

Reihe: Telekommunikation @ Mediendienste · Band 6

Herausgegeben von Norbert Szyperski, Udo Winand, Dietrich Seibt, Rainer Kuhlen
und Rudolf Pospischil

Martin Engelen/Jens Homann (Hrsg.)

Virtuelle Organisation und Neue Medien

Workshop GeNeMe99
Gemeinschaften in Neuen Medien

TU Dresden, 28./29.10.1999



JOSEF EUL VERLAG
Lohmar · Köln

Reihe: Telekommunikation @ Mediendienste · Band 6

Herausgegeben von Prof. Dr. Dr. h. c. Norbert Szyperski, Köln, Prof. Dr. Udo Winand, Kassel, Prof. Dr. Dietrich Seibt, Köln, Prof. Dr. Rainer Kuhlen, Konstanz, und Dr. Rudolf Pospischil, Brüssel

PD Dr.-Ing. habil. Martin Engelen
Dipl.-Inform. (FH) Jens Homann (Hrsg.)

Virtuelle Organisation und Neue Medien

Workshop GeNeMe99
Gemeinschaften in Neuen Medien

TU Dresden, 28./29.10.1999



JOSEF EUL VERLAG
Lohmar · Köln

Die Deutsche Bibliothek – CIP-Einheitsaufnahme

GeNeMe <1999 Dresden> :

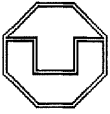
GeNeMe 99 : Gemeinschaften in neuen Medien ; Dresden, 28./29.10.1999, an der Fakultät Informatik der Technischen Universität Dresden / Technische Universität Dresden, Fakultät Informatik, Institut für Informationssysteme, Forschungsgruppe "Entwurfsmethoden und Werkzeuge für Anwendungssysteme". Martin Engeliien ; Jens Homann (Hrsg.). – Lohmar ; Köln : Eul, 1999

(Reihe: Telekommunikation @ Mediendienste ; Bd. 6)
ISBN 3-89012-710-X

© 1999

Josef Eul Verlag GmbH
Brandsberg 6
53797 Lohmar
Tel.: 0 22 05 / 91 08 91
Fax: 0 22 05 / 91 08 92
<http://www.eul-verlag.de>
eul.verlag.gmbh@t-online.de
Alle Rechte vorbehalten
Printed in Germany
Druck: Rosch-Buch, Scheßlitz

**Gedruckt auf säurefreiem, 100% chlorfrei gebleichtem,
alterungsbeständigem Papier nach DIN 6738**



Technische Universität Dresden

Fakultät Informatik • Institut für Informationssysteme

Forschungsgruppe „Entwurfsmethoden und Werkzeuge für Anwendungssysteme“

PD Dr.-Ing. habil. Martin Engelen
Dipl.-Inform. (FH) Jens Homann
(Hrsg.)

Dresden, 28./29.10.1999

GENEME99

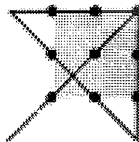
Gemeinschaften in Neuen Medien



*Workshop zu Organisation, Kooperation und Kommunikation
auf der Basis innovativer Technologien*

Forum für den Dialog zwischen Wissenschaft und Praxis

an der
Fakultät Informatik der Technischen Universität Dresden



Gefördert von der Klaus Tschira Stiftung,
gemeinnützige Gesellschaft mit beschränkter Haftung

sowie unter Mitwirkung der
GI-Regionalgruppe Dresden

am 28./29.10.1999
in Dresden

F. Fachübergreifende Aspekte

F.1. Information Systems for Managing Second Order Dynamics of Organizations

Dr. F. Wierda

Multimedia Skills, Niederlande

Introduction

From the point of view of information technology the past decade can be designated the “decade of ERP”. A global movement of implementing integrated systems for optimising the fulfilment of orders has dominated both investments from large and medium corporations and the focus of research and educational institutions. The results of these implementations sometimes have been dramatic: Significant improvements of throughput time, and at the same time clear decreases in inventory. Organisations have become like machines. Interesting material – though not in all aspects consistent - on the improvement of productivity is collected in (Potthof, 1998). Unfortunately, and strangely enough, only little research has been done in the consequences of ERP systems on the flexibility and adaptability of organisations.

