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Organizational Processes in ICT Management and Evaluation. Experiences with Large Organizations

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Abstract: In this study, we describe the managerial and administrative processes relevant in the assessment of cost, efficiency and value of ICT support within and around an end user organisation. Systems of interdependent processes have been proposed to guide the management of ICT, without looking at the organizational activities, outcomes and interdependencies closer. The changed role of ICT in organizations' activities does no more allow for isolated management of business and ICT domains.

Despite of a lot of talk about business alignment of ICT, a permanent link between the mandates of business and IT management remains yet to be established, even in organisations well aware of their information management and the business alignment issue. In our study we found that appreciated approaches of IT governance, e.g. ITIL and CobIT, and Information Systems Management models could profit from a supplementing comprehensive, architectural view of the ICT in organizations and from an enterprise architecture management process. We attempt to clarify the concept with the results of a three-year project where client organisations of an ICT provider were looked at from an ICT architecture management point of view. As complementary data, we study narratives on organizations that have some success in joint business and ICT planning and management.

A map of managerial processes, and a model for different areas of ICT evaluation are results of the study. The enterprise architecture concept can be seen as a shared platform to enable efficient joint management and development of business and ICT. To steer the organization towards future success, the strategy process interacts with an EA management process that guides and supports the comprehensive ICT management and development. EA also provides a sound foundation for ICT evaluation.

Keywords: Information Management , ICT Governance, Enterprise Architecture, Organizational Processes, IT Evaluation

1. Introduction

The aim of this study is to outline the organizational processes that influence the planning, management and development of information and communication technology (ICT) support in large organizations. We present them as a model, or a map of processes that shows where interaction should take place for business and ICT strategies and administration to be interlinked. This is needed to achieve the so-called and so much sought after business alignment of ICT. We also give a brief overview of methods and approaches that have been suggested for the organizational ICT management from the viewpoints of ICT management, IT governance, strategic planning, and enterprise architecture (EA) management, the two latter ones providing a joint approach to ICT and business.

Process-driven approach in the management and improvement of organizational performance has been permeated in the past decades. Organizational processes are by now the usual starting point for information systems planning. However, a closer look at both process theories and organizational reality reveals that the defining of core processes and administrative processes, and their ICT support, is not enough for the planning, managing and development of consistent and comprehensive ICT support for the organization's activities, and the development of both business and ICT along with evolving business environments.

This gives us the research problems:

- *Which processes need to be considered when attempting to manage and maintain comprehensive organizational ICT support, aligned with business goals and needs?*
- *What do suggested approaches to ICT management promise, and what are their relations to each other?*

First, we give an overview of organizational processes and an account of approaches to organizational ICT management as presented in the literature. To get direct access to large organizations and recent developments in their information and IS/IT management, we then look through a consultant's eyes at three client organizations with a long-term partnership with an ICT consultancy. Consultants are able to get an ethnographer's deeper insight into the organizations' reality in longitudinal observation, which to our view is more than snapshot data collected in interviews or survey questionnaires.

As supplementary data, we present narratives on corporation wide ICT improvement efforts found in trade papers during the period our research project. These stories are taken to give some indication how the problems of large organizations' ICT management are perceived in the professionals' community, and what are the current solutions seen.

As a conclusion, we present some considerations on enterprise architecture management as a comprehensive model to organize and manage the ICT support and its governance in large organizational settings.

2. The choice of approaches for ICT management in organizations

Both business and non-profit organizations are awakening to the fact that they have been acquiring technological support and solutions to variegated problems often in a decentralized way with fragmentary planning and inconsistent decisions in different parts and levels of the organization. This alone leads to diversity, but mergers, acquisitions and restructuring (also true in non-profit, e.g. governmental organizations) add even more to the technologies and applications landscape diversity. Taking the technology adoption model known as the S-curve (Nolan 1973), the point has been reached in many large organizations where technology adoption is taken into control, costs are cut and governance is centralized. Well aware of the discussion on adoption models (Fichman 1992), we only want to observe the developments in technology management in-the-large, as trends in the market of applications and services. A widely shared view is that today, user organizations seem to be more cautious and cost sensitive in their ICT investment plans, and take on a more centralized control on ICT, a trend that follows the Nolan model. Our findings support these views. On the other hand, changes in the role of ICT indicate transition towards business orientation as ICT is becoming mandatory strategic enabler (Hirvonen 2005). Business changes are enabled by ICT and business decisions are driving ICT decision-making (Seltsikas 2000; Ward and Peppard 2002).

