

Lecture Notes in Computer Science

Edited by G. Goos and J. Hartmanis

65

Information Systems Methodology

Proceedings, Venice 1978

Edited by G. Bracchi and P. C. Lockemann



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Proceedings, 2nd Conference of the
European Cooperation in Informatics,
Venice, October 10–12, 1978

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EDITORS' PREFACE

In the last decade a new and flourishing activity has developed within organizations: the design and operation of computer-assisted information systems.

The nature of information systems tasks and the large numbers of individuals involved in them create challenging problems for computer specialists, administrators and management personnel.

As in all evolving disciplines, information system analysts and designers debate the question of their profession as an art or a science. We strongly believe that the area of information systems has passed beyond the stage of an art: from modest beginnings as an empirical art in the Sixties, the area has developed into a broadly based, highly interdisciplinary science and technology that draws on the resources of many diverse fields, ranging from informatics through engineering, economics and the behavioral sciences. The development of larger and larger information systems has stimulated new research activities, it has forced the application areas to a more precise analysis of their own needs and institutions, and their social and economic impact has led to the beginnings of legislative control.

The ultimate goal of all these efforts is to provide a set of generally accepted, widely applicable methods and techniques to specify the information needs, predict the effects of computer-based information systems, design them, analyze their operational effectiveness and evaluate them within the context of an organization. A wealth of methods and tools has already been developed or has been adapted from other areas in informatics and from other fields. However, results about information system methodologies are presently widely scattered in various journals and conference proceedings. This fragmentation produces difficulties in communication among interested persons and in integration of interdisciplinary experiences.

The second conference of the European Cooperation in Informatics on 'Information Systems Methodology' that was held in Venice, October 10-12, 1978, has brought together for the first time a wide range of information system experts, from theoreticians through system analysts and designers to users, from the academic world through manufacturers to industry and government.

This book contains the papers selected for the conference, covering subjects such as information system planning, analysis of user needs, specification tools, data modelling, software systems development, implementation and simulation techniques, parallel processes, man-machine interface, operation and evaluation of information systems, relationships among information systems, information technology, organizations and the society.

Elsewhere the reader will find the names of the Program Committee members and the Organizing Committee members, who fulfilled their role with admirable dedication. In selecting the papers to be presented at the conference, the program committee had the help of many wellknown specialists and we wish to thank all of them for their contributions. Considerable support and encouragement were provided by the ECI board.

We also want to thank the sponsors, supporters and cooperating societies who made this conference possible:

Association Française pour la Cybernétique,
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We hope that this book will be useful to the information systems community at large.

Giampio Bracchi

Peter Lockemann

October 1978

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CONTENTS

Information System Planning and Analysis

B. Langefors	
Analysis of user needs.	
(invited paper)	1
J. Hawgood, F. Land, E. Mumford	
A participative approach to forward planning and system change.	39
C. Ciborra, G. Gasbarri, P.C. Maggiolini	
A participative approach to systems analysis: an action research in the local government.	62
F. Kolf, H.-J. Oppelland, D. Seibt, N. Szyperski	
Tools for handling human and organizational problems of computer-based information systems.	82
N.L. Richards	
Organising for common systems.	120

Information Systems and Organization

E. Mumford	
Values, technology and work.	
(invited paper)	142
M. Ricciardi	
A framework for the analysis of the relationship between business organization evolution and business information systems evolution.	160
J.-P. De Blasis	
Information systems management through office automation: an organizational and social perspective.	171

Analysis and Design Tools

S. Krakowiak

Methods and tools for information systems design.
(invited paper)

193

W. Bartussek, D.L. Parnas

Using assertions about traces to write abstract
specifications for software modules.

211

P. Ancilotti, M. Boari, N. Lijtmaer

Protection in languages for real time programming.

237

P. Aanstad, T. Johansen, G. Skylstad, A. Sølvsberg

An experiment in computer aided information systems
development.

249

C. Delobel, E. Pichat

The design of relational information system according
to different kinds of dependencies.

266

Data Modelling

R. Stamper

Aspects of data semantics: names, species and
complex physical objects.

291

A. Flory, J. Kouloumdjian

A model for the description of the information system
dynamics.

307

M. Adiba

Modelling approach for distributed data bases.

