



Detecting and Eliminating Bacteria Using Information Technology

Clinical Advisory Board Meeting #1
18th of May, Helsinki



Today's agenda

15:30	Informal coffee	
16:00	Opening, welcome	Dirk Colaert
16h05	Introduction of Clinical Advisory Board Members	Dirk Colaert
16h20	Role of the Clinical Advisory Board	Karl Stroetmann
16h35	Presentation of the DebugIT project	Dirk Colaert
17h00	Coffee Break	
17h15	Clinical approach	Christian Lovis
	Plenary discussion	Dipak Kalra
18h40	Next steps, feedback	José Verguts
18h55	Farewell	Dirk Colaert
19:30	Informal dinner	

Welcome to the members of the CAB

Prof. Dr. Didier Pittet

Dr. Didier Guillemot

Prof. Dr. Javier Garau

Prof. Dr. Kendall Ho

Dr. Vilma Marešová

Dr. Hans Rutberg

Not present today: Mr. László Balkányi MD, PhD

DebugIT members of the CAB:

Dr. Håkan Hanberger

Prof. Dr. Sten Walther

Not present today: Dr. Hugo Sax

DebugIT collaborators

Dirk Colaert, Agfa HealthCare

José Verguts, Agfa HealthCare

Christian Lovis, Les Hôpitaux universitaires de Genève

Veli Stroetmann, Empirica Gesellschaft für Kommunikations- und Technologieforschung mbH

Karl A. Stroetmann, Empirica Gesellschaft für Kommunikations- und Technologieforschung mbH

Dipak Kalra, University College London

Christel Daniel, Institut National de la Santé et de la Recherche Médicale

Daniel Schober, Universitätsklinikum Freiburg





The Clinical Advisory Board: rationale and roles

Presented by Dr. Karl Stroetmann



Consult and associate globally leading experts in order to:

- Assure ***clinical validity*** and relevance of project results
- Increase ***visibility*** of the project
- Feed project results into the ***wider scientific communities***

Tasks

- Help ***embed*** the project into the wider public ***health and clinical treatment context*** to reflect and respond to priority medical and policy issues
- Support identification of ***pertinent clinical research questions*** to be investigated in the data-mining process
- Advise on the optimal ***project research process***
- Accompany, assess and ***validate project outputs***
- Help identify ***clinical outcome indicators*** for use in the impact assessment

Duties

- Participation in person at **three annual meetings** is encouraged
- Participation in Project Executive Committee or scientific project / work package meetings where appropriate
- On a case by case basis, **critical review of project output** (deliverables)
- If and as desired by the experts, further involvement in project work and/or feedback to results and output

Remuneration

- **Travel and accommodation** costs for participation at Board or Committee meetings will be reimbursed as a lump sum
- **Review of deliverables** will be remunerated with a lump sum, depending on the scope and size



Detecting and Eliminating Bacteria Using Information Technology

Dirk Colaert MD, Agfa HealthCare, Belgium

Christian Lovis MD MPH, University Hospitals of Geneva, Switzerland

CAB - introduction

- objectives of DebugIT
 - generic IT framework
 - multisource, multimodal data aggregation
 - virtual pan-european patient cohort
 - detect patient safety related patterns and trends,
 - acquire new knowledge through advanced data mining, and
 - use this knowledge for better decision-making
- why infectious disease for this project
- technical, semantical and legal challenges

debugIT in short

- a Seventh Framework Program project
 - FP7-ICT-2007-1
 - theme ICT-2007.5.2
 - Advanced ICT for Risk Assessment and Patient Safety
 - FP7-217139 (7M€)
 - Jan 1st, 2008 to December 31st 2011
 - 11 Partners (next slide)



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partners

- Agfa HealthCare, Belgium (coordinator)
- empirica Gesellschaft für Kommunikations- und Technologieforschung mbH, Germany
- Gama Sofia Ltd., Bulgaria
- Institut National de la Santé et de la Recherche Médicale, France
- Internetový Prístup Ke Zdravotním Informacím Pacienta (IZIP), Czech Republic
- Linköpings Universitetet, Sweden
- Technologiko Expedeftiko Idrima Lamias, Greece
- University College London, United Kingdom
- Les Hôpitaux Universitaires de Genève, Switzerland
- Universitätsklinikum Freiburg, Germany
- Université de Genève, Switzerland
- Averbis gmbh, Germany
- Haute Ecole de Gestion et d'Information Documentaire, Switzerland
- MD Access, a.s., Czech Republic

why infectious diseases ?

