Symposium
Knowledge Management in Personalized Medicine

Program*

Reception
8:30
Dr. Klaus Heumann
9:30
Biomax Informatics AG, Munich
Welcome and Introduction

Part I: State of the Art in Personalized Medicine

Univ.-Prof. Dr. Hans-Werner Meuwes
10:00
Helmholtz Center, Munich
The Need for Structured Data in Medical Research

Univ.-Prof. Dr. Emiel Wouters
10:30
Department of Respiratory Medicine, University Medical Centre, Maastricht
The CIRO+ Data Center

Univ.-Prof. Dr. Josep Roca
11:15
Lung Function Unit, Hospital Clinic, Barcelona
Integrating Care for Chronic Conditions: Toward a Systems Medicine approach

Coffee Break
11:45

Univ.-Prof. Dr. Christian Peschel
12:15
Technical University, Munich
Challenges of Personalized Cancer Medicine

Univ.-Prof. Dr. Zlatko Trajanoski
12:45
Biocenter, Division for Bioinformatics, Medical University, Innsbruck
Integrating Biomolecular and Clinical Data for Cancer Research: Concepts and Challenges

Lunch
13:15

Univ.-Prof. Dr. Oliver Eckelberg
14:15
CPC Comprehensive Pneumology Center, Munich
Mechanisms of Pulmonary Fibrosis: Need for an Integrated Approach

Part II: Applied Knowledge Management

Univ.-Prof. Dr. Michael Berthold
14:45
KNIME.com AG, Constance
KNIME: Integrating Data, Tools, and Science

Isaac Cano, MSc
15:05
Institut d’Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Barcelona
Data Integration and Inference: from Biobridge to Synergy

Dr. Volker Stumpflen
15:25
Helmholtz Center / Cluea UG, Munich
Do you know what’s in your patient records? - Intelligent Harvesting in Large Unstructured Data Collections

Coffee Break
15:45

Univ.-Prof. Dr. Ulrich Mansmann
16:15
Medical Division, Ludwig-Maximilian University, Munich
Enhancing Statistical Inference by Exploiting Knowledge Structures

Andreas Dander, MSc
16:35
Biocenter, Division for Bioinformatics, Medical University, Innsbruck
Data Integration of Clinical and High-Throughput Data in Oncotrol

Short Break
16:55

Part III: Workshop - Practical know-how sessions

Parallel Workshop sessions (30 min each in 3 rounds) 17:05
Session 1 – Building a BioXM Solution from Scratch
Session 2 – Software Demonstration BioXM
Session 3 – Integration of External Databases and Tools
Session 4 – Building Custom Portals with BioXM
Session 5 – Modeling Knowledge in BioXM
Session 6 – Visual Data Mining with Viscovery

