Advances of **I**nformatics and **E**arth & **C**osmic **S**ciences

The first conference of ACADEMIA EUROPAEA, see www.ae-info.org, that combines specialists of two sections: Earth&Cosmic Sciences and Informatics.

We are deeply grateful to the following organisations for supporting this conference:

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Program of AIECS 2010

August 30, 2010

3 p.m.: Meeting of: members of the Informatics Section, speakers from Informatics and editors of JUCS to discuss issues concerning Informatics in general, concerning the Informatics section, including a planned workshop during the annual conference of the Academia Europaea in Paris, Summer 2011 and publication matters including J.UCS. The meeting takes place in the Seminar Room of building Inffeldgasse 16c main floor. All members of the Academia Europaea Informatics Section are encouraged to come, even if they come late. Please send me a short note to hmaurer@iicm.edu if you intend to come.

6 p.m.: Informal dinner at Gösser Bräu at Neutorgasse 48, see
http://www.goesserbraeugraz.at/

Note: Registration for the conference is possible during above events to avoid queues next morning

August 31, 2010

8:15 a.m.: Registration starts at conference venue, Stadthalle, Messeplatz 1

9 a.m. – 6:10 p.m.: Technical program (see below)

7 - 10 p.m.: Dinner reception at Graz City Hall at Graz Main Square

Sept 1, 2010

9 – 10:30 a.m.: Opening keynote of I-KNOW conference in Stadthalle

10:45 a.m.: Departure for geological excursion into Southern Styria.
The trip is guided by Professor Walter Kurz from the Department of Earth Sciences of the University of Graz http://erdwissenschaften.uni-graz.at/mitarbeiter/personal/homepages/kurz/index_de.php and is a combination of information on geological and volcanic aspects of Southern Styria while also enjoying the beautiful country-side and its typical features. Return expected around 7 p.m.

The Technical Program August 31, 2010 in the Stadthalle

8:15 Start of Registration

9:00 - 9:10: Welcome by H. Maurer (AE)* and D. Dingwell (AE)

9:10 - 9:50: Opening Keynote 1:

Dieter Fellner (AE), Fraunhofer IGD, Darmstadt, Germany, Section Informatics:
Visualizing semantically enriched 3D models
Abstract:
This presentation argues that in contrast to traditional scanning approaches of 3D objects / models the resulting models should not be based on billions of triangles but on generative structures which accurately (and hierarchically) encode semantic structures thereby esembling building structures rather than discrete surface approximations.
Due to the semantic encoding technology the resulting models will then be by several magnitudes more compact, compared to traditional triangle-based surface approximations thereby lending themselves for an internet-based access and dissemination.
Maybe even more important, this new approach will support traditional library services like searching, indexing and abstracting in libraries of 3D objects -- all of this only possible in an automated way by new and innovative types of metadata.

* (AE) = member of the Academia Europaea.

9:55 - 10:35: Opening Keynote 2:

Evgenii Burov (AE), UPMC, Paris, France, Section Earth&Cosmic Sciences:
Recent advances in numerical modelling in Earth Sciences
Abstract:
Earth Sciences belong to rare disciplines where thermo-mechanical numerical modelling plays a specifically important role due to the practical impossibility to study geodynamic processes directly. Geological-geodynamic processes occur at time scales that span over millions years, often at very slow rates, huge spatial scales, and mainly at great depth; this all makes the capacities of direct human-scale observations and experiments quite limited. Numerical models provide the necessary link between fragmented multiple multi-physical and structural observations. They serve both to test hypothesis and even to validate geological and geophysical data because the latter are extrapolated from human observational scales to geological time and spatial scales. At geological time scales, Earth materials have extremely complicated rheological behaviours that refer to non-linear viscous-elastic-plastic deformation that is also thermally, compositionally and strain rate dependent. These properties result in complex behaviours leading to organization of unique feedback systems such as plate tectonics and mantle convection patterns; they pre-condition plate geometries and the relations between deep geodynamic forces and surface processes such as climate- and tectonically controlled erosion, sedimentation and fluvial networks. Numerical (generally finite element) modelling of such systems provides a specific challenge to the modelers and code developers due to the necessity of handling high 2D and 3D numerical resolutions, wildly non-linear behaviors, large strains, multiple inter-dependent processes such as thermo-dynamic changes in properties of the material due to varying pressure-temperature conditions. However, when successful, numerical models allow us to understand some key problems such as driving mechanisms of Wegener's dynamic Earth. In the past few years, an important breakthrough has been done in modeling of coupled phenomena such as mantle lithosphere interactions, thermo-mechanically and thermo-dynamically coupled processes and complex multi-physical systems.

