

# **eTELEMED Panel (IT)**

## **Digital Society Trends: Technology Challenges for Healthcare**

### **Moderator:**

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### **Panelists:**

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# Digital Society and Healthcare

- Presentation of Panelists
- Open Discussion about Important Trends

# eTELEMED - a Patient's View

“Teleporting” physicians

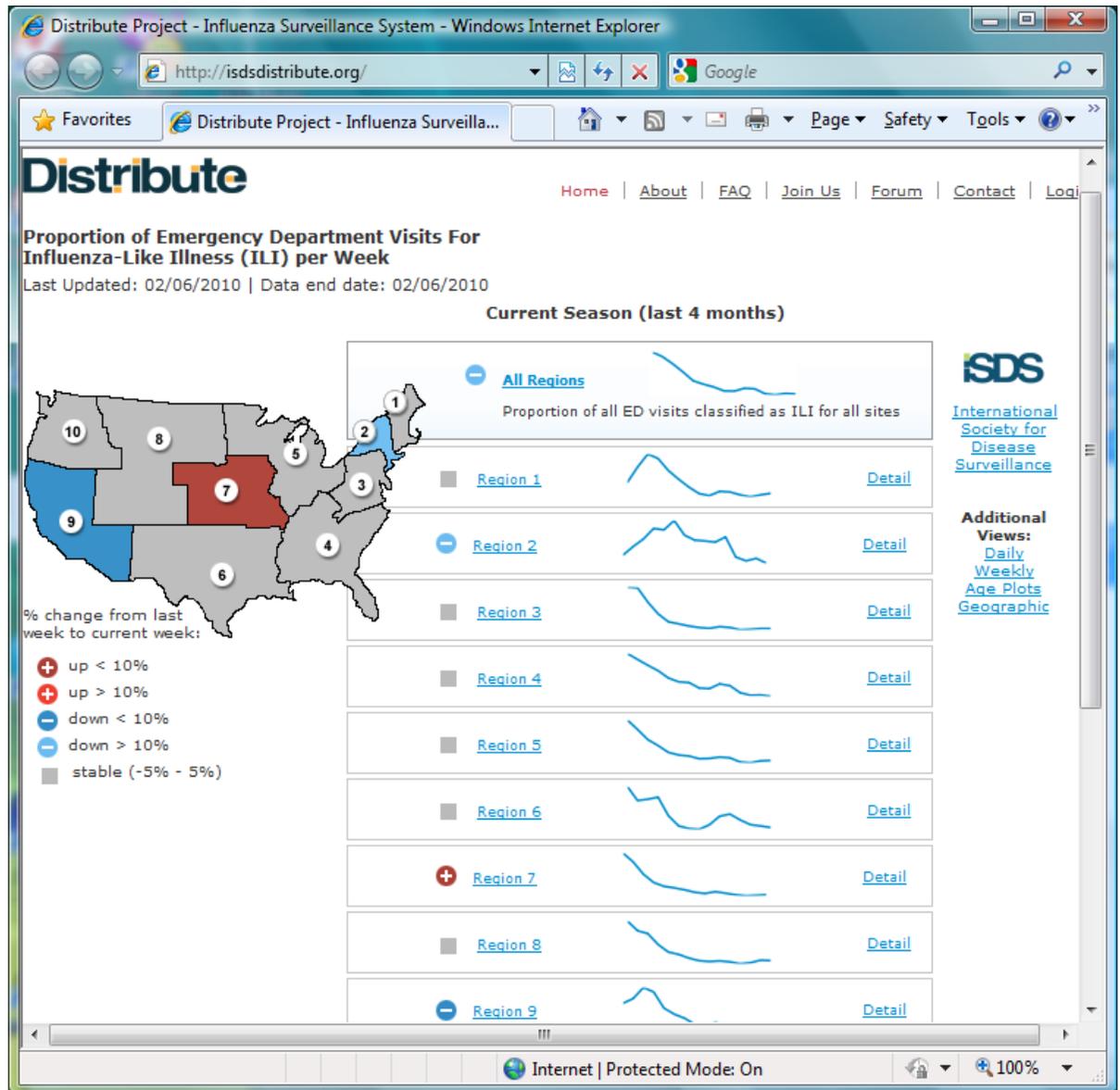
- eTelemedicine = specialists **consultation** (acute)
- eHealth = monitoring remote patients (chronic)

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

Thakor NV, Biopotential and electrophysiology measurement, CRC Press, 2000.

# 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

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# 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