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User centric communities

Patient monitoring and support

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User centric communities

Patient monitoring and support

- Health and Social issues
 - For **elderly** and patients with **chronic diseases**: importance of **social support**
 - They seek for support and for information
 - They must keep involved in maintaining/improving their health condition
 - Rich literature (physiology, sociology, mobile computing...)
- Financial issue
 - Search for most efficient investments in healthcare
 - Ageing population: more and more people are concerned

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Patient monitoring and support

- Expected improvements
 - Improve life conditions of elderly and patients
 - Improve life conditions for helpers (for instance: reduce culpability, provide reliable alert system, etc.)
 - Improve efficiency of care (for instance: by getting objective data about patients, etc.)
 - Decrease cost
 - Keep healthy people healthy
- Techniques to be integrated: sensors/actuators, data analysis, chatbot (NLP, semantic reasoning)

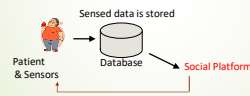
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User centric communities

Patient monitoring and support

Principles of a connected Health Social Platform



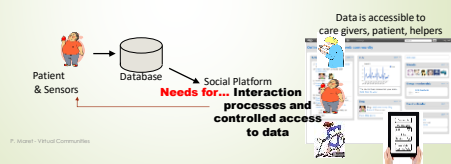
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Patient monitoring and support

Principles of a connected Health Social Platform



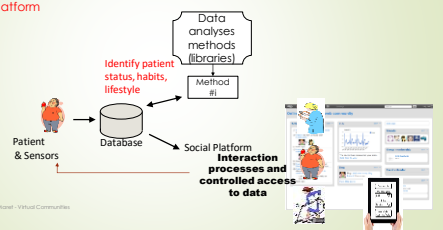
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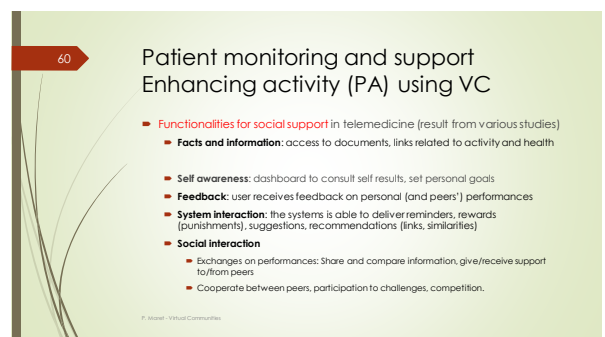
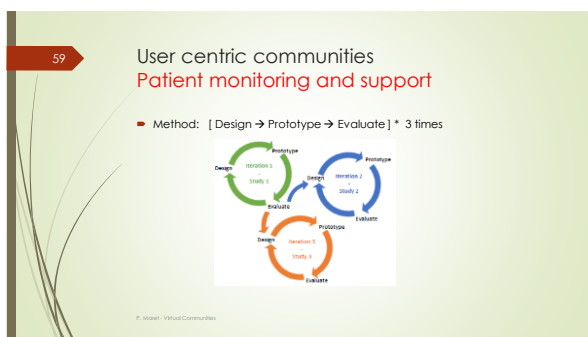
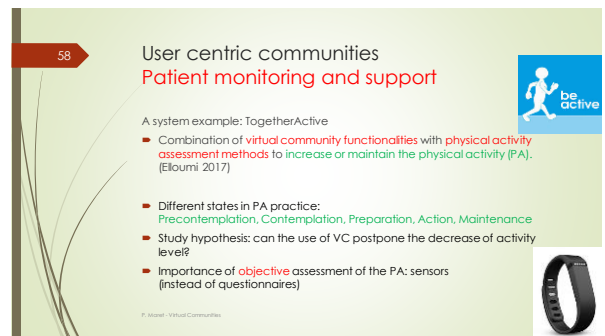
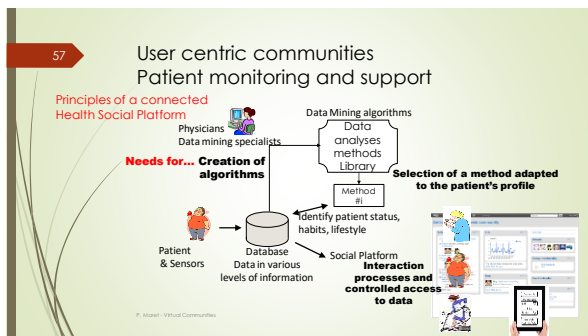
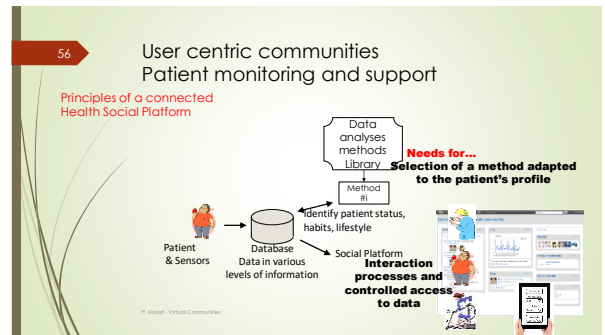
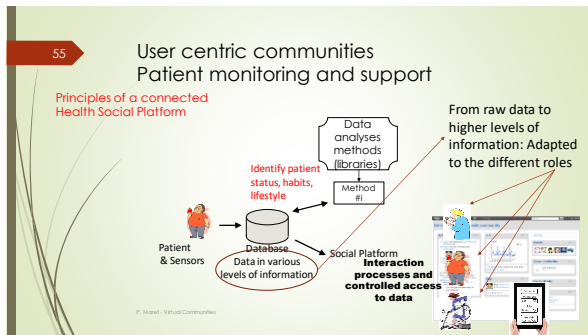
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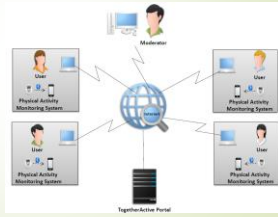
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Patient monitoring and support Enhancing PA using VC