In the same period organisational theorists and management gurus have worked on what they call the theory and practice of organisational change. In order to fulfil the requirements of an ever more dynamic environment organisations must continuously *reinvent themselves*. There is clear evidence that a thorough implementation of an ERP system *hard-wires* all processes and procedures in the organisation, thus making adaptation very difficult and very expensive. Actually the world of information systems has not been able to come up with a concept for supporting organisational change, and has contributed a fair amount to actually *decreasing* the flexibility of organisations.

In this paper the outline of the characteristics of information systems is presented, that truly supports organisational change, including the change in processes, information systems, portfolio, people, etc., without pushing the claim that information technology is, or can be, a panacea for securing adaptability of organisations. The “Change Agent” project at Multimedia Skills is a search for functionality that actually works. The vision and model behind the project are outlined in this article. Some of the functionality is actually being used and tested now, some other is under development, and developing

we will continue to do, to find true support for organisational performance in a dynamic world of today and tomorrow.

Some Views on Organisational Change

In his monumental work on flexible firms, Henk Volberda (Volberda, 1998) distinguishes three main approaches on flexibility: The general approach, the functional and the actor approach. In the general approach flexibility is defined by global, and often not sharply defined concepts like adaptability and preparedness. Volberda admits the general approach to have some intuitive appeal, but being too abstract to be of real prescriptive value. The functional approach reduces the concept of flexibility to certain – isolated -aspects of the organisation such as flexible contracts, flexible financing and flexible production automation. Several authors have shown that this kind of “impeccable micro-logic may create macro-nonsense” (Van de Ven, 1986). The third, the actor approach, concentrates on stakeholders in an organisation developing flexibility. It states that in order to create a flexible firm one needs flexible people. Research has shown, though, that there neither exists such a personality as the flexible one, and secondly that personality traits are not as determinant in developing flexibility as several managerial and structural characteristics. Volberda then proposes what he calls the *strategic approach* to flexibility, in which change and structure are combined for developing successful companies.

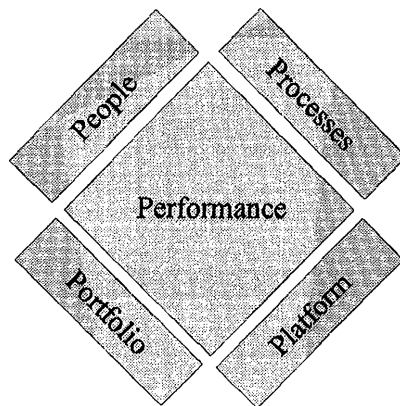
Interestingly enough a natural tension can be found in all approaches on organisational change between flexibility and adaptability on the one hand, and structure on the other. The flexibility is needed to be able to adapt to changes in the environment, whereas the structure needs to be stable enough to use the new situation for better performance. This tension between structure and change requires a particular type of management, and this type of management needs information systems that are not available in the market today, and that are not even on the ‘radar screen’ of the IT-gurus.

In this paper we do not want to take position in the debate on the determinants of flexibility of organisations. We *do* state, though, that flexibility is necessary for adapting, at the right time, in the right way, to all the changes that the environment of the organisation undergoes. Actually there is evidence for the existence of elements from all of the four approaches. In this paper we develop an approach of trial-and-error, along the lines of the mantra: *Empirical testing reveals what works!* (Schaffer et al., 1996). This approach is also in line with the conclusions derived in (Currie, 1999), who states that a broader historical and socio-economic perspective is needed to be able to

evaluate both the merits and demerits of management innovation and change panaceas as a whole. Only what works is good enough for us. Any claim for clear-cut organisational change processes is misleading, and should be distrusted. Modesty is the way to go!

A second line of reasoning we wish to use is along the concept of business modularity. The idea is not new, actually it can be understood as applying object orientation to business objects, including processes and product and service modules. The concept of modularity and its use in developing flexible, yet productive organisations, is thoroughly discussed in (Hoogeweegen, 1997). The use of Modular Network Design for developing customer oriented organisations is briefly discussed in (Wierda, 1999).

The diverse dimensions of organisational flexibility can be summarised in the illustration shown below. In the following paragraphs we will address each of the dimensions for securing organisational adaptability, as determinants for organisational performance and organisational success.



