

# NEWSLETTER

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## Editor-in-Chief: Gerhard Chroust

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### Dear Readers!

I am happy that my pledge for more articles has been fruitful! I have now in my files several good 'New Trend' articles which will appear in due course. Please keep me - and more so - the readers of our Newsletter informed of the latest trends, conferences and the like. This will enable me to provide you with another Newsletter in December. So let's keep the information flowing and make it a living basis for information exchange.

I would like to point out to you again, that the Newsletter is also available on IFSR's WWW-pages. The access is via http://www.sea.uni-linz.ac.at/ifsrl

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

## COMMITTEES OF THE IFSR

The Executive Committee of the IFSR has established the following committees:

- Strategic Program Design (Bela H. Banathy) long-term perspectives of the IFSR
- Research Committee (Michael C. Jackson) research projects
- Database (to be announced) printed and electronic repositories
- Publication Committee (Gerhard Chroust) coordination of publications
- Systems Education (Bela H. Banathy) education, learning, Fuschl meetings
- Funding development (Gerhard Chroust) contacts to potential sponsors
- Membership (to be announced) contacts to potential members
- Outreach (to be announced) relations with other organisations
- Distinguished Advisory Board (Robert Trappl) strategic advice

## **IFSR-STRATEGY**

## Executive Committee Meeting, Vienna

On Sept. 22 and 23, 1995, the Executive Committee (Bela H. Banaty, Michael Jackson and Gerhard Chroust) met in Vienna for their yearly meeting. The state and future of IFSR was intensively discussed and several important decisions made. In the next Newsletter you will find a detailed summary together with the implications on the future of IFSR.

- The major outcome was to make the structure of the IFSR much more dynamic. This will- involve the cooperation of both member organizations and their members to a much larger extent.
- The new structure will be based on the committee structure( see at the left).
- The Journal of Systems Research will be much more integrated into IFSR's life.
- Member organizations will be encouraged to cooperate more intensively with the IFSR.
- The member organizations will be challenged to actively structure the IFSR. To this aim there will be a *Strategy Meeting* on Saturday, April 13, 1996 (after the EMCSR-Conference) where we will determine and structure the future path for the IFSR.

#### IFSR wants Your contribution!

We would like to extend the Newsletter's function as a forum for information exchange. Therefore we ask you to send us short reports on relevant conferences, meetings, and announcements of conferences, as well as reviews of interesting books. You can reach us by mail, fax or e-mail. E-mail submissions are preferred! We promise a fairly short turn-around time!.

## **INFORMATION BASED DESIGN OF SOCIAL SYSTEMS**

**B. Antal Banathy** 

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

How should we go about designing social systems in the information age? Let me stimulate discussion with a metaphor that presents an unusual view of what a design should be, in informational terms. A design is an informational container in which life can organize itself. Our job as designers therefore is to build such informational containers.

These containers are woven from three different types of informational strands. The first must account for the system as it really exists; this strand is information-as-action, we will call it referential information. The second strand must convey some description of what the system is (or is to become); it takes the form of information-as-knowledge, we will call it non-referential information (Csanyi, 1989). The third strand can be used to lend stability, a-priori conditions (stateimpose to determination) on either or both of the previous aspects; it is a means of control, we will call it state-referential information (Banathy, 1995).

To get an (over-simplified but) intuitive understanding of the three information types, think of referential as experienced, nonreferential as observed, and state-referential as pre-planned information.

All three types of information come into play during the process of evolution. Csanyi, in his study of evolutionary processes, has found ample evidence suggesting that living systems evolve in a most dynamic and creative way.

Evolution takes place by continuous replication. Replication is shaped by a charter (functional information) that is influenced by non-referential information in the environment. The functional information specifies what the system must do in order to remain a viable part of the "bigger scheme of things", the larger systems in which it is contained. So, in order to secure a meaningful existence for itself, the system reaches-out for informational clues that guide its replication.

As replication takes place, the components of the system organize themselves in such a way that the functions (in the charter) are provided; given the capabilities of the components, and the conditions present in the environment. So, the (partly) non-referential information in the charter is reborn in the referential informational processes of the components. Only the purposes (functions), and not the details of the rebirth are specified in the charter. This leaves plenty of room for creative dynamics.

