Technische Universität Braunschweig

Hannover Medical School

PLRI PETER L. REICHERTZ INSTITUTE FOR MEDICAL INFORMATICS

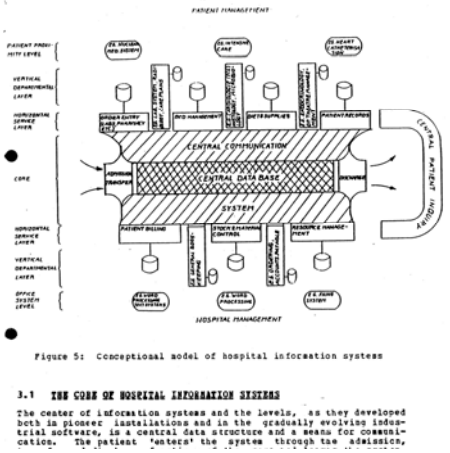

Figure 5: Conceptional model of hospital information systems

3.1 THE CORE OF HOSPITAL INFORMATION SYSTEMS

The center of information systems and the levels, as they developed both in pioneer installations and in the gradually evolving industrial software, is a central data structure and a means for communication. The patient 'enters' the system through the admission,

Medical Informatics: Past, Present, Future

Reinhold Haux

Peter L. Reichertz Institute for Medical Informatics
University of Braunschweig - Institute of Technology (TU Braunschweig)
and Hannover Medical School (MHH)

Past President of IMIA

German Japanese Medical Informatics Symposium (GJMIS) in 2013

history of this talk

- From 1999 to 2012 I have been serving in the Board of IMIA, the International Medical Informatics Association, among others
- from 2007 to 2010 as its President.
- The ideas presented in this talk have been presented
  - first in 2009 at CoMHI in Hiroshima, Japan,
  - then, revised, at 2010 at Medinfo in Cape Town, South Africa.
- A manuscript appeared in 2010 in the International Journal of Medical Informatics.
- It was may ‘fare well gift‘ as President.

structure

- medical informatics
  - past
  - present
  - future
- discussion

details in: Haux R. Medical Informatics: Past, Present, Future. Int J Med Inf. 2010.

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Summary points

- The aim of this essay is to reflect about medical informatics as a discipline.
- Its main goal is to emphasize some promising future research directions which may become important parts of medical informatics.

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- Its main goal is to emphasize some promising future research directions which may become important parts of medical informatics.

PLRI – Peter L. Reichertz Institute for Med. Informatics

Prof. Reichertz
1930 - 1987

Prof. Pretschner
1938 - 2007

40 years medical informatics

1969
P.L. Reichertz became professor at MHH (Development of the MSH)

1974
Foundation of the Institute for Medical Informatics at MHH

1975-1988
Minor subject medicine at computer science program of TU Braunschweig, organized by Prof. Reichertz

