Distinguished Keynote Speakers

Keynote Speech 1: IT-Science Based Economy: (Case Study JKU Softwarepark in Austria).

Prof. Dr. Bruno Buchberger, Johannes Kepler University in Linz, Austria.

Monday, April 15. 09:40 – 10:40.

The JKU Softwarepark is a spin-off of the Johannes Kepler University (JKU), Linz, Austria. It was founded and built up by the speaker in a rural region outside Linz on the request of the Upper-Austrian Government to "develop economy in this underprivileged region of Austria". Starting from the speaker’s Research Institute for Symbolic Computation (RISC) of the JKU with which he moved to this region with no more than 25 researchers and PhD students, there are now 1000 R&D people working and 1500 students studying in the Softwarepark. The Softwarepark Hagenberg was the first softwarepark (i.e. technology park exclusively devoted to software) worldwide and, recently, initiated the "Global Network of Softwareparks" and a special "Go Global" Program for its members. In this talk, we will explain a few fundamental strategic principles which we developed, tried out and followed for building up innovative and future-oriented economy from an academic institution and which proved useful in building up the JKU Softwarepark:

- "The highest first": Start from basic research and a PhD program even if, ultimately, you want to generate industry, attract companies, create working places, stimulate start-ups. If you manage to build up basic research and a doctoral studies, all other layers of research, education, and industrial application can be built up relatively easily and quickly and you earn the respect and attention of the international community.

- "The magic triangle": Try to have research, academic education and business "under one roof". Research, academic education, and business form the three pillars of innovation and, together, generate synergetic growth and, finally, economic welfare.

- Global networking versus regional focus: It is very important to pursue international networking and, at the same time, pay attention to one’s own region. Having strong international ties in a global network of technology centers generates a win-win situation for all members of the network and opens up numerous opportunities for the researchers, teachers, students, companies, employees of the network members. On the other hand, regional focus is equally important. A global world can develop an exciting future only if the regional peculiarities, traditions, historic insights, and unique cultural contributions are developed and cultivated.

- Academic excellence versus entrepreneurial spirit and risk capital: For a technology center to grow, it is very important to unify seemingly opposing views and attitudes like the standards, views, and foci of academia, the spontaneity and entrepreneurial spirit of young start-up companies and the business, risk and profit mentality of investors.

- Academic excellence versus life style: Scientific, technical, and economic excellence alone, nowadays, is not sufficient for creating a top technology center. Rather, technology centers must try to be a testbed for future vibrating juvenescent lifestyles, new societal opportunities and a new understanding of living in harmony with nature.

- Academic freedom versus societal responsibility: Traditionally, academia needs intellectual freedom for achieving excellence and innovation at international level. However, at the same time, academic institutions have a high responsibility for the growth, welfare, and development of the regions in which they are situated. Therefore, academic institutions must set a model for responsible thinking and acting for their students and prepare them for leadership in society.
Cooperation between academia, economy, and government: Technology centers can only grow if academia, economy, and government cooperate intensively and flexibly.

The particular role of IT: IT today is an essential ingredient into basically all areas of science and technology and all aspects of society and, in particular, economy. Therefore, it is a good idea to start the innovation chain from academia to economy in a region with a strong focus on IT.

Short Bio:
Buchberger is Professor of Computer Mathematics at the Research Institute for Symbolic Computation (RISC) of the Johannes Kepler University in Linz, Austria. Buchberger is best known for the invention of the theory of Groebner bases, which has found numerous applications in mathematics, science, and engineering. For his Groebner bases theory, he received the prestigious ACM Kanellakis Award 2007, see http://awards.acm.org/kanellakis/, he was elected (1991) member of the Academia Europea (London) and received five honorary doctorates. His current main research topic is automated mathematical theory exploration (the "Theorema Project"). This project aims at the (semi-)automation of the mathematical invention and verification process, see www.theorema.org.