Nature's evolutionary pattern seems to be working in a way that makes both components and the environment to sources of change. How do we humans cope with such change? There is considerable evidence that at the earliest stages of human evolution symbolic objects were used to "control and guide" social behavior (Csanyi, 1989). Since that time we have been perfecting symbolic control. This is where statereferential information comes into play, culminating in the industrial-machine-age and its bureaucracies.

Unfortunately state-referential information cannot fully account for either non-referential or referential informational processes in living systems. Furthermore, non-referential information cannot fully account for referential informational processes (Rosen, 1991; Kampis, 1991; B. A. Banathy, 1996). The informational strands of the container in which life can organize itself have very specific "containment" relationships to each other.

We should not be surprised by Vickers' (1983) remark that "Stability, even more than change, demands to be explained, aspired to and regulated." If we try to hold living systems in purely state-referential containers, the creative dynamics will spill on the floor and create a complete mess. This is where we are today.

It seems to me that in social systems, "stability" lies in the creation (restoration) of competence in individual human beings, coupled with a relaxation of the "brakes" on natural evolutionary processes. The implication is that we should not force a system to become what we want it to be (not even a brand new one). We should allow it to evolve into what it can become. The difference is vast. In the first instance, our specifications form the upper limits of the system's behavior; this is the way we design computer based systems. In the second instance, our specifications serve as the foundation upon which the system designs itself - a privilege of being alive.

As designers we have three mandates, all relating to B. H. Banathy's (1989) notion of evolutionary guidance. First, we must ensure that functional information is (continually) articulated and accepted as the basis for social organization. Second, we must (continually) develop models that serve as guidance (templates) for organization. When appropriate, we should delegate the processes prescribed by these models to computer-based systems.

Finally, and most importantly, we must provide for healthy informational processes within organizations, where "health" hinges on nonreferential to referential transformations at all (sub)system boundaries. This is the type of transformation that knowledge workers of the future will be expected to do.

The design community of today has considerable competence in the first area. The second area draws benefit from both design and traditional scientific communities. The third area is related to the general human competence, with education.

Banathy, B. A. (1995). The 21st Century Janus: the Three Faces of Information. System Res., in print.

Banathy, B. A. (1996). Information Based Design of Social Systems. Behav. Science, in print.

Banathy, B. H. (1989). The design of Evolutionary Guidance Systems, Systems Research. 6. 289-295.

Csanyi, V. (1989). Evolutionary Systems and Society, London, Duke University Press.

Kampis, G. (1991). Self-modifying Systems in Biology and Cognitive Science, Oxford, Pergamon Press.

Rosen, R. (1991). Life Itself, New York, Columbia University Press.

Vickers. G. (1983). Human Systems are Different, London, Harper & Row Publishers.

## COMPUTER BASED LARGE SCALE SYSTEMS (CBLSS)

Alexander Tschobokdji Institute of System Sciences Kepler University Linz, Austria



Comparing systems of former times with actual, modern systems, one can see that the new generation of systems is getting bigger and more complex, making the development of those systems more and more

expensive. This new kind of systems requires a larger amount of knowledge regarding the different areas involved than was needed for former systems. The software developers of former days have become system engineers, who now have to face problems of adjacent areas such as project-management, quality management.

The development of such complex systems generates new kinds of requirements and implies new methods, process models and strategies. Problems, neglected so far, suddenly show up.

Looking at this kind of systems, a definition of CBLSS would additionally match two other kinds of similar systems: (i) complex systems, whose number of components is rather low though the internal connections are very complex and (ii) large systems, which have a big amount of components and mainly a simple kind of connections. The link between these kinds of systems can be seen in the following figure.



The term "computer based" refers to the fact that important functionality is based on computers (often up to 80%) and that this computer support is not isolated but an integral part of the system.

Methods supporting the development of CBLSS must be able to integrate different areas of knowledge within large systems. The resulting number of persons involved requires a method which can also be used in a global way: to cover a major part of the integrated specialties. To find such a method which is universally applicable and specializable and which also covers all kinds of complex systems, will remain unachievable. However, some global methods combined with specialized ones already exist. These integration tendencies can also be found in the tools used.

The development process resulting from the application of new methods and tools is in

general similar to known types of processes but differs considerably in important parts from the development of "normal" systems. Areas like documentation, information flow and security and safety of the system as well as the development process itself are of special importance. Unfortunately little support for these areas exists at the moment. This deficit arises from the lack of understanding of the problems arising from the changed development process on the assumption that CBLSS still can be developed like "normal" systems.