1986
D.P. Pretschner became professor at Univ. of Hildesheim

1996
Foundation of the Institute for Medical Informatics at TU Braunschweig

1997
Prof. D.P. Pretschner moved to TU Braunschweig

2004
Retirement of Prof. D.P. Pretschner

2007
Foundation of PLRI

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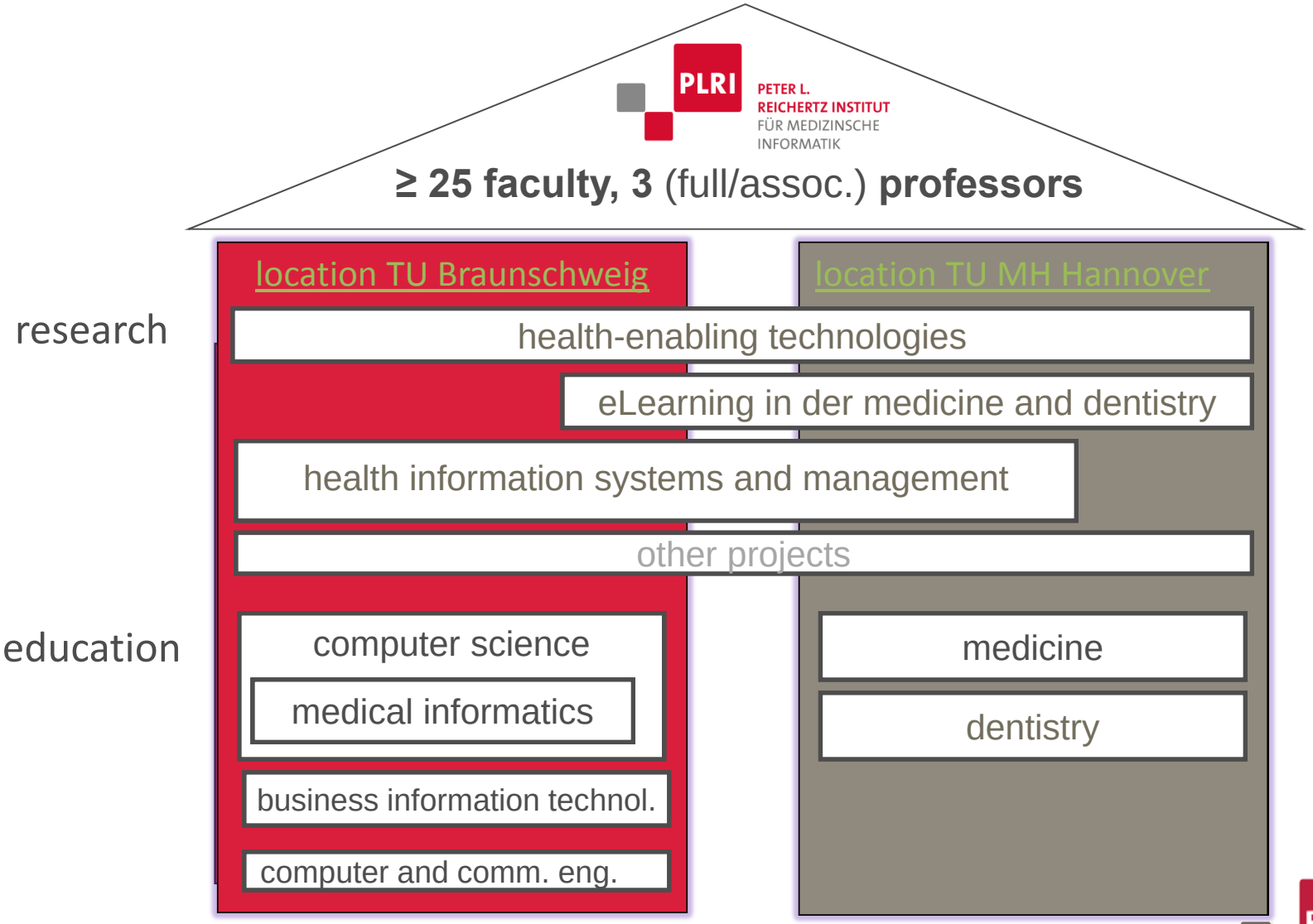
PLRI – Peter L. Reichertz Institute for Med. Informatics



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medical informatics

- ***What are important***
  future research fields for medical informatics?

- … and so to reflect about medical informatics
  as a discipline
- dedicated to IMIA (and so to you);
  it is a ‘gift‘ which you may (or may not) like
- biomedical, health, medical, … informatics?