319

Software Systems Development

H.D. Mills

Software system development.
(invited paper, not included)

M. Demuyne, P. Moulin, S. Vinson	
Portability of the programs using a data base management system.	342
K. Sauter, W. Weingarten, J. Klonk, P.L. Reichertz	
A multi-level approach for data description and management of a large hierarchical database supporting a hospital patient information system.	367
A. Endres, W. Glatthaar	
A complementary approach to program analysis and testing.	380
F. Lesh	
Organizing the sequencing of processes.	402
J.M. Triance	
A macro facility for COBOL.	420

Implementation and Simulation Techniques

H.-J. Schek	
The reference string indexing method.	432
D. Kropp, H. Wrobel	
Working set size reduction by restructuring APL workspaces.	460
M. Badel, J. Leroudier	
Optimal multiprogramming: principles and implementation.	474
S. Baragli, S. Valvo	
A simulation model for a loop architecture distributed computer system.	504

Parallel Processes

W. Cellary	
Scheduling dependent tasks from an infinite stream in systems with nonpreemptible resources.	521
R. Słowiński	
Scheduling preemptible tasks on unrelated processors with additional resources to minimize schedule length.	536

M. Di Manzo, A.L. Frisiani, G. Olimpo
Deadlock avoidance in graph-structured task systems. 548

P.R. Torrigiani
Synchronic aspects of data types: construction of
a non-algorithmic solution of the banker's problem. 560

Impact of Technology

W.K. Liebmann
The impact of technology on information system.
(invited paper) 584

Man-Machine Interface

W.A. Potas
Interactive systems as if users really mattered. 618

P.A.V. Hall
Man-computer dialogues for many levels of competence. 631

P.A.V. Hall, I.A. Hussein
Design of information systems for Arabic. 643

System Use

G.P. Learmonth, A.G. Merten
Operation and evolution of organizational information systems.
(invited paper) 664

V.P. Lane, F.G. Wright
Human resources systematically applied to ensure
computer security. 684

List of authors 696

ANALYSIS OF USER NEEDS

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1. The Problem

The design of information systems, IS, presents challenging problems to the computer specialists or IS designers. They are also aware of this and are eager to meet this challenge. Consequently computer people are anxious to have the clients or users specify their requirements for the system as soon as possible. They do not expect the clients to present their needs in very precise terms and, hence, they try to interpret the requirements into "computer language". In doing so the computer people formulate their conceptions of the requirements according to their own ideas of the solutions.

Unfortunately, the computer people are not aware of the fact that to specify the requirements for the IS is at least equally difficult as to design the IS. Indeed computer system specialists tend to ignore the fact that the IS is just a subsystem of a larger system which it is to serve. This ignorance is serious. To develop the specifications for the IS means to design the main structure of the System of which IS is but a component. And the System is not a data processing system, it is a living organization containing people and different subsystems only few of which are data systems. It follows that the System design task is not a task of computer specialists.

It is quite some time since the recognition of the analysis of user needs - and of the System needs - as an explicit project activity was beginning to attract the attention of some researchers. One and a half decade ago I wrote [Langefors 1963-1]:

"...great risks for a system to grow up, that will process large masses of data which are not used for decisions - and yet ignore important data - ...

What is sorely needed in this area is a systematic ... technique for establishing the real needs for information within an organization. Thus it has to define the information needed, its volume,

the time intervals at which it is required, and that at which it is available, the data from which it can be produced, and the process - or alternative processes - needed for its production and the form for presentation of the results ...

An analysis of an information system must therefore, in the first place, be hardware independent. It has to provide an abstract definition of the system itself."

Likewise, a decade ago, Ackoff pointed out the need for more careful analysis of the user needs and for systematic approaches [Ackoff 1967]. Ackoff also pointed out the problem of collecting and processing masses of data which are not used:

"It seems to me they suffer more from an overabundance of irrelevant information."

Also Ackoff emphasized the fact that crucial questions may be asked by people who know the organization but do not know much about computers:

"The recommendation was that the system be redesigned as quickly as possible...

The questions asked of the system had been obvious and simple ones. Managers should have been able to ask them but - and this is the point - they felt themselves incompetent to do so. They would not have allowed a handoperated system to get so far out of their control."