Several approaches have emerged for the managerial control and oversight of information and communication technology in organizations. However, discussion between the groups developing these approaches seems to be scarce. Their development target, the ICT end-user organizations, receives information on a variety of suggestions how to improve their organizational performance with ICT, or the performance of their ICT, or the improvement of their ICT with a perspective on the organizational performance.

A look at the organizational processes (next section) gives some context for the discussed approaches. In section 2.2 the "market offering" for the administration of the organizational ICT support and the related processes is briefly presented.

2.1 Organizational processes: a richer picture

Garvin's survey on processes of organizational activities covers a wider range of organizational phenomena than the classic categories *production processes* (or core processes) and *support processes*. According to the classification that takes into account different dimensions of organizational life, the activities that – by definition – "transform inputs into outputs" are carried out in a network of other, more elusive processes that involve human behaviour and interaction. These *behavioural processes* include decision making, communication and learning processes (both individual and organizational learning). With these, and by rearrangements in the core processes, changes that modify the organization and its identity are taking place in *change processes*. (Garvin 1998)

The organizational activities are arranged around the core processes, and the decision making takes place on and around these. The ICT support is designed to support the core processes in their needs to store and process information, communicate and interact with stakeholders (internal and external). ICT systems also provide information for the decision making processes that are not carried by the systems but by humans. This is important also with decisions about ICT development and management: the problem of ICT-business alignment is not solved by a system to be implemented, but by changing organizational actions around both business and ICT decision making. Common frameworks of reference will be of help there.

Traditionally, ICT is organized in an IT department or IT function. Models have been created to set up, manage and assess the processes of the ICT organization. ITIL (ITIL 2004) and CoBIT (ISACA 2005) provide methodic ways to define and assess IT function processes. Software organization process models, e.g. ISO/IEC 15 504 - (1998); TickIT (2005) or CMMI (Chrissis, Konrad et al. 2003) may be used also in IT departments, not only because IT professionals know of these, but systems development can be a major activity in a large IT department. Yet even though helpful in other ICT-related activities, the software process related models do not cover the business management viewpoint in control and strategic planning of the organizational ICT. For this, there are various approaches that are presented next.

2.2 What do we need to do: SISP, IM / ISM, ITG or EA?

In the late 80's and early 90's, the concept of 'Strategic Information Systems Planning' (SISP) was the linkage between IS / IT and business strategic planning. The concept of IS planning had been established as the phase in which the organizational context and the entirety of IT / IS support in it was planned before going into the systems development process for one system at a time (Olle, Hagelstein et al. 1988). Strategic IS planning brought the aspect of business planning and the strategic value of IS to this concept (Earl 1989; Ward, Griffiths et al. 1990). It was focusing on one or a few systems bringing about a superior competitive advantage for a company.

Through the introduction of the networking technologies in the beginning of the 90's the organizational ICT and its strategic value became a far more variegated issue. Local area networks enabled virtual structures like cross-functional business processes (Humphrey 1989; Davenport 1993; Hammer and Champy 1993) with "virtual teams" and information sharing with horizontal information systems (Braa and Rolland 2000). The 'business process' thinking was enabled and enhanced by ICT. Wide area networks made this possible even across continents: Global companies are enabled to carry out their activities almost as if their parts would be co-located (Ives and Jarvenpaa 1991). The Internet as a direct access point for the customers and partners caused further unplanned moves and drastic changes in the ways to do the business. Web based information systems created new business models. The concept of strategic information systems planning had to be revisited (Ward and Griffiths 1996; Ward and Peppard 2002). The evolution is going on with mobile technologies and increasing data transmission capacities.

Technology advancements and the deep changes in the ways organizational activities are carried out do have an impact on the traditional IT function and its management. Even more challenging is, that the information and communication technologies influence the hard core of business, not only

in companies devoted to e-business - any organization today can be under the pressure to meet the new standards of instant information accessible to both internal and external customers and other stakeholders. Methodical approaches to manage, to plan and to develop the organizational ICT as assets and services are taking on with the technological changes. The underlying technology structures, architectures and applications enable, but also constrain the planning of e.g. new service structures.

