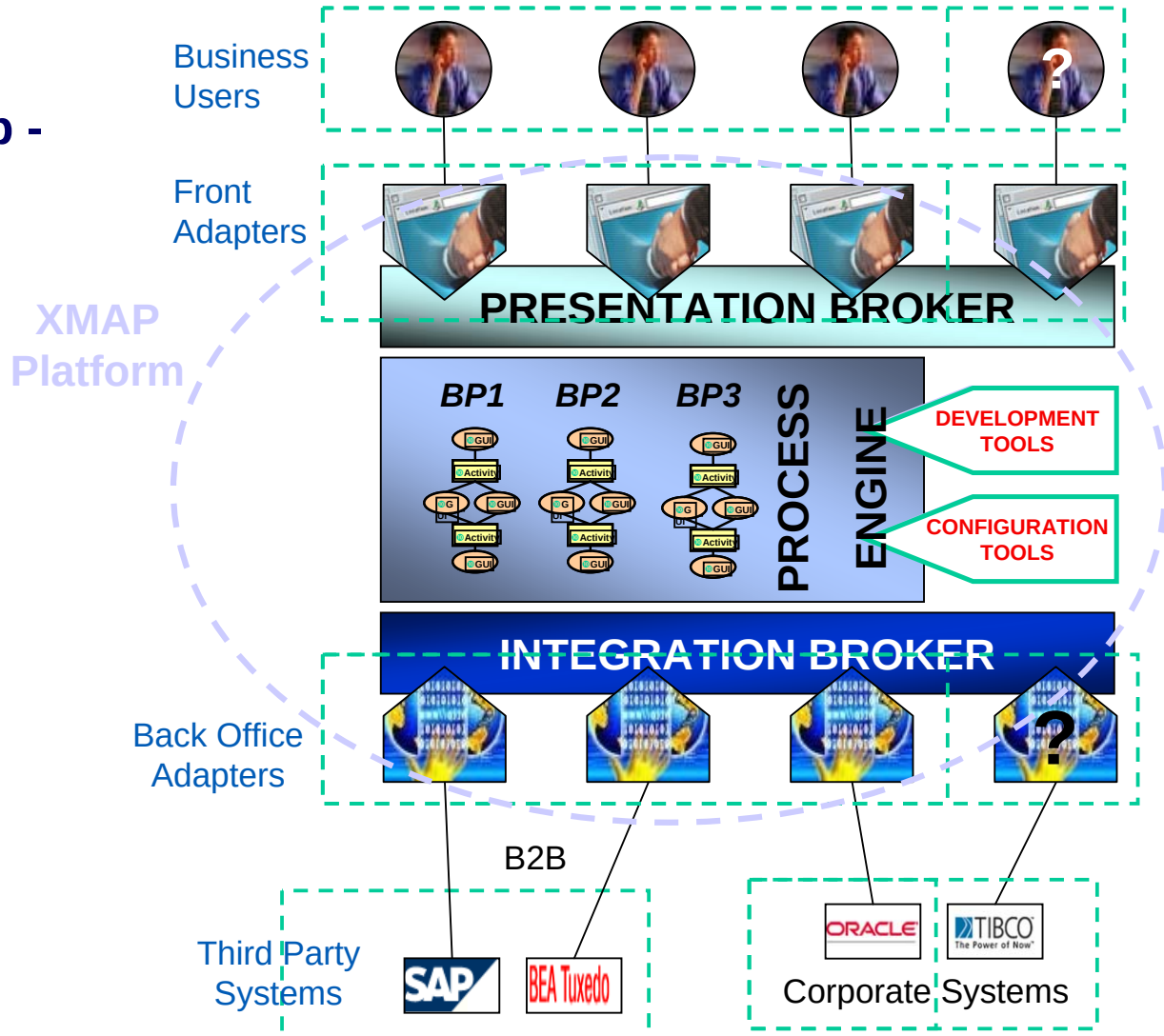
### ARCHITECTUE

- Standards based (J2EE, XPDL, XML, XSL, Web Services, SOAP …)
- High degree of reusability
- Optimized
- Secured
- Strong level of integration
- ASP support
- Modular and multilayered