Dr. Klaus Heumann
Approx. 18:30
Biomax Informatics AG, Munich
Closing Remarks

*Times are subject to modifications
## Workshop

### Practical Know-How Sessions

<table>
<thead>
<tr>
<th>Slot</th>
<th>Time</th>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
<th>Session 5</th>
<th>Session 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17:05 -</td>
<td>Building</td>
<td>Software</td>
<td>Integration</td>
<td>Building</td>
<td>Modeling</td>
<td>Visual</td>
</tr>
<tr>
<td></td>
<td>17:35</td>
<td>a BioXM</td>
<td>demonstra-</td>
<td>of external</td>
<td>custom</td>
<td>knowledge</td>
<td>data mining</td>
</tr>
<tr>
<td></td>
<td></td>
<td>solution</td>
<td>tion of</td>
<td>databases</td>
<td>portals</td>
<td>in BioXM</td>
<td>with Vissco-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>from scratch</td>
<td>BioXM</td>
<td>and tools</td>
<td>for BioXM</td>
<td></td>
<td>rY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DR. HILMAR</td>
<td>DR. SASCHA</td>
<td>Dr. Wenzel</td>
<td>Dr. Gerd</td>
<td>Dr. Dieter</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IEGERNE-</td>
<td>LORECO</td>
<td>KAISER</td>
<td>LOFENGER</td>
<td>MAIER</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RITZ</td>
<td>Biomax</td>
<td>Biomax</td>
<td>Biomax</td>
<td>Biomax</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Biomax</td>
<td>Informatics</td>
<td>Informatics</td>
<td>Informatics</td>
<td>Informatics</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Informatics</td>
<td>AG</td>
<td>AG</td>
<td>AG</td>
<td>AG</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This</td>
<td>This</td>
<td>This</td>
<td>This</td>
<td>Multiple</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>introduces</td>
<td>presentation</td>
<td>presentation</td>
<td>session</td>
<td>concepts</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>principal</td>
<td>gives</td>
<td>shows</td>
<td>exist</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>concepts</td>
<td>an overview</td>
<td>how</td>
<td>to create</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>of knowledge</td>
<td>about the</td>
<td>BioXM</td>
<td>abstract</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>management</td>
<td>different</td>
<td>installation</td>
<td>presentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>in BioXM</td>
<td>modules of</td>
<td>of BioXM</td>
<td>of bio-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>It begins</td>
<td>the BioXM</td>
<td>portal of</td>
<td>logical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>with the</td>
<td>framework</td>
<td>a BioXM</td>
<td>knowledge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>design of</td>
<td>and will</td>
<td>installation</td>
<td>This work-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a semantic</td>
<td>present the</td>
<td>BioXM is</td>
<td>shop will</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>knowledge</td>
<td>new features</td>
<td>integrated</td>
<td>focus on</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>model,</td>
<td>of the latest</td>
<td>into</td>
<td>advantages/</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>continues</td>
<td>version of</td>
<td>other</td>
<td>disadvantages</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>with building</td>
<td>BioXM</td>
<td>systems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>with</td>
<td>and shows</td>
<td>The special</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>building</td>
<td>ways to</td>
<td>needs of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a knowledge</td>
<td>explore the</td>
<td>the user.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>network</td>
<td>network</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>from raw</td>
<td>content.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>data, and</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>shows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ways to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>explore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>the network</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>content.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Every session is held three times.
Everybody can visit three sessions at most, one in every time slot.
Please register for one session per time slot.
Workshop Session Plan

Session 1

Session 2

Session 3

Session 4

Session 5

Session 6
Symposium
Knowledge Management in Personalized Medicine

Feedback

Part I: State of the Art in Personalized Medicine
Please rate the first part of the symposium.

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relevance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part II: Applied Knowledge Management
Please rate the second part of the symposium.

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relevance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part III: Workshop - Practical Know-How sessions
Please rate the third part of the symposium.

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relevance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
After work session

Margaretenstraße 31
82152 Krailling
Telefon: (089) 89 19 84 44
Symposium

Knowledge Management in Personalized Medicine

Program*

Reception
8:30
Dr. Klaus Heumann
9:30
Biomax Informatics AG, Munich
Welcome and Introduction

Part I: State of the Art in Personalized Medicine

Univ.-Prof. Dr. Hans-Werner Mewes
10:00
Helmholz Center, Munich
The Need for Structured Data in Medical Research

Univ.-Prof. Dr. Emiel Wolters
10:30
Department of Respiratory Medicine, University Medical Centre, Maastricht
The CIRO+ Data Center

Univ.-Prof. Dr. Josep Roca
11:15
Lung Function Unit, Hospital Clinic, Barcelona
Integrating Care for Chronic Conditions: Toward a Systems Medicine approach

Coffee Break
11:45

Univ.-Prof. Dr. Christian Peschel
12:15
Technical University, Munich
Challenges of Personalized Cancer Medicine

Univ.-Prof. Dr. Zlatko Trajanoski
12:45
Biocenter, Division for Bioinformatics, Medical University, Innsbruck
Integrating Biomolecular and Clinical Data for Cancer Research: Concepts and Challenges

