IFAC International Federation of Automatic Control

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Newsletter

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The Proper Use of Human Ability:
A CHALLENGE TO ENGINEERS

In May 1983 Professor H. H. Rosenbrock D. Sc., FRS (University of Manchester) addressed the International Research Symposium on „New Techniques and Ergonomics" in Valenciennes (France). What he said seems to be of great interest to the engineering community in general both with respect to the challenge and to the encouragement of his words. We have therefore asked and received his permission to publish this address in the IFAC Newsletter and we invite our readers to forward to us their comments.

If a stranger to our industrial civilisation were to see it for the first time, he would I think be struck by a number of things. The high average level of wealth that it makes available; but also the wide disparity in the distribution of wealth. The intense desire for greater wealth, and the lack of contentment with what we have. The immense potential for greater production that somehow we are unable to tap. And after a little acquaintance, he would I think be profoundly impressed by a contrast: between the care with which we ensure that all the potentialities of machines are brought into play, while the potentialities of human beings are neglected, if not rejected.

In talking of the "rejection" of human skill and ability, it may be thought that I exaggerate, but consider a sight which can be seen in any industrialised country. A stamping press is making parts from metal sheet, and is attended by an operator. Every few seconds, the operator picks up a piece of metal and puts it in the machine. The press operates, the part is ejected, and the operator puts in a new piece of metal.

Now at the present time it would be easy to find general-purpose robots which could do the operator's job. Yet any engineer who proposed to use a general-purpose robot in this way would no doubt be accused of extravagance. A robot has far greater versatility than is needed here, and much of its potential ability would be wasted. What has to be done is within the scope of a much simpler and cheaper machine, a pick-and-place device.

The contrast between our attitudes to machines and to people is striking. We should not habitually use a machine for tasks which are much beneath its ability, yet we habitually give to people jobs which involve an incomparably greater waste of ability.

It is no answer to say, as is sometimes said, that the advances of technology inevitably require the rejection of human skill. Technology is a human product, and it is human intentions that have given it the shape that it now has. These intentions were clearly and consciously expressed by F. W. Taylor in the well-known quotation from the "Art of cutting metals": "Under our system the workman is told minutely just what he is to do and now ne is to do it; and any improvement which he makes to the orders given to him is fatal to success."

If we accept this attitude, then in the future it will not only be the shop-floor worker who will be "told minutely just what he is to do". It will also be the office worker, and the workers in banks and shops, and also many workers who have had a professional standing: in design, in management, in some parts of medicine and legal work. And the "telling minutely" will be done not by people but by computer systems, linked together in communication networks, and running "artificial intelligence" programs into which human knowledge has been encapsulated.

Such a vision of the future must surely repel us, and there is no good reason why we should bring it to pass. It is not required by the technology that is becoming available. It does not make good use of the human and material resources that we possess. Yet if we wish to avoid it, we shall have to change the spirit in which we approach the design and development of new technology.

The change that is needed is a simple one. We must not regard human skill and ability as things to be rejected, and replaced by the machine. We must regard them as a precious resource that is to be fostered and made more productive by machines. We must not see machines as competing with people, to replace them, but as cooperating with people, to assist them.

The preservation and enhancement of human skill does not mean a backward-looking nostalgia for earlier skills. We have to admit that skills must change as technology changes. But this also implies that technology must allow space in which existing skills can be exercised and can evolve into the new skills that a new situation demands.

Is such a programme possible? I believe profoundly that it is, and if it were not I should no longer wish to be an engineer. Not only is it possible, but I believe that it offers better technological and economic solutions, as well as a better social and human future. It is, I suggest, the most important project that confronts technologists at the present time.

