M POWER

challenges and opportunities

"In the end, it's not the years in your life that count.
It's the life in your years." - Abraham Lincoln

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MPOWER Objective and Approach

- Create a middleware platform that enables rapid development of novel smart house systems
- Service encapsulating through SOA architecture
- Use Model Driven Development
- Use Standards HL7, ISO, CEN
    - SOA4HL7 methodology
    - IBM SOA Reference Architecture
    - IBM Software Service UML Profile
- Develop two Proof of Concept Applications
- Share the results: OPEN Source

Modeling methods
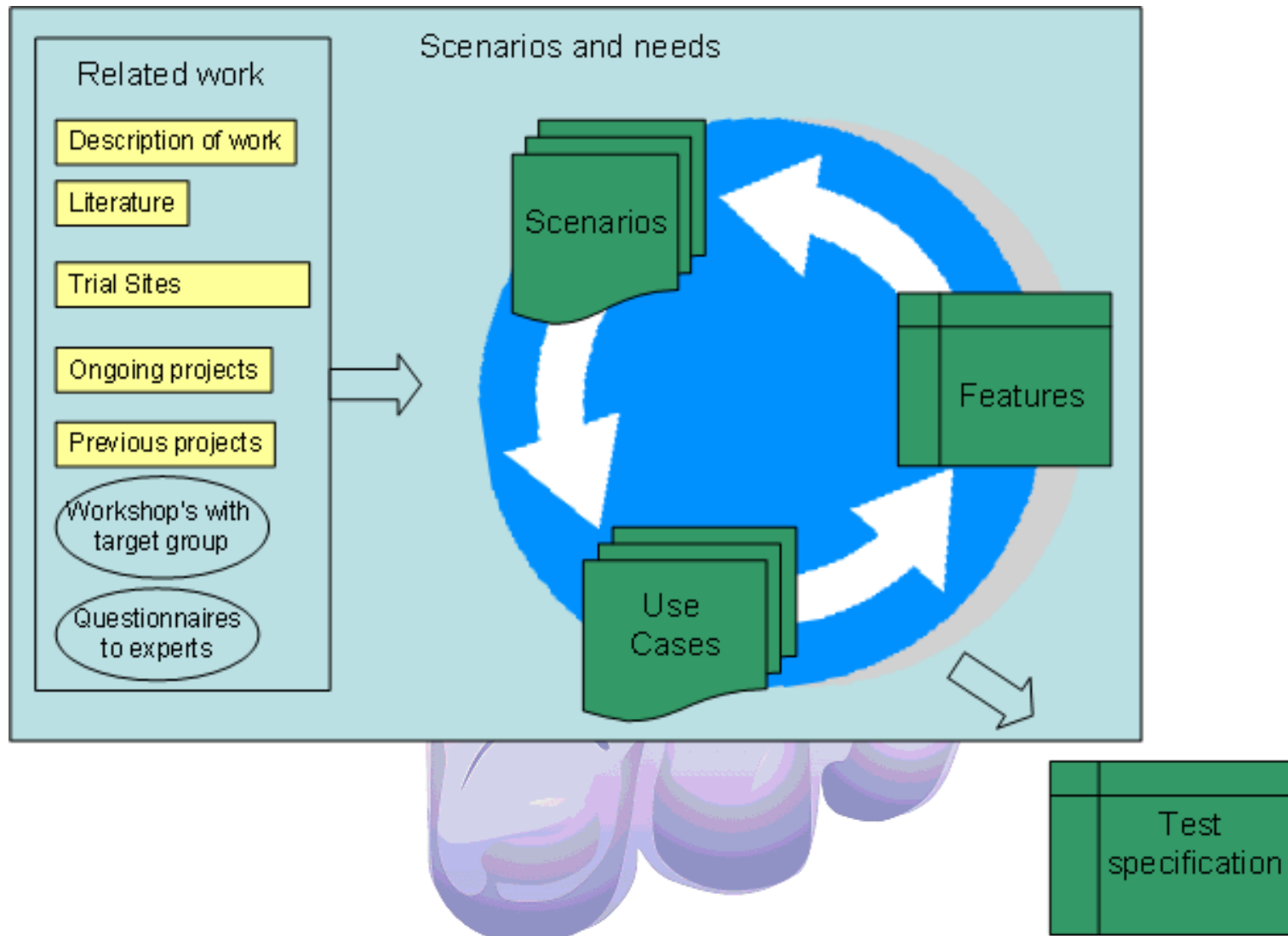
Scenarios - UseCases - Features
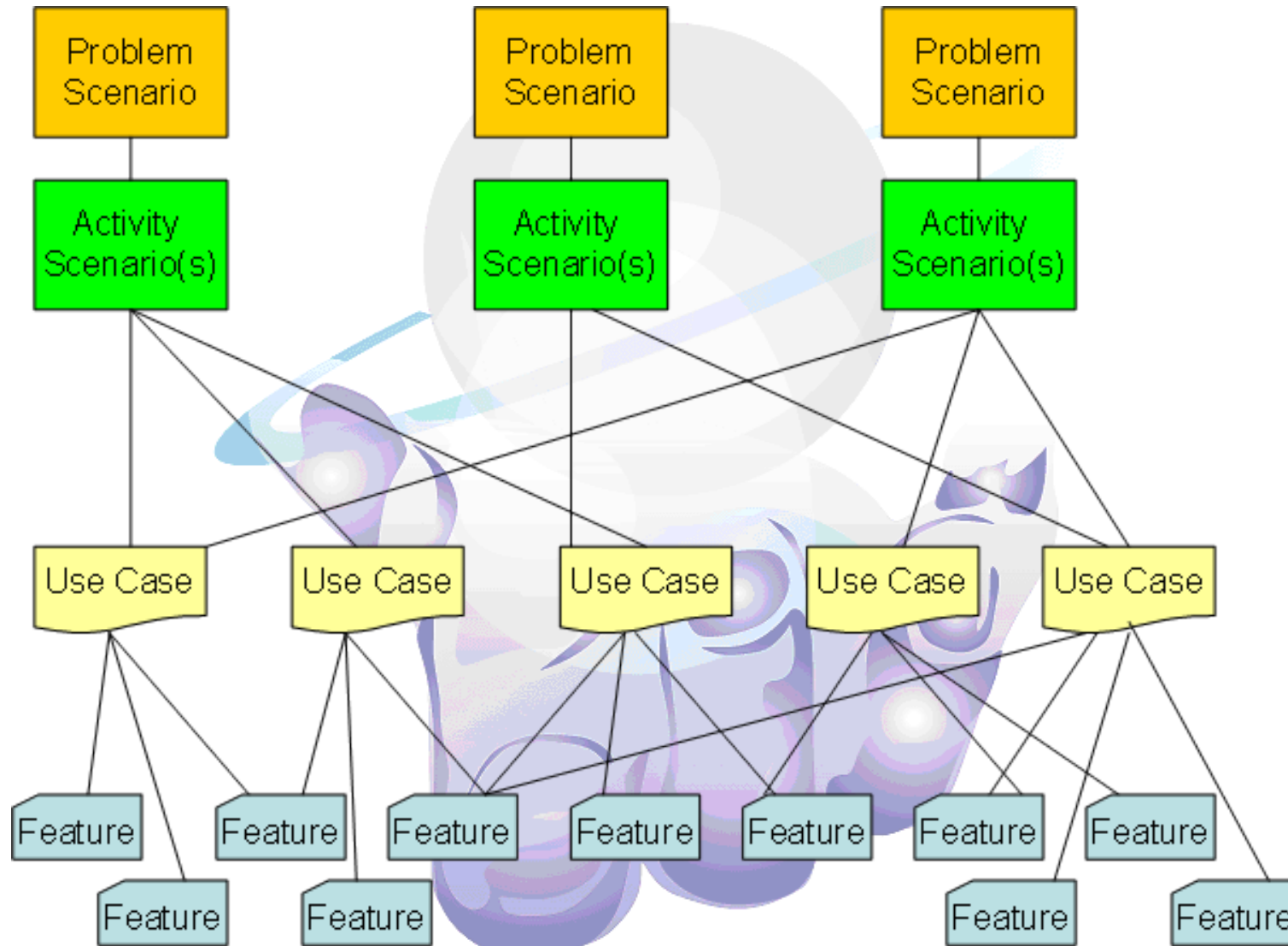
Participants in workshops, interviews and questionnaires

