

Abstract Booklet

Workshop on

*“Complex Societal Problems,
Sustainable Living and Development”*

IAM, METU, Ankara, May 13-16, 2008

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**“Complex Societal Problems,
Sustainable Living
and Development”**

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<http://www3.iam.metu.edu.tr/>

Institute of Applied Mathematics, METU
Department of Industrial Engineering, METU
Department of Modern Languages, METU
Middle East Technical University
Balaban Valley Group
EURO WG on Complex Societal Problems
EURO WG “Operational Research for Development”
EURO WG on Continuous Optimization

May 13, 15.40h: General Seminar. IAM
May 16, 11h: Presentations

Place: IAM 209
Contact: grueber@metu.edu.tr

EUROPT **EURO ORD**

Poverty, and Schooling in Turkey: a Needs Assessment Study

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The number of internal migration flows in Turkey went up to 72% in 2007. Inevitably such dramatic inter-regional urban-rural movement influences the education system in new communities as well as the ones that are left behind and challenge the school quality as well as the schooling process. The purpose of this talk is to give a brief overview of the current education indicators in Turkey and PISA 2006 results, and focus on school quality needs based on a nation-wide study in disadvantaged communities caused through internal migration. Findings show that poverty and education were the main indicators that led the populations to migrate from their settlements. The quality of schooling that migrant students received stemmed mainly from the resources of schools in the local communities they reside and from the families' low socio-economic status. The schools were likely to be resource-poor, overcrowded, and diverse urban schools. School in these districts were challenged with various needs that are compatible with Maslow's hierarchy of needs; and academic challenges as a result of poor language skills, learning differences, and poor school quality.

Flood: a Complex Societal Problem Not a Technical Issue

Climate Change as a Complex Societal Issue

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Risk prevention of floods in rivers and on coasts is very relevant and necessary. In the past and in recent years there is a huge amount of economic and human damage done by the flooding of European rivers, by the Tsunami's and due to hurricanes, for instance the Katrina disaster in New Orleans in 2005. More knowledge on prevention, handling and recovery afterwards is very relevant. There is a relation between climate change, sustainable development and flood. Most governments focussing on floods are looking for technological support and devices. Although technical devices are necessary and should be, if relevant, developed, they are not the most relevant issue to prevent flood. Lack of early warning systems was not the problem in recent floods: in the Katrina disaster (September 2005) most of the knowledge was available only the political will was missing to protect the poor areas and the industrial areas from flooding.

In the case of the Tsunami of December 2004 near Indonesia, one phone call to the coast of Africa would have saved the life of many people there hours after the tsunami was noticed. Main causes of flood are next to the item mentioned above: political ignorance and reluctance, corruption and lack of communication.

Floods should be handled as a complex societal problem, where technical interventions are sometimes necessary and needed, however they should be imbedded in a political and social context. Complex societal problems contain knowledge aspect, power and emotion. This can be done according to the guidelines of the methodology of societal complexity.

Sustainable Development: a Complex Societal Issue

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Sustainable development is a complex societal problem belonging to the field of societal complexity and should be handled based on the scientific ideas of this field. Sustainable development sometimes only refers to agricultural production and sometimes includes industrial production. We would like to extend the concept of sustainability to production in general, agricultural production as well as industrial production, and include the way of production, and the working conditions. More and more the world is influenced by the capitalist economic system. Capitalism stimulates and approves of an unequal benefit of work and profit, which results in extreme differences in power, wealth and work. In order to have a more sustainable society, capitalism should be socially based and huge money speculators and transnational firms should be democratically controlled by international organizations.

Whether it is possible to develop a sustainable world should be carefully explored. The contemporary and possible future situations have to be analyzed, and it should be determined whether there is enough support to develop a more sustainable society. The possibilities can be brought out through carefully organized multi disciplinary workshops. Here we examine, the nature of sustainable development, what is needed to reach sustainable development (knowledge), what is wanted for sustainable development (the goals), how to reach sustainable development (the power), and how to implement a plan to reach sustainable development. For analyzing the situation in the world or in a society we need indicators to measure the situation. Evaluating a society by its GNP is too limited. The GNP is only based on economic development and excludes the negative aspects of that development like healthcare threats and pollution. A better way to evaluate a society is to use the concept of quality of life. The quality of life can be operationalized, quantified and measured as capitals, such as cultural, social, economic capital.