FORTHCOMING EVENTS

Title	1983	Place	Deadlines	Further Information
IFAC Workshop Design of Work in Automated Manufacturing Systems (with special reference to small and medium sized firms)	Nov. 7—9	Karlsruhe, FRG	—	Mr. H. Wiefels VDI/VDE GMR Postfach 1139 D-4000 Düsseldorf, FRG
IFAC Workshop Human Gait Analysis and Applications	Nov. 24—27	Montpellier, F	—	Prof. P. Rabischong Unité de Recherches Biomécaniques, INSERM 395, Avenue des Moulins F-34000 Montpellier, France

Title	1984	Place	Deadlines	Further Information
IFAC Workshop Systems Engineering Approaches in Control Engineering	March 26—28	Noord- wijkerhout, NL	October 15, 1983	H. Feikema Foundation for post-degree- education in control engineering Lorentzweg 1 NL 2628 CJ Delft, Netherlands
IMACS/IFAC Int'l Symposium Modelling and Simulation of Electrical Machines and Converters	May 17—18	Liège, B	—	Prof. H. Buysse Unité Courant Fort et Electrotechnique Université Catholique de Louvain Bâtiment Maxwell Place du Levant 3 B-1348 Louvain-la-Neuve, Belgium
6th INRIA/IFAC Int'l. Conference Analysis and Optimization of Systems	June 19—22	Nice, F	not yet known	Prof. A. Bensoussan INRIA Domaine de Voluceau B.P. 105 F-78153 Le Chesnay, France
9th WORLD CONGRESS **IFAC**	**JULY** **2—6**	**BUDAPEST,** **H**		Computer and Automation Institute Hungarian Academy of Sciences P. O. Box 63 H-1502 Budapest, Hungary

The most recent information received from the Congress Secretariat indicates that near to 1000 papers have been submitted. The International Programme Committee, meeting in Laxenburg on November 2 and 3, will have to select something like 550 papers for presentation in about 90 sessions. The next Newsletter issue will have more details.

Title		Place	Deadlines	Further Information
IASC/IFAC 6th Symposium on Computational Statistics COMPSTAT '84	August 27—31	Prague, CS	—	COMPSTAT '84 M. Novak General Computing Center Czechoslovak Academy of Sciences CS-182 07 Prague P.O. Box 5, CSSR
IFAC Workshop Reconfigurable Spacecraft Systems Autonomous and Non-Autonomous	Sept. 11—13	Cambridge MA, USA	not yet known	John W. Hursh Aircraft and Spacecraft Division The Charles Stark Draper Lab., Inc. 555 Technology Square Cambridge, MA 021389, USA

The forthcoming meeting of the Technical Board will consider and approve events scheduled for 1985 and further. The complete list will be included in the next issue of the Newsletter.

Workshop Reports:

12th IFAC/IFIP Workshop on Real-Time Programming

The Workshop was held on 29—31 March 1983 at the Balls Park Campus in Hertford of the Hatfield Polytechnic, UK.

It was attended by 37 people, with 11 coming from industry, 5 from research institutes and 21 from academic institutes. Only one research student attended.

The international programme committee selected fourteen papers for presentation at the Workshop, as shown below:

PROGRAMME:

Tuesday, 29 March

J. Chapman: A Database Administration Support Environment
J. Gorski: Testing and Reliability Issues in a Development of a Dedicated Real Time System
E. Crichton: Data-Base Management in a Distributed Process Control System
S. Savoysky: Data Bases in Civil Engineering Control and Research
B. Wiszniewski: A Man-machine Intercommunication Facility in Well-structured Concurrent Systems

Wednesday, 30 March

J. N. Magee: Dynamic System Configuration for Distributed Real-Time Systems
W. Epple: A System for Application Oriented Requirements Specifications
A. Lewis: IRTB — An Alternative to Real-Time Programming
G. Bull and R. Mitchell: Exception Handling Considered Harmful
S. Riviora: A Multiprocessor Implementation of Tasking Facilities in Ada
R. Mitchell and H. Robinson: Normalisation in Another Context.

Thursday, 31 March

J. Dubery: A Debugging Package for Modula
T. Tempelmeier: Monitoring of Real-Time Systems by a Separate Processor
E. J. Dowling: Some Tools and Methods for Real Time Software Validation

The papers presented fell into the following categories:

Programming support environments

The 3 papers covered the topics of application oriented requirements specifications, configuration control, and design description languages. The paper on requirements specification described the implementation of a system called SARS which provides the user with both a methodology for application oriented requirements specification and a set of tools to support the creation, modification and manipulation of a requirement specification. The paper on configuration control described a system called CONIC and how dynamic configuration control is achieved. The paper on design description languages described the approach taken with Industrial Real-Time Basic to the problem of designing and implementing complex, distributed real-time systems.