- 62 Older people (22 in Netherlands, 40 in Poland)
- 11 Family carers of persons with dementia (5 in Austria, 6 in Norway)
- 49 Healthcare Professionals (all in Poland)
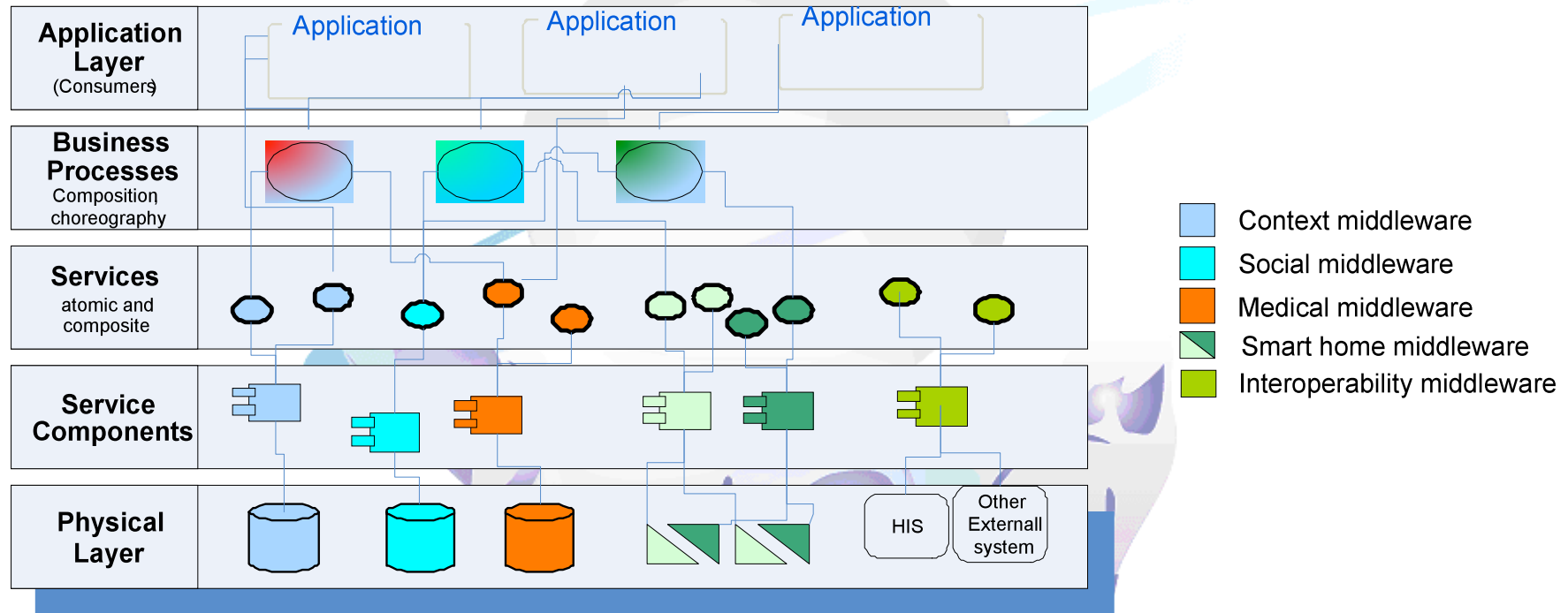- 15 Dementia Experts (4 in Austria, 11 in Norway)
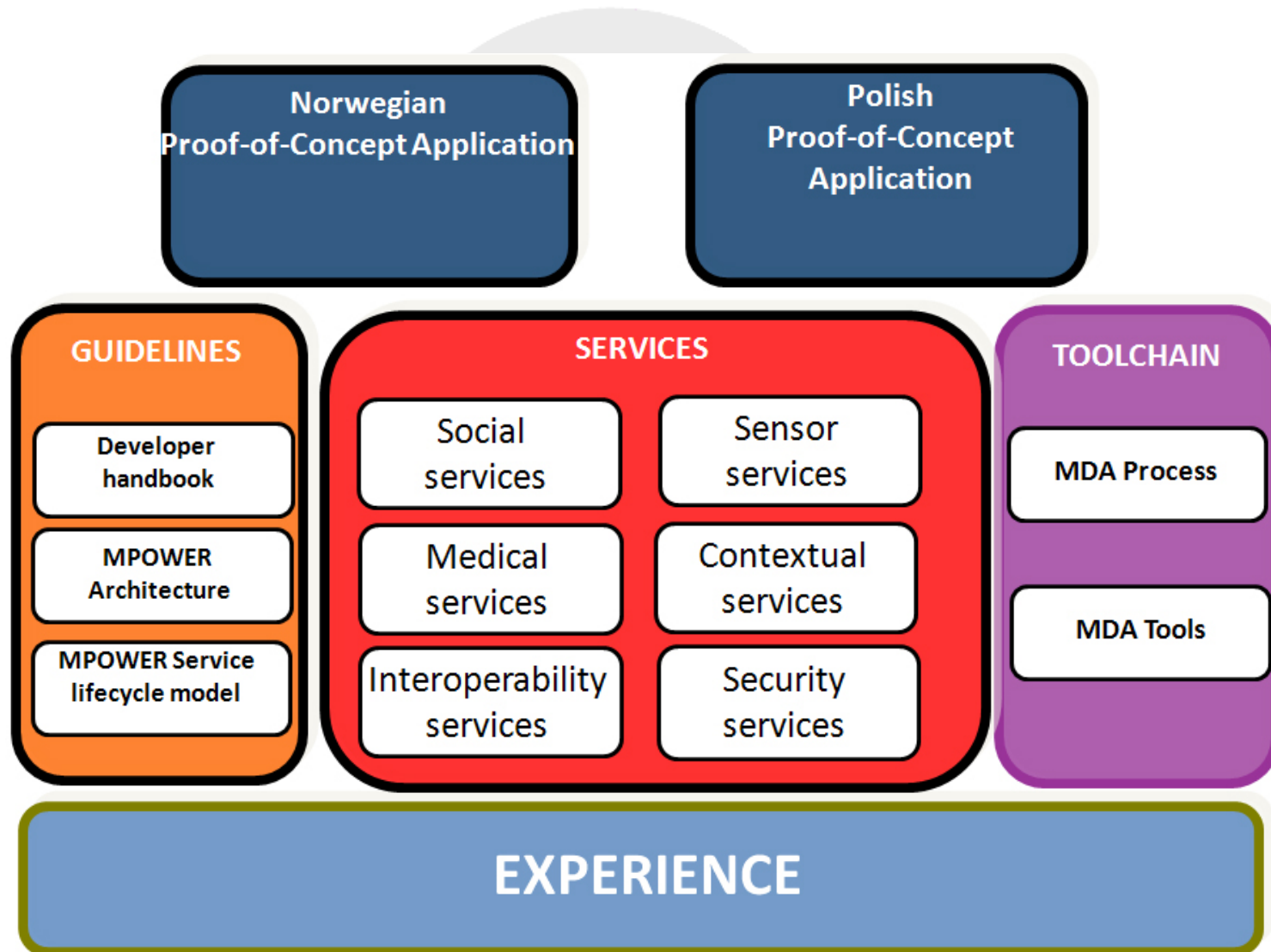
The Service Model