Nowadays CBLSS are getting more and more important within technical applications. This "new" kind of systems requires a "new" kind of view, development, thinking and a "new" kind of engineering discipline matching exactly the requirements and problems of large complex systems.

Thome B. (ed.): Systems Engineering - Principles and Practice of Computer-based Systems Engineering.-Wiley Chichester-New York 1993

Tschobokdji A., "Computer Based Large Scale Systems - Systemwissenschaftliche Erfordernisse für den Entwurf komplexer Systeme", Thesis, Kepler, Linz 1995

White S., et. al.: Systems Engineering of Computer-Based Systems.-IEEE Computer Nov. 1993, pp. 54-65

## **CONFERENCE REPORTS**

### EUROMICRO and ESPITI

## Sept. 7, 1995, Como (I)

ESPITI, the European Software Process Improvement Training Initiative is a Europe-wide effort sponsored by the European Commission. It aims at raising the awareness for high quality software by improving the 'software process', i.e. by improving the way software is developed.

The initiative concentrates on the software



production process and its improvement in all socalled 'software producing units'. The term includes software houses and departments within other organizations which produce software as a subsidiary product. This improvement has to be based on a clear definition of the process via a so-called 'process model'. At the same time it must be ensured that the defined process is provably followed and applied by everybody involved in the process. In the long run this leads to a certification of the software producing unit according to one of the certification models (e.g. ISO9000, BOOT-STRAP, TICKIT, CMM).

A key for ensuring conformance to the process is an automatic support/control of the process via a computer.

Under the ESPITI-program (lasting till May 1996) meetings, workshops and training courses will be conducted in all European countries.

For details contact Gerhard Chroust

#### **EUROCAST-95**

#### An Austro-Canarian Collaboration

4 months ago in Innsbruck (the capital of the Tyrol) an important event took place: EUROCAST 95, the 5th Int'l. Conference on Computer Aided Systems Technology. This conference series was started in February 1989 in Las Palmas de Gran Canaria. These conferences takes place every 2nd year, alternately in Las Palmas and in an Austrian City. The center of interest is located in Europe. EUROCAST can be considered as a prototype for an Austro-Canarian collaboration which brings together researchers from the European Community. This year Spain had the largest group of participants (36), followed by Germany and Austria. Further contributors came from Italy, France, Belgium, Great Britain, Sweden, Portugal, USA, Czech Republic, Poland, Venezuela and Ecuador.

Internationally renowned and outstanding scientists presented papers on Computer Aided

## **CONFERENCE ANNOUNCEMENTS**

For contacts, etc. see Calendar of Events.

**1996 IEEE Int. Conference on Systems, Man and Cybernetics** Information, Intelligence and Systems October 14-17,I996 Tsinghua University, Beijing, China

The conference will cover a large range of topics. For systems sciences the following of its topics seem to be of prime relevance:

Decision Technologies, Cognitive Systems and Engineering, Artificial Intelligence, Adaptive and Learning Systems, Knowledge-based Systems, Biocybernetics, Biomedical Engineering, Perturbation Analysis, International Stability, Environmental Systems, Socio-economical Systems.

### ECBS'96

## **IEEE Symposium and Workshop**

## 'Engineering of Computer Based Systems'

March 11-15, 1996 Friedrichshafen, Germany

The symposium is the ninth in a series of international meetings dedicated on formulating

Systems Technology, an important branch of applied computer science. CAST not only covers theoretical research but it also concerned with the construction of computer based systems in practice, such as checking of air pollution, control of robots, geographical information systems, image processing, (automatic) detection of failures in leather. chemotherapeutical protocols, diagnosis in medicine, simulation of nuclear power plants, scheduling of radio-taxis, designing of computer chips, and others.

The next conference (EUROCAST-97) will again be organized in Las Palmas by the Centro Internacional de Investigacion en Ciencias de la Computacion and the Faculty of Computer Science of the University of Las Palmas. Prof. Roberto Moreno-Diaz will be the general chairman, Prof. Franz Pichler, University Linz, will be the Programme Chairman.

Werner DePauli-Schimanovich

and advancing methodologies and techniques for the engineering of computer based systems (ECBS).

This emerging discipline is devoted to design, development, deployment, and analysis of complex systems comprising heterogeneous, distributed, software, hardware, communication, and other components. It aims at integrating systems engineering and engineering fields like software, electronics or communications into a total engineering discipline.