Testing real-time software

Five papers dealt with this subject; they covered a wide range of topics. The first was concerned with the importance of structure in producing testable and reliable software. The second paper was concerned with identifying principles relating to testing and reliability issues based on the practical experience gained in designing and implementing a Telex switching system. The third paper described the use of a separate computer to provide a monitoring system for measuring and tracing real-time software. The fourth paper described a set of tools and methods developed for testing real-time software within a Coral/Mascot environment. The final paper on testing described a set of debugging facilities incorporated into the language Modula.

Databases for real-time systems

The 5 papers again covered a wide range of aspects of the problem. The first paper identified and defined the facilities needed to enable a database administrator to organise and control the development and operational running of a database system. The second paper addressed the problems of database management in a distributed process control system and described an implementation of a large database with tens of thousands of values spread over thousands of processing elements. The third paper considered the diversity of types of information required in a real-time database and the set of functions required to manage and process these types. The fourth paper explored the role of data normalisation in a real-time database and gave examples of the use of normalisation and stressed the need for its use. The final paper on databases was not presented but described a database management system called PCDB.

Validation of real-time language translators

The three papers on languages only partly addressed the area of validation. The first criticised the current exception handling mechanisms provided by languages and proposed a general syntactic form which reduced the perceived problems. The second paper described an evaluation of the performance of the run-time support for task management in Ada. The third, which was not presented, described the implementation of multi-tasking and inter-task message passing for Industrial Real-Time Basic.

G. M. Bull
The Hatfield Polytechnic

Fourth IFAC Workshop on Applications of Nonlinear Programming to Optimization and Control

(June 20—21, 1983, San Francisco, California, USA)

The purpose of the Workshop was to exchange information on the applications of optimization and nonlinear programming techniques to real-life control problems, to investigate new ideas that arise from this exchange, and to look for advances in nonlinear programming which are useful in solving modern control problems. It was the Fourth Workshop on this subject with the first held in Denver, USA (1979), the second in Oberpfaffenhofen, Federal Republic of Germany (1980), and the third in Rocquencourt, France (1982).

With seventeen papers presented over the two days and approximately fifty attendees from many countries including England, Belgium, Germany, Italy, South Africa, Canada, and USA, this Workshop was considered a great success.

A number of papers treated various aspects of computer-aided-design of control systems using nonlinear programming. Specific applications included optimal design of a

structure for a satellite, identification of hovercraft characteristics, determination of optimal electricity generation, optimal automatic transmission for road vehicles, and time optimal cross country soaring.

The Workshop was held at the same hotel in San Francisco, and immediately preceding the three-day 1983 American Control Conference, so most of the attendees stayed to participate in the larger meeting. The Workshop benefited from the sponsorship of the Mathematics of Control Committee. Dr. Herbert E. Rauch (USA) was the Workshop organizer and Professor Arthur Bryson (USA) was Chairman of the International Program Committee with other members being Professors H. T. Banks (USA), Phillip Gill (USA), Faina M. Kirillova (USSR), R. W. H. Sargent (England), and J. P. Yvon (France).

Pergamon Press is planning to publish the Workshop Proceedings.

Herbert E. RAUCH
Palo Alto, USA

IFAC congratulates

J. H. Westcott F.R.S.

IFAC takes great pleasure in announcing that Professor John H. Westcott, who for many years has served IFAC in various capacities — at present as member of the Policy Committee — has been elected Fellow of the Royal Society. Congratulations and best wishes are herewith extended on behalf of the IFAC family.

NEW PUBLICATIONS

Systems Research

Announcing a New Pergamon Journal

The Official Journal of
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for Systems Research

Editor-in Chief: J. N. Warfield,
Center for Interactive Management,
Thornton Hall, University of Virginia,
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Systems Approach to Appropriate Technology Transfer

Proceedings of the IFAC Symposium, Wien,
Austria, 21—23 March 1983

Edited by P. FLEISSNER, Österreichische
Akademie der Wissenschaften, Wien, Austria.

Presents and discusses major recent advance-
ments in the field. Major areas covered in-
clude technology transfer in selected fields,
flexible manufacturing systems, energy
technologies, information and communica-
tion, economic, social and educational
aspects. Contains 33 papers. Of interest to
systems and computer scientists, techno-
logists and control engineers.