- Derived from the Use Case models
  - Communication Services
  - Information Services
  - Management Services
  - Sensor Services
  - Security Services

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MPOWER reference architecture

Application Layer (Consumers)
- Application
- Application
- Application

Business Processes Composition, choreography

Services atomic and composite

Service Components

Physical Layer
- HIS
- Other External system

Legend:
- Context middleware
- Social middleware
- Medical middleware
- Smart home middleware
- Interoperability middleware

MPOWER Results

Norwegian Proof-of-Concept Application

Polish Proof-of-Concept Application

GUIDELINES
- Developer handbook
- MPOWER Architecture
- MPOWER Service lifecycle model

SERVICES
- Social services
- Sensor services
- Medical services
- Contextual services
- Interoperability services
- Security services

TOOLCHAIN
- MDA Process
- MDA Tools

EXPERIENCE

MPOWER Process and partners

ERICSSON TAKING YOU FORWARD

Ericsson, Croatia

SINTEF

Sintef, Norway

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

AIT, Austria

Demens Nasjonalt kompetansesenter

Norwegian Center for Ageing and Health

tb·solutions advanced technologies

TB-SOL,Spain

Jagellonian University – Medical College, Poland

University of Cyprus

TRONDHEIM KOMMUNE

cast Center for Aging Services Technologies

IAHSA THE GLOBAL AGEING NETWORK

e ecomit

indra

DI, Spain

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Proof of Concept Application(POCA)

- **Norwegian POCA**
  - Information access and sharing
    - Calendar Service, Medication Service, Message Board Service, Patient Management Service, Security Services, External Notification Services, and more.

- **Polish POCA**
  - Smart Home environment
    - Frame Sensor Adapter, Context managment, Alarming Service, (BPEL) Notification services (BPEL), Location Services, Security Services, Patient Management Services, Calendar Service, MessageBoard Service, CameraService

Norwegian Pilot

■ A collaborative environment for distributed and shared care, providing requirements for:

- information security
- information models
- context awareness
- usability
- interoperability
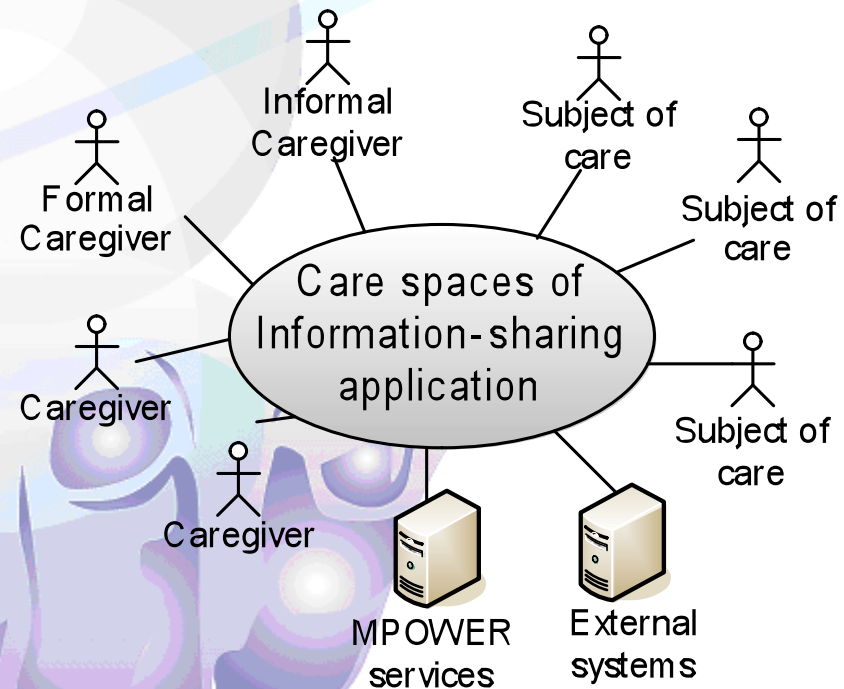
Norwegian Pilot

- Day's events
- Calendar & reminders
- Contacts
- Message board
- Local News
- Medications

Tirsdag

9:24

Natt
6 Mai 2008

Kontaktpersoner

Navn: Albert Johnson Telefon: 4797034099	Ring meg
Navn: Jane Millner Telefon: 35799519002	Ring meg
Navn: Peter Smith Telefon: 4793411597	Ring meg

Startside   Kalender   Medisin
Kontakter   Beskjeder   Nyheter
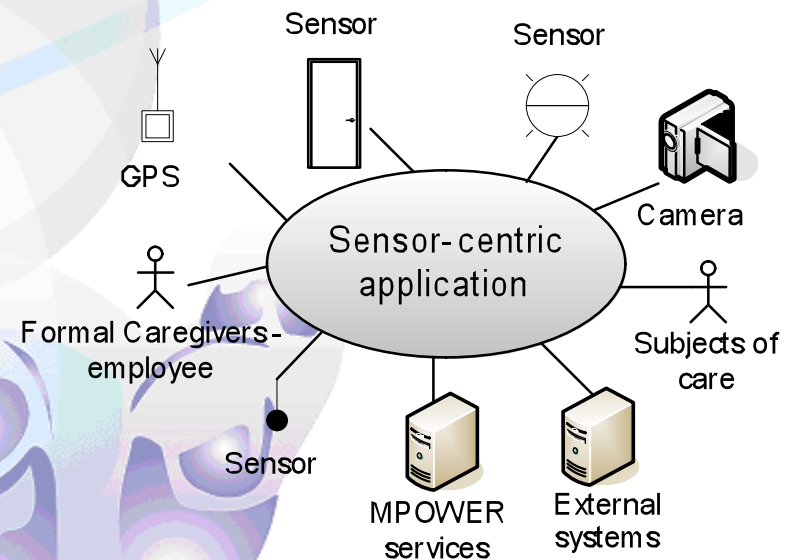

Fredag

14:00   Test!
17:00   Medication!

08:33

06.03.2009
Fredag

Hjem	Kalender	Kontakter
Medisin	Meldinger	Nyheter

Polish pilot

- Smart-house environment facilitating environment and patient monitoring and control
  - heating
  - oven
  - water
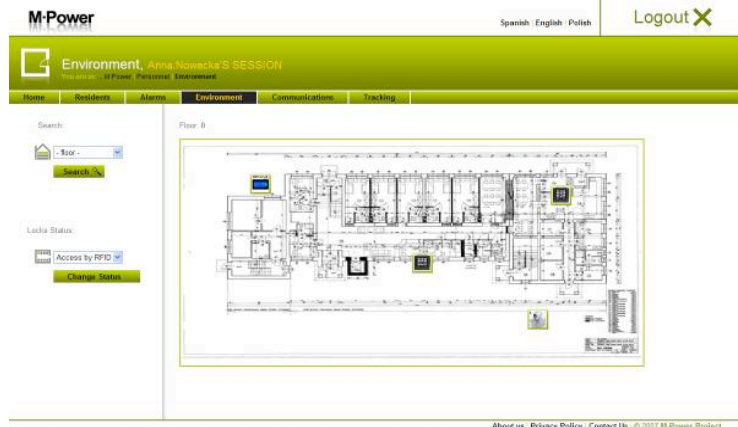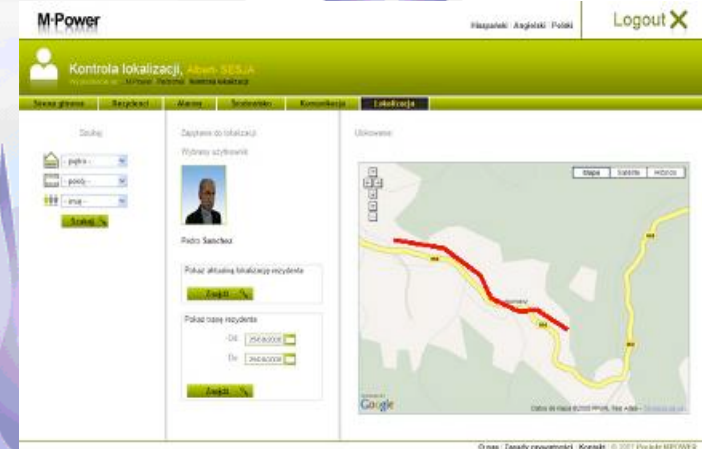 - doors
  - light
  - non-invasive bio-sensors