- TogetherActive Architecture Overview
 - 2 roles: user, moderator
- Portal:
 - Set of web pages with specific functions (data gathering, display...)

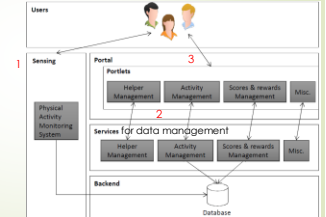


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Patient monitoring and support Enhancing PA using VC

- TogetherActive Functional Architecture
 1. Data collection
 2. Data preparation
 3. Interaction



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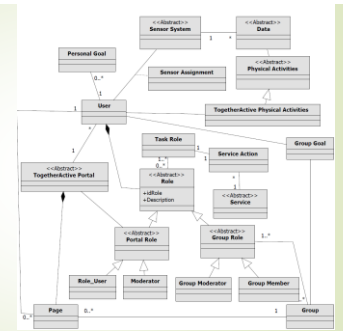
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Functional architecture : list of the pages

- Portal main pages
 - Profile Management
 - All Groups
 - Group i
 - Portal blog page
 - Portal wiki
 - Portal settings
- Personal pages
 - Daily PA
 - PA history
 - Current pers. goal
 - Pers. goal mangt
 - Pers. goal history
- Group pages
 - Group PA
 - Group PA history
 - Current group goal
 - Group goal mangt
 - Group goal history
 - Current group members
 - Group members mangt
 - Group members history
 - Group blog

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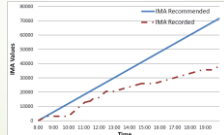
TogetherActive
Information model

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Patient monitoring and support Enhancing PA using VC

- From sensor data to PA level (PA= Physical activity)
 - Use of the 3D-accelerometer sensor, coupled with a smartphone.
 - PA value = IMA = Integral of the Modulus of the Accelerometer



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Enhancing PA using VC Experimentation

- Goal: Test the usability of the portal + Show the impact of VC functions
- Study design:
 - 4 Intervention groups : they use VC functions
 - Receive group-based functionalities of the system
 - Asked for collaboration and communication between them
 - Daily group goal, Competition against other 3 groups; Rewards for achievements
 - 1 (one) Control group : no VC
 - Receive basic version of the system : PA monitoring
 - Duration: 9 weeks

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Enhancing PA using VC Experimentation

- Results
 - Questionnaire + Analysis of portal logs to evaluate the system use and usability
 - Analysis of PA data to evaluate the potential difference with VC functions
- Questionnaire
 - Method (from Lewis 95): Overall system usability (OVERALL) / System usefulness (SYSUSE) / Information quality (INFOQUAL) / Interface quality (INTERQUAL)
 - Result: Same results: Ease of use in both cases

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Enhancing PA using VC Experimentation

- Analysis of portal logs
 - Method: number of sessions, pages visited, exchanged messages (intervention group)
 - Intervention group uses the portal twice as often as the control group
 - Very few messages posted
- Analysis
 - Steps per day

A strong decrease at week 7 vs. 4

(a) Intervention Group

(b) Control Group

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Enhancing PA using VC Conclusion

- The study shows the potential difference of virtual communities Decrease arises 2 weeks later
- Difficulty encountered: recruitment, sensor wearing, objective analysis (ex: steps per hour wearing the sensor)
- Such study are useful
 - Improvements/adjustment of systems (usability, functions)
 - For political investments
- Lot of means and energy required for such study.
- Ethical question raised
- Next study: PA activation with a coaching system (The system rings a coach when it detects low activity by the patient)

