

Strategies for balancing the Competence-gap

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Abstract

Information Systems are invading our lives and our society with a more and more accelerating speed, but a lot of systems do not fulfill the expectations focused on them. Many times the needs for rationality motivate investments in sophisticated technical solutions, developed by experts, without any consideration to the people that are going to use them. This situation leads to a gap between the existing and the required competence of individuals being part of the information systems.

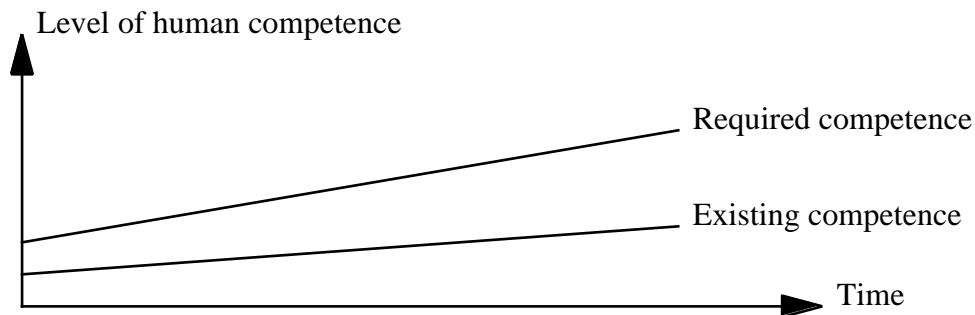


Figure 1: Gap between existing and required human competence

The more sophisticated technical systems we get, the more serious are the requirements for human competence to use them. This report discusses some aspects causing the competence-gap. and strategies to balance it, with a special focus on human issues in system development and implementation processes.

Introduction

Very often, computerized information systems are only conceived as being economic resources. According to my opinion, this conventional point of view is the main hinder to mobilize human energies in productive and innovative applications of information technology. With the challenges we have to face today through the increasing use of computerized information systems the question is, how far these conventional approaches are still

convenient. It is therefore important to enlarge the existing economist-toolbox by adding strategies to help the "victims" of new systems, i.e. the people, to get more involved in the development and implementation processes that concern them.

The individuals being part of the information systems have to be conceived as critical factors for the successful development of the whole organisation. This has to be seen as a very important contribution to the development of a corporate identity and the mobilization of positive energies not only in organisations acting in the field of tourism, but in any kind of institution.

The purpose of this paper is to provide some answers to a few critical questions associated with the competence gap created by the accelerated investments in information technology, namely:

- Which factors are responsible for the competence-gap?
- Which strategies can be used to balance it in a successful way?
- How can system analysts and organizational members contribute to the success of system development processes?

According to my opinion, these questions gain high priority in the debate on information technology due to the fact that it influences all areas of our society. Information technology provides many opportunities for the development of enterprise systems. It can - if used in an appropriate way - increase a company's competitive-power, improve working-life, reduce production- and coordination-costs etc. Alvin Toffler (9) points out that information technology has to be considered as being a necessary and important factor in all areas of our society.

An aspect that has not been considered with the same intensity as technology itself is the human competence required to employ technology. The fact is, that information systems should not be decoupled from the other elements of the organisation, especially the individuals.

The development of information systems, organisation, technology and human competence must be seen as an inseparable critical process. Any attempt to isolate them from each other may result in most undesirable consequences.

Which factors cause the competence-gap?

Almost all kind of organisations have implemented information technology - at an increasing pace - during the last years. The expected results such as increased productivity, cost-reduction, improved decision-making and an enhanced ability to respond to environmental changes etc.

depend on the ability and motivation of the people using information technology in their daily activities (3). Looking at the results of current research, one may conclude, that information systems and information technology often fail to satisfy the expectations mentioned above. A study of 2,000 US companies revealed that about 40% of the implemented systems did not achieve the expected results (11). It is important to point out that more than 90% of the failures were related to low human competence as well as organizational complexity. E. Levinson summarizes:

”While the 1960s were the era of hardware failures, and the 1970s of software deficiencies, the issues for system failure in the 1980s have become organizational and managerial.”(12)

For achieving success in information system implementation a large number of aspects concerning individuals have to be taken care of, as there are user-training and -support, job-design and -specification, performance-measuring and issues like health and ergonomics (2). Current research proves, that human issues do not receive the attention they deserve. As a matter of fact, a lot of system development is still performed without user participation. Some of the arguments for excluding them are:

- Users do not know what they want.
- Users will use the systems being provided with anyway.
- Users are no system experts, so leave them outside the development process.