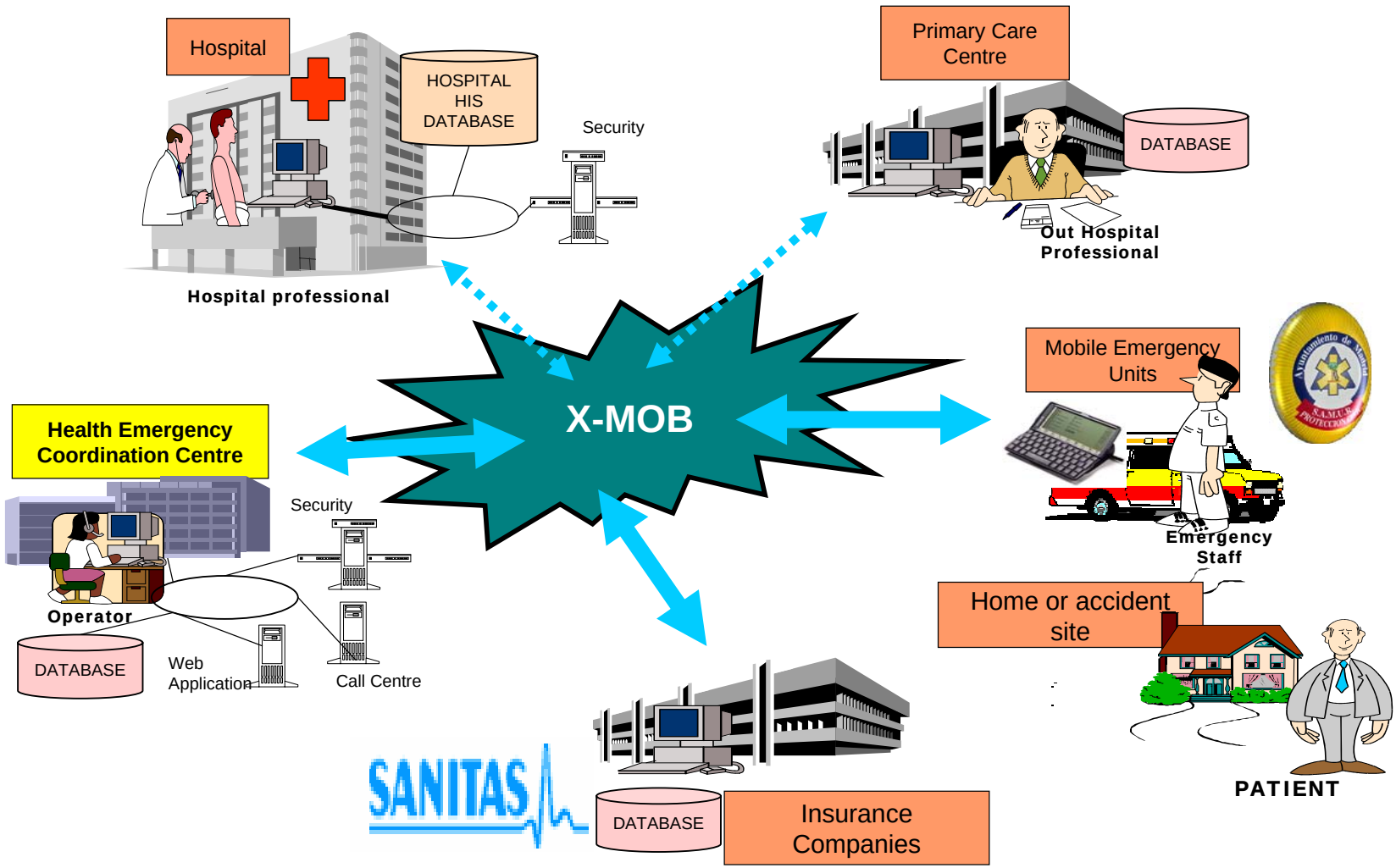
# 2 XMAP
## Development Methodology

- **Underlying platform to develop better and leaner mobile applications**
- **The DECE approach (Develop - Extend - Customise - Evolve)**
  - **Develop**
    - New Business Processes
  - **Extend**
    - Front adapters
    - Back office adapters
  - **Customise**
    - Behaviour change through user-friendly tools
  - **Evolve**
    - Non disruptive Business Process change