Sensor

Sensor

GPS

Camera

Sensor-centric application

Formal Caregivers-employee

Subjects of care

Sensor

MPOWER services

External systems

Resident homepage

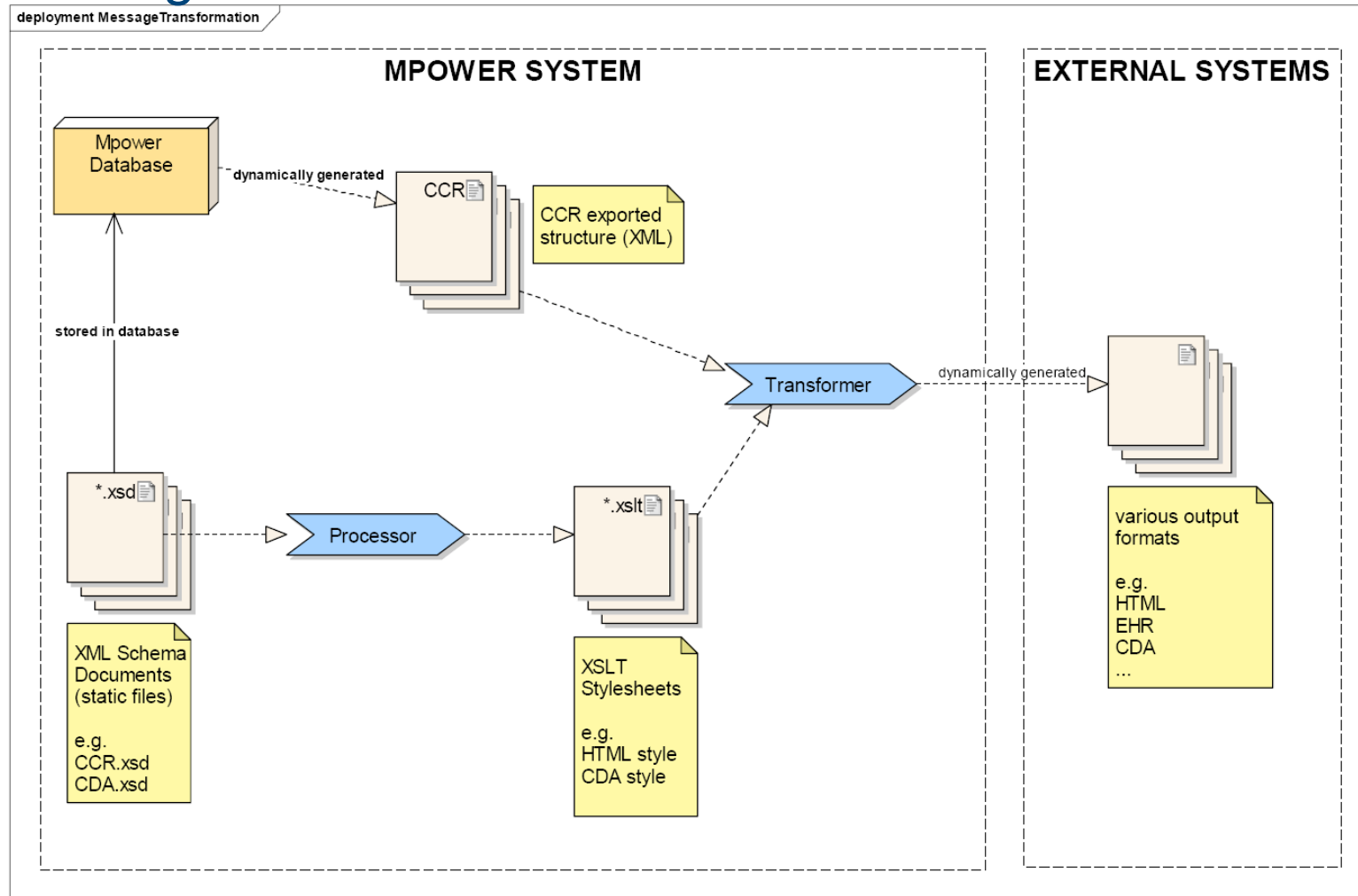## New incoming message

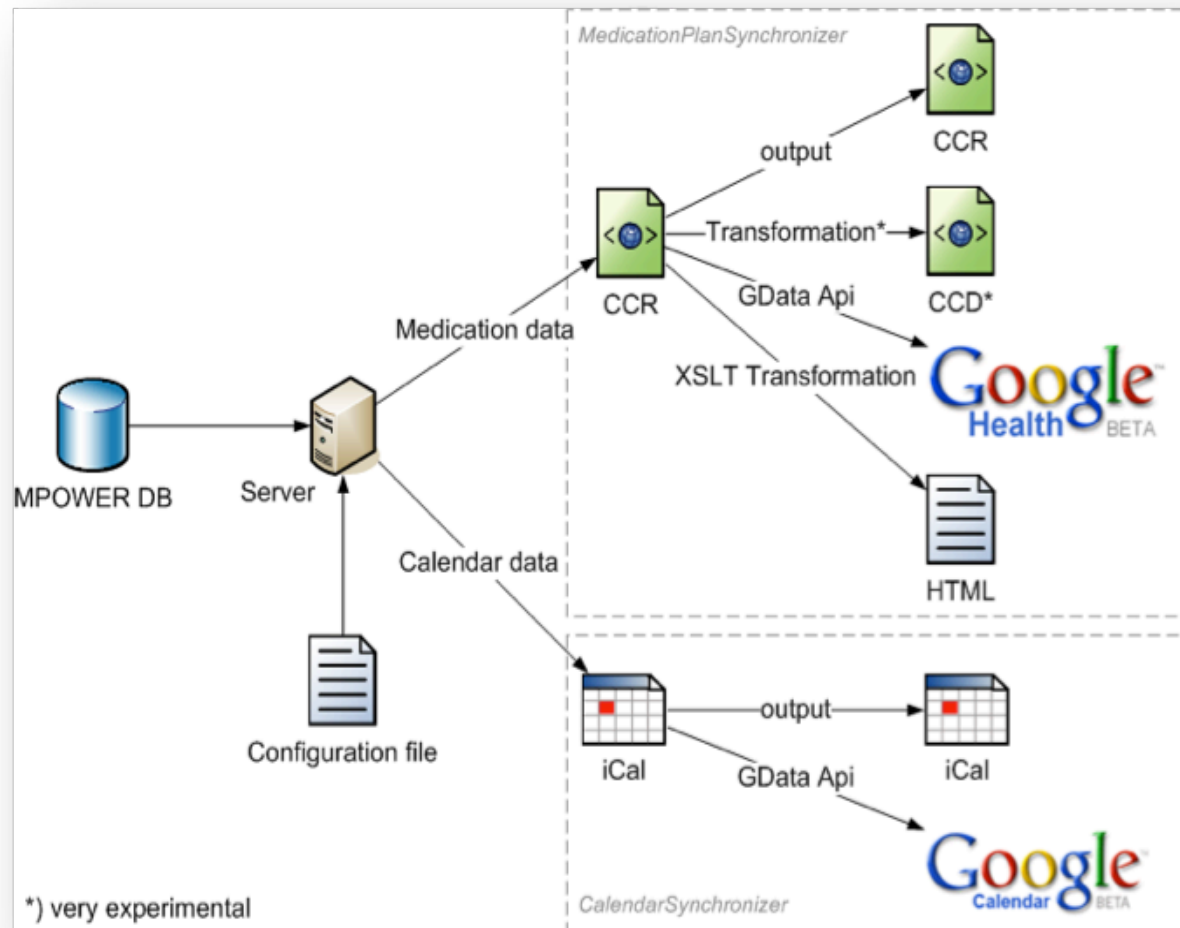## Sensor management

Tracking – route

Interoperability with other systems

■ Message Transformation – Content Interface

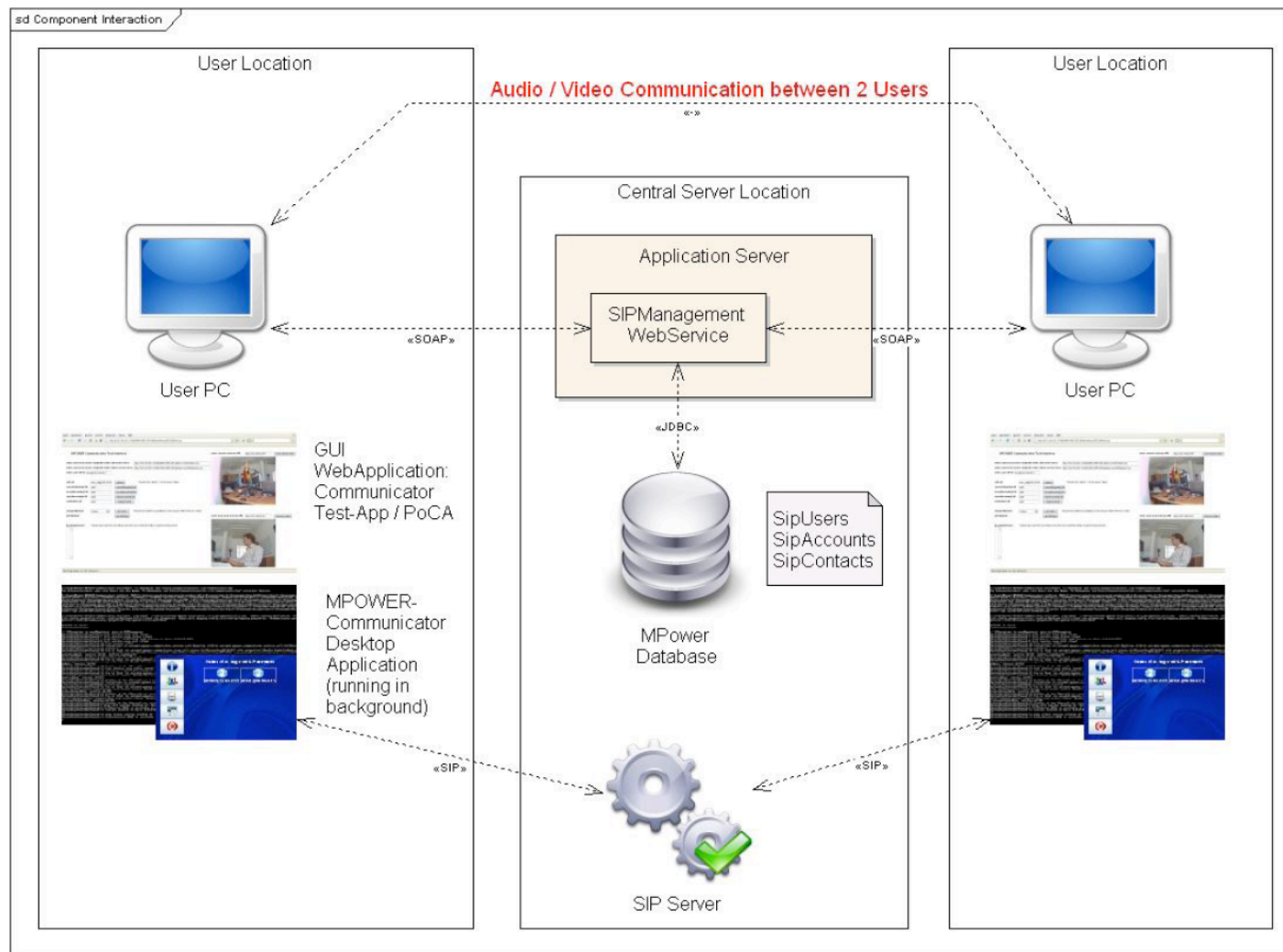# Interoperability with other systems

- Implementing SNOMED and FDA coding system in eHealth record generation (message transformation)
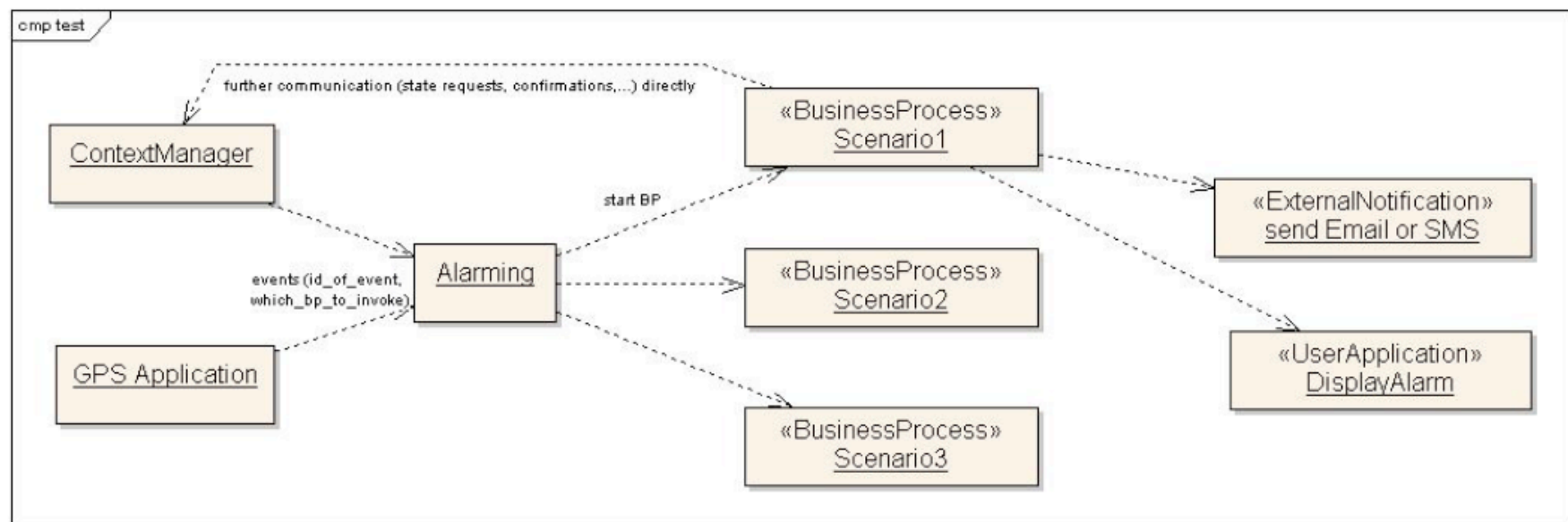
Interoperability with other systems

