Reference Architecture of Application Services for Personal Wellbeing Information Management

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Outline

• Introduction and Context
  – the MyWellbeing project
  – need for a reference architecture

• Materials and methods

• Results
  – a reference architecture and a set of identified application services for personal wellbeing information management

• Conclusions
Speaker background

• Juha Mykkänen, PhD, research director
• University of Eastern Finland, Kuopio, Health Information Systems R&D
• Board member in Finnish Social and Health Informatics Association, IMIA representative of Finland, HL7 Finland chair (co-chair common services SIG), HL7 SOA Ambassador
• Projects developing and applying SOA and integration approaches, citizen-centred eHealth and wellbeing projects
  – OmaHyvinvointi (MyWellbeing): personal wellness management 2008-2010
  – Mind and Body programme (SalWe SHOK), ”consumer service ecosystem” 2010-2013
  – PlugIT: healthcare application integration 2001-2004
  – eKat / guidelines for national eBooking of health services 2008
  – Healthcare services specification project (HSSP) / HL7 and OMG, 2005-
  – Integrating the Healthcare Enterprise - IHE.fi 2008-
  – National project for social services IT - Tikesos 2006-2011
  – China/Finland eHealth partnership + other projects in Shanghai 2004-2008
  – Various HL7 Finland and web services standards specifications
the MyWellbeing project (Omahyvinvointi)

• a national R&D project in Finland on citizen-centric wellness management concept – ”coper” / ”pärjäin”

• includes various viewpoints
  – citizen as the center of services ecosystem
  – 2 case groups: citizens retiring from work, families having a baby
  – concept development: generic dual model between service providers and citizens
  – infrastructure and architecture: relationship of patient-owned solutions to service provider systems, integration
  – citizen-centric needs analysis and future scenarios for eWellbeing
  – business models and evaluation

• Six universities and various companies in Finland, coordinated by university of Turku
  – work packages including concept development, case groups, scenarios, architecture and connectivity, information landscape, evaluation

“Copernican revolution – salutogenesis / Antonovski”
the MyWellbeing project (Omahyvinvointi)

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Why did we need a reference architecture for wellbeing-related application services?

• patient / individual empowerment increasingly required to support improving health and transition towards high quality and affordable health services

• increasingly, personal information management solutions and eServices **do not live in isolation** but must be integrated, e.g.
  – personal health record systems
  – citizen eBooking
  – patient/provider communication systems
  – personalised decision support and knowledge systems and sites

• many different content, use and implementation models related to PHRs, mainly due to different business models

• PHRs or other self-managed digital information collections are mostly absent in collaborative health information system typologies

• to support information management in different wellbeing-related services, a reference architecture which could be populated by specific services and components is needed
Materials and methods

• The objective of this work
  – to specify a **functional, logical level** reference architecture for the Coper eServices
  – to identify components (services) for personal wellbeing management solutions
  – to classify these services

• The work based on
  – a service-oriented architecture (SOA) approach → reuse and integration
  – literature and standards survey (personal information management, PHRs, standards)
  – experience from citizen eService development projects, (such as national guidelines for eBooking)
  – existing products
  – results from **nine workshops** of the project participants, four of which focused on service implementation and specification

  • participants from two EPR vendors, vendors for community, citizen and knowledge services, message delivery operator, five research institutes, four health service provider organizations
Results: basic architectural principles

• Instead of an enterprise standpoint, the analysis of citizen needs and activities as a starting point for the solutions and the architecture was used.

• The architecture based on the dual model of services:
  – the citizen has the right to receive a copy of documents from wellbeing services
  – traditionally information stored in the providers’ professional systems
  – the customer's copy is under the control of the individual and can be used to combine information from various services
  – such combination, if performed by service providers, is often difficult due to legal and privacy constraints
Results: classification of services

• The wellbeing services offered to the citizen are reflected the identified software services

• The SOA services are classified according to functional, platform, information type or interactivity requirements
  – The classification is generic
  – All identified Coper services and functionalities can be located in one of the classes
  – Many products or real-life services combine several services / classes
Results: Services

- Based on the results of the workshops and surveys, a total of 62 identified services were classified.

