

## Information Systems Development – Some Highlights from Infology

*“Open up the systems and let the people in!”*

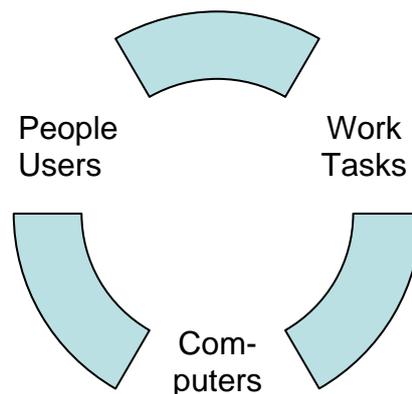
This would be the lodestar for building up a new subject of Information Systems in the middle of the 60ies in Sweden. Professor Börje Langefors is well recognised for the establishing of Information Systems as an academic discipline – at the first university department of its kind in the world! The approach is well-known as “Infology” (Langefors, 1995). The infological approach is based on the observation that the end users should have real control of the development of information systems in their organisations. This line of systems thinking is indicated by the loadstar above.

*“We need systemeering before programming or in other words Think first – Act then!”*

This would be the lodestar for the Scandinavian school of information systems development that emerged from Langefors infological approach. ‘Systemeering’ was at the time being a newly invented Swedish word for ‘systems engineering’ – explained as the definition of requirement specifications of the user’s information needs for managing business operations in companies. Systemeering was a solid modelling work (“Think first”) as a platform for a reality based programming (“Act then”) from an end user perspective. A first step to a systematic approach for information systems development was taken!

*“Developing information systems – people, computers and work tasks in concert!”*

This would be the lodestar for succeeding in the “Art” of information systems development. Information Systems as an academic discipline has from the beginning emphasised its nature as a “relationship” subject trying to integrate knowledge from computer science (computers and information technology), behavioural science (people and learning), and business administration (work tasks in organisations). The mission is to investigate how people or users develop IT solutions to support and improve work tasks in their social life. There is a strong interplay between people, computers and work tasks. See figure 1.



**Figure 1.** Information Systems as a relationship subject.

DSV has as an academic institution a good reputation for starting up pioneering research on models and methods for information systems development (ISD) in organisations. My percep-

tion of information systems development can in this case be described in different ways. I will try to highlight some milestones in the evaluation of the ISD field which originates from the infological approach. This will be done as some changeovers during the years in a “From ... to ...” notion.

### **From Efficiency Focus to Usability Focus**

From the beginning systems development had a flavour of *efficiency focus* in organisations. In this early stage the focus was on automating certain business operations – to do things right, faster and cheaper with systems support. The primary use of information systems was to increase the efficiency of different functions or activities in organisations, e.g. by automating jobs that earlier were carried out manually. This way of working could lead to “information islands” more or less isolated from each others. The infological approach was advancing this kind of problem to the “surface”! Business people or end users often think in terms of work flows or core processes for achieving expected results. Therefore integration of information systems always has been a key issue. The infological approach promotes that bridges are being built between “information islands” in organisations.

The academic discipline of Information Systems has broadened up the perspective for systems development. Since the mid 90ies the development work is regarded more as a “design for usability” in the words of Professor Pelle Ehn. The target for a *usability focus* is to design information systems in a wider context as a tool or artifact for carrying out work practices in organisations. The art of information systems development is here full of nuances comprising functional, technical, economical, aesthetical, ethical, knowledgeable, psychological as well as physiological considerations. This is a more complex task than only to take care of administrative rationalization in organisations. The information systems should be usable for multiple purposes and also fulfilling conflicting demands from various interest groups.

### **From User Orientation to Stakeholder Orientation**

From the infological approach we have learnt the lesson to proceed from user needs, demands and requirements during the development process. The simple argument is that there are the end users who in their daily work should live with the new information systems. They have the best knowledge of the business operations for creating effective systems solutions. The principle of *user orientation* goes back to the theory of infology that states the significance of designing and operating information systems from a user point of view in order to achieve desired results in organisations.

Development work in organisations can be seen as a social field of forces between different interest groups or stakeholders. There usually exist communication gaps or misunderstandings when people from various interest groups try to deal with information systems development. Therefore it is important to find constructive ways to bridge the communication gaps between key actors such as general managers, business people and systems experts during the development process. One way to achieve this is to highlight and illuminate the needs and demands from all stakeholders’ points of view. A future trend with a *stakeholder orientation* is a more general principle for change work in organisations and in this sense includes the former ways of user orientation for information systems development.

