

Editor-in-Chief: Gerhard Chroust

c/o Systemtechnik und Automation, Johannes Kepler University Linz, 4040 Linz/Austria,

e-mail: CHROUST@SEA.UNI-LINZ.AC.AT, Tel:+43-732-2468-865, Fax:+43-732-2468-878

www-home page: <http://www.sea.uni-linz.ac.at/ifsr/>

Dear Readers!

*A Merry Christmas  
and a  
Happy New Year !*

*Looking back, I realize that I am already serving my third year as editor of this Newsletter - and I would like to assure you that it is a very enjoyable task. May I voice a wish for the New Year and hope, that we will receive even more pieces of information from you - especially small items on events taking place in your country, upcoming events and reports on past events. I believe that the latest changes (partial printing in the USA) have improved the turn-around time. I would like to express our sincere thanks to Gordon Rowland from Ithaca College for having done the printing in the USA! I think that the speeding up is even more important than the financial side. Therefore, let's endeavor to make the IFSR-Newsletter an even better support of communication. If you have new ideas, please contact me. It is primarily YOUR Newsletter!*

*I would like point your attention to the discussion on AST on page 6.*

*You probably know that IFSR is essentially working in a biannual rhythm - every even year there is the EMCSR-Meeting in Vienna and in parallel meetings of the IFSR. Therefore you will find in this and the next Newsletters some information and ideas which should lead to fruitful meetings and to a more active IFSR in the years to come.*

*Gerhard Chroust  
Systemtechnik und Automation  
Johannes Kepler University Linz, 4040 Linz, Austria*

IMPRESSUM: Mediuminhaber, Herausgeber, Satz und Layout: Int. Federation for Systems Research

Für den Inhalt verantwortlich: Prof. G. Chroust, Kepler Universität Linz, 4040 Linz, Druck: Druckerei Bad Leonfelden Ges.mb.H. & Co. KG, Bad Leonfelden. (A)

## BUILDING AN AUTHENTIC AND CONTRIBUTING SYSTEMS COMMUNITY

Bela H. Banathy

A community is authentic if - and only if - its members actively and creatively participate in working toward commonly held purposes. It is a contributing community if - and only if - its collective work benefits its members, the community as a whole, and the larger society.

Our aspirations as an international federation of systems and cybernetic organizations can not be anything less than building such an authentic and contributing community. Our aspiration cannot be anything less than engage through our member organizations - and collectively as a whole - in continuing work that will foster and advance the purposes of ISRF, namely:

- engage in long range strategic design and short range program design by organizing, supporting and sponsoring R&D programs, international meetings and workshops;
- coordinate systems research among member organizations;
- develop data and knowledge bases in the cybernetics and systems sciences;
- develop and promote publications in the area of systems/cybernetic research and applications;
- seek resources and funds that enable us to carry out the functions that serve our purposes;
- define and promote programs and standards of competence in systems education;
- promote membership and coordinate programs among member organizations and provide assistance to them;
- promote cooperation with other international scientific, educational and social service organizations in order to enable scientific advancement and serve the improvement of human condition.



These are purposes that are explicitly stated in the by-laws and the program statements IFSR.

Each of the purposes described here would be served by an IFSR Standing Committee. Our member organizations were already asked to participate and define the tasks of the Committees, consider some others, and appoint members to the Committees. The Committees will self-organize, elect their leadership and proceed with their work. A member of the Executive Committee would serve as liaison to the Committees. The definition of the tasks of the Committees, their organization and their work are the major agenda items of the Strategy Meeting of the IFSR Board on Saturday, April 13th 1996. We ask our members organizations to bring their aspirations and ideas to this meeting.

IFSR cannot be a top-down bureaucracy. Authority and power is not derived from being elected or appointed to a position but only from a commitment to get involved in the work of IFSR. Recognition is earned from the contributions we make individually, as

contributing member organizations, and collectively as a Federation in order to attain our common purposes. The role of the Executive Committee is not one of directing or managing. Its role can be less and nothing more than only of enabling.

We invite all of our member organizations to join in to create and intelligent, ethical, and learning organization with constantly unfolding purposes and programs. Our shared aspiration is to empower IFSR to become a dynamic living and creating institution that will make contributions to its member organizations, to the attainment of its stated purposes, to the global systems community, and to humanity as a whole. We, members of the Executive Community are offering our services in enabling IFSR to fulfill its potential.