# 3 Mobile Proposed Services

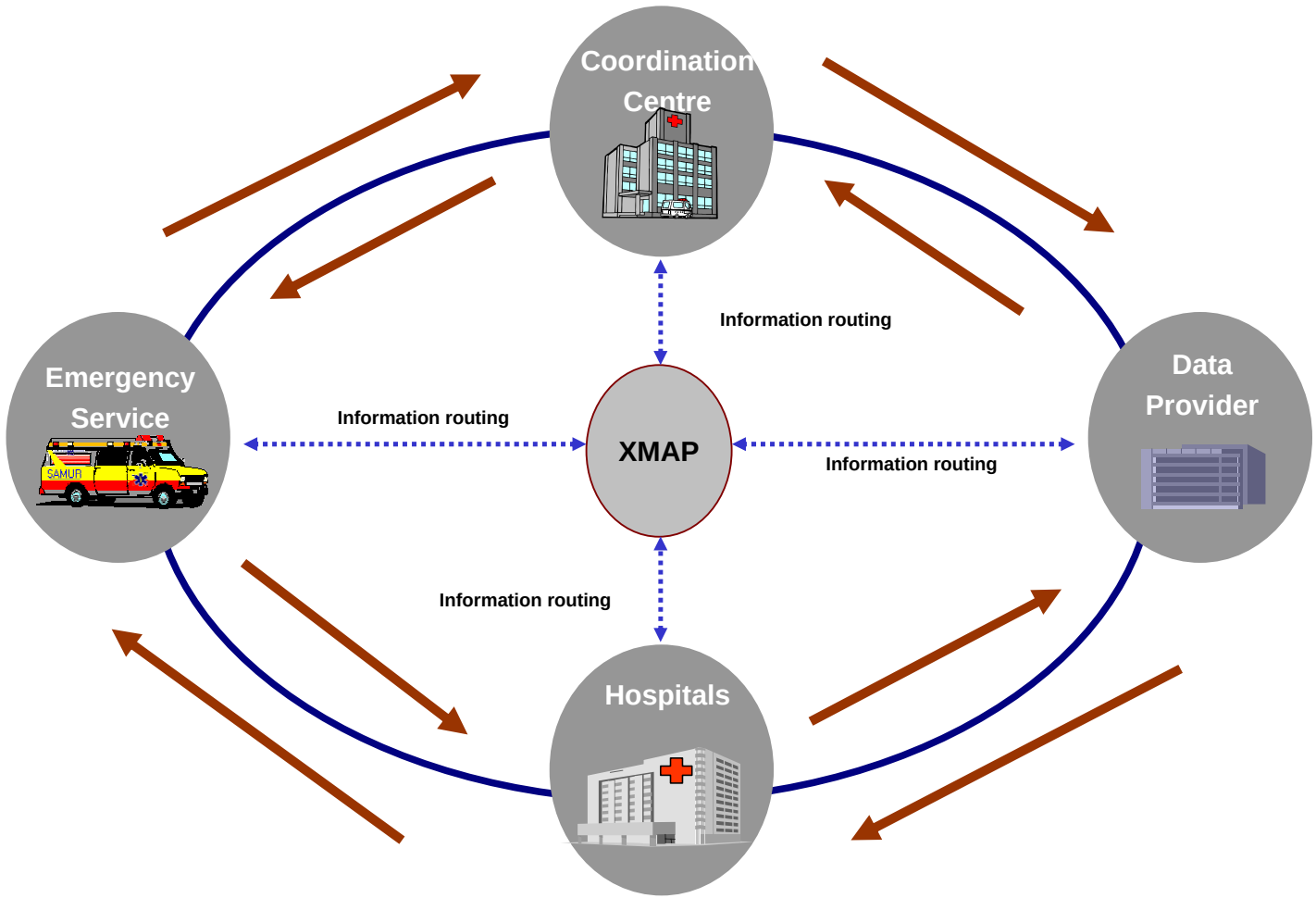
## Healthcare Scenario



# 4 Results

## Healthcare Scenario

The main goal of the X-MOB health care pilot is to enable European emergency services to access extended information related to their patients with the aim of providing them with a more complete and personalized assistance



# 4 Key factors

- In emergency conditions personnel must rely on a robust system able to hide all technicalities involved in such complex information updating and retrieval

- Even though the information system is composed of many parts (e.g. communications, information retrieval, smart graphical user interface), they must be seen by users as a single reliable application able to perform all necessary activities

- The high-level functionalities to be provided are sketched: regardless of the communication technology adopted infrastructures (e.g., GSM, GPRS, UMTS) and the allowable computing devices (e.g., PC embedded in the ambulance, PDA), the healthcare emergency team has to have the ability to access patient relevant data

- The solution envisaged in X-MOB sets together a number of flexible modules that operate on the common XMAP platform. Such modules (or tools) can be designed and upgraded separately, with great efficiency, since they can be easily set to work together through the common platform

# 4 VRGT: The Vital Record Cycle

## Vital Record Generator Tool

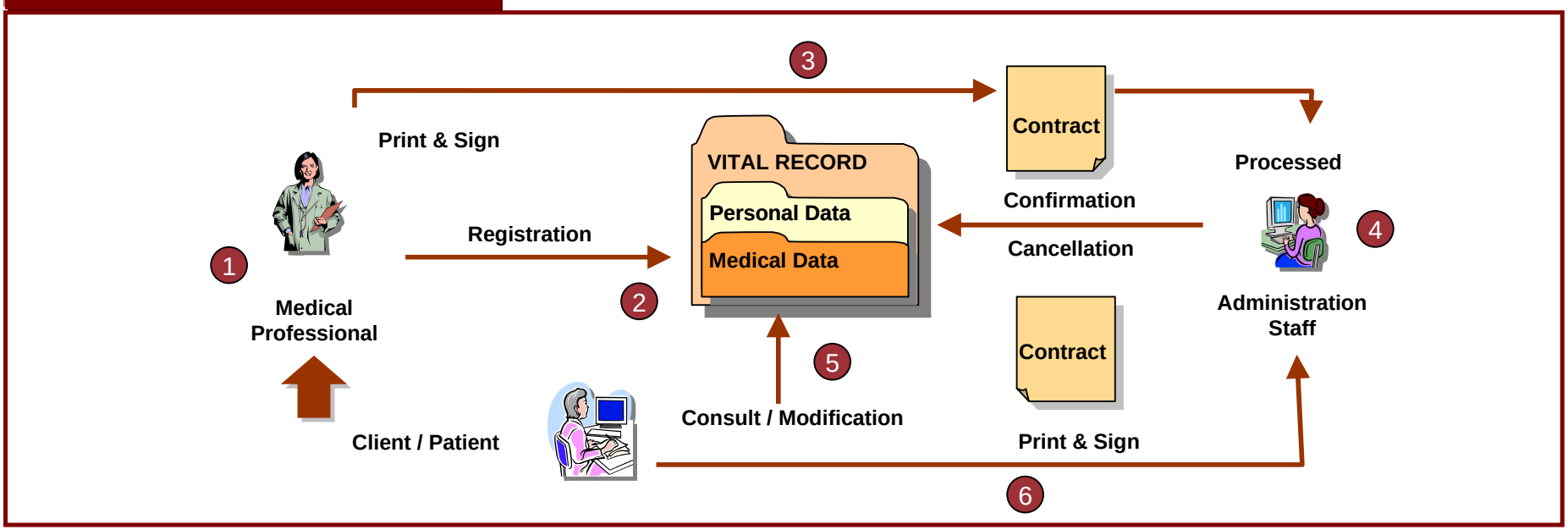
**Vital Record Definition:**

Unit of medical information that could assist in the treatment of a patient in an emergency situation:

- **Personal Data:** Name, Surname, DNI, habitual address, reference hospital
- **Medical Data:** Illnesses, Allergies, family medical history