## **5th Bi-Annual Conference of the**

## International Society for the Empirical Study of Literature August 21-26, 1996

University of Alberta, Banff, Alberta, Canada

THEORY - The theory and epistemology of the Systemic and Empirical Study of Literature

METHODOLOGY - Development and justification of methods in the systemic and empirical study of literature

EMPIRICAL RESEARCH - Creative processes: reading, comprehension, memory, affective components and literature

## **NEWS FROM THE BOOK MARKET**

#### A Science of Generic Design John N. Warfield

This book demonstrates how large systems work in organizational or societal settings and how their performance might he improved with regard to explicit human objectives. This detailed text focuses on sociotechnical systems, in which qualitative factors (such as social mores and human values) weigh heavily on determinations of successful performance, rather than on technological systems susceptible to more conventional quantitative measures of performance. The techniques discussed here have been employed in the analysis of agricultural production systems, economic development programs, industrial corporations, and organized public-health efforts.

#### Chaos and the Evolving Ecological Universe Sally J. Goerner

The Gordon and Breach Publishing Group 1994 .272pp, ISBN 2-88124-635-4 . \$431 £281.

#### **The Evolving Mind**

Ben Goertzel 1993, 280pp The Gordon and Breach Publishing Group ISBN 2-88124-587-0 . \$351 £231

The Evolution of Cognitive Maps, New Paradigms for the 21st Century Ervin Laszlo, Ignazio Masulli (eds.) The Gordon and Breach Publishing Group, 1993, 288pp. ISBN 2-8812-4559-5 . 5751 £401

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from		from
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## FROM OUR MEMBER SOCIETIES

## Dr. HANEEF AKHTAR FATMI †

\* 3rd July 1933, † 4th April 1995

Haneef Fatmi was a man of exceptional and wide-spread intellectual talents. Born at Berusia, a small town in Bhopal State in 1933, he obtained his first degree in Electrical Engineering in 1951 at Karachi University. He subsequently studied with two Nobel Laureates at Imperial College London: Professor Denis Gabor FRS, the discoverer of holography and Professor Abdul Salem FRS, the theoretical physicist and cosmologist. His doctorial thesis was concerned with the physics of ionised gases.

He was also a barrister being a member of both Lincoln's Inn and the Inner Temple. His training as a lawyer and as a scientist endowed him with the necessary skills to succeed and bring enlightenment in novel and diverse areas peculiar to our present complex age. He often managed to do this with great wit and charm.

In addition, Dr. Fatmi was a linguistic scholar and having obtained a B.A. degree in Arabic Studies in 1985, was able to produce a new English translation of the Holy Qoran which was published before he died.

However, it was during his sojourn at the former Chelsea College at the University of London, that he both founded the Cybernetics Society (London), a registered friendly society, and inaugurated the University of London Master of Science course in cybernetics. These were no mean feats, as cybernetics requires an understanding of the functions of both 'information and control in the machine, animal, and human being'. This very ambitious undertaking did not fit conveniently into the faculty structure of any university.

The acceptance and subsequent success of the M.Sc. course was the result of his carefully prepared and defended proposals made to

several expert committees in the University. His various post masters degree and post doctoral students have also achieved great influence both occupying chairs in academia and by pursuing, for example, the engineering of optical fiber telecommunication systems.

Dr. Fatmi's wide interests in human culture, philosophy, and the structure of logic led to an intriguing series of letters to the journal Nature on the subject of intelligence in the intellectual sense rather than the security sense! He and his collaborator R.W. Young established a working definition of intelligence as "that faculty of mind by which order is perceived in a situation hitherto considered to be disordered": a definition quoted in the Oxford Companion to the Mind.

Haneef took a great interest in understanding and developing the works of the Russian mathematician A. Kolmogorov. In a most prophetic way he demonstrated aspects of Kolmogorov's work which predated the mathematical form of the current and highly successful neural network analysis.

In recent years he made a notable contribution within King's College London on the Strand, by organizing meetings addressed by Nobel Laureates and Fellows of the Royal Society on a wide variety of subjects within the cybernetics domain.

His untimely and unexpected death, after a short illness is particularly ironic, when in this post specialist age the ideals of the professional cybernetician are more in demand than ever. Dr. Fatmi's gift was a good sense of balance between justice, spiritual and philosophical knowledge and physical (scientific) knowledge.