10:35 - 11:10: Break

11:10 - 12:50: Section 1

Note: A section consists of two or three talks of 25-30 minutes each with 5 minutes break to change rooms if desired. “Overlap” means talks that are suitable for members of both sections.

Topics in Informatics: Chair: S. Havemann

Egon Börger, U. of Pisa, Italy:
Ambient Abstract State Machines for modelling an architecture of current WEB applications systems
Abstract
This is a report on the first steps of a recently started project with V. Gervasi, C. Dittamo, A. Cisternino, all U of Pisa. We attempt there to discover the pattern underlying the large numer of different client-server architectures for concurrent (distributed) WEB applications. The goal is to make such a structure explicit by defining precise high-level models which can be refined to the major current implementations of WEB application architectures so that as a result their differences can be precisely analyzed, i.e. stated and hopefully evaluated and classified.
To support the modelling of the various agents involved (for the components constituting the browser---like launcher, netreader, parser, ECMAscript interpreter, renderer, etc.---and the server) we have defined a flexible abstract ambient concept in terms of Abstract State Machines. It uniformly captures the common static and dynamic disciplines for isolating states and concurrent behaviour as well as for sharing memory. We are completing an ASM interpreter for ECAMScript programs, thus rigorously defining their dynamic semantics. Currently we are modelling the various browser and server components.

Maurice Margenstern, U. of Metz, France:
Computer Science and hyperbolic geometry-promising interactions
Abstract
In this talk, we consider the interaction between hyperbolic geometry and computer science. The general algorithmic approach of computer science has given a new approach to hyperbolic geometry. This is especially the case for tilings of the hyperbolic plane. This has given rise to a particular navigation tool, a uniform one which is valid for infinitely many tilings of the hyperbolic plane. This had an impact on a long-pending open problem which is now solved. But this has certainly a drawback on computer science itself. A few applications exist and new ones can be foreseen, especially in computer science itself. There could be applications to biology too. All these aspects will be discussed in the talk.

Bruno Buchberger (AE), RISC and U. of Linz, Austria:
How Can Algorithms Be Invented Automatically?

Abstract:
Algorithms (methods for solving problem on computers) are the basis of the current IT-revolution that permeates all facets of modern science, economy, and society. They are the basis of automation. In this talk, we will discuss the question of whether or not the invention of algorithms itself can be automated? We present recent findings that support a positive answer to this question in an ever expanding universe of intellectual challenge.

Topics in Cosmic&Earth Sciences: Chair: H. Sünkel

Karin Sigloch, U. of Munich**:**
Illuminating the darker corners of Earth's deep interior: computational waveform modelling and seismic tomography
Abstract:
We give an introduction to seismic tomography - the science and art of constructing 3-dimensional images of the earth's interior structure, from crust to core. Humans or scientific instruments have never penetrated the solid earth more than a few kilometers deep, so knowledge about what lies below draws on indirect measurements, leading to mathematical inverse problems. The earth is transparent to seismic waves (man-made or earthquakes), which illuminate all of the interior at least in principle. In order to interpret the subtle and complex signals in seismograms, seismologists need massive computing power. The field advances in lockstep with the availability this resource.