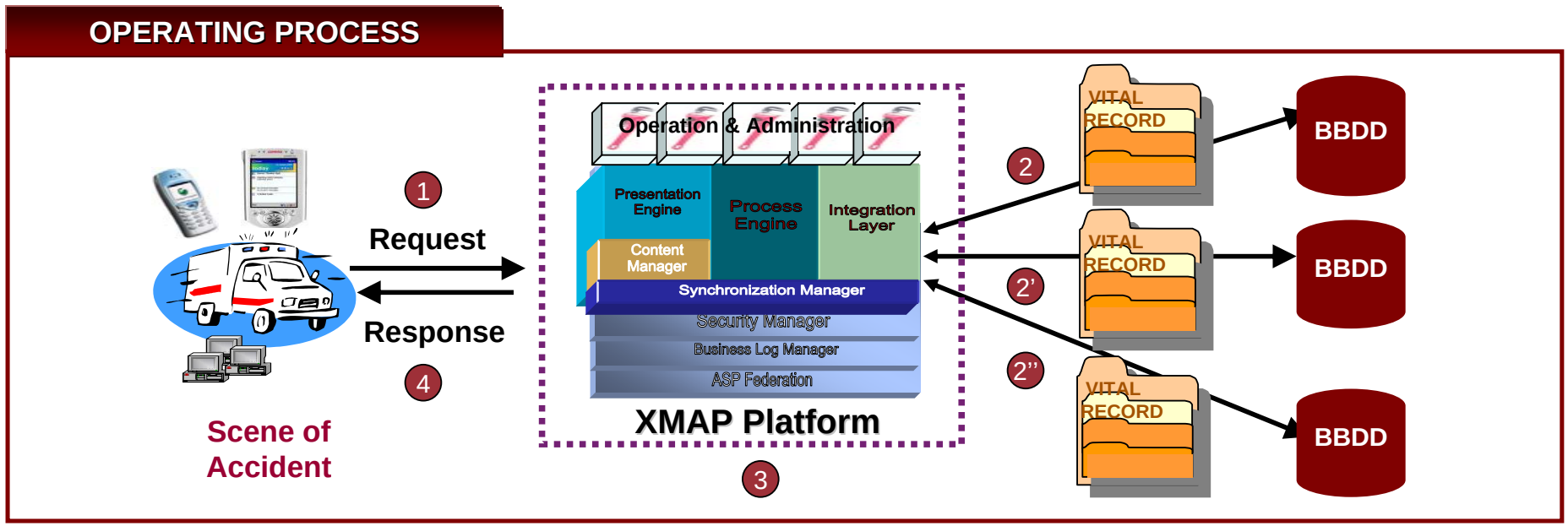
- **Disassociation** of personal data and medical data through the use of encrypted keys
- Definition of **auditory** mechanisms and tracing to control the use of the information
- Encryption and codification of the information based on standards
- Use of **digital certificates** as a means of trust

**OPERATING PROCESS**



# 4 ECDAT: How the VR can be accessed wirelessly?

Emergency Clinical Data Access Tool



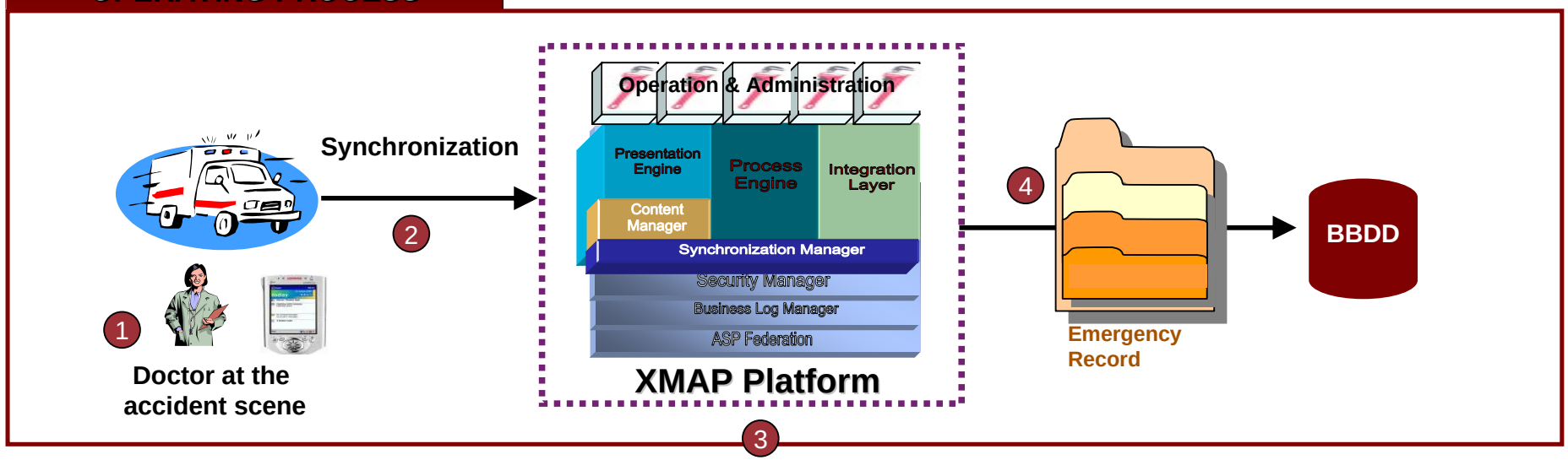

- Access Control (authentication necessary)
- Mechanisms to identify the patient (National ID, Healthcare Provider ID, ...)
- Information Provider Pooling (local mapping or request broadcast)
- Information normalization process using XMAP HL7*
- Final conversion and presentation of data

* The clinical document architecture HL7 is an easy to use XML specification that possesses sufficient potential to extend the interchange of clinical documents through an extended spectrum of levels and environments of assistance

# 4 LVRGT: Closing the Loop

Service that permits the saving of time and effort in administrative tasks, permitting the improvement of the emergency staff operations and efficiency