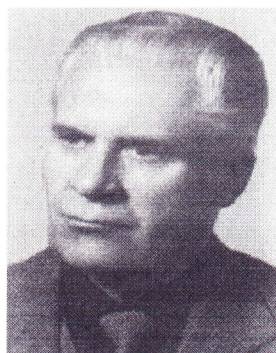
## NEW TRENDS

### THE DEVELOPMENT OF KNOWLEDGE AND SCIENCE ON SYSTEMS, GENESIS AND MOTIVATION

**Prof. Mieczyslaw Bazewicz**

*President of the Polish Systems Society  
Politechnical University of Wroclaw  
Poland*

Systems knowledge about methods and ways of systems perception of reality is an intellectual phenomenon of the cultural development of humanity in the 20th century. Reasoning by systems categories is becoming a kind of "master-key to the gates of knowledge" about the surrounding world. Systems science enriches the intellectual foundations of a holistic consciousness of the human being and contributes to an increase of



efficacy of the synergy of his/her cognitive and decision making behavior. The term "system" can be metaphorically identified with a "focus" or "guidepost" which directs motivations or inspirations to shape the imagination and to assign values to perceived and evolutionary quantified images of reality.

The currently appearing symptoms of different kinds of conflicts stimulate the search for new approaches and paradigms of reasoning in recognizing neurophysiological and psycho-intellectual functions occurring in consciousness of the human activities. The appearance of this type of conflict is also proof of a lack of sufficient perception of natural relationships or a lack of intellectual openness



(intelligence) of the human being with respect to the knowledge of different areas of science and epistemological methods.

The systemic vision of the world provides a higher level of general human knowledge concerning complex natural systems and their relationships to biological, ecological, socio-logical, economic and philosophical-cognitive sciences. In shaping the vision and knowledge of a viable system, it is necessary to neutralize (reject) the influence of mental approaches resulting from a historical attitude in perceiving the world development by categories of continuity of states and transitions (occurrences of changes) of a physical-chemical character. The basic value of shaping systems sciences is the development and increase of the role of intelligence in the behavior of viable systems, in their association with the surrounding world, as well as in the increase of the cultural consciousness and perceptiveness in the transformation of the human behavior, categorized by ethics and creativity of the social evolution of the environment.

Cybernetics proposed by N. Wiener, and the theory of biological systems of L. von Bertalanffy, which were elaborated in the 20th

century, have started the worldwide science of complex systems. Systems sciences have inspired the development of a new intellectual and cultural current, deprived of any kind of disciplinary partitions and reductionistic simplifications of the perceived fragments of reality. System sciences motivate the overcoming of consciousness barriers in recognizing the complexity of reality. They thus contribute to the foundation of the cultural evolution of the "systems movement".

The systems movement already came to life already 40 years ago through assemblies and societies of interested scientists and practitioners. An important role in the development of this movement has to be attributed to the books and papers of Bela H. Banathy.

In Poland, systems activities are carried out by the Polish Systems Society (PSS). The objectives of PSS's activities include inspiration, support and provision of systems research and inquiry, formation of the development of systems education and culture, creation and development of systems methodology with an interdisciplinary scope, as well as the popularization of wide-conceived systems knowledge.

---

## INFORMATION BASED DESIGN OF SOCIAL SYSTEMS



**B. Antal Banathy**

*International Systems Institute  
Saybrook Institute  
38 Seca Place, Salinas,  
CA 93908 USA*

*Sometimes one forgets..This happened with B. Antal Banathy's picture. It did not make its way into No. 38 of the Newsletter. So with my apologies, here is his picture.*

*G. Chroust*

---

### IFSR goes WWW!

In the last year we have set up a World Wide Web server with information about the IFSR. You can reach the home page by URL: <http://www.sea.uni-linz.ac.at/ifsr/>



---

## Project Reports

### A Network Model for Prioritization of Factors Affecting Software Development Productivity

D.I. Petkov\*, O. Mihova-Petkova\*\*

\* University of Natal, Pietermaritzburg

\*\* Technikon Natal, Pietermaritzburg

**PROBLEM OUTLINE:** The aim of this research is to provide a new model for the prioritization of the various quantitative and qualitative factors affecting software development productivity. This is important for the evaluation of project risk, for the selection of an appropriate technique for software development effort estimation and for the overall management of software development. It uses an extension of the Analytic Hierarchy Process (AHP) for systems with feedback. It is a continuation of a previous research which modeled those factors using the classical AHP assuming independence between the factors and hierarchical relationships [1]. If we consider software development as a complex managerial process, the interaction between elements becomes important and for such cases it is more appropriate to use a recent extension to AHP for systems with interdependencies.