Figure 2: Specific personal wellbeing information management services in different service categories.
Core functionalities

Communication platform
- Technical service directory
  - Time stamp
- Secure communication
- Messaging

User management platform
- Identification
- Authorization
- Access rights
- Digital signature
- Log

Information management platform
- Translation
- Backup
- Compress
- Encrypt
- Archive
- Synchronize

User interfaces
- Desktop application
- Presentation services
  - Portal / WebUI
  - SMS/MMS
  - Single sign-on
  - Presentation personalization
  - Graphical presentation
- Mobile application

Core functionalities
- Enter
- Import/Download
- Correct
- Amend
- Tagging (associate)
- Classify (associate)
- Comment
- View
- Sort
- Search
- Print
- Export
- Delete
- Destroy
- Nullify/

Presentation services
- Graphical presentation

Personal added value services
- Comparison & monitoring
- Calculators
- Diary
- Calendar
- Reminder & alert
- Emergency access

Personal health device
- Pulse
- Blood pressure
- Glucose
- ECG
- Weight

Personal information repository
- Structured documents
- Binary document
- Structured data elements
- Text documents
- Hyper- and multimedia
- Metadata

Information source services
- Import service
- Service provider system
- National EPR archive

Community added value services
- Blog
- Community forum
- Comparison of data
- Risk analysis
- Links to knowledge
- Information interpretation
- Decision support
- Patient instructions
- Wellbeing services directory
- Anamnesis
- Question – answer service
- Data selling for research
- Reachability
- Payment
- Order
- Consent
- Feedback
- Electronic application forms
- Prescription renewal
- eAccess to EPR archive

Knowledge services
- Providers collaboration services
- Communication platform
- Core functionalities
- User management platform
- Information management platform
- User interfaces
- Presentation services
- Core functionalities
- User interfaces
- Presentation services
- Communication platform
- Core functionalities
- User interfaces
- Presentation services
User interface services + added value presentation services

Communication platform:
- Technical service directory
- Time stamp
- Secure communication
- Messaging

User management platform:
- Identification
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- Digital signature
- Log

User interfaces:
- Presentation services
  - Desktop application
    - Portal / WebUI
    - SMS/MMS
    - Single sign-on
  - Mobile application
    - Graphical presentation

Presentation personalization:
- View
- Sort
- Search
- Print
- Export

User management platform:
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Information source services:
- Structured data elements
  - Text documents
  - Metadata
  - Hyper- and multimedia

Structured information repository:
- Structured documents
  - Binary document

Information management platform:
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Privacy services:
- Core functionalities
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  - Edit
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  - Classify (associate)
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  - Print
  - Export

Personal added value services:
- Comparison & monitoring
- Calculators
- Diary
- Calendar
- Reminder & alert
- Emergency access

Personal health device:
- Pulse
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Technical service directory:
- Import service
  - Scanning
- National EPR archive

Presentation services:
- Mobile application
  - Single sign-on
  - Graphical presentation

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Information source services:
- Structured data elements
  - Text documents
  - Metadata
  - Hyper- and multimedia

Structured information repository:
- Structured documents
  - Binary document

Information platform:
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- Fitness guide
- Reminder & alert
- Emergency access

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- Import service
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- National EPR archive
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**Knowledge services**
- Risk analysis
- Links to knowledge
- Information interpretation
- Decision support
- Patient instructions

**Provider collaboration services**
- Wellbeing services directory
- Question – answer service
- Data selling for research
- Prescription renewal
- eAccess to EPR archive

**Service rating**
- Payment
- Consent
- Feedback

**Patientship**
- Electronic application forms
- Scanning
- National EPR archive

**External service**
- Service provider system
Knowledge services

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Use of the reference architecture

• The work was harmonized with the information architecture for the Coper, and the prototypes for the case groups of the project
  – persons retiring from work life: focus on core functionality and document scanning
  – families having a baby: focus on community added value services

• Using the reference architecture, the concrete citizen-targeted services have been prioritized, identifying combinations which should be integrated using the existing offerings from different providers
  – performed in two projects

• More detailed integration and interface specifications were produced for Import service and Personal decision support

• Standards for integration of selected services have been identified
Conclusions

• Lack of services for personal information management is not a problem
  – Lack of interoperability and integration between them is!
  – Many services were identified in readily-made products or completed projects

• Any given system should not integrate all services, although individual implementations of all services can already be identified
  – Services should be selected according to goals of individuals or specific projects

• Value of approach
  – Personal wellbeing information management decouples the individual from health or wellness service provision and avoids several obstacles related to service providers' view

• Value of reference architecture
  – Generic classification, specific repository basis for logical of services for development efforts and ecosystems
  – Identification of functionalities as SOA services enables stepwise development and individually-driven combination of various services
  – Service categories promote uniform architecture to support interoperability
  – There are readily available standards or proprietary open interfaces for many parts of the architecture for integration of services
    • Standards for structure and semantics of health information are especially relevant
"One step towards an open, sustainable and orchestrated eService ecosystem for people/citizens/consumers/patients/people."

Tusen takk / Kiitos

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