Platform: Side Effects of Information Systems implementations

Before we start developing an information systems concept for supporting organisational adaptability, let us take a brief look at the influence of current IS on organisational change. One of the main reasons for the much-discussed Year 2000 problem (Y2k) is that our information systems have a much longer life span than we ever dreamt of. Cores of code of information systems that originate from the mid-seventies are no exception. The reason for this is that once we have a working (sound would be too ambitious) IS-support for our business processes a fortune has been

invested in the infrastructure, and the organisation probably has gone through something like an ordeal. The main message from management is then, understandably: "*don't touch it again!*"

The same emotion is strong in organisations that have implemented large ERP-systems, irrespective of the brand of the system. Implementation projects are known to be, and have been, very laborious and very expensive. Often the business was directly and negatively impacted. Processes had to be adapted to the software, with great impact on procedures, skill sets and even layouts of factories and inventories. Once the ERP-machine rolls, it rolls fast (we do not want to focus on the disasters due to over-selling and over-expectations). But who will have the courage to start a large change program after two to five years of blood, sweat and tears? This explains, why large integrated systems, like ERP systems, tend to freeze the processes in an organisation. Understandable, but not good in a dynamic business environment as we know it today.

What is then the contribution of current ERP-systems to the success of organisations? Wayne Gretzky, the famous Canadian hockey-player, answered the question why he was so good with the words: "I always skate to where the *puck is going to be*, not where it is....". Maybe with our current information systems we are perfecting for skating *where the puck is right now*, but when we get there we are surprised it is not there anymore. This does not mean we can, or should, do without the merits of the current ERP-systems. It just means that we will have to add the capability to change the organisation constantly without losing our fulfilment capability. How can we overcome this trap?

Current Concepts for Supporting Organisational Change with Information Technology

It would be incorrect to state that the current IS-community does not work on organisational flexibility. One of the hot issues in organisational flexibility is "organisational learning" (Argyris, 1978; Senge, 1990; Nonaka, 1995). A closer look at these concepts, and the actual information technologies that were developed on top of these, shows that they focus on one of the following aspects: (organisational) learning, knowledge management, co-operation, or on problem-solving. These technologies have been implemented in many large organisations, and there have been varying reports on success. With no exception the existing technologies for supporting organisational flexibility are supposed to support one, maybe a few, of the dimensions, or conditions for creating flexibility. The background is often a strong theory on "the ONE

determinant for success". Most empirical research shows, however, that there is not ONE determinant for success, and a factor that may be very influential today may play no role tomorrow.

So we need more. Probably and preferably using technologies that already exist. But using those methods and technologies in a mode that truly supports management to adapt to the changing environment and at the same time remain capable to deliver. We need to support the dimensions People, Processes, Portfolio and interestingly enough Platform itself to create an adaptive organisation. What does this enhanced type of information system, or platform, look like?

Platform: Information Systems for Supporting Second Order Dynamics

Before we start building the elements of our "Change Agent" information system we have to make a statement about our vision on dynamics. Dynamics, especially in an organisational context, is only weakly understood. And second order dynamics even less so. Our claim is to develop IS-support for *only* the second order dynamics. We realise that further research may develop the concept of third order dynamics, a series that in theory has no end (an idea that must be sympathetic to business people and scholars alike). But in this paper we do not argue beyond the already misty horizon of second order dynamics: The processes that change the current way of realising value as an organisation.

Building on the considerations above we are interested in support for the following issues:

- Monitoring and warning of (relevant) change in the environment: "Read the Tea Leaves". A typical technology that aims at monitoring the environment is Business Intelligence. Other systems are marketing information systems, combined with sophisticated analysis tools and models. In our model we will concentrate on communication with the customers to look forward with the customer, and plainly ask the customer what he expects to be buying in the coming weeks, months and years.
- Monitoring and warning of deteriorating adaptability of the organisation: For this a clear (and evolving) model is required of the dimensions that determine, or that

indicate, adaptability, along the dimensions painted in the figure above. Some of the indicators are:

- People: Openness of communication, speed of decision making, alignment of communications and actions;
- Portfolio: Percentage of business with new products, number of projects, functions, processes, products etc. that were stopped;
- Process: Number of defence mechanisms, age of business processes;
- Platform: Actual use of transactions, percentage of budget used for maintenance, etc. etc.

For each business and each organisation there will be different indicators, which need very close monitoring, and which need regular critical evaluation (that would be an example of third order dynamics).