Sierd Cloetingh (AE), VU Amsterdam, The Netherlands:
Challenges of Earth and Cosmic Sciences to Informatics
Abstract:
TOPO-EUROPE addresses the 4-D topographic evolution of the orogens and intra-plate regions of Europe through a multidisciplinary approach linking geology, geophysics, geodesy and geotechnology. TOPO-EUROPE integrates monitoring, imaging, reconstruction and modelling of the interplay between processes controlling continental topography and related natural hazards. TOPO-EUROPE initiates a number of novel studies on the quantification of rates of vertical motions, related tectonically controlled river evolution and land subsidence in carefully selected natural laboratories in Europe. From orogen through platform to continental margin, these natural laboratories include the Alps/Carpathians-Pannonian Basin System, the West and Central European Platform, the Apennines--Aegean-Anatolian region, the Iberian Peninsula, the Scandinavian Continental Margin, the East-European Platform, and the Caucasus-Levant area.

Taras Gerya, ETH Zurich, Switzerland:
Innovative Solid Earth Modelling
Abstract:
Modern gross challenges in Solid Earth Modelling are: (i) creating high-resolution realistic 3D numerical models applicable to nature, and (ii) obtaining a rigorous understanding of geodynamic and planetary processes and the key physical parameters controlling them. We developed a family of finite-difference, marker-in-cell codes which can handle visco-elasto-plastic rheology, mineralogical phase changes, free surface and self-gravitation. With this new tools we created a number of predictive numerical models for various geodynamic and planetary processes, such as mid-ocean rift formation, oceanic and oceanic-continental subduction, continental collision, slab breakoff, intrusion emplacement into the crust, planetary accretion and metallic core formation.

Topics with Overlap: Chair: N. Scerbakov

Manfred Broy (AE), TU Munich, Germany:
Reliable Software Development and Maintainance
Abstract:
Today engineering software intensive systems is still more or less handicraft or at most at the level of manufacturing. Many steps are done ad-hoc and not in a fully systematic way. Applied methods, if any, are not scientifically justified, not justified by empirical data and as a result carrying out large software projects still is an adventure. However, there is no reason why the development of software intensive systems cannot be done in the future with the same precision and scientific rigor as in established engineering disciplines. To do that, however, a number of scientific and engineering challenges have to be mastered. The first one aims at capturing a deep understanding of the essentials of carrying out such projects, which includes appropriate models and effective management methods. What is needed is a portfolio of models and methods coming together with a comprehensive support by tools as well as a deep understanding of the obstacles of developing software intensive systems and a portfolio of established and proven techniques with clear profiles and rules that indicate when which method is ready for application. In the following we argue that there is scientific evidence and enough research results so far to be confident that solid engineering of software intensive systems can be achieved in the future. However, yet quite a number of scientific research problems have to be solved.

Margrit Gelautz, Vienna University of Technology, Vienna, Austria:
Spatial Scene Reconstruction for 3D Video/TV
Abstract:
In this talk, we focus on the special requirements imposed by 3D video/TV applications on stereo analysis techniques. In order to compute high-quality depth maps that allow the subsequent rendering of realistic novel views, the precise 3D reconstruction of object contours and the proper treatment of associated "mixed pixels" are gaining importance. We sketch the principle ideas of stereo matching algorithms developed recently by our group, with an eye to 3D content generation for novel (auto)stereoscopic displays.

Narayanan Kulathuramaiyer, Universiti Malaysia Sarawak, Kota Samarahan, Malaysia:
Knowledge Management in Rural Communities
Abstract:
Knowledge Management, as practiced in rural communities via oral traditions, has been time-tested in preserving indigenous knowledge and practices. The form of KM employed however distinctly differs from current practices in organizations. This paper then focuses on this less studied but potentially invaluable, indigenous knowledge management practices within these rural communities. This work serves as an extension to the past experiences of the authors in implementing rural ICT intervention projects over the past twelve years. This study has adapted the use of current knowledge management tools in the realization of a holistic approach to model indigenous knowledge management practices. The framework developed has been instrumental in delivering strategies to best address the particular needs for effectively empowering rural communities.