Lunch
13:15

Univ.-Prof. Dr. Oliver Eckelberg
14:15
CPC Comprehensive Pulmonary Center, Munich
Mechanisms of Pulmonary Fibrosis: Need for an Integrated Approach

Part II: Applied Knowledge Management

Univ.-Prof. Dr. Michael Berthold
14:45
KNIME.com AG, Constance
KNIME: Integrating Data, Tools, and Science

Isaac Cano, MSc
15:05
Institut d’Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Barcelona
Data Integration and Inference: from Biobridge to Synergy

Dr. Volker Stumpfen
15:25
Helmholz Center / Cluea UG, Munich
Do you know what’s in your patient records? -Intelligent Harvesting in Large Unstructured Data Collections

Coffee Break
15:45

Univ.-Prof. Dr. Ulrich Mansmann
16:15
Medical Division, Ludwig-Maximilian University, Munich
Enhancing Statistical Inference by Exploiting Knowledge Structures

Andreas Dander, MSc
16:35
Biocenter, Division for Bioinformatics, Medical University, Innsbruck
Data Integration of Clinical and High-Throughput Data in Oncotrol

Short Break
16:55

Part III: Workshop - Practical know-how sessions

Parallel Workshop Sessions (30 min each in 3 Rounds) 17:05
Session 1 - Building a BioXM Solution from Scratch
Session 2 - Software Demonstration BioXM
Session 3 - Integration of External Databases and Tools
Session 4 - Building Custom Portals with BioXM
Session 5 - Modeling Knowledge in BioXM
Session 6 - Visual Data Mining with ViScovery

Dr. Klaus Heumann
APPROX. 18:30
Biomax Informatics AG, Munich
Closing Remarks

*Times are subject to modifications
**Motivation, Rational and Objective of the Symposium**

**Motivation:**
- Profs. Mansmann, Mewes and Peschel to develop an innovative concept for the Trail Service Center with Knowledge Management as center piece.

**Rational:**
- Shed light on the topic from a science perspective:
  - Different disease areas (chronic vs. complex)
  - Different consortia (how do others do it)
  - Different countries in Europe (where is it done)
- Shed light on the topic form a technology perspective
  - What are the pieces needed?
  - How do they fit together?
  - How to evolve into the future?
- Exchange hands on experience

**Objective:**
- Stipulate common understanding and critical discussion of principals of a knowledge driven approach to personalized medicine.
I know my patient

Will my patient benefit from the treatment proposed?

I do not know all comparable patients and their outcome.
The current healthcare system is flooded with information but lacks solutions for efficient integration & exploration. Decisions in care management need comprehensive information.

Cartoon Gary Brooch
“The impact of being able to exploit clinical knowledge effectively using state of the art technology cannot be overestimated. This applies to both, improved patient care and better management of treatment costs”

Prof. Wouters, Chairman Board of Directors CIRO+
Heaven and hell of personalized medicine

- No new hip if you are older than 80 years
- No kidney, if older than 70

Best medical treatment to improve quality of life

Treat everyone equally bad

Treat everyone differentiated

The Cost of Care Dilemma
The basis of personalized medicine „Stratification of Patients“

Objective:

An integrated, coordinated, evidence-based data analysis to individualize patient care and treatment

- efficient patient therapy & risk management
- reduction of costs

Knowledge Management: Closing the gap between complex data and existing information & required knowledge
Stratification: From complex Data to Specific Knowledge

- Genetic predisposition
- Life style: nutrition, physical activity
- Environment
- Clinical parameters
- Biomedical Information

Traditional medical perspective:
Statistical classification of patho-phenotypes leading to standardized therapeutic concepts

Stratified medicine:
Individualized knowledge leading to personalized medical decisions

Only a fraction of patients benefit from suggested standard treatment
Better patient care & improved therapy
Generate impact for patients from knowledge exploitation

- Collect
- Aggregate
- Data
- Information
- Knowledge
- Insight with patient impact
- Domain-specific utility
- Actionable knowledge for rational decision making
The unmet need: connect information to establish relevant knowledge