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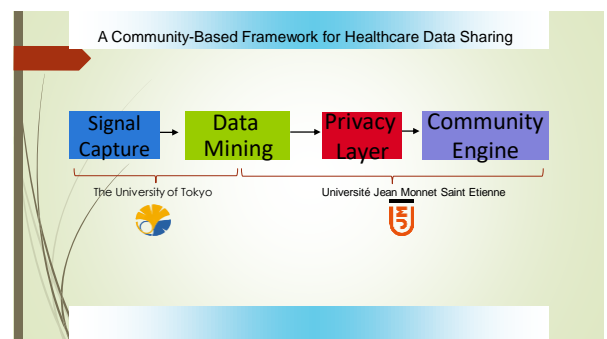
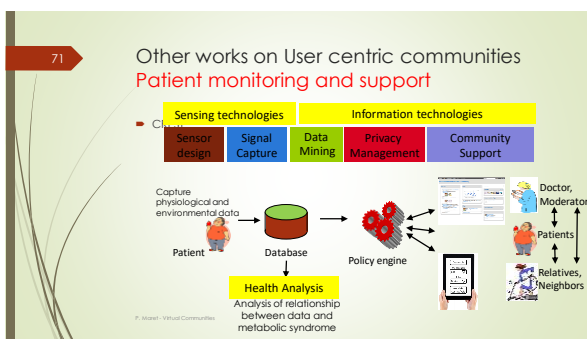
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Other works on User centric communities

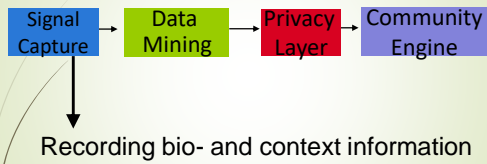
Patient monitoring and support

- Social support for patients with metabolic syndrome
 - Among the chronic disease
 - Cardiac problems, unhealthy meals, no physical activity, depression

→ Social support may help to recover a better life style
(Cooperation with the University of Tokyo and JST)

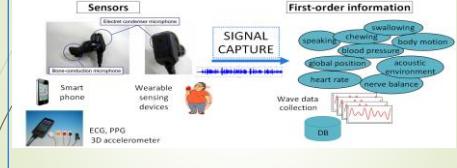


A Community-Based Framework for Healthcare Data Sharing

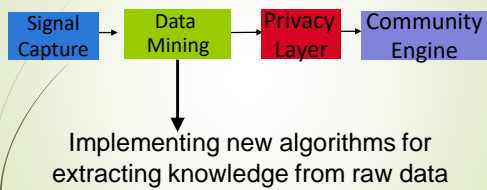


Signal Capture

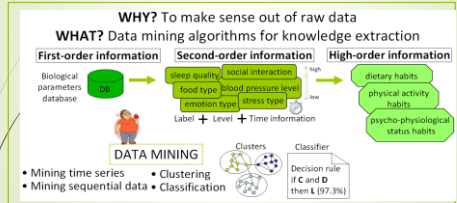
WHY? To capture bio-information without feeling constrained
WHAT? Small scale sensors recording bio- and context information



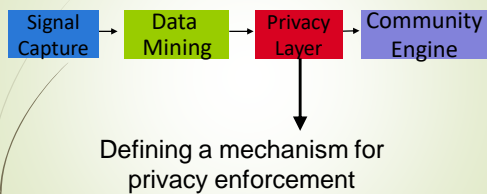
A Community-Based Framework for Healthcare Data Sharing



Data Mining



A Community-Based Framework for Healthcare Data Sharing



Privacy

WHY? Not everybody is allowed to access everything
WHAT? Policies specify who is allowed to access what in which case



A Community-Based Framework for Healthcare Data Sharing



Designing a social platform to monitor and give recommendations

Community Engine



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Other works on User centric communities Patient monitoring and support

- **Social support** for patients with **metabolic syndrome** - Results
 - Prototype design with
 - Privacy engine implementation
 - Community platform (based on Elgg)
 - Data mining; data model and framework description (lack of real data!)
 - No in-use evaluation

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User centric communities Patient monitoring and support

Related research topics in CS (a selection of)

- System engineering methods Component based; Agile design
- Text analysis on social networks applications (NLP) Identify patient's needs and status
- Data mining Identify the actual patient status, habits, lifestyle
- Data security Ensure identity on Internet (blockchain); privacy preservation; information granularity management
- Linked data Reuse knowledge bases; large scale reasoning (data; stream data)

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