Haneef is survived by his wife, daughter and two sons, daughter-in-law and grand children.

Brian Warburton

## IFSR goes WWW!

In the last few months 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/

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## WHAT'S NEW IN "SYSTEMS RESEARCH"?

The quarterly *Systems Research*, the official journal of the IFSR, is published by John Wiley and Sons. Papers for publication and subscription requests should be sent to:

Professor M.C. Jackson University of Humberside Cottingham Road Hull. HU6 7RT, United Kingdom tel: +44 1482 440550 Ext. 3720 fax: +44 1482 445715

#### Contents of vol. 12, no. 3 (September 1995):

- Expanding the Horizon of Information Systems Design, J.D.R. de Raadt
- Developing a Family Declaration of Interdependence: A Methology for Systems Design within a Small Social Unit, *Gordon Dyer*
- Systems Definitions and Derivation Based on Structural Data Flow Modelling, *Taher A. Razik and James W. Jacobs jr.*
- Only Connect! An Annotated Bibliography Reflecting the Breadth and Diversity of Systems Thinking, David C. Lane and Mike C. Jackson
- I As in Academy: Learning to be Systemic, Richard Bawden
- Combining Hard, Soft and Critical Methodologies in Systems Research: The Cultural Constraints, John Brocklesby and Stephen Cummings

#### Future volumes:

**Volume 12.4** is a special issue edited by Bela Banathy, on **Kenneth Boulding.** Kenneth Boulding, as well as being one of the pioneers of systems thinking, constantly sought to put his ideas into practice : most notably as a peace campaigner.

This special issue features a previously unpublished paper by Kenneth Boulding hImself, on 'Education in the World System': contributions from Banathy, Boulding, Churchman, Henderson and Hammond, and a full listing of Boulding's publications.

**Volume 13. 1** of Systems Research is expected to contain papers by Ackoff, Snow, and Leach, Tsouvalis and Checkland, Uphoff, and Warfield and Staley.



# Newsletter

## **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</no.>			
Groupware in Mechanical Engineering, ETCE-1996 <no. 38=""></no.>	Jan 28-Feb.2, 1996, Houston, TX, USA CfP: expired	P. Grünbacher, Kepler Univ. Linz, 4040 Linz, tel: +43 732 2468 867, e-mail: pg@sea.uni-linz.ac.at	
ECBS-96: Int'I IEEE Symposium and Workshop on Engineering of Computrer Based Systems	March 11-15, 1996, Friedrichshafen, Germany CfP: expired	Marcus Voss, Univ. of Karlsruhe, IMA, D- 76131 Karlsruhe, tel: +49 721 608-4378, email:mvoss@ira.uka.de, www: http://i50s19.ira.uka.de/ecbs96.html	
Int. Symposium and Workshop on Engineering of Computer Based Systems <no. 38=""></no.>	March 11-15, 1996 Friedrichshafen (D) <i>CfA: Oct. 15, 1995</i> <i>FP: Jan 15, 1996:</i>	G. Schweizer, Univ. Karlsruhe, IMA, Haid- und-Neu.Straße 7, D-76131 Karlsruhe, email: mvoss@ira.uka.de WWW: http://i50s19.ira.uka.de/ecbs96.html	
'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 CfP: expired	Marcelo Pakman tel: (413) 594-2211	
13th European Meeting on Cybernetics and Systems Research, Vienna <no. 37=""></no.>	Apr. 9-12, 1996, Vienna, Austria <i>CfP: Oct. 12, 1995,</i>	R. Trappl, Dept. of Med. Cybernetics & Al, 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:http://www.ai.univie.ac.at/emcsr/emcsr. html	
IFSR Strategic Meeting	April 13, 1996, morning, Vienna	open only to IFSR member societies! details to be announced	
Fuschl-Talks 1996 <no. 34=""></no.>	Apr. 14-19, 1996, Fuschl, Austria <i>CfA: May 15, 1995</i>	B. Banathy, 25781 Morse Dr., CARMEL, CA 93923, USA, email: belasr@aol.com	
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	
5th Bi-Annual Conference of the International Society for the Empirical Study of Literature <no. 38=""></no.>	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.	
1996 IEEE Int. Conference on Systems, Man and Cybernetics: 'Information, Intelligence and Systems <no. 38=""></no.>	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	