This points of view, still very common among system specialists has in many organisations led to a situation, that the human competence is not regarded as a critical success factor neither for the development of new systems nor for the reorganization of existing ones. This causes the problem that the individuals competence is not developed towards the new technological opportunities. That depends on the fact, that either organizational members seldom are involved in system development processes at a stage that allows them to achieve real influence or they do not get a chance to get involved at all. Their real role was most often restricted to react on problems emerging after the implementation.

Often the technical specialists have to take all the blame for the negative consequences. Even the organizational members themselves are not totally innocent due to the fact that their attempts to be involved in system development were not hard enough. The management of organisations has to take its part of the responsibility as well, because they have been

delegating the critical decisions concerning system development and implementation to technical specialists. The main argument for this form of delegation is based on the belief that the systems to be developed have a technical nature more than a social.

According to my opinion, an appropriate strategy for design and implementation of information systems must be based on the active development of human competence and abilities as well as on the adaption of the technological possibilities to human skills and limitations. Thereby we can improve both the quality of life and the realization of a company's expectations.

Konosuke Matsushita of the Matsushita Corporation has been critical to the traditional approaches on system development and implementation and states that:

"The intelligence of a handful of technocrats ... is no longer enough to take up (the new technological and economic) challenges with a real chance of success." (2)

Which strategies can be used to balance the gap successfully?

I have found that there are three strategies which can be used in order to obtain a successful balance between required and existing human competence. These are:

- Standard-strategies to adapt individuals to the systems requirements.
- System-strategies aiming to decrease the complexity of the information systems.
- System-strategies aiming to increase organizational capacities to manage the issues of information.

It is important to point out, that the strategies above should not be used totally independent from each other. Instead I propose that the most appropriate way for achieving a successful system development and implementation process is to provide an adequate combination between them.



Figure 2: Strategies for balancing the competence-gap

Standard strategies to adapt individuals to systems requirements

The standard strategies, mainly developed during the 1960s and 1970s, were aimed at adapting the individuals to the systems requirements because the systems themselves were conceived as static elements. The standard strategies includes aspects like recruitment, changes in the categories of work and their structure, education and skills training as well as standardization of work and technology. In order to use the capabilities of a system in the best possible way, several types of training and education have to be used.

Today this education is often restricted to the so called "type A"-learning (13), which means that the system users are educated only in the technical use of the systems. The need of knowledge about the relation between technology, organisation and individuals is frequently neglected. The education and training concerns all categories of organizational members such as managers, supervisors and clerical workers.

The elaboration of these standard strategies may be solve a number of competence-problems, but not all of them. There will always be a lot of new questions which may be seen unanswerable. For instance, introducing information technology in organisation increases the complexity of tasks, diffuses responsibilities and increases the amount of social conflicts. None of these issues can be managed in a satisfying way by traditional approaches.

Another critical issue is that the roles and tasks of organizational members may change dramatically. The belief that only training and education increases motivation and innovation is

not true. Therefore these changes will always lead to undesirable consequences. Some of the critical questions are:

- Why should technology influence the roles and tasks of individuals?
- How can individuals with their limitations face the accelerating technical developments?
- Who decides the form, function and content of training?

These, and other questions are posed and a lot of research will have to be done and a lot of failures will be made before these questions are answered. It may even be doubted if it will ever be possible to answer them. I have found, that traditional strategies concerning the issues of human competence are limited in their application and therefore they must be completed with system-related strategies.

System strategies to balance the competence-gap

System strategies do not conceive information systems as static. Instead they are conceived as flexible and aiming to support an ever changing human environment. System strategies are based on a few critical assumptions concerning the interdependencies between the human activity system and the information systems. Human activity systems and information systems are mutually dependent from each other. Therefore their development can not be considered in isolation. Changes in human activity systems must be followed in the information systems and changes in information systems must be followed by changes in the human activity systems. There is no way to avoid this mutual dependency, but with help of system strategies we can balance the effects of changes.