12:50 – 14:15: Lunch

14:15 – 15.55: Section 2

Topics in Informatics: Chair: E. Duval

Erol Gelenbe (AE), Imperial College, London:
Search in Uncertain Environments
Abstract:
Search with mobile robots in remote or planetary environments, searching in very large networked data bases with software robots, the travel of particles or of biological agents in random media in search of a specific docking location, packets that travel in large wireless networks, animals that forage for food or move in search of a mate, or computer processors that search for the minimum of an imperfectly known functions, all share characteristics of a search in uncertain environments. Using Brownian motion, we will compute travel times of such "searchers" that have a limited life span and that are prone to loss or destruction, and derive the expected travel time for a search to be successful. Also, an N- dimensional Brownian motion will yield the time it takes to find the object being searched when N-searchers are sent out simultaneously to accelerate the search process. The energy consumed in the search will also be discussed.

Krzysztof R. Apt (AE), CWI and University of Amsterdam:
Quo Vadis Program Verification
Abstract:
In spite of years of intensive research, there is a huge gap between the theory and practice of program verification. One of the reasons is that programming features considered in theory form only a small subset of features used in practice. We briefly survey what has been achieved in the field of program verification using the assertional method. Then we discuss our recent work on verification of object-oriented programs.

Herbert Edelsbrunner (AE), IST-A, Vienna, Austria:
Using homology to visualize scale and structure in datasets
Abstract:
Persistent homology is a recent grand-child of the classic theory of homology groups in algebraic topology. This talk sketches the method and mentions a few applications.

Topics in Cosmic&Earth Sciences: Chair: Sierd Cloetingh

Hans Sünkel, Graz U. of Technology, Austria:
Gravity field determination from space
Abstract:
As an integral response to its mass distribution, the structure of the Earth's gravitational field represents an important source of information about our planet. Its knowledge is therefore an indispensable for a substantial progress in the geosciences in general and in solid Earth physics, geodesy and oceanography in particular.

For the first time in space geodesy, three dedicated gravity field missions are currently being realized. The three missions are based on different observation concepts and have one element in common: GPS-based high-low satellite-to-satellite tracking (SST). A second dedicated on-board sensor makes the three missions focus on different aspects of the Earth´s gravity field: the determination of the static field with utmost precision and resolution by gravity gradiometry (GOCE mission) versus the monitoring of the dynamic field with reduced resolution (GRACE mission).
The derived gravity field models, if combined with altimeter data, will allow the precise determination of the absolute ocean circulation on a global scale, and substantially improve weather forecast and climate research. Combined with seismic data, the knowledge of the global gravity field will enable a significant advance in the understanding of the physics of the Earth's interior and will contribute to a better understanding of processes such as plate tectonics, volcanism, and earthquake phenomena. And finally the knowledge of the global gravity field will provide a global height reference surface at the centimeter level which is of paramount importance for positioning and navigation.

Don Dingwell (AE), U. of Munich, Germany: Magma:
The ultimate materials modelling challenge
Abstract:
The potential of simulation science to enhance the understanding of volcanic processes is enormous. We are only at the beginning of its potential. The early days of volcanic simulation were marked by a disregard for anything but the simplest possible description of molten rock - i.e. magma. Today, the demands of simulation scientists on the experimental community of magma physics and chemistry are huge. From the point of view of an experimentalist, the "market" is ready for the most complete parameterisation of magma properties and behaviour that is experimentally feasible to obtain. The range of properties of interest, together with their complexities in a system containing gas, solid and liquid components, will be briefly reviewed. Ultimately we must meet the challenge of a complete physico-chemical description of a system transitioning from a multi-phase foam to a dusty gas phase, on highly variable timescales of pressure, temperature change and mass and momentum transfer.