**STRUCTURE OF THE MODEL AND AN APPROACH FOR ITS PRIORITIZATION:** The relationships between the components of the system form a network: the weight of each factor with respect to the goal - higher software development productivity can be found using the supermatrix approach based on the theory of Markov chains. The final priorities are obtained by calculating the limit of the supermatrix's high powers [2]. The factors were selected on the basis of their inclusion in a number of well known models for software cost estimation (COCOMO, Function Point Analysis and others). Besides, an attempt was made to take into account issues related to user characteristics (user computer literacy, user involvement, user management commitment) and developers' motivational factors. The results of the ranking of the factors in the accompanying example show that requirements volatility, project management features, developers' management commitment, user management commitment and motivation were placed respectively as first, second, fourth, sixth and seventh among all factors. Note that all these are not technical but managerial factors.

This fact supports the findings of Kemerer, Jeffery and others on the need to incorporate more diverse factors in the software estimation models, reflecting thus in a better way the nature of software development.

**CONCLUSION:** The need for models related to variations of the software development process, measures of its characteristics, and practical mechanisms for obtaining those measures is often underlined in the literature. The research in this paper aims at providing a new way of treating the problem of prioritization of factors effecting software development productivity. The structure of the model is considered to be transportable for application in other environments. The solution of the problem of identifying those factors that have the potential to enhance software development productivity dramatically is an important prerequisite for overcoming the software crisis. It is hoped that the model suggested in this paper provides a deeper insight into its many facets.

[1] Finnie, G.R., G.E. Wittig and D.I. Petkov: "Prioritizing Software Development Productivity Factors Using AHP", *The Journal of Systems and Software*, 22:2, 129-139, 1993

[2] Saaty, T.L. : *Fundamentals of Multicriteria Decision Making with The Analytical Hierarch Process*, RWS Publ., 1994 Pittsburgh

### MWOOD & KOMDOM-CASE

Christian Demmer

Dept. of Software Engineering

Technical University Vienna

<dipltom@eimoni.tuwien.ac.at>

We started a project in the field of applied Artificial Intelligence in the early 90ies. The basic idea was to improve the usability of 'user-friendly' state-of-the-art applications for restricted domains by extending them with typical AI-techniques, namely language understanding and object-oriented frame-based representation of domain-specific knowledge. To deal with the complexity of such applications we propose a disciplined, computer-aided approach. Our CASE prototype KOMDOM (COM-mercial DOM-ain) is based on the Micro-World's Object-Oriented Design methodology (MWOOD) that was influenced by Rick Zahniser's 'design by walking around', Wasserman's OOSDL, Firesmith's ADM3 and Nerson's BON, but also



by Brachman, Meyer, Rumbaugh, Coad & Yourdon and Grady Booch.

We interpret computer-tools as 'working places' consisting of 'micro-worlds' constructed upon an iterative process encouraging dialogue and participation among developers and users. Generators for code, the user-interface and all kinds of design-documents describing the software-system under development together with hypertext based editors make design decisions more transparent.

We argue in favor of an extended frame-formalism representing a 'purified object oriented approach' with an independent conceptual and implementation hierarchy of object-classes. The related KE-tool (KOMDAT-III) acts as intuitive object-oriented knowledge-base for all kind of information that is needed to develop and to run an advanced 'user-friendly'

application with NLU facilities. Information is stored locally by means of a functional frame-description language for decisions of analysis, specification, design and implementation. All kinds of architectures are represented explicitly by 'architectural frames'. A frame-based natural language understanding unit for the German language was built on top of this environment. The next step is to complete the application's system-object model.

Note: We are looking for (non-military/nuclear) sponsors to support the implementation of a small prototype (approximately 1 man-year, no infrastructure needed) on Macintosh PowerPC hardware using Commonlisp (C++ Code generator is under development). A full-time project is not possible at the moment because of a postgraduate course. 'Research donations' will be stated in papers and articles.