medical informatics

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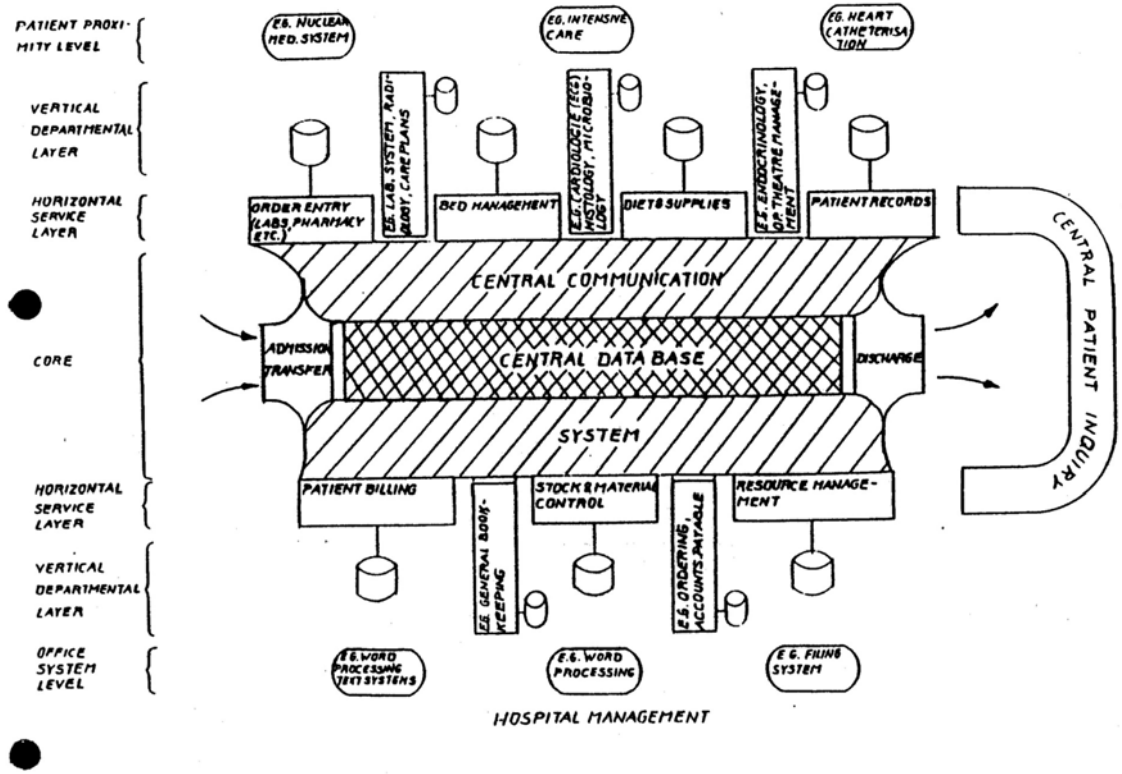
medical informatics – past

some (few) milestones of the past

- 50 years ago: Ledley/Lusted, dec.-supp.
- 25 years ago:
  Jan van Bemmel: structure of our field, ...
  Peter Reichertz: HIS and research, ...
  Edward Shortliffe: research methodology , ...
  Jos Willems et al.: ECG-database, ...
- 10 years ago:
  Reed Gardner et al.: 20 yearsHELP
  IMIA recommendations on education

Hospital Information Systems
- Past, Present, Future -1

Peter L. Reichertz
Institut für Medizinische Informatik
Medizinische Hochschule Hannover



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Hospital Information Systems
- Past, Present, Future -[1]

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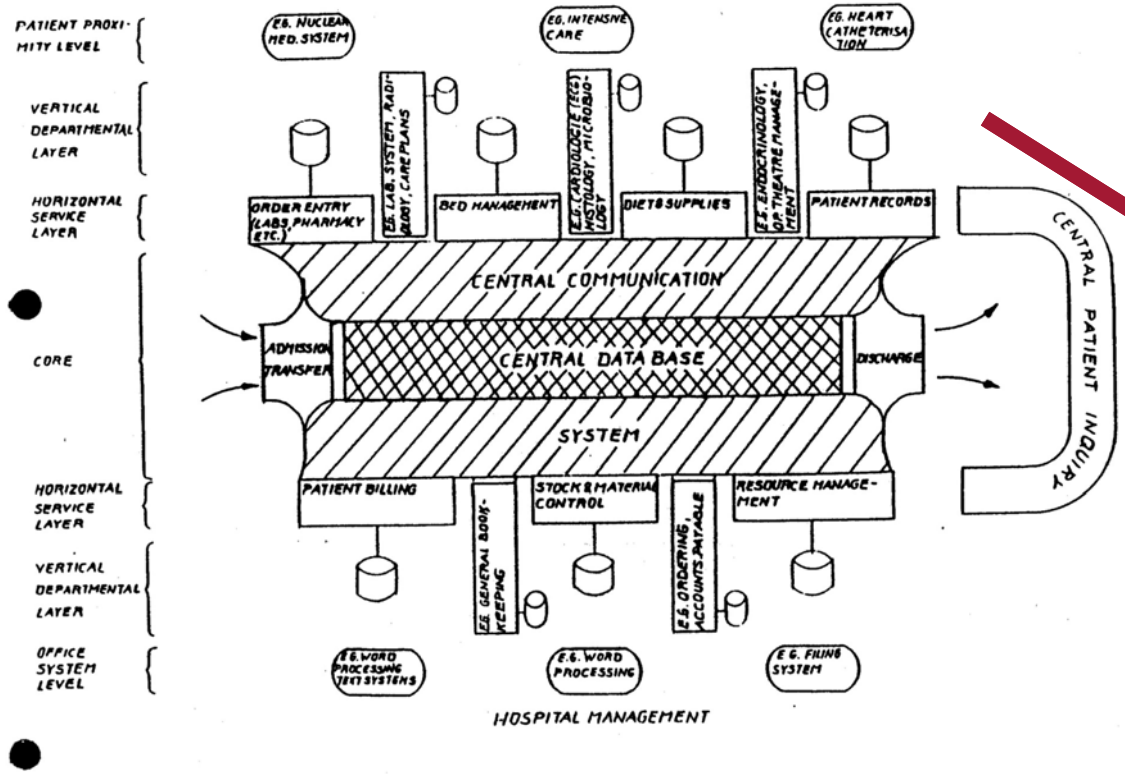
Medizinische Hochschule Hannover