The complex process of organizing societies towards a sustainable world can be guided by using the Compram methodology (DeTombe 1994; 2003). The Compram methodology is developed to analyze, define, guide and evaluate complex societal problems. The Compram methodology starts with defining the problem based on cause-effect models (system dynamic models) built by experts of different disciplines related to the problem (knowledge), and then the same problem can be defined by the actors involved in the problem (power). Based on the comparisons of these models of the problem the actors and experts discuss possibilities for interventions. By using the guidelines of the Compram methodology one can find causes of the complex problem and give directions for change.

Designing Sustainable Living in Rural Areas

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A steady increase in world population and economical growth caused excessive use of resources to such extent that threatens healthy living of present and future generations. One of the global effects of ever increasing consumption of resources is climate change. Approaching peak oil, and non-renewable resource depletion are creating the need for a new world paradigm. An education program presenting a holistic training about the principles of sustainable living is developed by Gaia Education. Two workshops based on this education have been organized in October 2007 and February 2008 at METU. It consists of the four modules of sustainability which are holistic world view, ecological, economical and social.

Designing a sustainable community at Güneşköy ecovillage initiative continues as a part of Balaban Valley Project. Building of a new sustainable society is based on creation of relations between people, nature and resources. On social issues, for improving the communication skills of people non-violent communication, group decision making, circular leadership, conflict resolution and making life enjoyable by games are considered and tried together. Food production by natural farming is based on creating useful relations between soil, plants and pests. The fuel for agricultural machinery is supplied by vegetable oil extracted from plants grown locally. Economical sustainability is developed by applying community supported agriculture that creates direct relations between food producer and consumer, and hence both benefits from the relation; one gets direct income and the other feeds on healthy food.

Attitudes of METU Students toward Learning English

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As METU is an English-medium university, all the students have to be competent in that language in order to be able to follow their departmental lessons easily and cope with the difficulties likely to be confronted in an academic environment as well as after graduation, in industry. To that aim, Department of Basic English (DBE) and Modern Languages (DML) work hand in hand, showing incredible effort to help the students from all the departments. To increase the quality of the programs and courses offered by the DBE (prep. school) and DML, some program and course evaluation studies are carried out at certain intervals. The research committee members prepare and distribute questionnaires to both the students and the instructors from almost all the departments, asking them to evaluate the effectiveness of the course objectives, methods and materials used in the courses, assessment procedures and finally the attitudes of the learners –referred to as “affective domain” -toward those language courses. The collected data are collated and analysed both quantitatively and qualitatively. Finally, the results are shared with the house to make the necessary modifications and improvements in the offered courses. The focus of this session is specifically on the results of the “attitude” section of the surveys given to DBE students in 2004-5, the same section of the surveys carried out by the DML committee to evaluate the ENG 101 course in 2005-6; (Development of Reading and Writing Skills 1 course offered to the first year students of METU) and finally the questionnaire and interview results concerning mainly the students’ situation in terms of speaking skills (2008).

Climate Change and Cognitive Science

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It has only recently been recognized that Climate Change is anthropogenic to a non-negligible extent (see the fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC), November, 2007). While hitherto climate change has been discussed mainly within the natural and life sciences and solutions have been sought on the political, economical, ecological, and technical level, it becomes increasingly clear that it also has important humanistic, sociological, psychological, pedagogical, and philosophical aspects. In my talk I will mainly approach the topic from a cognitive perspective.

The biggest challenge, indeed, may be a cognitive one, namely that we all have to change our way of thinking and our behavior. Climate Change has been caused by the concrete behavior of people, nations, and economies, which must somehow be reflected in the minds of these people and in the discourse within and between those groups.