---

## CONFERENCE REPORTS

### Konrad Zuse honored in Namur

Konrad Zuse (85) the famous inventor and computer pioneer receives the Award of Honor at the 14th International Congress on Cybernetics, Namur (Belgium), August 21 - 25, 1995, from Prof. Jean Ramacken, President of the International Association for Cybernetics (left) under the assistance of Prof. Daniel Dubois (University of Liege).

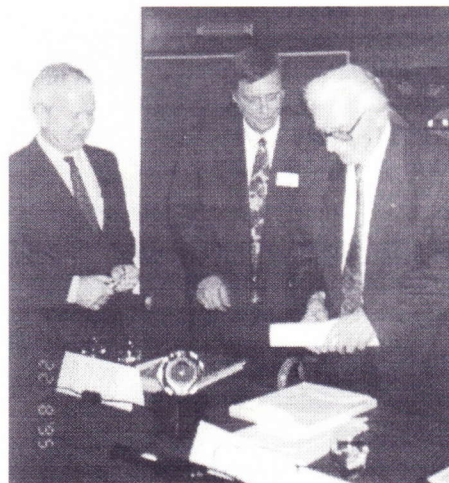


photo: Pichler

---

## CONFERENCE ANNOUNCEMENTS

*For contacts, etc. see Calendar of Events.*

### 10th Internat. Congress of Systems and Cybernetics

August 26-31, 1996,  
Bucharest, Romania

This triennial conference organized by the World Organization of Systems and Cybernetics is supported by many international groups concerned with management, the sciences, computers, technology systems, cybernetics and ecology. The 1996 Congress will be the tenth in the series. It will provide a forum for the presentation and discussion of current systems

research in sciences, engineering and the humanities, theory and practice in environmental problems.

The Congress is organized in Symposia, with each having a special subject. The chairperson of the symposium proposes the theme, organizes the communications and leads the debates. This preliminary program lists the symposia which have already been accepted by the Organizing Committee. Conference languages are Romanian, English and French.

Authors are invited to send two copies of 1.000 words summary to the Secretariat (deadline: Jan.15, 1996), full papers are due April 15, 1996.





### From the Secretary/Treasurer

*Dear Members!*

*In April 1996 the next ECMSR-Conference will take place in Vienna, a good chance for you to meet with colleagues. During that week IFSR will hold 2 events: a Board Meeting to which the representatives of all our member organizations are invited, and on April 13 (Saturday morning) an IFSR Strategic Meeting which should direct IFSR to become a more dynamic and efficient organization. The committee structure proposed by the Executive Committee is also a step*

*in that direction. Please join us for the Strategic Meeting and bring your ideas along!*

*I also want to thank you for having filled in our questionnaires. We now have a fairly good overall view of ours members. Please remember to inform me of any changes in the officers of your society!*

*Yours sincerely,*

*Gerhard Chroust*

### **Do we need Computer Aided Systems Theory? - A Discussion**

*In an e-mail to the participants of EUROCAST-95 (Innsbruck) Jimmy (Werner) Schimanovich stated a provocative thesis. Here is Jimmy's original statement and some answers:*

Dear friends,

I agreed with Franz Pichler and Gerhard Chroust to play the role of the advocatus diaboli: Therefore let me state a provocative thesis:

#### **The old system theory is not longer a scientific subject of its own!**

The reason is that it is now already absorbed by the different branches of science and technology. It only survives in combination with chaos-theory (e.g. in Italy) or as part of philosophy (in some universities of the USA).

Therefore I am very glad that Heinz Schwärtzel suggested to change the meaning of CAST from *system theory* to *systems technology*. This includes the construction of several systems in practice. We have to look for new instruments to use for the construction of systems.

To come to the point: I am convinced that the CAST community should learn as much as possible from related fields and I find this very interesting, too, but I have to confess that I personally find the endless discussion about system theory boring. I can understand that some people like to design abstract models for systems and like to discuss this process in detail. I certainly will not share this discussion.

jimmy/werner

Dear Jimmy!