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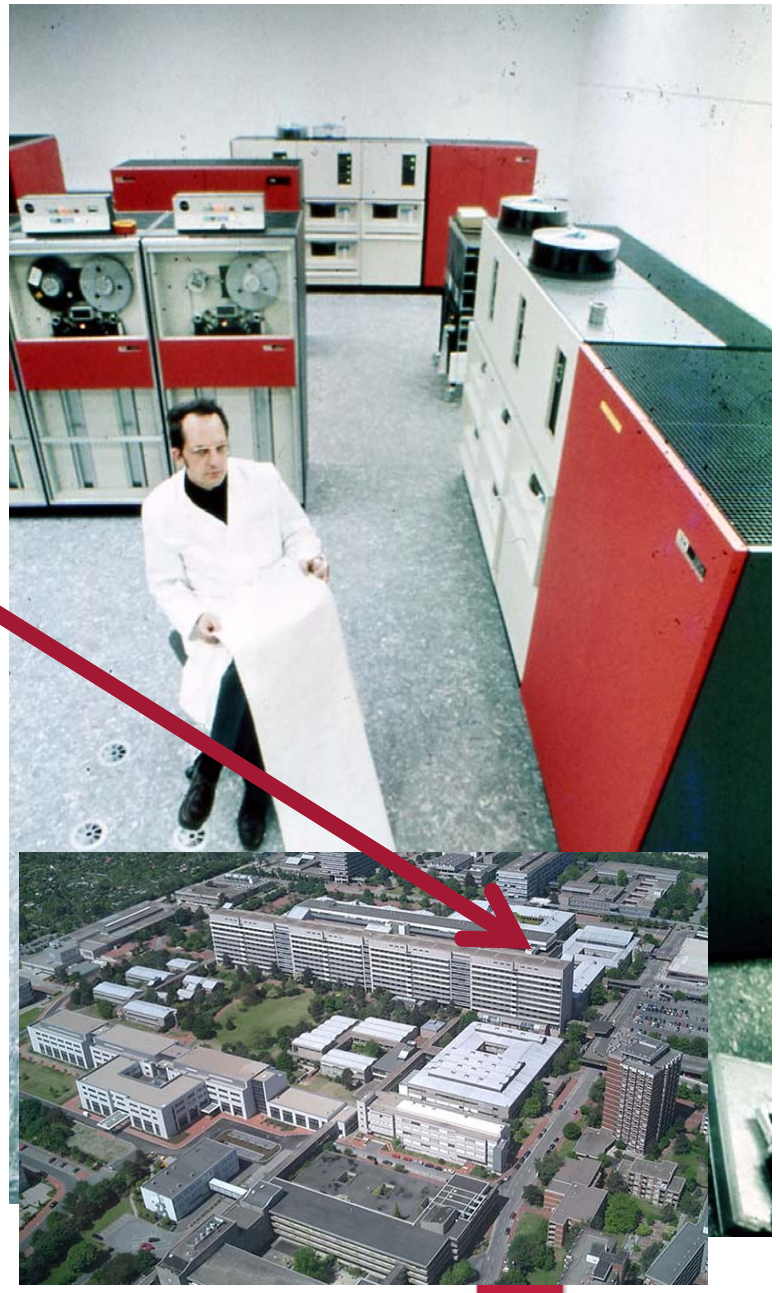