Christos Zerefos (AE), U of Athens, Greece:
Physics of climate change and its manifestation in art
Abstract:
Prevailing climatic conditions can be seen in famous sculptures, paintings and manuscripts depicted from works of art during the past few thousand years. The presentation includes works of art related to climate change from the cromagnon prehistoric period through the 19th century. It also includes model estimates on the effects of volcanic eruptions as seen by famous artists and depicted in their paintings and comparison with actual measurements and observations in the atmosphere.

Topics with Overlap: Chair: Ch. Gütl

Wolfgang Reisig (AE), Humboldt U., Berlin, Germany:
Informatics concepts for early discovery of earthquakes
Abstract:
We present the Experimentation Infrastructure for an Earthquake Early Warning System prototype SOSEWIN, as implemented in Istanbul. Technically this is a meshed, multi hop wireless sensor network, with software based on a Model-driven approach. A conceptual challenge is the software for the sensor nodes and the alarming protocol: It must detect clear patterns of an earthquake in a distributed world of potentially failing components and deteriorating links.

Ivan M. Havel (AE), Center for Theoretical Study, Prague, Czech Republic:
Seeing Numbers
Abstract:
In 1890 William James listed several "elementary mental categories" that he postulated as having a natural origin. Among them, alongside the ideas of time and space, he also listed the idea of number. A symptomatic feature of Informatics as well as Cognitive Science today is the tendency not to talk so much about ideas as about their representations, either in the computer or in the brain. Taking up somewhat different perspective I will discuss the way natural numbers, viewed as counts of real or imagined objects, may be experienced phenomenally. I put forth even some speculative ideas about mental number processing by numerical savants.

Martin Ebner, Graz U. of Technology, Graz, Austria:
Academic Use of Microblogging

Abstract:
Microblogging has become a rapidly growing web based service in the last two years. The most popular platform Twitter addresses millions of users who are communicating around the globe, by writing small pieces of text messages. Bearing in mind that only 140 signs for each posts are allowed, it is amazing how different kind of data is linked and exchanged among followers/friends or even by searching/using so called #Hashtags. In this talk we will give a short introduction into the use of this kind of social networking platforms and how people are communicating. We are studying how it can be used in a meaningful way in education and research. Furthermore we will address the research question "How Microblogging can be used at scientific conferences" and present some outcomes of different studies. The talk tries to present a critical view to a new increasing communication possibility.

15:55 - 16:30: Break

16:30 - 18:10: Section 3

Topics in Informatics: Chair: N. Kulathuramaiyer

Detlef Seese, Karlsruhe Institute of Technology, Germany:
Complexity in theory and application structural and descriptive aspects
Abstract:
Many algorithmic problems interesting from a theoretical or practical point of view are *NP*-hard and permit at least till now no efficient algorithmic solution. Usually one tries to get solutions in polynomial time by restricting structural parameters of the input structures (e.g. as in parameterized complexity considering structures of bounded width - band-width, tree-width, branch-width, path-width, …) or restricting the language allowed for problem definition (descriptive complexity).
In the talk we consider a unified combinatorial / logical approach to demonstrate that many complexity results in this area can be deduced using tools developed for the investigation of the decidability and undecidability of theories in mathematical logic.
The approach shows where areas of special interest for further research are located. Moreover areas of potential applications will be discussed.

Wilfried Imrich, Montan U., Leoben, Austria:
Product Graphs and Large Networks
Abstract:
This talk is concerned with the role of products of graphs in the investigation of networks. Networks arise in many different areas, such as biology, ecology, mathematical chemistry, software technology, and operations research. Nonetheless, the investigation of complex networks became a hot research topic only in the last decade, coinciding with increased interest in the Internet network, social networks, citation networks, and neural networks.
The networks are being studied by from many different points of view. Mostly they are representable by graphs with the following properties:

–Sparsity – the number of edges is bounded by a constant c times the number of vertices.
– The small world phenomenon – any two vertices are connected by a short path.
– Power law degree distribution – the number of vertices of given degree is proportional to the degree
– Fractal-like structure.