Let me draw your attention to following aspects:

- (1) Systems theory will not be absorbed, but applied in more and more fields of science,
- (2) Systems theory and other fields, especially computer science and cybernetics (measurement, automation, communication), will lead to a complex theory in the future.

E.G. Woschni

e. g.woschni@infotech.tu-chemnitz.de

Dear Jimmy!

I think that System Theory is more an objective than a result: a broad interdisciplinary theory which should be constructed. This process of construction can be conceived as a dynamic system where theory and practice interact in an evolutionary way. The value of the theory is determined by the utility of its applications and the sense of the applications depends on its capacity to make understandable the phenomena modeled.

System Theory can be viewed as a framework of interdisciplinary communication, which will evolve according to the progress of its applications, and vice versa.

I think that the discussion is not to make a selection between System Theory and System Technology, but the need for the consciousness of their interaction and mutual construction: How



can the process of interaction between System Theory and System Technology be conceived as an evolutionary system? The big difference between the analytical view and the systemic one is not better theories, but the capability of understanding change and of integrating the phenomenon perceived and the perceiver (modeller) of phenomena.

An interesting example is the role of ecology in the conception of the world in the last 20 years, which has shown that human activity cannot be conceived isolated from nature, but as a whole system. Then a systemic ecological attitude is not a list of forbidden activities, but a global view of the planet that determines activities which, in turn, impose a new global view, and so.

Jose Parets, jparets@ugr.es

### Marconi Wireless Telegraphy Station

Franz Pichler provides the following example of a system:

Marconi Wireless Telegraphy Station (typically for ship installations around 1905) at the Radio Museum in Holcombe (near Rochester), New York. Take it as a typical example for a "system" and for the demonstration of "synergy" in the sense of Buckminster Fuller.



photo: F. Pichler

## **SYSTEMS RESEARCH**

**THE OFFICIAL JOURNAL OF THE INTERNATIONAL FEDERATION**

**FOR SYSTEMS RESEARCH (IFSR)**

Now published by John Wiley and Sons

1996 is the thirteenth year of publication of Systems Research. It took on a new lease of life in 1995 with a new editor, Professor Mike Jackson, and a new publisher, John Wiley and Sons. Systems Research aims to become truly international and to reflect the best work in all traditions of systems thinking. Its ambition is to be a quality, flagship journal of which the international systems community can be proud.

Submissions and suggestions for the journal are welcome. Papers or inquiries about submissions should be addressed to:

Professor M.C. Jackson  
Dean of Systems and Information Sciences  
University of Humberside  
Marvell Hall  
Hull, HU6 7RT, United Kingdom  
Tel: +1482 440550 Ext 3720  
Fax: +1482 445715

Systems Research is published 4 times a year in large format, totaling over 320 pages. It is available at a special price of \$40 per annum for members of the societies affiliated to IFSR. Subscribe now by sending \$40 to:

John Wiley and Sons Ltd., Journal Administration  
Baffins Lane, Chichester  
West Sussex, PO19 1UD, United Kingdom  
Tel: +1243 779777  
Fax: +1243 776128

Payment is possible by telephoning or faxing your name, credit card number and expiration date. Institutional subscription enquiries should also be addressed to John Wiley and Sons Ltd.

The first issue of Systems Research in 1996 (Volume 13.1) is expected to contain papers by Ackoff, Snow and Leach, Tsouvalis and Checkland, Uphoff, Warfield and Staley, and others; as well as 'Notes and Insights', book reviews and news.