System strategies to decrease information systems complexity

The first kind of systems strategies aims to decrease the complexity of information systems. This can be obtained by the following actions:

- Choose the appropriate system architecture.
- Increase the infological validity.
- Consider the issues of information economics.

System architecture

The architecture of information systems has to be chosen from a perspective that integrates individuals, organisation, information and the technology used in this context. The system

architecture will support the balance of individual autonomy and the needs for coordinated action. The information system architecture must provide a harmonious integration among systems in order to support cooperation and to satisfy individual needs at the same time.

Infological validity

The information systems designed to support individual needs must be characterized by a high degree of infological validity. Issues of consistency, completeness, relevance, information load, presentation forms, etc must be defined in terms that correspond to the cognitive capacities of individuals. This means that information systems should be designed with respect to local languages, working styles, world views and norms. The implementation of infological validity presumes an appropriate system architecture, the right level of autonomy and the differentiation of information support.

Information economics

Information economics reflects the needs for differentiation of information in global respectively local information (16). Not all information is relevant to the needs of cooperation and coordination of human activities. According to current research 80% of the information flowing within an organisation is of local nature. Only a few percent of the rest is conceived as valuable for the cooperation of human activities and must be globalized. This means that a well designed information system must provide "the correct information at the right place at the right time in the right form and amount". I call this the informations "just in time concept".

System strategies to increase organizational capacities

The actions mentioned above can decrease the complexity of information systems by adapting them to individual and collective needs. But these actions can only provide a limited effect. Therefore organisations must be designed in a way that improves their capacities to handle the issues information. The following actions aim to provide some directions toward this objectives.

- Ensure perspectivity.
- Provide appropriate level of autonomy.
- Obtain workability.

Perspectivity

Organisations are incomprehensible systems. The ever changing organizational environment, the technologies employed in production and administration, the heterogeneous needs of markets, the differentiated interests of organizational members as well as the size of organisations are typical factors reflecting the incomprehensibility of organizations. In order to provide a base for management one must reduce the organizational incomprehensibility. Systems thinking may be seen as a proper strategy in this direction if it is based on a human perspective. This means that areas of responsibility as well as decisions taken within these areas must in correspondence to the cognitive capacities of individuals.

Furthermore, perspectivity means a better understanding of how information and information systems are related to human work. Systems thinking provides an adequate platform firstly to develop information systems that support local needs without losing the overall perspective on cooperation and coordination of human actions and secondly to design organisations capable to manage the usage of information.

Autonomy

Usually comprehensibility presumes a high level of autonomy. Otherwise the bureaucratic hierarchy can hinder the effects of systems thinking. Delays, information overload, social conflicts and competition, as well as misunderstanding can be conceived as consequences of mismatching between system structure and management philosophy.

With a high level of autonomy individuals are even responsible for the development, implementation and use of their own systems. In this sense, the systems under concern are designed to satisfy the individual needs. This ensures that the system implementation can not fail because of a large motivation potential of people to improve their working environment, efficiency and effectiveness.

Workability

While autonomy is a necessary factor to mobilize individuals within an organisation, workability reflects the needs for a harmonious cooperation between individuals. Workability is based on firstly mutual agreement on the objectives to be achieved by cooperation as well as on the role of the information systems and information systems architecture within this context. Secondly, workability implies reciprocity. In other words mutual contributions to the expectations of the involved participants. Workability is the result a political process including negotiations and compromises in order to establish a common image of reality.

Struggling with Developmental Cohesion

Developmental cohesion reflects the need to conceive organisations, their information systems, the people working in them as well as the technologies employed as an indivisible system. The expression of this need can be seen as a paradigm for the development of organizations in the 1990s. Developmental cohesion means, that the development of information systems always has to be integrated and coordinated with the development of organisations as well as with the development of individuals cognitive capacities.