A central problem in the area is to generate networks quickly and efficiently that permit investigation using analytical tools, and that are as close as possible to real-world networks.
We will briefly outline the appealing approach in this direction by J. Leskovec, D. Chakrabarti, J. Kleinberg, C. Faloutsos, and Z. Ghahramani, who use the direct product of graphs (or, equivalently, the Kronecker product of matrices) for the generation of stochastic networks fulfilling these requirements. We then continue with another application of products of graphs that was proposed by B. Stadler, P. Stadler, G. Wagner and W. Fontana for the investigation of the relation between genotypes and phenotypes. It leads to the investigation of graphs that are product-like. We thus present an overview of graph products used for this purposes, and algorithms designed for the recognition of product like graphs which are not sparse. Finally, several ideas for the use of statistical methods in the recognition of sparse approximate products are presented.

C.A. de Moura, Rio de Janeiro State U., Brazil:
Mathematical Modeling- an art, a duty, a danger
Abstract:
Mathematical modelling is an essential component of many scientific studies and, we could even say, a sensible part of our everyday experience. Sciences based on mathematical models deserve to be called “exact". This allows them to bear a more respect-full status as compared to the ones known as “soft". An important fact is overlooked, though: to model is to pretend. When facing a mathematical truth no questioning may be posed and often one is led

to the same attitude towards a mathematical model. But mathematical conclusions about a model are true for that model, not necessarily for the modelled phenomenon.
These remarks are intended to guide the discussion on a topic that nowadays is of utmost importance: the use of numerical parameters to rate scientific papers and journals.

Topics in Cosmic&Earth Sciences: Chair: D. Dingwell

Paolo Papale, INGV Pisa, Italy:
Volcano modelling: control of deep magma dynamics on geophysical network signals
Abstract:
Deep magma movements preceding and accompanying volcanic eruptions involve complex physical and chemical processes occurring under extreme P-T conditions. Such processes can not be directly observed, therefore, their investigation combines a number of approaches from the analysis of the volcanic products, laboratory experiments, inversion of the associated signals recorded by the volcano monitoring networks, and numerical modelling. Combining all of the approaches above in a unique frame for understanding volcano dynamics is a frontier in modern volcanology. Here the results of advanced numerical simulations of magma convection and mixing in geometrically complex volcanic systems, and of the associated gravity change, ground displacement, and seismic signals, are illustrated and discussed.

Peter Hanappe, SONY Computer Science Laboratory, Paris:
The use of volunteer computing for large-scale climate simulations
Abstract:
We will present the results of our case study on the U.K. Met Office's climate model, FAMOUS/HadCM3, that was carried out in support of Climate Prediction net's Millennium Experiment. This experience has shown us the some of the challenges that large-scale Earth System simulations continue to pose for computer scientists, including those of performance and energy consumption.

Topics with Overlap: Chair: K. Apt

Horst Bischof, Graz U. of Technology, Austria:
Aerial based 3D Reconstructions of Cities
Abstract:
Aerial camera imagery is essential in the creation of a Virtual Earth on the internet as currently done by Microsoft (Bing) or Google (Virtual Earth). In this talk I will highlight the technology to generate fully automatically 3D models from highly overlapping images. I will demonstrate that redundancy plays a key-role to achieve automation and to obtain accurate results. Besides images acquired by airplanes. I will also discuss alternative platforms such as quadrocopters. Recent progress in hardware (e.g. GPUs) allows us to obtain reconstruction results from entire cities within a reasonable time. I will also highlight some current research issues that addresses the fully automated interpretation of such images to model urban spaces with their buildings, vegetation, windows, doors, façade details, and so forth. We observe a transition from a focus on visual aesthetics towards interpreted and searchable objects in our habitat.