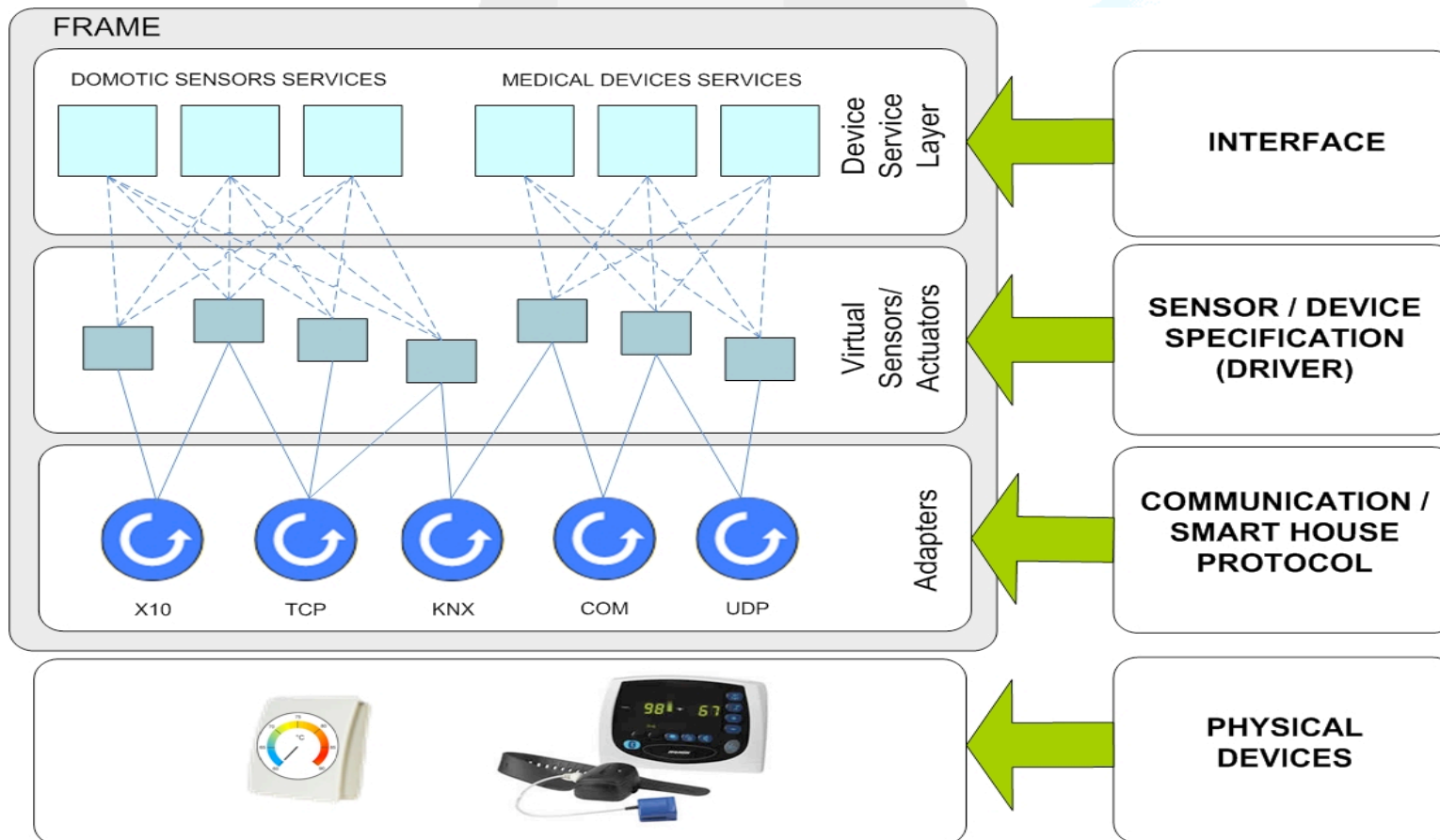- Web Service based Audio / Video Communication

Interoperability with other systems

■ External Notification Service

Interoperability with other systems

- **FSA ISO / IEEE 11073 implementation**

Interoperability with other systems

- **HL7 compliant service & modeled using HL7 opensource toolchain**
  - Medication management service
  - Calendar Management service
  - Reminder Management service (No HL7 domain→Proposal for HSSP)
  - Message Board Management service (No HL7 domain→Proposal for HSSP)
  - Patient Management service (HL7 compliant definition)

Summary / pros and contras

- MPOWER is middleware platform, which allows rapid application development in terms of orchestrating a suitable set of existing, interoperable middleware services
- interoperability between the project's components and also to external systems.
- MPOWER is based on service oriented architectures (web services, WSDL and SOAP). That in itself is an interoperability enabler, as the web service front ends allow heterogeneous platforms to interoperate (e.g. .NET and Java)

Summary / pros and contras

- The platform consists of several middleware building blocks with coordinated interfaces based on the IBM Service-Oriented Architecture (SOA) approach.