- **Advanced ICT** for Risk Assessment and Patient Safety project
-> main focus on *Advanced ICT*
- **risk assessment and patient safety on a 4 years project**
-> a coherent choice: infectious diseases
 1. usually short life cycles
 2. measurable results
 3. data available on the whole range of semantic and technical complexity
lab results, order entry, structured text, free text, images
 4. hot topic for public health and clinical research
 5. can provide decision support for research, clinicians and governance

the debugIT conceptual framework

- collect routinely stored data from **clinical systems**
- learn by applying advanced data mining techniques
- store the extracted knowledge in repositories
- apply knowledge for decision support and monitoring



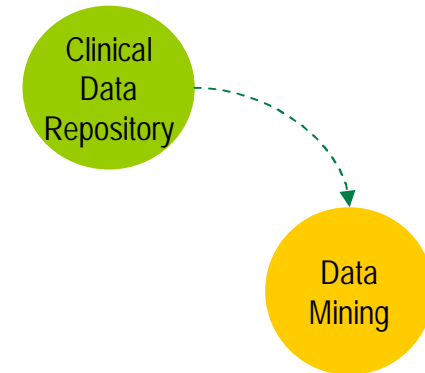


- routinely stored clinical data is collected and aggregated across
 - hospitals
 - countries
 - languages
 - information models
 - legislations
- via
 - commonly agreed data models (minimal data sets)
 - standards
 - mapping algorithms
 - unified and enhanced ontologies
- organized in a virtualized, **Clinical Data Repository (CDR)**.





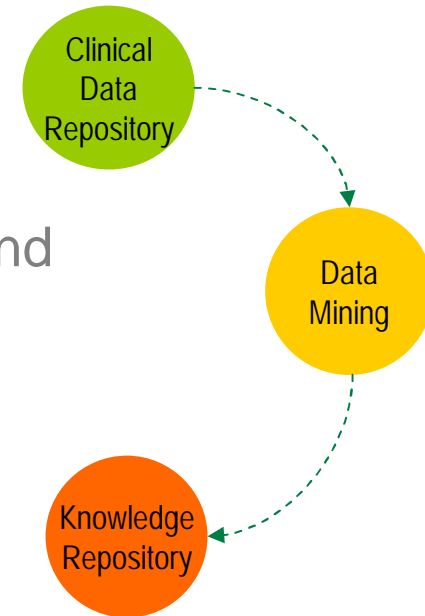
- detect relevant patterns
- advanced data mining techniques on
 - multimodal & multi-source data
 - structured data mining
 - text mining
 - image mining
- create new knowledge using
- **advanced multimodal knowledge-driven data mining**



store and author knowledge



- knowledge is
 - stored in a distributed repository
 - validated by clinicians
 - visualized and
 - aggregated together with pre-existing medical and biological knowledge (guidelines, regulations)



- a consolidated organization in the **Knowledge Repository**



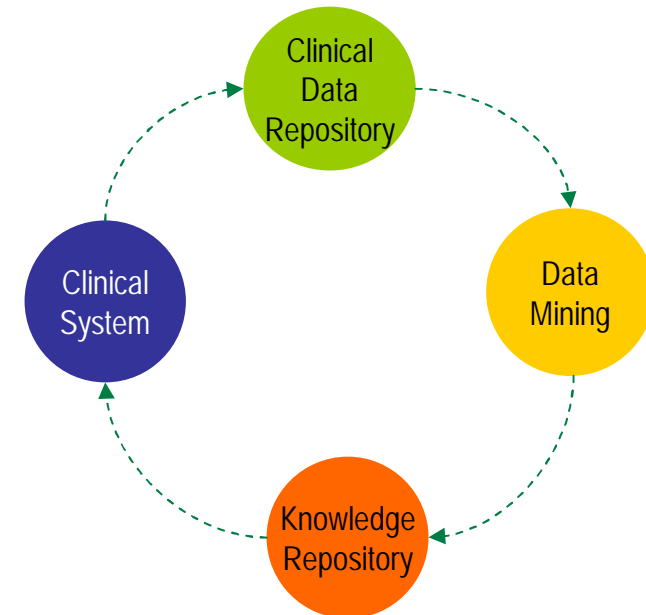
- software tools integrated in clinical and public health information systems

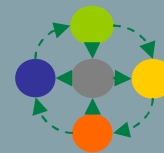
- bedside decision-support for clinicians
- population monitoring tools for research, epidemiology and health



translational framework

- debugIT is a nice example of translational medicine
 - clinical care uses knowledge and evidences from research (*bench to bed*)
 - research uses real life clinical data (*bed to bench*)





expected results

- **technical and scientific**
 - research databases, virtualized Clinical Data Repository
 - standardization and semantic inter-operability
 - advanced multimodal data mining techniques
 - machine reasoning related to real, point of care patient data
 - innovative and knowledge representation paradigms
- **clinical outcome**
 - direct and sharable bedside decision support in infectiology
 - new knowledge discovery mechanisms
 - distributed Medical Knowledge Repository (MKR)
- **commercial outcome**
 - advanced ICT in healthcare health monitoring and patient safety
 - pan-european Clinical Research technical framework

technical challenges - interoperability

- language independent formal vocabulary as input for data analysis & data mining
- formal semantics and textual descriptions to precisely describe abstracted meanings
- extraction of heterogeneous structured and unstructured EHR content
- semantic standard for project-wide information Clinical Data Repository Formalism

technical challenges - data mining

- data aggregation of heterogeneous sources
- management of data quality and reliability
- integration and mining of multimodal data
- knowledge-driven data mining
- advanced data mining, (bio)statistics, signal theory, lexical analysis and ontological analysis
- multi axial mining, temporal, multimodal, case and cohort base