## From Data Systems to Enterprise Systems

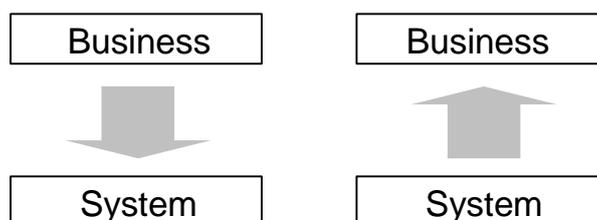
The infological approach for ISD work was focused on designing a set of well-specified *data systems* each supporting a certain type of business process in companies. These systems were interacting in a business context and the system interfaces are therefore important to outline and specify. The data systems could be implemented by tailor-made solutions, ready-made software or object oriented architectures. A productivity or cost-reducing motive lies behind the development work.

*Enterprise systems* or ERP-systems are a recent trend since the mid 90ies with the aim of offering companies mega-based systems for their business operations. By enterprise systems we refer to large standard application packages that fully cover the provision of information required in a company. An important criterion is that the included parts or data systems are closely integrated with each other through a central database. A possible strategy for a company is to acquire best-of-breed solutions through selecting the most excellent parts from different vendors of enterprise systems on the market. An integration or coupling motive lies behind the development work with enterprise systems.

## From Information Support to Business Enablers

The infological approach has traditionally focused on designing systems in order to give *information support* to various business operations in companies. These systems are regarded as resources and are embedded in the organisations. Starting with the needs of the users, a business process specification is made which provides both content-based and structural requirements on the information systems. An information system is not an end in itself but rather a productive tool to gain expected business effects! See figure 2 (left side).

Since the mid 90ies we have tried to devote a lot of efforts for designing information in our systems to create new business opportunities for the organisation, and hence strengthen the competitive edge on the market. The information systems are regarded as *business enablers* for change. Here the focus is on the potential that a new information system represents for the company. The system becomes an enabler for renewing the business. New technological innovations in multimedia, the Internet and electronic commerce become new value-adding enablers to the business of the company. Instead of a detailed requirements specification we outline a scenario description for analysing the business potentials of information systems. See figure 2 (right side).



**Figure 2.** *The system as information support (left) and as business enablers (right).*

## **From Systems Work to Change Work**

Information systems or nowadays IT-systems have been a natural construct to start from when establishing the practice of systems work. The concept of *systems work* was preferred according to the infological approach in order to illuminate both systems development and maintenance management. The Information Systems field is traditionally defined in a rather broad sense to also include relevant issues of software maintenance. A significant feature for setting out a genuine practice of systems work has been the innovative research of useful methods for information systems development (ISD). The profession of ISD has over the years shown to be heavily dependant on practically oriented methods such as the ISAC, YSM, SADT, CS4, EAR, NIAM, JSD, IE, SSM, UML and RUP approaches for systems work.

The ISD practice has gradually evolved to regard systems work in a larger context as a fraction of more comprehensive *change work* in today's companies. Development of new information systems leads to a major change for affected people and their business operations. Change work implies a purposeful growth and development of organisations and means that we are advancing the business towards some concrete visions or goals. Changes of different kinds should be a starting-point for discussions between different stakeholders in business development. In the Information Systems field we have learnt the significance to start up development work from a change analysis (cf. the ISAC method) which builds a platform for further development of information systems and other types of measures.

## **From Formalised Methods to “Hands-on” Methods**

The use of *formalised methods* builds on an engineering paradigm for information systems development. The methods are precisely defined in coherent work steps and well-formulated description techniques for documentation. The development work is formalised in a planned or predictive manner. A requirements specification should reflect the user needs in a complete and consistent way. Information systems development is performed with a harmony perspective where stakeholders are regarded to have common goals for the development work. This was the starting-point for working out the ISAC method for information systems development in organisations based on the infological approach (Lundeberg, Goldkuhl & Nilsson, 1981).

The use of so called “*hands-on*” *methods* builds on a rather pragmatic oriented paradigm for information systems development. The leading idea behind this future trend is to use a combination of existing methods available on the market instead of innovating totally new ones. In this scenario it is useful to apply tool boxes of methods where you select suitable combinations adapted to specific development situations. These combinations can be worked out in different ways for example using the concepts of method chains (through the development cycle) or method alliances (across the same development phase). “Hands-on” methods are often worked out as checklists, templates and best practice models.