- Stimulating the use of all ideas, experience and problem solving capabilities in the organisation, using Group Decision Technology, Knowledge Management Technology and Distributed Co-operation Technology. Especially in the software industry, but also in other sectors these technologies are used to drain every piece of brain from the organisation, and use it for generating high performance. A good example can be found in (Muller, 1999). But the technology and the method are generally used in an isolated way. There are special sessions to be creative, and then we have to go on with our normal work again. The idea is to *embed* the methodology in all daily work processes.
- Measuring all activities on computers and communication devices, in order to be able to derive models of success. This is necessary for a real trial-and-error approach for developing business processes and supporting information systems. The same technology that is currently being used for analysing sales databases can be used to analyse the working behaviour of the staff of an organisation (in this paper we will not discuss the privacy issues that this approach implies). Especially when using web-technology for supporting transactions, every transaction generates a string of characteristics of that transaction. These data usually disappear into oblivion, but can be extensively used for understanding why certain schemes do not work. The key message is thus: *Measure, measure, and measure!*
- Analysing all data on the organisation and its environment to discover possible patterns that need explanation (this explanation, and combining them with actions, imply human interference!) and have the potential of generating improvements for

the business. The technology is available (data mining), but the intelligent use has been rare until now.

A side effect of implementing and using an information system that concentrates so heavily on supporting change is that the staff in that organisation will accept the fact that the high performance fulfilment processes of today will be changed again and again. They will accept that the skills that are required are in the realm of continuous change, and not of being the best in doing the same process forever. Change thus becomes a normal phenomenon, change becomes the job, and the responsibility, of each and every person in the organisation.

In the "Change Agent" project the technologies briefly mentioned above are being used to concentrate on developing IT-support for a change model that runs from the environment of the organisation (the customers in particular), via the portfolio to the fulfilment processes. These dimensions will now subsequently be discussed.

Customer Process Management

Actually, in our view and according to our observations, all processes of successful corporations are, or can be derived from, customer processes. Customer processes are processes that are organised to be executed together with the customer, and creating a clear value for that customer. We see a tendency toward co-operative product development, and toward co-makship. Exactly these tendencies we try to integrate in our proposal for adaptive organisations, and the information systems they need. But let us first concentrate on the customer processes in the traditional sense of the words: Sales Activity Management, Account Management, Account Planning; other processes can be added, like Customer Service, Call Centre, and Sales Marketing.

Just count the number of articles and books on organisational change, that start with the assertion that change is necessary because the acceleration in development of demand from the market. It is the market, the customers, who decide that we must change. Of course the increase in competition for the preference of the customers is the other side of the same issue. The information systems world has recognised this move to the customer, and the customer processes in developing software for Client Relationship Management (CRM), Sales Force Automation (SFA), and whatever the products are called. This movement is in line with our claims, in so far as it actually tries to bring the client, the market, "into the system".

No longer is 'the customer' regarded as being exterior to the organisational system, but part of it. *Together* with the customer products and services are being developed and delivered that make the customer more successful in his or her business, or more successful in fulfilling their prime needs. The customer process is more than just a database with name, address and what has been bought in the past, it is joining forces to go the next step, to go the *extra step*. The focus in client processes will be to identify the needs of the customer to be successful in his or her environment. This requires a coalition of working together for that success. It requires what Vervest et al. (1999) call "outside-in thinking".

One of these next steps is to work on the portfolio of tomorrow in a newly structured way.

Portfolio Process Management

Due to the increasing speed of change in the market the lifetime of products and services decreases continually, with the limit going to the durability of the single instance of a product. The process of securing both the development of new products and new product families on the one hand, and the elimination of obsolete products on the other hand is one that requires huge amounts of information and intense communication among the different processes inside and outside the organisation. Current successes are often the result of extreme commitment of staff, partly, though, through luck. A systematic support of managing the life cycle of products, and managing the portfolio as a whole is dramatically needed. In some industries up to 7 generations of products are developed at the same time. This pro-active development process requires very sound understanding of the developments in the market, understanding of developments in technology and insight into the direction that the competition chooses. The organisation must be capable of standing continuously on its toes, not loosing too much time over celebrating successes: The next battle for the preference of the customer is being fought already.

This roundabout of innovation, which allows for no pause, requires a different type of supporting information systems than we find in current ERP systems. We need structural monitoring of the environment, both market and technology. We need systematic gathering of ideas, screening of ideas and designs, development, change and destruction of business plans, and communication and joint design with customers. Not the database with parts, but the database with ideas, in all its complexity, and with all its hyperlinks, and through its entire life cycle is what is needed here.