Main Problems

Some Basic Problems

- . Who are the users?
- . Who does the analysis?
- . Why are systems not made use of?
- . Which system, what problem, opportunity, or need?
- . How combine overview, comprehension, user meaningfulness with concreteness and precision in details, in design documentation?

User Needs

- . Needs for better organization, management, job design
- . Organizational change, learning & development
- . Needs for information, information service, computeraided data handling
- . Social and personal needs

Problems with the information

- . Relevance of information, for whom?
- . Who are able to share the same data?
- . How make sure the data provide the right information?
- . Information for Everybody - what design implications?
- . Information administration and data administration?

Who are the users?

Often when we talk about the users we have in mind all those who are affected by the system in some way, without having a designer's interests in the system. This is, for instance, quite reasonable in cases where the main question is about dominance of the experts or when one is concerned with other user/designer controversies. But the people affected are of many distinct kinds and are affected in distinct ways, often in ways such that the term "user" appears quite inadequate. Therefore, to study "user needs" or effects of systems upon people it is important to identify either the distinct kinds of affected people or the distinct ways people are affected. The latter way has several advantages and can be pursued by listing distinct roles vis-à-vis the information systems. Then any person or work group can be analyzed into what roles he or it plays and to what extent.

Some roles are

- . System sponsors - people who initiate and finance systems projects, because they estimate this is in the interest of the organization, regardless of whether or not they will be serviced directly by the system. Corporate management and the concerned line manager are in this role

but any employee may be too, depending on the power structure at work.

- . Information consumers - people who are aided in their work, decision-making or operating activities, by being serviced with information.
- . Information suppliers - those who have to provide information to the system.
- . System operators - those who have to manipulate the equipment, for instance interact with the systems on terminals.
- . Other employed people - who are affected by the functioning of the system, for example workers whose work is scheduled by the system.
- . Other affected people - who are not employees of the organization owning the system, for instance citizens vis-à-vis a computerized taxation system.

It is important to recognize that one person may simultaneously have several of these roles. Thus a manager may operate a terminal to feed in data for a decision model and receive results at the terminal. He is then an information consumer and supplier and is also, part time, a system operator. He may also be one of the system sponsors. It is also important that the needs of these distinct roles are distinct.

Normally an IS is developed for the purpose of supporting information consumers. People in the other roles are, typically, affected by the system not because they wanted to use the system - being no information consumers - but because it is required as part of their job in order that the system will work. It is natural, though unfortunate, that the needs of these people have attracted less interest. It is unfortunate because if the system was not designed with the purpose of serving them in their job, their jobs may become most affected. However, more recently the needs of these people have begun to be taken seriously into consideration.

Because many people are affected in the distinct roles they have, the effects on all the non-information consumer roles are complex and not yet well understood. It is not only how the system affects these people but also how they will experience these effects in the long run that must be clarified. Nevertheless these problems do not seem to be essentially distinct from other job design problems and it seems likely that there will, fairly soon, be a reasonable knowledge among system architects - and among the people themselves - how to handle these user needs.

The needs of the information consumers, though they have been investigated more early, appear to be the most problematic ones and they are likely to challenge us as researchers still for a long time. Because they are also the central problems of any IS design, they will be given the main focus in this presentation. Also, remember that I am talking of roles, not of persons, and any user, or affected person, may perhaps improve his situation through becoming also an information consumer. If so he will also profit from any advances we make in determining the needs of information consumers.

Who does the analysis?

Traditionally, computer programmers have expected the users to specify their needs. When this did not work system analysts entered the scene. In this way we had two kinds of specialists: the computer specialists - programmers and computer system analysts on the one hand and management scientists on the other hand. Often the same person tried to be all these three experts. The specified needs became more a reflection of what these experts believed to know about users' needs, perhaps after quick interviewing, than they reflected the real needs. Somewhat later, around 1965, it became common to have user representatives as members of the project teams. They were supposed to know the user needs. It turned out that the "system analysts", though often recruited from the user lines and trained by the computer manufacturer, behaved more as a kind of computer system experts than as real analysts of user needs. Their documentation was not understood by the users. As a consequence, the user did not know what the system would be doing and be requiring until the system was implemented.