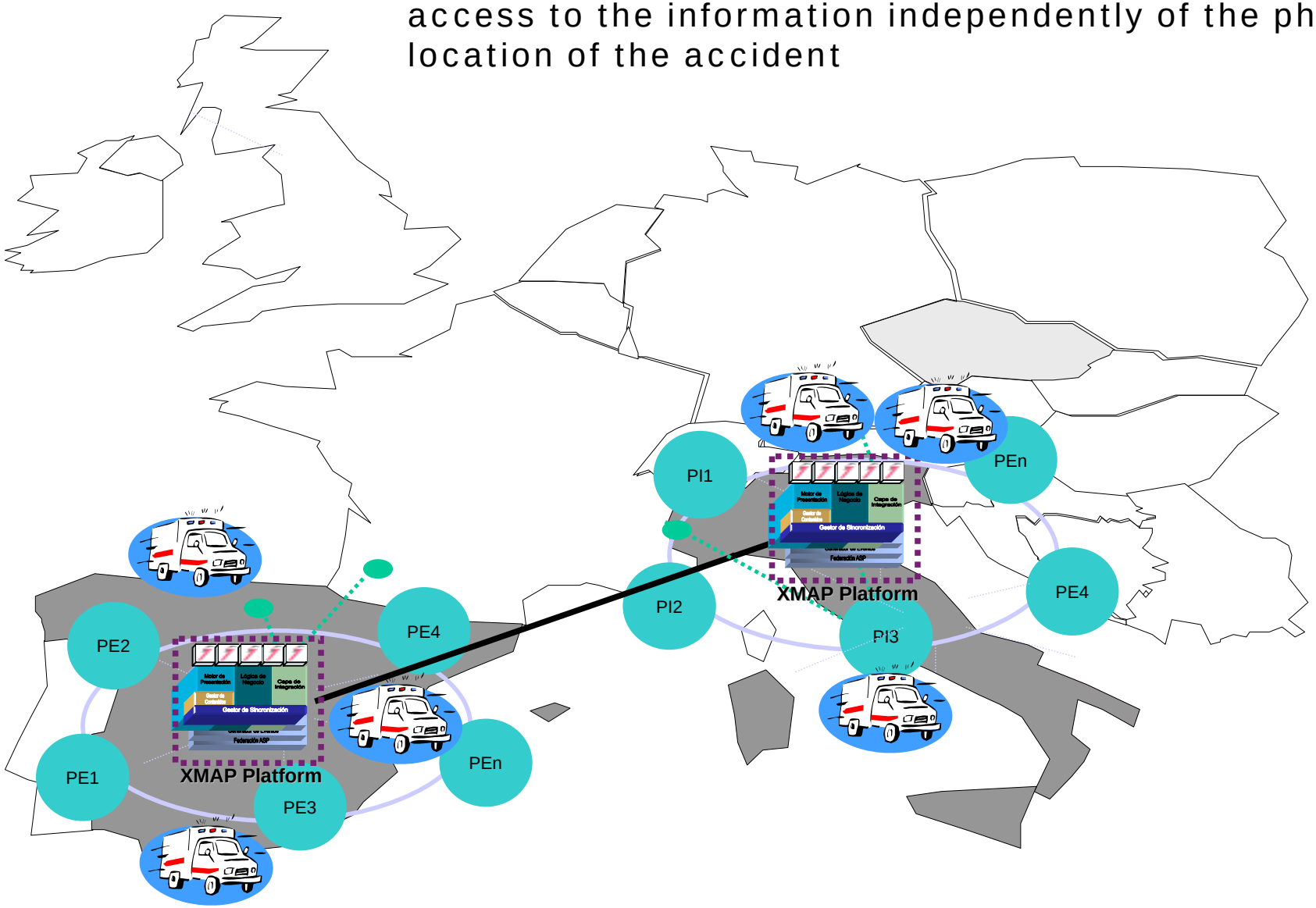
## OPERATING PROCESS



- Easy to use, local execution
- Efficient use of communications canal
- Security management based on profiles
- Synchronization of data “on demand”
- Local database management

# 4 Federated Scenarios: A Pan-European Approach

The federation service that searches the patients medical data, permits the possibility of intelligent access to the information independently of the physical location of the accident