The decreased lifespan of products, and the increased customisation will lead, at the same time, to ever smaller fulfilment batches, which puts high pressure on the costs of the fulfilment apparatus. See here the basis for frequent resistance of “factory people” against customer oriented business. The fear that the requirements of the customer will lead to a destruction of the economies of scale that had been developed over many years.

This situation, the situation of the so-called mass-customisation, is the basis for the development of a new type of transaction process design and management.

Transaction Process Management

Through a modularization of products (and services) a practical implementation of the concept of one-to-one marketing and mass-customisation can be realised. This is a bold statement, for which little evidence is available. Nevertheless the concept is clear and both in the field of organisation theory and in the field of business the direction finds an increasing crowd of supporters. Easily said, how can we practically realise modular fulfilment processes (we speak of fulfilment processes rather than production, as we intend to imply the services industry in our claims). And what does this mean for the information systems supporting the fulfilment processes? What will be the steering processes? And what will be the measurements that are needed for these steering processes?

We are entering a terrain here with plenty of complexity and vagueness. Think about concepts like virtual organisations, chain management, outsourcing, insourcing and the like. There are many ways to construct fulfilment systems, and the examples of ad hoc fulfilment systems are increasing in number. Coming up with a clear-cut solution, or proposal, to act in this complex environment takes us too far. But still we can present some elements of a modular fulfilment environment that are being implemented and used today.

In Hoogeweegen (1997) a method is developed for designing and evaluating modular fulfilment chains. This work, which concentrates on e-commerce, i.e. on the so-called external organisation, is applicable to any set of fulfilment modules, as long as they are set up in an independent way. The good thing is that only a limited number of fulfilment modules allow for innumerable variants of a product and innumerable variants of a

fulfilment chain. The complex part of this way of organising fulfilment is to manage the process. Here is where our information systems are needed.

The concept of *the 'Warroom'* monitors the fulfilment process of the current orders (first order dynamics), and at the same time monitors the adaptation of the organisational processes based on changes in the environment of the organisation (second order dynamics) (see e.g. Sharker et.al., 1998). Not only the status and exceptions of the internal processes, but the monitoring of the entire fulfilment chain, including signals of changing customer needs are monitored, and a range of pre-defined actions is available to react on different patterns of information. Some interesting examples that close in on this concept of warroom are available today in the transportation world (mostly still internally focussed) and in the logistics world. Central to the concept is that the modular world is a loosely coupled world, in which interfaces have to be managed, and coalitions have to be forged. This activity, necessary to be successful in a dynamic world, requires information systems specially designed for supporting this kind of second order dynamics.

Next question: Is this fantasy, nice for a conference, and back to the real world issues tomorrow. No, this is real world, and is being worked on today.

Real World Solutions for Real World Problems

We will briefly present some examples of organisations that are currently working on developments of their information systems and their information management exactly to support the adaptability for the new environment. Non of the examples below is ready, and they will not be so for the near time to come. But they have chosen the direction discussed in this paper.

A large European postal organisation started to discover the customer. Having been a state monopoly, they were forced to invest heavily in building the interface with the customer ("What are customers?"), and discovered that those customers often needed different services than the standard palette. Heavy debate was the result. Especially so, because a huge efficiency project had just swept through the factories, killing off what potential for flexibility there was until then. In order to bring light in this situation, two movements were started: One to boost the product innovation process, using the inputs of key-customers. The second movement was – and is currently under way – to change the fulfilment processes in such a way, that for each large customer tailor-made services can be delivered without disturbing the economies of scale. This approach requires a

warroom, in which the entire added value chain is monitored, and which initiated correcting measures if needed. The effort is big and difficult, and “political” battles are all over the place. But the direction is clear, and each little success enforces the project.

A large European telecom operator changes its processes for product management. Two bottlenecks are identified: How do we know the customers *really* want what we are developing? And how do we overcome the sheer impossibility to implement the business processes that are internally needed to get the new products in the market? The first step that was taken is to start a large, and expensive, thrust towards listening to the customers. The cultural change that is needed for this is dramatic. Very often improved customer processes are translated into “better talking to the customer”, instead of “better listening”. A next step will have to be to make implementation of new products easy. The change that is necessary for this is dramatic, the investments will span a period of many years. But without the change, the company will belong to the laggards, fit for take-over.