Bruno Buchberger initiated and built up the Softwarepark Hagenberg starting in 1987 from his research institute RISC (Research Institute for Symbolic Computation) of the Johannes Kepler University in Linz, Austria. From an initial group of 25 international researchers and PhD students, in the meantime, the Softwarepark grew to currently 2500 people (1000 R&D co-workers in 12 research institutes and 60 companies and 1500 students in computer science on the postdoc, PhD, master and bachelor level) with a total infrastructure investment of approx. 150 mio Euro. The secondary effects of the work of the Softwarepark on the regional and national economy was recently estimated to be six times as high as the infrastructure investment.

By building up the Softwarepark Hagenberg, Buchberger wanted and wants to demonstrate the innovative power contained in basic research in computer mathematics and software science (the areas in which RISC plays a leading role in the world). From a solid foundation in basic research, by opening the mind of academia to the practical needs of industry, small and medium enterprises, and society one can build up efficiently and quickly all the intermediate levels of the innovation chain (applied research, software development, start-up companies, high-level research education in international postdoc and PhD programs, high-quality practical education on the master and bachelor level, life-long training etc).

Research, high-quality education, and entrepreneurial spirit must come together with sustainable investment and risk capital. The close interaction of academica, economy, and government is crucial for the success of such endeavors as the Softwarepark Hagenberg. The Softwarepark Hagenberg was the first technology park in the world specializing in software-. By now, approximately, 50 other softwareparks evolved throughout the world.

This year, Oct 10-12, 2012, the Softwarepark Hagenberg proudly invites the other Softwareparks from all over the world to the "1st International Meeting of Softwareparks" with the goal of establishing a worldwide network of Softwareparks that will support the global promotion of our start-up companies. With his unique experience of turning successful research into economic growth and societal progress, Professor Buchberger is a sought-after keynote speaker at conferences and consultant of governmental and industrial organizations.
Because private, confidential and secret data are more and more abundant in modern society and because malicious hackers and intruders are using more and more sophisticated methods and technologies, developing powerful data protection becomes an urgent need. Presently, three main methods are being used: cryptography, watermarking, and steganography. Encryption techniques (cryptography) consists in making the signal (text, speech, image, ...) look garbled to unauthorized people. Watermarking consists in hiding data (also called object, signal or signature) in a cover medium (also called cover or host signal) to convey information about the cover signal itself such as ownership and copyright. The hidden signature could be visible or invisible. In contrast to cryptography, steganography (from Greek: covering or hiding) consists in secret communication by hiding signal (secret) in another signal (public or intentionally wrong signal) to avoid suspicion. This quality is referred to as imperceptibility and is correlated with the amount of data to hide. To enhance protection of data, if the intruder, by accident or by any sophisticated tool, realizes the presence of hidden data and is able to separate hidden and cover signals, he or she should not be able to exploit what he/she found. Thus, it is worth encrypting data before hiding them inside the cover signal.

An overview on encryption methods (data security) and on watermarking and steganography (data hiding) will be given, with a focus on the less known and most recent discipline, namely steganography. Techniques, limitations and future trends will be presented. A new method based on representation of data by combinations will be also presented.

**Short Bio:**

Hamam obtained the B.Eng. and M.Sc. degrees in information processing from the Technical University of Munich, Germany 1988 and 1992, and the PhD degree in Physics and applications in telecommunications from Universite de Rennes I conjointly with France Telecom Graduate School, France 1995. He also obtained a postdoctoral diploma, "Accreditation to Supervise Research in Signal Processing and Telecommunications", from Universite de Rennes I in 2004. He is currently a full Professor in the Department of Electrical Engineering at the Universite de Moncton and a Canada Research Chair holder in "Optics in Information and Communication Technologies". He is an IEEE senior member and a registered professional engineer in New-Brunswick. He is among others associate editor of the IEEE Canadian Review, member of the editorial boards of Wireless Communications and Mobile Computing - John Wiley & Sons - and of Journal of Computer Systems, Networking, and Communications - Hindawi Publishing Corporation. His research interests are in optical telecommunications, Wireless Communications, diffraction, fiber components, RFID, Human-Machine interaction and E-Learning.