## **From Life Cycle Strategy to Evolutionary Strategy**

Systems work in organisations goes through a life cycle with sequential, parallel and/or iterative phases. A *life cycle strategy* for systems work is in line with the infological approach. Börje Langefors presented in his inaugural lecture as professor (1967) an original proposal for

partitioning of the system's life cycle. The result was four classical problem areas which have had a great impact on subsequent methods for systems work: (1) object system analysis and design, (2) information analysis, (3) data system architecture and construction, and (4) realisation, implementation and operation. The two first areas treat infological or user-oriented problems, while the two last areas treat datalogical or technical problems. The traditional ISAC method was built on these four classical problem areas within information systems development.

We are nowadays more facing a strategy for evolutionary development of information systems. The idea behind an *evolutionary strategy* is to implement a new information system in minor parts which are distributed over a certain period of time. Characteristic for this situation is that the information system will be delivered step by step in smaller turns. It is regarded as a safer strategy to have a successive renewal of the business operations than to dramatically change the whole organisation. The border lines between systems development and maintenance would be more or less erased. In an evolutionary development we rely on the principle that it would be better to have a continuous improvement of the business instead of more risky "big bang" solutions.

### **From Information Modelling to Virtual modelling**

The justification for starting up the new field of Information Systems in the mid 60ies was to propose the work with information analysis before "jumping down" to program construction and database design. *Information modelling* was invented as a useful tool for analysing information flows and elementary messages (e-messages) in organisations which after that would be realised by so called computer-based systems. Information modelling is still an important kernel or corner-stone in the today's theories of information systems development.

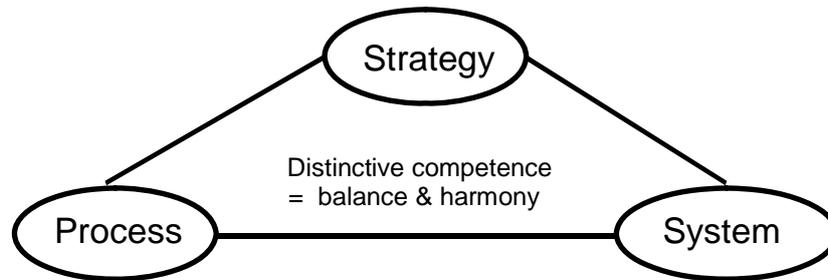
New investments in information systems are today made in a changing world, where the progress of society moves towards horizontal organisations and electronic business. In the future information systems development will be oriented to model how companies will operate in the on-coming virtual markets. The modelling area of interest will become how different kinds of inter-organisational IT-systems can support electronic commerce applications and web-based business solutions. The future trend is towards more service-based operations in companies which mean that *virtual modelling* will be a necessary extension to the earlier tools of information modelling. There is a challenge to integrate systems development with service improvement in networked organisations of tomorrow.

### **From Technology Competence to Distinctive Competence**

In the beginning systems development was based on a high degree of *technology competence* from the EDP or IT department in a company. The infological approach stressed the demand for a more comprehensive user influence in development projects. Development of information systems was regarded as an organisational design and that the information needs analysis could be free from technological aspects. In this connection systems development was not longer just a matter for the technology people in a company.

Information systems are more and more becoming strategic investments for a company. It is therefore a vital issue of growing importance on the management agenda. When making

organisational changes, we need to work concurrently with the corporate strategy, business processes and information systems of the company. According to the organisation theory, a successful company acquires unique or *distinctive competence* by creating a good balance between strategy, process and system areas, thereby achieving harmony in the organisation. In change work, we need to combine specialist competence for strategy formation, business process improvement and information systems development. See figure 3.



*Figure 3. Distinctive competence achieved by a balance between three areas.*

## Closing Words

In conclusion I would like to give our Information Systems discipline a challenge for the future. From this respect I will refer to a well-known formula for performing success in business by applying it to the area of information systems development (ISD):

$$\text{Degree of success in ISD} = f(\text{Quality} * \text{Acceptance} * \text{Value})$$

The success formula states that to attain a successful result for information systems development in organisations, we must have a sufficient *quality* in the designed IT solutions and a good *acceptance* among the users or people to give them a motivation for using the information systems as well as that the designed IT solutions should create a business *value* to the ultimate beneficiaries or customers to the company. A low figure in either quality, acceptance or value will lead to an unsuccessful result – hence the multiplication sign in the success formula. There is a strong interplay between computers, people and work tasks in organisations – a lesson learned from the history of Infology!

## References

- Langefors, Börje (1995). *Essays on Infology – Summing Up and Planning for the Future*, Studentlitteratur, Lund.
- Lundeberg, Mats, Goldkuhl, Göran and Nilsson, Anders (1981). *Information Systems Development – A Systematic Approach*, Prentice-Hall, Englewood Cliffs, New Jersey.