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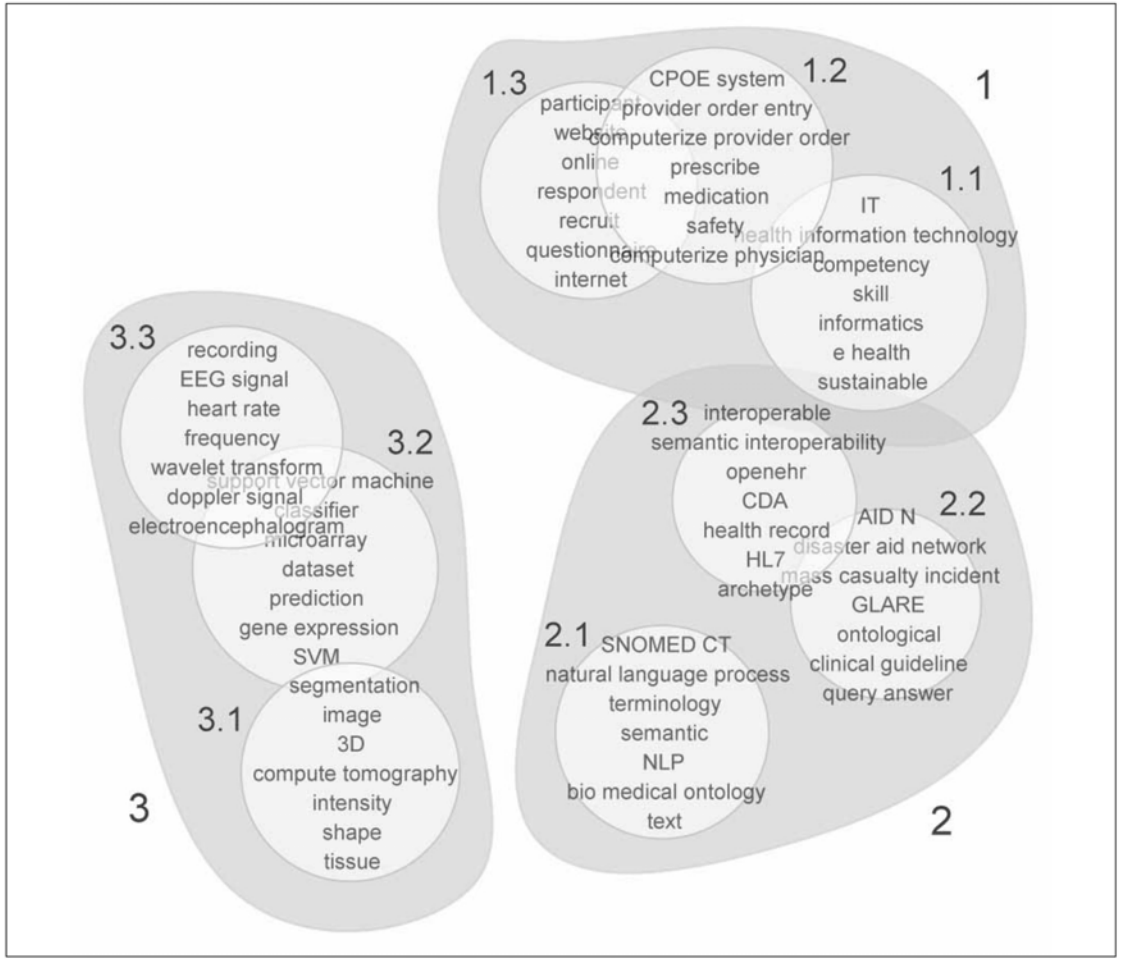
medical informatics – present

analyses e.g. by Schuemie, Talmon et al.
Mapping the domain of medical informatics.



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medical informatics – present

- their summary: current medical informatics research concentrates on
  - the organization, application, and evaluation of health information systems
  - medical knowledge representation
  - signal and data analysis

medical informatics – future

- ***What are important – original and relevant – future research fields for medical informatics?***

- always consider
  - the aims of medical informatics …
  - … and its driving forces (progress in inf. proc. methodolology / ICT, medicine / health sc., society)

- two views to present the suggested research fields (details in the IJMI paper)

medical informatics – future

other references (excerpt)

- Blum B (ed). A framework for medical information science. Med Inform. 1984
- Sittig DF. Grand challenges in medical informatics? JAMIA 1994
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- Kay S. Health informatics: challenges to progress. Methods Inf Med. 1999
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medical informatics – future