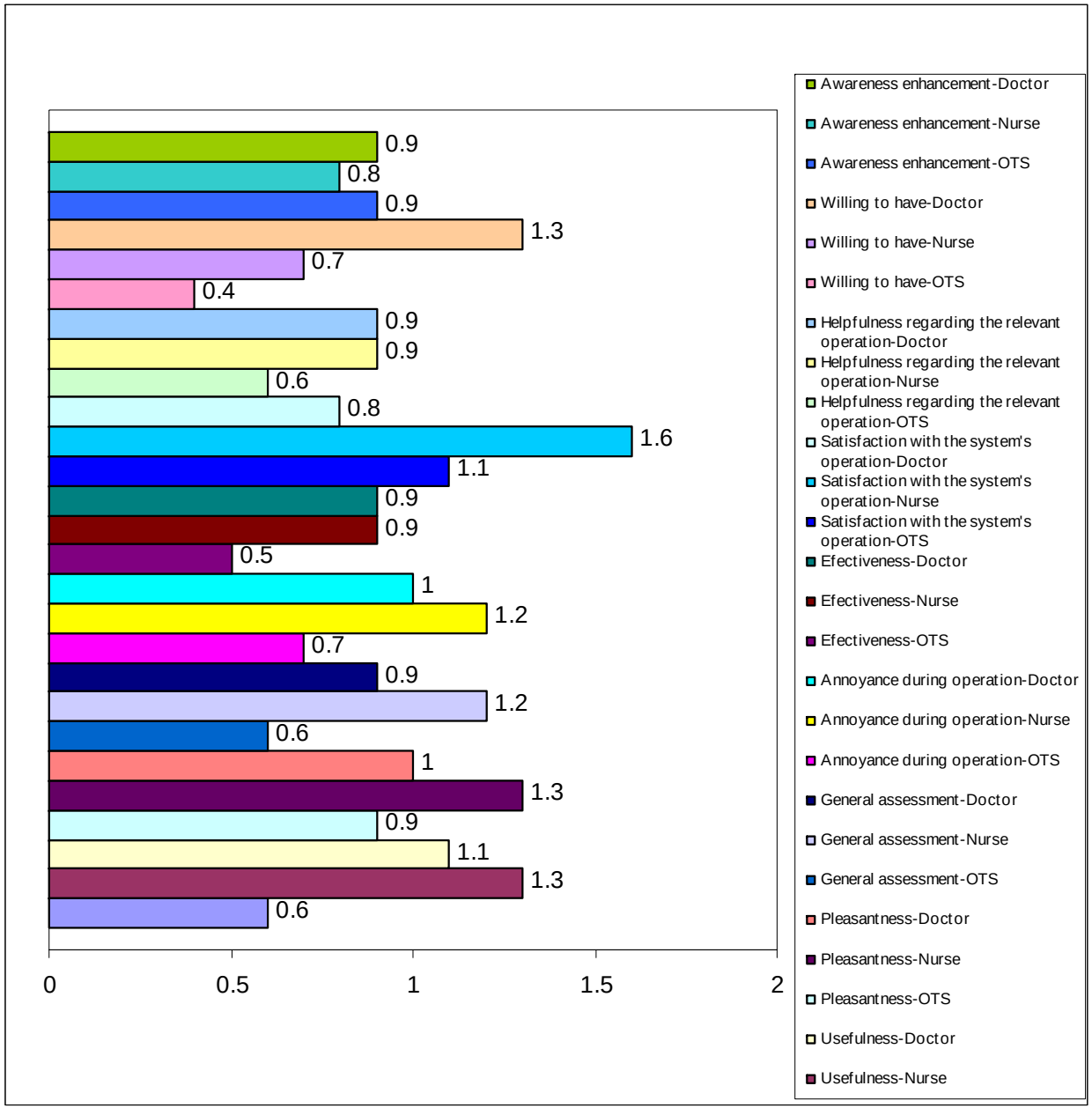


# 5 Pilot validation

- The platform was validated in real life situations
- The trials were carried out in Madrid and Genoa cities and lasted three months.
- Eighteen medical doctors, twenty nurses and eighteen transportation technicians participated in the evaluation
- The opinion of the users consisted of a self-evaluation with a questionnaire distributed to different staff categories
- The main system's characteristics like the effectiveness, the pleasantness, the "willingness to have", etc. were evaluated by each participants' category