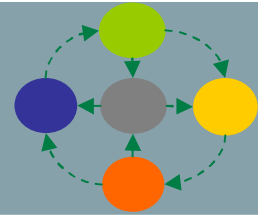
technical challenges - knowledge and inference

- federated knowledge repository
 - heterogeneous sources, variable level of certainty
 - representation presentation of knowledge and rules
- reasoning
 - statistical + logical
 - performance
 - formalism and decidability
- reliability for case base decision support

challenge - ethical and legal framework

- pan-european legal framework
 - country specific regulations
 - patient privacy
 - consent-based approach not realizable
- ethical framework
 - patient data
 - use of the system for case-based decision support
 - reliability for population-based decision support

conclusion

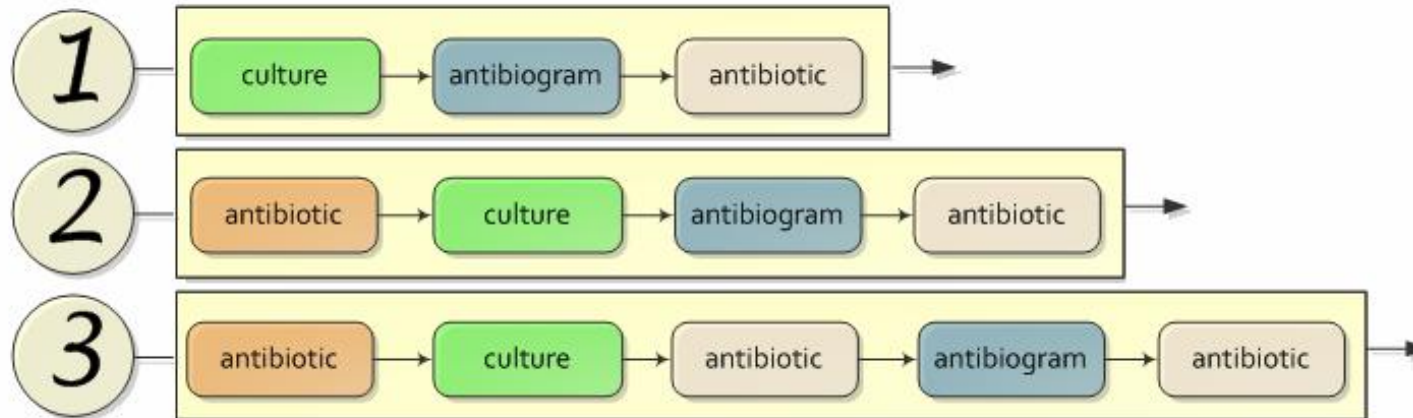


- the goals system are scalable and distributed
 - usable from local levels to strategic and global levels
 - distribution matches legal requirements
- many technical and semantical challenges
- foundation for a new approach to clinical research
- foundation for a new vision of translational medicine

strategy

- infectious treatment approach
 - patient
 - context, signs and symptoms
 - > empirical treatment
 - culture, antibiograms
 - > specific treatment
- focus on small analysable dataset
 - “treatment course: temporality [culture, antibiograms, antibiotics]”
 - no privacy issues, no direct patient data
 - lots of data available
 - mostly structured data
 - already numerous challenges
- get the IT infrastructure running: “*close the loop*”

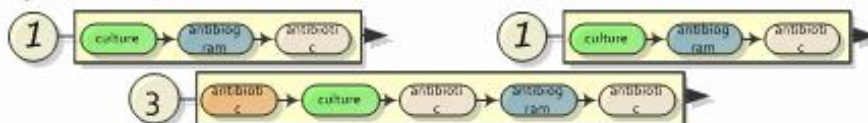
example of data mining challenge



sequence of treatment course



juxtaposition of treatment course



thank you ...



More info ?

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Plenary discussion

Christian Lovis MD MPH, University Hospitals of Geneva, Switzerland
Dipak Kalra, University College London, UK





Next steps, feedback

José Verguts, Agfa HealthCare



Feedback, next steps

First feedback

Comments later on when back at home

Non-disclosure

Cost reimbursements

Review of deliverable(s)?

Next meeting: when-where-format



Farewell... informal dinner

Restaurant Terra Nova

Holiday Inn, Messuaukio 1, Helsinki; 358-9-150900

Dirk Colaert, the DebugIT Consortium

