

## Keynote speaker

### Artificial-intelligence-augmented clinical medicine

Klaus-Peter Adlassnig

Section for Medical Expert and Knowledge-Based Systems  
Center for Medical Statistics, Informatics, and Intelligent Systems  
Medical University of Vienna, Spitalgasse 23, A-1090 Vienna, Austria  
klaus-peter.adlassnig@meduniwien.ac.at

#### Abstract

##### *Background*

Nowadays, clinical decision making is increasingly based on a large amount of patient medical data, on continuously growing medical knowledge, and on extended best clinical practice guidelines.

##### *Clinical decision support*

There is evidence that clinical decision support systems can significantly improve quality of care in, eventually, all areas of clinical medicine [1]. Technically, suitable means to formally represent clinical knowledge and to connect decision support algorithms with patient data sources in a seamless way are prerequisites for successful clinical decision support applications.

##### *Clinical decision support server and Arden Syntax*

Arden Syntax, as an internationally standardized formal language for medical knowledge representation and processing [2–4], was implemented as a clinical decision support server and equipped with service-oriented interoperability [5]. This technical solution has already been proven to be deployable in connection with hospital and intensive care information systems and practicable useful in a number of clinical areas [6]. Telemedical and mHealth systems also participate in this technological advance [7].

##### *Routinely-used, fully automated, knowledge-based system for detection and continuous monitoring of ICU-acquired infections*

An example for extended clinical decision support in infection control is given by Moni/Surveillance-ICU, a system for the early recognition and the automated monitoring of hospital-acquired infections in intensive care units with adult patients [8–11]. This knowledge-based system includes concepts of fuzziness to formally represent medical linguistic terms. The European Centre for Disease Prevention and Control (ECDC) criteria

for hospital-acquired infections [12] form the basis of its knowledge base; results are given in form of degrees indicating to which extent the ECDC definitions are fulfilled by the patient data taken into account.

#### *Artificial-intelligence-augmented clinical medicine*

Today, clinical decision support technology becomes integrated in or connected with various health care information systems such as hospital, laboratory, and intensive care information systems, electronic health record, telemedicine, and web-based systems. Thus, many forms of clinical decision support in the diagnostic and therapeutic process render possible, for instance, clinical reminders, alerts, recommendations, support in differential diagnosis, therapy selection, and patient management according to guidelines and protocols. In this context, Arden Syntax, or its extended form Fuzzy Arden Syntax [13, 14], seems highly suitable for developing clinically useful decision support systems. Soon, a new type of proactive clinical information systems will become available. Through web-services, a globally available medical knowledge grid—adapting its content to the individual parameters of the patient—will eventually emerge.

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Artificial Intelligence and NetMedicine**



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## Message from the Program Chairs

Medical telereporting and second-opinion over the Internet are nowadays cost-effective and widely adopted practices. Physicians and general practitioners make daily use of tele-consultation over the WEB, VOIP, chat and video-conferencing.

Social networking favors the constitution of large communities of members sharing similar medical interest, so that TeleMedicine is rapidly turning into what we call "**NetMedicine**", which simply denotes every Health-related activity which is carried on through the Internet.

Since its inception and along all its history, Artificial Intelligence served the Medicine, under both its souls, the logicistic and the conessionistic ones. But in the current digitally networked and hyperlinked e-Health scenario, Artificial Intelligence has to play also new important roles. Today we urge intelligent software to semantically interpret and filter diagnostic data, automatically classify and convey medical information, virtualize nurses and hospital lanes to reduce the costs of healthcare, etc.

The **International Workshop on Artificial Intelligence and NetMedicine** (NetMed) aims at bringing together scholars and practitioners active in Artificial Intelligence driven Health Informatics, to present and discuss their research, share their knowledge and experiences, define key research challenges and explore possible international collaborations to advance the intelligent practice of Medicine over the Internet.

The NetMed Workshop collects original contributions on research and application aspects of Artificial Intelligence driven e-Health. In particular, areas of interest include:

- Tele-Health and Telemonitoring over the Internet
  - Collaborative care and communication
- Intelligent devices and instruments
  - Ontology modeling and reasoning in Health Information Engineering and Systems
  - SNOMED CT
- Patient care, monitoring and diagnosis
  - AI-based clinical decision making
  - Clinical Evidence-Based decision support systems
- Architectures of Electronic Health Records
- AI in medical education
- Medical knowledge engineering
  - Medical data mining
- Modelling and simulation
- Implementation and case studies
- Intelligent Visualization in Medicine
- Intelligent Medical Information Systems

- Intelligent health records
- Automated Reasoning and Metareasoning in Medicine
- Philosophical, Ethical, and Social issues of AI in Medicine
- Extending quality healthcare to rural communities
- Health Informatics in the developing world

We would like to thank the ECAI organization for having allowed us to organize this event. We would like to thank all the authors for having submitted their work to the workshop for selection, the Program Committee members for their effort in reviewing the papers, the presenters for ensuring interesting sessions, and the attendees for participating into this event.

We hope that interesting ideas and discussions will come out of the presentations, demos and the questions that will alternate along the day. We hope you will find this day interesting and enjoyable.

**Aldo Franco Dragoni, Università Politecnica delle Marche, Italy**  
**Roberto Posenato, Università degli Studi di Verona, Italy**  
**NetMed 2012 Program Chairs**