“knowledge is the interconnection of detail which in isolation is of lesser value”
Any type of data
Any format of data
Any volume of data
Any location of data
Any size of data
Maschine is configured to build the connections to information and data based on the knowledge model.
Maschine is configured to deliver relevant actionable knowledge through apps.
Maschine is configured to deliver relevant actionable knowledge through apps.
**Vision clinical Knowledge as a Service (cKaaS)**

**Build** relevant insights from actionable knowledge

**Connect** information within the relevant knowledge context

**Aggregate** data points to interpretable pieces of information
cKaaS - beyond intuitive experience

• Cover all data sources, integrate, quantify, and visualize

• **predict**, whether patient will benefit from a treatment from baseline assessment data

• **profile** patients against the map of all previously seen patients
Outlook Patient Stratification

Huge Data-Sets and information:
- Individual Genomes
- Epigenomic profiles
- Metabolic profiles
- Social parameters
- etc

Integrated, coordinated, evidence-based approach to individualizing patient care
- Cancer
- Diabetes
- Neurodegenerative diseases
- etc

Source: Roche Diagnostics

Patient stratification towards personalized medicine
**Symposium**

**Knowledge Management in Personalized Medicine**

Program:

**Part I: State of the Art in Personalized Medicine**

**Dr. Klaus Heumann**
Biomax Informatics AG, Munich
Welcome and Introduction

**Univ.-Prof. Dr. Hans-Werner Meves**
Helmholtz Center, Munich
The Need for Structured Data in Medical Research

**Univ.-Prof. Dr. Emil Wouters**
Department of Respiratory Medicine, University Medical Centre, Maastricht
The CIRO + Data Center

**Univ.-Prof. Dr. Josep Roca**
Lung Function Unit, Hospital Clinic, Barcelona
Integrating Care for Chronic Conditions: Toward a Systems Medicine approach

**Part II: Applied Knowledge Management**

**Univ.-Prof. Dr. Oliver Eckelberg**
CPC Comprehensive Pulmonary Center, Munich
Mechanisms of Pulmonary Fibrosis: Need for an Integrated Approach

**Univ.-Prof. Dr. Michael Berthold**
KNIME.com AG, Constance
KNIME: Integrating Data, Tools, and Science

**Isaac Cano, MSc**
Institut d’Investigaciones Biomédiques August Pi i Sunyer (IDIBAPS), Barcelona
Data Integration and Inference: from Biobridge to Synergy

**Dr. Volker Stumpflen**
Helmholtz Center / Gheda UG, Munich
Do you know what’s in your patient records? - Intelligent Harvesting in Large Unstructured Data Collections

**Part III: Workshop - Practical know-how sessions**

**Coffee Break**
11:45

**Univ.-Prof. Dr. Christian Peschel**
Technical University, Munich
Challenges of Personalized Cancer Medicine

**Univ.-Prof. Dr. Zlatko Trajanoski**
Biocenter, Division for Bioinformatics, Medical University, Innsbruck
Integrating Biomolecular and Clinical Data for Cancer Research: Concepts and Challenges

**Univ.-Prof. Dr. Ulrich Mansmann**
Medical Division, Ludwig-Maximilian University, Munich
Enhancing Statistical Inference by Exploiting Knowledge Structures

**Andreas Dander, MSc**
Biocenter, Division for Bioinformatics, Medical University, Innsbruck
Data Integration of Clinical and High-Throughput Data in Oncotrol

**Short Break**
16:35

**Coffee Break**
15:45

**Parallel Workshop sessions (30 min each in 3 Rounds)**
17:05

Session 1 – Building a BioXM Solution from Scratch
Session 2 – Software Demonstration BioXM
Session 3 – Integration of External Databases and Tools
Session 4 – Building Custom Portals with BioXM
Session 5 – Modeling Knowledge in BioXM
Session 6 – Visual Data Mining with Viscovery

**Dr. Klaus Heumann**
Biomax Informatics AG, Munich
Closing Remarks

*Times are subject to modifications*