Hans Zima, CALTEC, USA:
Adaptive Fault Tolerance for Many-Core Based Parallel Computation in Space
Abstract:
Future missions of deep space exploration will require a high degree of autonomy supported by an enhanced on-board computational capability. Earth-based mission controllers will be unable to directly control distant spacecraft and robots to ensure timely precision and safety, or to support “opportunistic science” by capturing rapidly changing events, such as dust devils on Mars or volcanic eruptions on a remote moon in the solar system. Furthermore, the high data volume yielded by smart on-board instruments would overwhelm the limited bandwidth of spacecraft-Earth communication, enforcing on-board data analysis, filtering, and compression. Emerging many-core technology is expected to provide the low-power, high-performance computational capability needed for the support of such missions. Fault tolerance for such systems will face new challenges, but also provide opportunities that do not exist for existing space-borne systems. We present an introspection-based approach that provides adaptive fault tolerance for on-board systems based on many-core technology. The goal is to enable a software system to become self-aware of its health, performance, and power consumption by monitoring its execution behaviour, reasoning about its internal state, making decisions or recommendations about appropriate changes of the system or system state when necessary, and supporting recovery from faults. Emphasis is placed on application-oriented fault tolerance that takes into account knowledge about the application and the algorithms and programs with which it is implemented. We have already implemented prototype versions of an introspection system for a cluster of Cell Broadband Engines and a Tilera Tile64 system; this work has been documented in a

number of publications. In this paper we will focus on on-going work at the Jet Propulsion Laboratory (JPL) that allows the user to categorize applications with respect to the required level of fault tolerance and the mechanisms required to implement such a specification. In this context we are studying methods that can provide automatic support for the generation of fault-tolerant software.
Specifically, we will describe how automatic analysis of the control and data flow in source programs can be exploited to automatically generate correctness assertions for critical sections of a program, or to generate redundant code that can be embedded in a self-checking programming framework.

Erik Duval (AE), K. U. Leuven, Belgium:
The Snowflake Effect in Science, Learning and Music
Abstract:
The Snowflake Effect is a label we use for a widespread trend towards personalization, at a both deeper and wider level than ever before. Deeper, because personalization is no longer based on stereotypes that group us in clusters of people with the same taste, or learning style, or demographics: rather, technology now makes it possible to treat each of us as the unique individual that we are, with our personal characteristics, requirements, constraints and contexts. Wider, because it is possible to realize it in more contexts more often for a wider audience than ever before.
In this talk, I will present some example of how we put the Snowflake Effect into practice in how we help people learn, how we interact with music and how we support our own research - and that of others.

See also a fuller description on
http://www.ae-info.org/ae/User/Duval_Erik/The%20Snowflake%20Effect

General Information

Program on the Server of Academia Europaea: www.ae-info.org/AIECS
Registration: www.ae-info.org/AIECS/Registration

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Map of Graz with locations of events:

Conference Venue Stadthalle Graz, bottom marker. Bus for excursion Sept. 1 leaves here at 10:45 a.m.

Recommended Hotel: AMEDIA Hotel Graz: opposite conference venue, 100 m direction city center, see AMEDIA Hotel Graz, www.amediahotels.com.

Reception at city hall ("Rathaus") August 31, 7 p.m., top marker, this is center of old town . Use taxi-cab or tram (stop directly outside conference venue and get out on main square with the city hall)

Informal get-together dinner August 30, any time after 18:00 in Gösser Bräu, Neutorgasse 48, 8010 Graz, ph.0316 829909, www.goesserbraeugraz.at , second marker from top

Informatics meeting August 30, 3 p.m.: Seminar Room, main floor, Inffeldgasse 16c, right-most marker