Towards interoperable clinical systems
Evolution or revolution?

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Agenda

- Our health prospects, as we age
- The health service need and the expected support ratio
- So, what have we done the last ten years?
- Interoperability - what is the problem?
- What do we need to do the next ten to meet the needs?
- My claims
- My advice
Our health prospects

Prevalence of chronic conditions

USA 2004

Our health prospects

In Canada, 60%–80% of general medical costs are related to the care of persons with chronic disease[1].

Our health prospects

Rates hospital usage pr. age
Norway 2002-2006
Weighted for no. of inhabitants

Rates (no. of stays/treatments pr. 1000) vs. Age

- Male Inp.
- Female Inp.
- Male day
- Female day
- Male Outp.
- Female Outp.
Our health prospects

Rates of primary care service usage pr. age in Norway

Does anybody in the audience know? If nobody knows, why don't we know?
Health service needs forecast

Expected support ratio

The demographic change

Potential Support Ratio 1950-2050
World / Europe

Source: UN, Population Division

Number of elderly 2000–2050. Source: Statistics Norway
Patient pathways and future needs

Focus area

Rates (no. of stays/treatments pr. 1000)

Age

Male
Inp.
Female
Inp.
Male day
Female
day
Male
Outp.
Female
Outp.

Focus area

Patient pathways and future needs

Focus area

Rates (no. of stays/treatments pr. 1000)

Age

Male
Inp.
Female
Inp.
Male day
Female
day
Male
Outp.
Female
Outp.

Focus area
What do we need to do?

• Patients must be allowed to do part of the job of staying healthy!
  – Diabetics
  – COPD
  – CHF

• Good thing is, giving patients the knowledge and responsibility also seems to influence the medical outcome in a positive direction.
What do we need to do?

• Structure our EHR systems to support
  – Clinical Decison Support
  – Evidence Based Clinical Guidelines
  – Research
  – Disease surveillance
  – .....
We need structured interoperable systems

PHR - Personal health record (for patients)
EPR - Electronic patient record (for GP’s)
EMR - Electronic medical record (Hospitals)
RR - Rehabilitation Records
NHCR - Nursing Home Care Record
HCR - Home Care Record

Systems: 3-4
EPR 6
EMR 2 (3)
RR 3
NHCR 3
HCR =17-19
So, what have we done the last ten years?

Number of elderly 2000–2050. Source: Statistics Norway
So, what have we done the last ten years?

The 20th of June 2000 the first XML based discharge letter were transferred electronically from the University Hospital of North Norway to a GP office, Sentrum Legekontor in the centre of Tromsø, using software developed at Norwegian Centre for Integrated care and Telemedicine.
So, what have we done the last ten years?

Messages in the Norwegian health net
January 2006 - May 2010
So, what have we done the last ten years?

Messages types

• Discharge letters
• Referrals
• Radiology request / reply
• Bio-chemistry
• Others
• Message acknowledgement
So, what **more** have we done the last ten years?

- Discussed.... need, security, privacy...
- Fixed the adress registry (2009)
- Fixed the legislation (2010)
- ....
Progress is hindered by

• Many actors and systems lead to complexity
• Many projects and interdependencies between them
• Lack of resources for implementors
How can we achieve interoperability?

Interoperability => IM A = IM B

What does R71 mean?
Information models in healthcare

Requirements:
• Stable over time
• Simple and implementable

The reality:
• Constant change
• Increasingly complex
Problem

Change factors in medicine have been characterized by Rector as follows: Not only is medicine big, it is open-ended:

1. *In breadth*, because new information is always being discovered or becoming relevant
2. *In depth*, because finer-grained detail is always being discovered or becoming relevant
3. *In complexity*, because new relationships are always being discovered or becoming relevant.

My claims
Binding software to information content

If the medical software is tied to the information content handled in the system (implicit model), then medical software needs to change constantly

– Brilliant business model for EHR vendors

The singel information model is doomed to change as medical knowledge expands.

– Brilliant business model for information architects
– The model will collaps because of the complexity
– *We will never acheive stable interoperable systems following these strategies*
My suggestion: Use Two-Level Modelling

“Separation of Information and Knowledge”

Source: Rong Chen, Guest lecture at UiT, IFI, June 2008. Two level modelling and ‘future-proof’ information system.
Information

Reference Model

Instances

Information

Knowledge

Archetype Model

Instances

Semantics of constraint

Runtime constraint

Archetypes

Source: Rong Chen, Guest lecture at UiT, IFI, June 2008. *Two level modelling and ‘future-proof’ information system*
What can we do?
My advises for the next ten years

• Let clinicians define the clinical information models in the EHR system, they know their domain
• Use the two level modelling method for EHR systems
• => adopt the OpenEHR methodology

• Ban closed and proprietary systems in healthcare
  – We don’t have time to evolve all systems into interoperability
  – We really need to know what is going on in the health service

• Let the vendors work on one common and open software repository for EHR software
  – They have the knowledge, experience and skills to do it
We need interoperable systems

Systems:

- PHR: Personal health record (for patients)
- EPR: Electronic patient record (for GP’s)
- EMR: Electronic medical record (Hospitals)
- RR: Rehabilitation Records
- NHCR: Nursing Home Care Record
- HCR: Home Care Record

One shared and Open EHR system

- PHR
- EPR
- EMR
- RR
- NHCR
- HCR
Conclusion

We don’t have time for evolution!
We must choose revolution!

Thank you for listening 😊