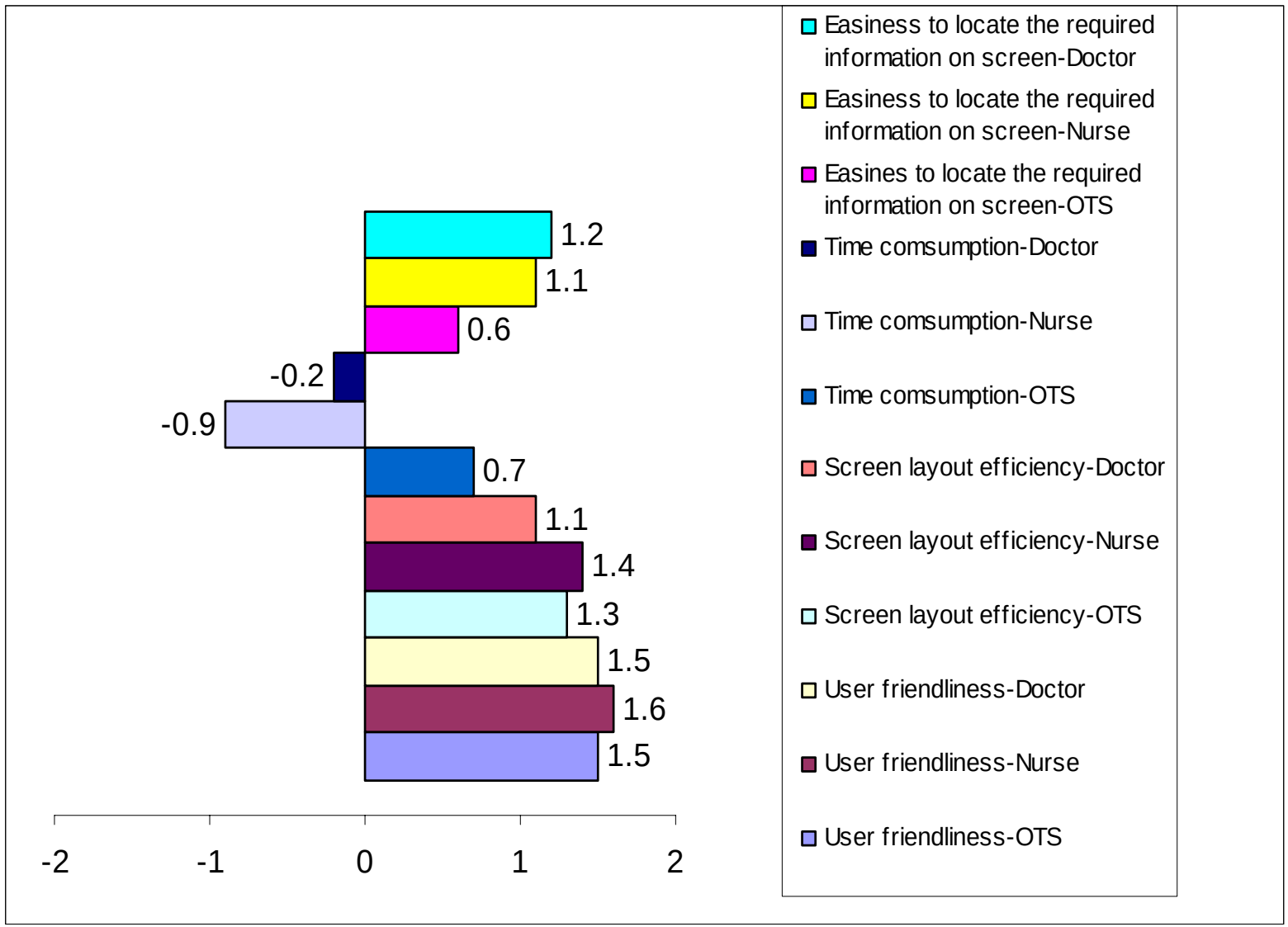
# 6 Validation results

## Weight average per user group and per evaluated user acceptance characteristic



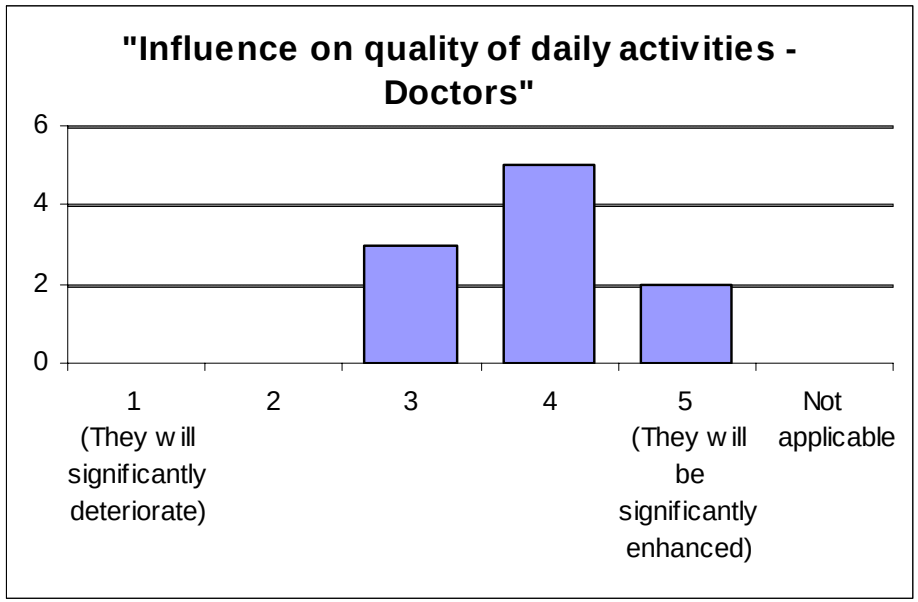
# 6 Validation results

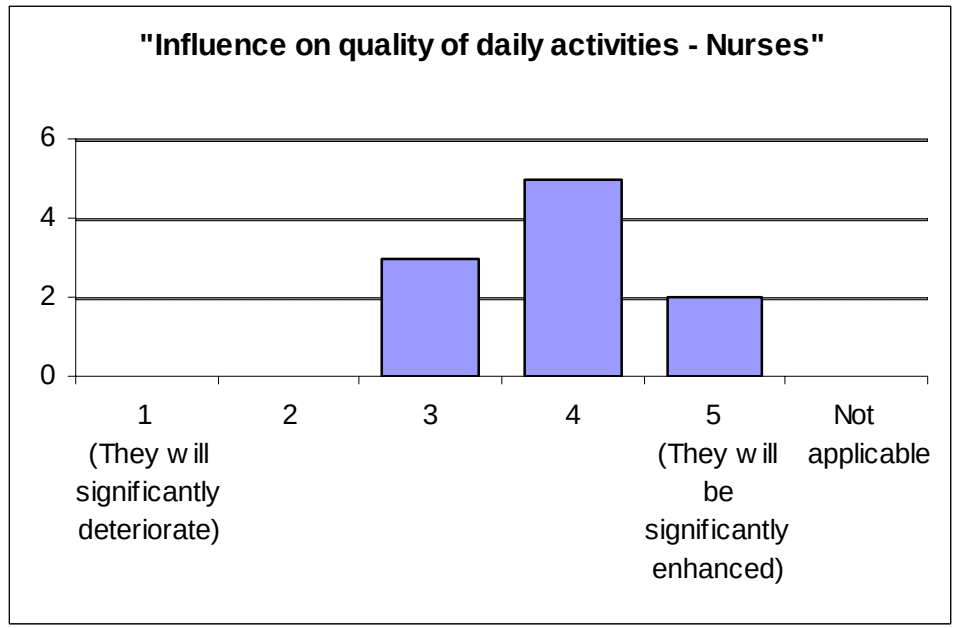
## Weight average per user group and per evaluated user interface characteristic