Short-comings as well as strengths of the human mind/brain may be explored that hitherto have contributed to the problem and which might be relevant to solve it in the future. Possible shortcomings include limitations of cognitive resources such as memory, in particular prospective memory, and probabilistic reasoning. It may be that our species is simply not laid out to overview such large time scales and to keep track of and predict complex, non-linear and largely unpredictable events in the future. Even if reasonable predictions can be made humans find it hard to translate this knowledge into concrete actions, in particular, if this necessitates an effective change in thinking and acting in everyday life. Uncertainty, fear of loss and actual loss of acquired privileges and convenience may be only some negative emotional and factual consequences that complicate human reasoning and behavior. On the other hand, humans are equipped with cognitive resources that may overcome (some of) these shortcomings such as anticipatory planning (despite obvious limitations), mentalizing the future, counterfactual thinking, imagination, tracking of distal goals and the use of analogies and associations in order to make successful predictions. A particular problem might be the lack of immediate effects of one's own actions: driving a car or riding a bike does not immediately show any differential effect in the environment. In the face of missing evidence, the behavior of others and their feedback to one's own behavior may be particularly important in shaping behavioral routines and mental attitudes. Therefore, education and raising awareness will play an important role in this process, too.

In conclusion, I argue that through the consideration of cognitive processes involved in human thought and behavior with respect to Climate Change we may more effectively master the multifarious challenges in the future.

Working with Volunteers: a Complex Societal Problem

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Working with volunteers can be a win-win situation. From the outside it might seem easy? Give some unpaid people tasks; watch the work get done as they gain experience? But reaching that position is a challenging process of defining tasks clearly, giving tasks according to abilities, giving enough information for all to access, allowing for feedback, but knowing that many will not tell you what you really need to know. What are the critical factors? How should they be balanced to maintain the momentum of the Strong Days? Claire Ozel has worked in many groups as a volunteer, and is now attempting to motivate people to volunteer for several projects. She is Disability Support Coordinator at METU.

Community Participation in Kerkenes

Francoise Summers, Soofia Tahira Elias-Ozkan

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The Kerkenes Eco-center was established in the village of Shahmuratli in Yozgat, near an archeological site on top of the Kerkenes mountain. The Eco-center has been instrumental in introducing water saving schemes, the use of renewable energy resources, recycling, composting, and appropriate building techniques to the villagers and the students of the Department of Architecture at METU. This presentation will throw light on the participation of the students as well as the rural population in the Eco-center's activities towards a sustainable future.

Applied Mathematics Used in Complex Societal Problems

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The development of high-throughput technologies and the availability of large data sets now allow gaining deeper insights in the dynamic behaviour of complex dynamical systems and opens promising avenues for further scientific progress in medicine, health care, technology and life sciences. For a mathematical analysis of such systems so-called eco-finance networks have been recently introduced. An important example of these networks is given by the Technology-Emissions-Means model in the context of environmental protection and CO₂-emission control. This particular case of eco-finance networks has been developed for a mathematical investigation of international collaborations and Joint Implementation Programs in the framework of the Kyoto protocol. We demonstrate how this model could be analyzed by eco-finance networks with respect to errors and uncertain measurement data.

Data Mining Used in Complex Societal Problems

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Many real-world applications from finance, science and technology can be analyzed by least squares estimation and the classification tool CART. One of its most advanced and refined versions and modifications called MARS (Multivariate adaptive regression spline). We investigate this statistical tool by means of Tikhonov regularization and conic quadratic programming and, herewith, offer an alternative view and invite to future research and practical applications. Then, we give a short introduction into Support Vector Machines (SVM) which belong to the very important classification tools, and have a look at the case of infinite kernels which is new research topic. Throughout the talk, the relevance to extracting information, especially, on development and societal problems, is reflected.

Gene-Environment Networks – the Financial Aspect Included

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Gene-Environment Networks provide a conceptual framework for the analysis of highly interconnected dynamical systems with respect to errors and uncertainty in life sciences and financial sciences. Given the noise-prone measurement data we extract nonlinear differential equations to describe and investigate the interactions and regulating effects between the data items of interest and certain environmental items. In particular, these equations reflect data uncertainty by the use of interval arithmetics and comprise unknown parameters resulting in a wide variety of the model. For an identification of these parameters Chebychev approximation and generalized semi-infinite optimization are applied. In addition, the time-discrete counterparts of the nonlinear equations are introduced and their parametrical stability is investigated by a combinatorial algorithm which detects the region of parameter stability. This approach allows an investigation of a wide range of real-world problems and we explain the interdisciplinary implications with special regard to Operational Research and financial sciences and introduce the so-called eco-finance networks.

Short Presentation:

Indonesian Oil

Native Owned and Producing Oil Wells on the Island of Java, near CEPU

Allen Johnson

USTR chief agricultural trade negotiator

(presentation given by *Gerhard-Wilhelm Weber*)