A mid-sized European energy-supplier was confronted with the market liberalisation, and started a project of implementing account management. As soon as the company listened structurally to the customer, it became clear that the large customers, good for well over 70% of the turnover, and for a larger share of the profit, demanded services and contracts that differed from those supplied by the company. Much effort was put in the portfolio management process. How do we configure services, and how will we be able to deliver these services? Current fulfilment has great difficulty with this way of working. A next step will be to change the fulfilment processes into real modularity, so that the services that bring real added value to the customers can be configured together with that customer, at competitive pricing and high quality.

The examples above concentrate on the business processes that would need information system support. In these examples that support is still extremely thin (see Icking, 1999; Slikkeveer, 1999). The last example concentrates on what the platform-side of the organisation does to support flexibility. A large European electronics producer experiences growth rates of up to 100% yearly. This requires all business processes to be in the *fast lane*. Marketing and Sales are extremely successful, as is product development. Modularity in product development is a strong conviction. The information management function in the company was not able to keep up with the speed of the rest of the organisation, and especially the issue of the contribution of information management to the *value* of the business was hard, if not impossible to

answer. A change project was initiated to concentrate all activities of information management on customer value. This leads currently to the development and implementation of procedures and systems that actually support the dimensions described above in a structural way, and to monitoring variables that are critical for the organisation to evaluate their position in the market today and tomorrow.

Further Development

The “Change Agent” project at Multimedia Skills, a European consultancy organisation, focuses on developing and evaluation the use of information technology for improving performance at the point of customer contact. Organisations need to move to where the business is *tomorrow*. Through a trial-and-error approach, “measure what you do, keep what is successful”, organisations are made fit for continuous change. Change to what is necessary tomorrow. Looking at the life cycle of a product, we know that there is a price bonus on early entry. That is what we are aiming for. Not as an incident, but as a structure.

In the near future we will report on the results of individual elements from the “Change Agent” project.

References

- Argyris, C. & D. Schön, *Organisational Learning*, Addison-Wesley, Reading, Mass., 1978.
- Currie, W.L., Management Innovation and Change Panaceas: Strategic Vision or Tunnel Vision? In: *Proceedings 7th European Conference on Information Systems, Copenhagen*, June 23 – 25 1999, 184 – 99.
- Hoogeweegen, M.R., *Modular Network Design: Assessing the Impact of EDI*, Rotterdam School of Management, Rotterdam, 1997.
- Icking, M.A.T., *ICT-ondersteuning van Productmanagement*, Groningen, 1999 (Masters thesis).
- Muller, P.C. *Team-Based Conceptualization of New Products: Creating shared realities using information technological support*, Groningen, 1999.
- Nonaka, I. & H. Takeuchi, *The Knowledge-Creating Company*, New York, Oxford University Press, 1995.
- Pothof, I., Empirische Studien zum Wirtschaftlichen Erfolg der Informationsverarbeitung. In: *Wirtschaftsinformatik*, 40/1 (1998), 54 – 65.
- Ramackers, G.J. & A.A. Verrijn-Stuart, First and Second Order Dynamics in Information Systems. In: H.G. Sol & K.M. van Hee (eds.), *Dynamic Modelling of Information Systems*, Amsterdam, North-Holland, 1991.
- Schaffer, R.H. & H.A. Thomson, Successful Change Programs Begin with Results. In: *Harvard Business Review on Change*, Harvard Business School Press, 1998.
- Senge, P., *The Fifth Discipline: The Art and Practice of the Learning Organisation*, Doubleday, New York, 1990.
- Slikkeveer, L.H.J., *Ontwerp van een analysemethode die inzicht geeft in de kwaliteit van ICT-ondersteuning voor accountmanagement*, Delft, 1999 (masters thesis).
- Van de Ven, A.H., Central Problems in the Management of Innovation, *Management Science*, 32/5: 590 – 607.
- Vervest, P. & A. Dunn, *How to Win the Customer in the Digital World? Total Action - Fatal Inaction*, Amersfoort, 1999.
- Volberda, H.W., *Building the Flexible Firm. How to Remain Competitive*, Oxford University Press, Oxford, 1998.
- Wierda, F.W., Unforeseen Consequences of Customer Oriented Redesign of Organisations: The Weakest Link Moves On, *European Journal of Engineering for Information Society Applications*, 1/3, May 1999.