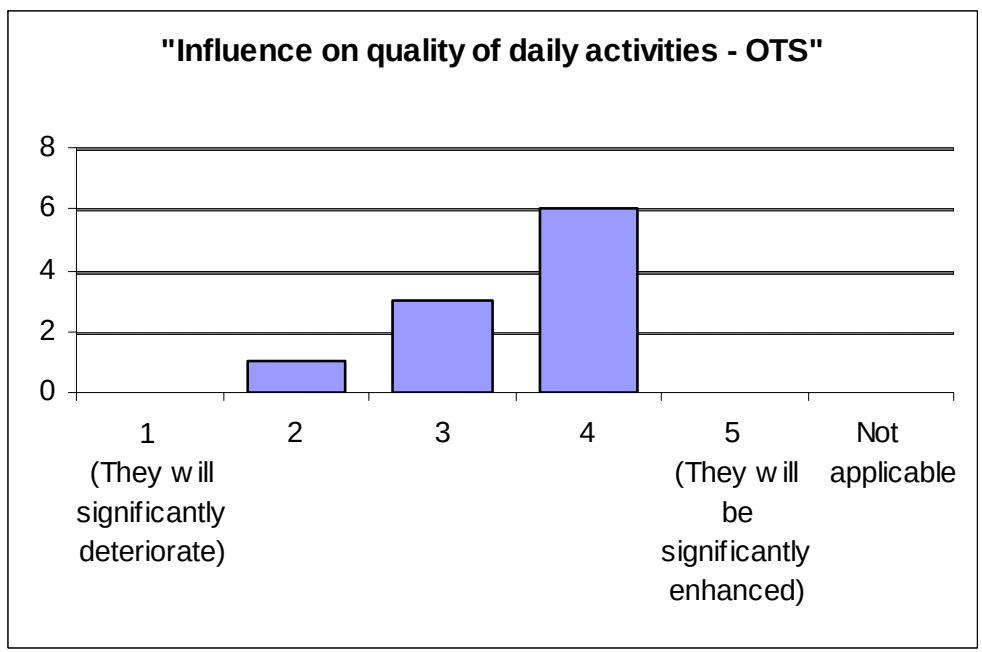


# 6 Validation results

## Daily activities influence

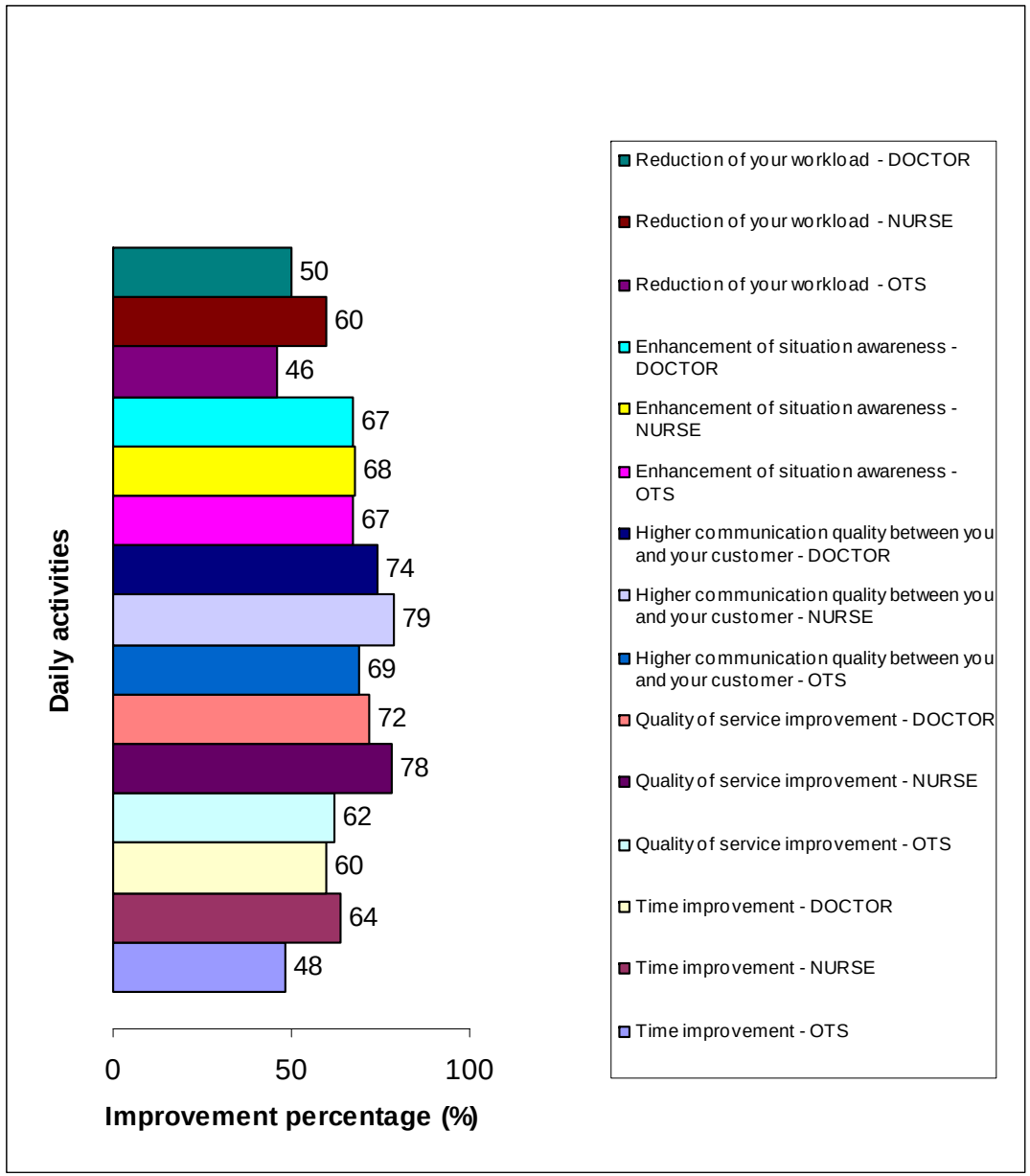


# 6 Validation results

## Efficiency improvement of daily activities, per user group



# 7 Conclusions

- All user groups are in all cases and in both pilot sites positively oriented towards the XMOB system
- Most of the users felt comfortable during the system's operation, possibly due to their experience to handle new technologies
- The project's team was able to acknowledge the true value of the project and assure that the system proved to be robust and resilient.
- The project was useful in terms of verifying the need for such an IT solution to meet the needs of the people involved in the health emergency management
- The benefits of a seamless infrastructure are the foundational components of this platform that improve the efficiency and efficacy of the EMS