206pp   US $50.00   £27.00

Pergamon Press
Headington Hill Hall, Oxford, OX3 OBW U.K.
Fairview Park, Elmsford, New York 10523 USA.

Contribution of IFAC to the Transfer of Automatic Control and Systems Engineering Technology

Readers may recall that under the above title
"a proposal drafted on behalf of EDCOM and
DECOM by M. Cuénod and M. Schaufel-
berger" was published in IFAC Newsletter
No. 4, July 1982.

Consequently the authors have received a
number of comments and inquiries, con-
firming the necessity to promote the ex-
change and circulation not only of informa-
tion and knowledge in the field of Automatic
Control and Systems Engineering, but also of
scientists or engineers on a worldwide scale.

The following points were raised in particular:
1. The exchange of visiting professors
2. The possibility to attend training courses
   abroad
3. The possibility to present a paper at an
   IFAC conference.

North-Holland Announces:

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As a follow-up to such communications in
one case personal contacts have been estab-
lished between members of two institutions
which, it is hoped, will lead to certain activities
in the near future. Other inquiries were
answered by letters forwarding the necessary
information.
To give this information a wider distribution
on a more general level, Dr. Cuénod has
asked us to advise people who wish to contact
specialists in any specified area of automatic
control and systems engineering, to approach
the chairman of the particular TC or the
related NMO directly. He also wishes to
emphasize that the attendance at IFAC events
always provides good opportunities to meet
people and to establish personal contacts.
Apart from that both Dr. Cuénod and Prof.
Schaufelberger will be pleased to give advice
and support wherever asked to do so.

WHO IS WHO IN IFAC
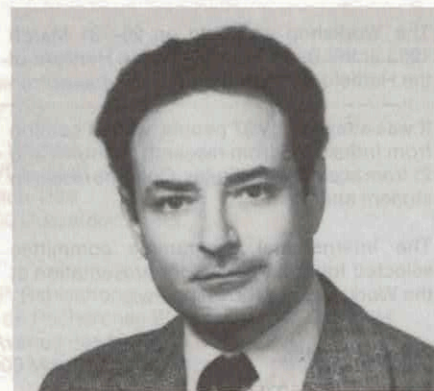
Professor Janos Gertler
Chairman IFAC Policy Committee
Chairman IPC for Congress '84

Born to Hungarian parents in Vienna, Janos
Gertler was educated in Hungary. He
received his Diploma Engineer degree in
Electrical Engineering from the Budapest
Technical University in 1959, his Candidate
of Science (Ph. D.) and Doctor of Science
degrees, in 1967 and 1980, both in Control
Engineering, from the Hungarian Academy
of Sciences.

He worked for several years at the Power
Systems Research Institute in Budapest as a
research associate, later he was assistant
professor at the Budapest Technical Uni-
versity, Chair of Automation. In 1967 he
joined the Institute for Computing and
Automation, Hungarian Academy of Sciences,
where he served as Deputy Director of the
institute between 1971 and 1981. Since
January 1982, on leave from the Hungarian
Academy of Sciences, he has been teaching
and conducting research at Case Western
Reserve University, Cleveland, USA, as
Visiting Professor of Systems Engineering.

His research interests concern different
aspects of computer control of industrial
processes, including statistical filtering and
identification, software and structural aspects
of real-time computer systems. He has
published 80 papers and research reports on
these subjects.

Professor Gertler has been serving IFAC in
many different capacities. He was the first
chairman of the Technical Committee on
Computers from 1972 to 1975. Then he served
as vice-chairman of the Policy Committee
between 1975 and 1981 and as chairman of
the same since 1981. He is a member of the
IFAC-Pergamon Publications Managing
Board and of the Editorial Board of Auto-
matica. As a member of the Constitution
Committee, he played a major role in the
formulation of the new IFAC Constitution.

Since 1971 when he was organizer of the IFAC
Symposium on Digital Simulation of Con-
tinuous Processes, he has been involved with
a large number of IFAC technical meetings.
He served as chairman of the International
Program Committee for the first SOCOCO
Symposium and as IPC member for several
conferences, symposia and workshops. He
was on the IPC-s of 4 IFAC Congresses, last
time as vice-chairman. At present, he is chair-
man of the International Program Committee
for the 1984 Budapest World Congress.