## Calendar of Events

Title	Date and Place	Further Information
Abbreviations: CfP, CfA: Call f. Papers/Abstract, FP: Final Paper due, <No. nn>: more details in issue.nn		
Groupware in Mechanical Engineering, ETCE-1996 <No. 38>	Jan 28-Feb.2, 1996, Houston, TX, USA <i>CfP: expired</i>	P. Grünbacher, Kepler Univ. Linz, 4040 Linz, tel: +43 732 2468 867, e-mail: pg@sea.uni-linz.ac.at
ECBS-96: Int'l IEEE Symposium and Workshop on Engineering of Computer Based Systems	March 11-15, 1996, Friedrichshafen, Germany <i>CfP: expired</i>	Marcus Voss, Univ. of Karlsruhe, IMA, D-76131 Karlsruhe, tel: +49 721 608-4378, email: mvoss@ira.uka.de, www: <a href="http://i50s19.ira.uka.de/ecbs96.html">http://i50s19.ira.uka.de/ecbs96.html</a>
Int. Symposium and Workshop on Engineering of Computer Based Systems <No. 38>	March 11-15, 1996 Friedrichshafen (D) <i>CfA: expired</i> <i>FP: expired:</i>	G. Schweizer, Univ. Karlsruhe, IMA, Haid-und-Neu.Straße 7, D-76131 Karlsruhe, email: mvoss@ira.uka.de WWW: <a href="http://i50s19.ira.uka.de/ecbs96.html">http://i50s19.ira.uka.de/ecbs96.html</a>
'Constructing Persons' - A joint Conference of the American Society of Cybernetics and the Faculty of Sociology at the University of Urbino	April 1-5, 1996, Urbino, Italy <i>CfP: expired</i>	Marcelo Pakman tel: (413) 594-2211
13th European Meeting on Cybernetics and Systems Research, Vienna <No. 37>	Apr. 9-12, 1996, Vienna, Austria <i>CfP: expired</i>	R. Trappl, Dept. of Med. Cybernetics & AI, Univ. of Vienna, Freyung 6/2, A-1010 Vienna, Austria, tel: +43-1-53532810, fax: +43-1-5320652, Email: sec@ai.univie.ac.at, www: <a href="http://www.ai.univie.ac.at/emcsr/emcsr.html">http://www.ai.univie.ac.at/emcsr/emcsr.html</a>
IFSR Strategic Meeting	April 13, 1996, morning, Vienna	open only to IFSR member societies! details to be announced
Fuschi-Talks 1996 <No. 34>	Apr. 14-19, 1996, Fuschi, Austria <i>CfA: May 15, 1995</i>	B. Banathy, 25781 Morse Dr., CARMEL, CA 93923, USA, email: belasr@aol.com
Int'l Cnf. on Modeling, Simulation and Optimization	May 6-9, 1996 Gold Coast, Australia <i>CfA: Jan 1, 1996</i> <i>FP: March 15, 1996</i>	IASTED secretary MSO 96, 4500 16th ave NW, unit 80, Calgary, Alberta, Canada T3B0M6 tel: (403) 288-1195, fax (403) 247-6851, e-mail: iastad@istd.cuug.ab.ca
ICCHP 1996: International Conference on Computers for Handicapped Persons	July 16-19, 1996, Linz, Austria	Austrian Computer Society, Wollzeile 1-3, A-1010 Wien, tel: +43 1 512 02 35, e-mail: ocg@vm.univie.ac.at
1996 Summer Computer Simulation Conference	July 21-25, Portland, Oregon, USA <i>CfA: expired</i>	SCS-96, 4838 Ronson Court, Suite L, San Diego, CA 92111-1810
5th Bi-Annual Conference of the International Society for the Empirical Study of Literature <No. 38>	August 21 - 26, 1996, Banff, Alberta, Canada.	Steven Tötösy de Zepetnel, Res. Inst. for Comparative Literature, Univ. of Alberta, Edmonton, Alberta Canada T6G 2E6, tel: 403-492-4776; fax: 403-492-5662; e-mail: stotosyagpu@srv.Ualberta.ca.
World Congres of Systems and Cybernetics <No. 39>	Aug. 26-31, 1996, Bucharest, Romania	Ecological University in Bucharest, 4-6 Dem I Dobrescu Street, 70119 Bucharest 1, Romania, tel: 40-1-6137468, fax: 40-1-6150326
1996 IEEE Int. Conference on Systems, Man and Cybernetics: 'Information, Intelligence and Systems' <No. 38>	Oct. 14-17, 1996 Beijing (China) <i>CfA: Jan 15, 1996</i> <i>FP: June 1, 1996</i>	Prof. Jian Chen, School of Economics and Management, Tsinghua Univ., Beijing 100084, China, tel. (8610) 2595876, fax: (8610) 2561532
EUROCAST '97: 6th Intern. Workshop on Computer Aided Systems Technology	Feb. 1997, Las Palmas de Gran Canaria	Prof. Roberto Morena-Diaz, CIICC, Universidad de Las Palmas d.GC, Spain tel: +34-2845-87-50, fax -85, e-mail: rmoreno@ciicc.ulpgc.es