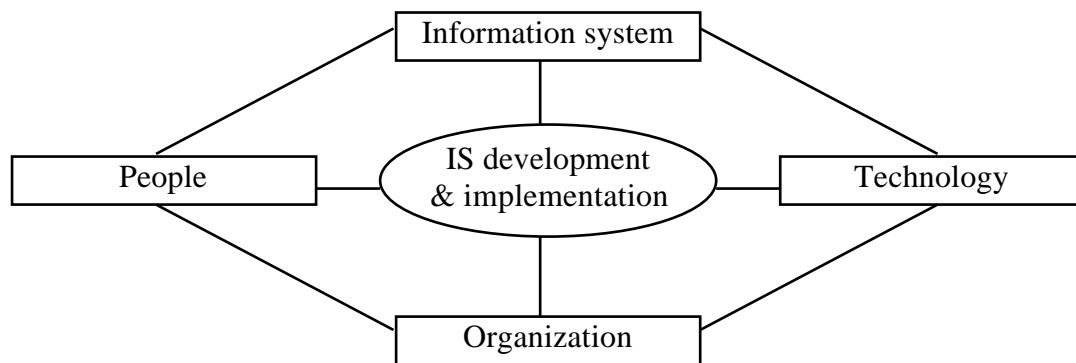


Figure 3: Developmental cohesion

Futhermore, developmental cohesion means that these processes are controlled by those who are responsible for the enterprise activities. Any form of delegation to experts implies risks, conflicts and Mis-information systems. By this way, individuals are motivated to improve their competence in order to be in control of the changes that influences the success of their enterprises.

The Role of Organizational Members

Organizational members can influence the developmental cohesion in three different ways. These are:

- Reactive
- Supportive
- Proactive

When playing a reactive role organizational members get involved at a very late stage, after the implementation is completed. That restricts them to react on emerging problems like dissatisfaction and low performance rates.

The effects of such a delay may be given in terms of personal conflicts, increased personnel turnover, complaints etc. All these factors reflect a low developmental cohesion which can be given by inappropriate implementation procedures and organizational policies. Changes in organisations, people, technology and information systems are often treated in an "ad hoc" manner, resulting in inefficiency, ineffectiveness and inhuman working environments.

In the supportive role the organizational members get involved in the development process. It is expected that they create alternative scenarios about possible problems related to the implementation and how these problems may be solved. This may include the design of training programs, support in the solution of social conflicts and development of new policies for competence development. In such an environment it is expected that developmental cohesion has a moderate level.

The proactive role of organizational members is doubtless the most demanding and successful one. They are expected to be involved in the development process at the earliest stage and will thereby be able to point out and avoid potential problems from the very beginning. Their goal is to improve their working environment. This is done by designing an "ideal system", that is far from potential social problems and threats. This environment is expected to mobilize both the technical and the non-technical resources in a cooperative and successful process for satisfying mutual expectations. In this sense it is expected that development cohesion has a high value.

The role of the system analysts of the future

The most important point is, that the system analysts of the future have to learn how to manage the issues related to the developmental cohesion of organisations. This means that he or she must learn to think in system terms in order to understand the interdependencies between information systems and human activity systems. Information systems are designed to support human activities. But the effectiveness and efficiency of this support depends the competence and the cognitive capacities of the organizational members to manage the issues of information.

According to my opinion, the acceptance of such a framework implies critical changes in the work structure of system specialists. The future expects a closer cooperation between organizational members and system analysts, system developers, system operators etc.

Furthermore it is expected that the system analyst of the future is able choose appropriate methods in order satisfy the analytical needs of developmental cohesion. This means that current methodologies are limited and inappropriate to satisfy the future requirements of organizational analysis, architectural analysis, system analysis aso.

Lastly, system analysts of the future must be able to support both the strategical and operational environments of an organisation. In the first case it is expected that scenarios or strategies are developed. These strategies refer to all factors involved in my conception of developmental cohesion. In the second case the analyst must be able to support the needs of local or individual working environments. The potentials of information technology can be utilized for the successful achievements of human expectations.

Conclusions

The main message of this study is based on my opinion, that the traditional approaches for improving human competence have a limited effect because of the nature and complexity of organisations. This complexity increases with an accelerating pace with the introduction of information technology in working environments. I have proposed a systems thinking framework aimed to supply an suitable platform for understanding the mutual dependencies between organisation, information systems, technology and human competence. Furthermore i have discussed three different strategies for struggling with the issues of balancing and harmonizing the gap between required and existing human competence.

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