- All services and components are developed in Java with Netbeans IDE running on a Glassfish application server (those technologies are developed or sponsored by Sun Microsystems and available for free)

- There is one central database for each MPOWER platform. These specifications lead to the fact that there is only one physical server for a particular MPOWER platform installation where all components are hosted and provided.

Summary / pros and contras

- This avoids many interoperability problems which automatically arise when different systems are used in a distributed environment. **BUT** a central installation on one server makes it difficult to adapt the modules to their special requirements in runtime, e.g. the hardware or software environment.

- Interoperability standards in smart home applications are not widely used and implemented. The MPOWER platform integrates different domestic and medical sensors based on ISO 11073 standard.

Free-mpower – download all Services

Free-mpower is hosted on SourceForge

- http://sourceforge.net/projects/free-mpower/
  - Everyone can browse and acquire the
    - Source code
    - Basic documentation
    - Submit requests
    - Handbooks
    - Open Source Tool Chain
  - Current members choose who can join in
    - Current members = MPOWER partners
  - Members can:
    - Post code
    - Make documentation
    - Post pictures

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AND MORE Services and documentation can be downloaded

- All MPOWER services are made open source, e.g.,
  - Security Services
  - Databasemanagement service (with init data)
  - Patient Manager
  - Calendar Services with reminder (HL7v3)
  - Patient Information Message Board Services (HL7v3)
  - Location Services
  - Frame Sensor Services (ISO / IEEE 11073)
  - Business Services: Alarm Notification

- Documentation
  - Services
  - Overall Architecture

Who can use and how ?

- Everyone can use
  - Short-term: student projects, proof of concept, rapid prototyping
  - Long-term: EU projects, commercial solutions, application provider
- Example
  - Install required tools: Netbeans bundle, Oracle
  - Download sources from SourceForge
  - Compile and Deploy
  - Use in your favourite IDE, e.g., Netbeans "Web Service Client" drag-and-drop
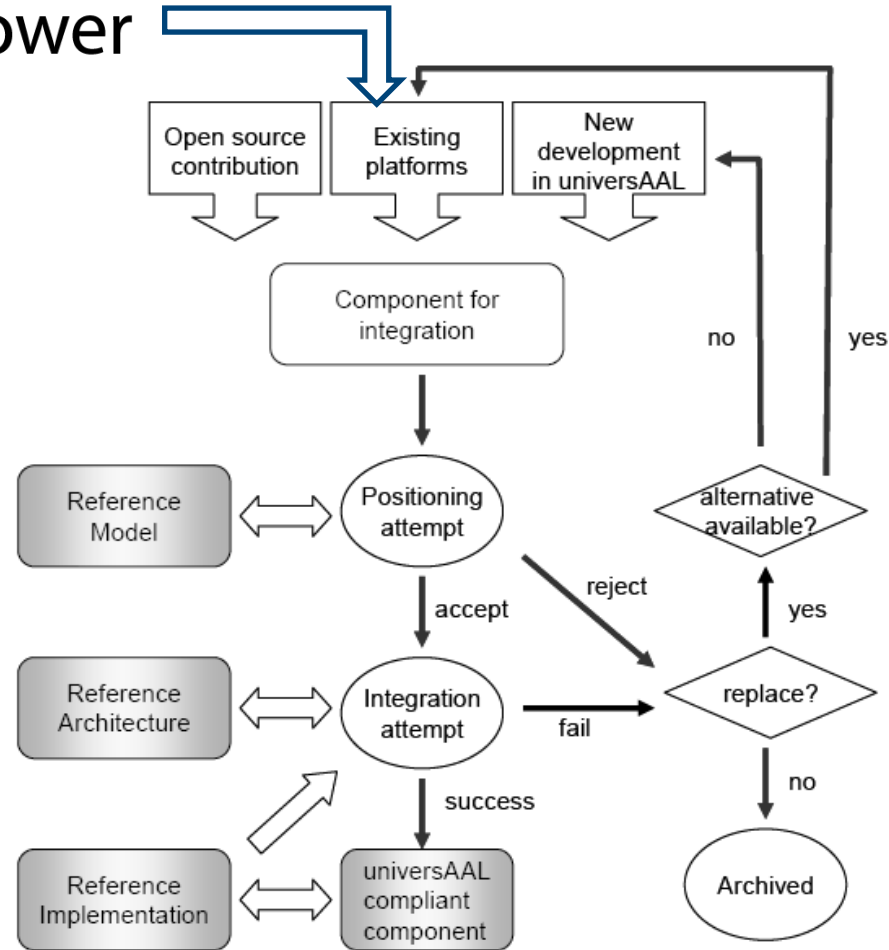
How to get involved

- Visit the homepage, request the papers/deliverables:
  - http://www.mpower-project.eu
- Get involved and use and contribute to the open source project at sourceforge:
  - Free-MPOWER: http://sourceforge.net/projects/free-mpower/
- Contact the project manager:
  - Marius.mikalsen@sintef.no
  - +47 970 34 099
- MPOWER is part of the universAAL FP7 project

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Go on!

UNIVERSAAL

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Open source contribution	Existing platforms	New development in universAAL

Component for integration

Reference Model ⟷ Positioning attempt

accept / reject

Reference Architecture ⟷ Integration attempt — fail

success

Reference Implementation ⟷ universAAL compliant component

alternative available? — no / yes

replace? — yes / no

Archived