- research fields are grouped in medical informatics contributing to
  - good medicine and good health for the individual
  - good medical and health knowledge
  - well-organized health care

medical informatics – future

- research fields are grouped in medical informatics contributing to
  - good medicine and good health for the individual
  - good medical and health knowledge
  - well-organized health care
- MI / research fields with the aim to contribute
  - to progress in the sciences
  - to high-quality, efficient health care, and to quality of life

medical informatics – future – view 1 (1/3)

good medicine and good health for the individual

1) comprehensive electronic patient/health records
   combined with appropriate concepts for representing, accessing and visualizing health data
2) computer-enhanced decision support combined
   with appropriate concepts for reasoning and knowledge representation
3) comprehensive measurement and visualization of the human body
4) formal models for better understanding the functions or workings of the human body

medical informatics – future – view 1 (2/3)

good medical and health knowledge

5) comprehensive, easily accessible
   medical / health care knowledge bases

6) data mining and analysis
   for health reporting, health consulting and for identifying new medical knowledge

7) controlled medical vocabularies
   and their relation to models of health and disease

medical informatics – future – view 1 (3/3)

well-organized health care

8) effective architectures of HIS
   for patient-centered (not institution-centered) care and appropriate information management methods

with all these research fields being related to

9) understanding nature, properties and management of information in biological structures as well as in health care organizations

10) demonstration of effectiveness through evaluation studies

medical informatics – future – view 2 (1/6)

having in mind that today and in the near future

a) health has to be considered as integral part of life (not as disease episode(s))

b) medical informatics is addressing both, health professionals *and* individuals/consumers

c) the individual, is at the center of medical informatics research even though it can range in scale from molecules to populations

d) research, education and practice may shift more and more from local to global activities

the research fields can be structured into 16 groups

medical informatics – future – view 2 (2/6)

good medicine and good health for the individual

1) seamless interactivity with automated data capture and storage for patient care and beyond
   from perception to high-level semantic concepts, related to H-H, M-M, H-M interaction; not restricted to episodes
2) knowledge-based decision-support for diagnosis and therapy and beyond
   decision-support in its broadest meaning, context-aware, individualized
3) patient-centered data analysis and mining
   with representations of patient data based on appropriate semantic concepts

medical informatics – future – view 2 (3/6)

good medicine and good health for the individual

4) informatics diagnostics
   informatics tools form major part of the diagnostic entity

5) informatics therapeutics
   informatics tools form major part of the therapeutic entity

6) informatics capability-enhancing extensions
   both mental and physical
   implanted, immersive or external assistants
   providing a person with extended memories, senses, and connectivity

medical informatics – future – view 2 (4/6)

good medical and health knowledge

7) systematization of medical/health knowledge with formal representation, automated knowledge collection, beyond languages

8) analysis of medical and health knowledge
incl. knowledge generation, quality assessing & certifying

9) identifying new disease patterns
e.g. through pervasively measured sensor data, combined with molecular and clinical knowledge

10) modelling the virtual human
more ‘in vitro experiments‘ through simulation

medical informatics – future – view 2 (5/6)

well-organized health care

11) elaborating concepts for appropriate health data bank architectures and for its organizations
   allowing a range of local to global offerings for storing and maintaining personal health data

12) elaborating concepts for patient-centered health information system architectures
   within and beyond health care institutions
   and its information management strategies
   considering data from ambient environments

13) automated, individualized health advice and education

medical informatics – future – view 2 (6/6)

*w*ith all these research fields being related to

14) analysing, creating and/or extending theories, concepts, and methods

15) systematic evaluation, from ‘phase 1‘ lab experiments to ‘phase 4‘ field tests

16) establishing and exploring the use of ‘living labs‘

medical informatics - future

- consequences? significantly, not only for medical informatics (details in IJMI paper)
- boundaries between disciplines may shift
  and as every discipline, medical informatics needs to be successful in the competition of sciences

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- my personal summary:
  - medical informatics is an attractive discipline
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- my personal summary:
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  - IMIA plays an important role
- thanks to all who contributed
- and keep in mind: „life punishes those who delay" [Mikhail Gorbachev, 1989]

discussion?

Many things have to be done and can be done, just let not sit back and let them happen by themselves. Don't let us only react to events which induce a change, let us actively prepare for a meaningful evolution.

Reichertz PL. Preparing for change: Concepts and education in medical informatics. Comput Methods Programs Biomed. 1987.

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