eTELEMED Panel (IT)
Digital Society Trends: Technology Challenges for Healthcare

Moderator:
Asa Smedberg, Stockholm University/KTH, Sweden

Panelists:
Cedric Pruski, CRP-Henri Tudor, Luxembourg
Voicu Groza, University of Ottawa, Canada
Digital Society and Healthcare

• Presentation of Panelists
• Open Discussion about Important Trends
eTELEMED - a Patient’s View

“Teleporting“ physicians
– eTelemedicine = specialists consultation (acute)
– eHealth = monitoring remote patients (chronic)

IT alone cannot solve the problem:
• Data Quality vs Quantity
• Measurement Uncertainty
• Technologies limitations
  – Technical
  – Security
  – Policies
eTELEMED - a Patient’s View

... as in opposed to other “statistical / professional” views of providers, payers, politicians...
Quantity

- ECG 0.05 – 100 Hz
  - 300 Hz sampling rate
  - 8-bit resolution
  - 207 MB/day
- EEG 0.5 – 40 Hz
- EMG 20 – 2000 Hz
- EOG dc – 10 Hz

Data Quantity

- Storage
- Transmission
- Processing
- Interpretation
Medical Measurements

- The result of a measurement is defined as:
  - a numerical value
  + a measurement unit
  + a measurement uncertainty

- The measurement result is meaningless if any of these three items is missing

- **Uncertainty**, not *error, accuracy, precision, ...*
Uncertainty Definition

• Non-negative parameter characterizing the dispersion of the quantity values being attributed to a measurand, based on the information used.
  – VIM: International Vocabulary of Metrology

• Two key points.
  – The **measurement result is always an interval** of values that can be attributed to the measurand
  – The capability of characterising the dispersion of these values depends on the amount of available information.
Noise & Errors => Measurement Uncertainty

Quality?

- Motion artifact
- Cross-talk
- No power
- Aliasing
  - Improper setup
  - Poor electrode contact
  - Power-line interference
  - Electromagnetic interference
Quality in Quantity

• Blood pressure and ECG
• Low-cost portable systems
• Decreased quality and robustness
• Increased amount of data
• More representative data
Data Quantity VS Quality

- Global trends
- Garbage or important
- Continuous versus intermittent monitoring
- What to do with questionable data
Interoperability in eHealth systems

- 3 majors interoperability issues to be tackled in health systems:
  - Organizational interoperability
  - Technical interoperability
  - Semantic interoperability
Organizational Interoperability

- **Objectives**: Identify and organize the various involved actors
- Logical and physical organization of the information
- Definition of data flows between entities
- Security issues from the organizational point of view (e.g. define roles and assign permissions)
Technical Interoperability

• **Objective**: achieving health data exchanges in an heterogeneous environment

• Use of standards (mainly to exchange or access data)
  - Healthcare standards (DICOM, openEHR, HL7 ...)
  - IT standards (RBAC, BPEL ...)

• Security issues from the technical point of view
Semantic Interoperability

- **Objectives:** To make data explicit and machine understandable to facilitate health information exploitation
- **Models for representing domain knowledge:**
  - Termino-ontological resources (ontologies, terminologies, thesauri ...)
- **Trends and challenges:**
  - Web-based tools development using Semantic Web technologies
  - Construction (and acceptation) of standardized terminologies
  - Language and cultural barriers to overcome
  - Inform and train health actors
eHealth for Empowering Patients and Citizens

• Search and Retrieval of Health Information
• eHealth Systems for Communication with Experts and Peers
• eHealth 2.0
• Empowering Effects?
• Effects on Healthcare and Healthcare Professionals?
eHealth Communities

- For Peers with Different Disorders and Health Concerns
- Preventive Healthcare, Lifestyle Issues
- Community Conversations - Characteristics
- Pros and Cons of eHealth Communities
- Challenges
Holistic Approach to eHealth

• How to Integrate Health Systems to a Working Whole
• What Possible Relations can be Detected between the Different and Separated Systems?
• What could Users/Patients/Citizens/Health Professionals Benefit from Integrated Systems?
Digital Divide

• What Groups Are Included and Able to Benefit from the Technology Change?
• Groups Left Out?
• What Can Be Done to Bridge any Gaps?
Summary of Trends and Future Challenges

• The Panelists Share Their Views