The methodic approaches for managing the ICT support of an organization's activities (whether private business, non-profit or public organizations) take different viewpoints:

- IS / IT strategic management and application portfolio management (Ward and Griffiths 1996; Weill and Broadbent 1998; Ward and Peppard 2002)
- Information Management (Seltsikas 2000) and Information Systems management (McNurlin and Sprague 2002, 2004),
- IT Governance that takes a methodic view to the processes and services of the information management function of the organization (Peterson, O'Callaghan et al. 2000). For this, the most prominent effort is the development of the Information Technology Infrastructure Library, ITIL within the governmental organizations of UK (ITIL 2004). Another major effort is Common Objectives for Information Technology CoBIT (ISACA 2005).
- The Enterprise Architecture (EA) approach or managing of the ICT support of the organization from the point of view of business and IT architectures. Several efforts have been taken, most prominently, within the government of the US. EA frameworks, supporting standards and guidelines have been created (FEA-PMO 2003). This work has flown into The Open Group's Architecture Framework TOGAF, with the abiding Architecture Development Method ADM (The Open Group 2003). Numerous commercial methods have been presented: 15 different EA process models have been found (Pulkkinen and Hirvonen 2005).

Presented independent of each other, any of these approaches may look like comprehensive. However, closer look indicates that the methods under the four labels have overlaps, but many of them are for a narrow area in the problem field of joint business and ICT management, planning and development. Introduction of any one of these methods into an organization takes a significant effort, and end user organizations face the problem where to begin,

- to achieve business aligned ICT, and improvements in ICT that bring business benefits
- to ensure that investments are made and technologies chosen in a well-informed process with realistic knowledge of the choices
- to organize the ICT services function in a way that satisfies the needs and is cost efficient
- to view the future together for reasonable strategic planning of both business and ICT

Our study seeks some clarity to this problem field with practical experiences in large organizations: what would be worth while to start with in the line of consistent business aligned ICT management?

3. Research setting and methods

The present study bases on a series of previous efforts within a research project conducted by an academic research institute in collaboration with an ICT services provider. One of the researchers has been involved in the provider's projects with three large client organizations (A,B,C), and has been able to observe the situation within the organizations in the role of an ethnographer (Harper 1997) as mediated in workshops, meetings and also documentation (Hodder 2000). Since there has been a long term partnership between the client organizations and the provider collaborating in the research effort, it gave the possibility for longitudinal observation needed in an ethnographic study.

To supplement the first-hand data, we analyse stories in trade papers presenting large organizations' efforts and achievements in improving their information management policies, standards, processes and ICT linkage to business. In ethnography, stories and narratives are an indicator of issues that are perceived important (Harper 1997). With stories, ideas are shared, knowledge passed on and a common understanding is collectively created. In this case, the

community that shares the ideas are not only the organizations the stories are told about, but the community of IT professionals (readers of the papers) discussing and cumulating knowledge on solutions for organization and management of ICT support in large organizational settings.

In our study, the first-hand organizations provide a picture of the problem field, and the second-hand organizations give an idea which way to look for improvement. The next section lays out the findings in the two phases: ethnographic observation (4.1) and study of narratives (4.2).

4. Collected data

4.1 ICT management - the reality

This data was collected during the period of 2002-2004 within three large client organizations in which consulting projects on ICT and architectures were conducted. The effort was guided by the academic institute, and was a part of a larger research undertaking (Hirvonen 2005).

Table 1 The data collected in three ICT end user organizations

Topic	Organisation A	Organisation B	Organisation C
Organisation type	Public organization	Public organization	Private business organizaion
ICT management methods / models in use	No methods in use, service suppliers use e.g. ITIL	No methods in use, service suppliers use e.g. ITIL	Uses e.g. ITIL and CMMI
EA management areas covered	There is ICT management, but no EA management. Top management decides on large projects' initiation and accepts the results. Organisational sub-units are rather independent and have own budgets for small projects. ICT is mostly connected to operative processes and middle managers are highly involved.	Technology architecture is the main focus area. Some business processes are described. No direct link from business architecture to other EA areas. ICT development is fragmented. Development is done on a system-by-system basis, not business-driven. Planning is reactive.	There is ICT management, but not the entire EA is covered. The intention is to become increasingly business oriented in EA management.
ICT organization's role	Support unit, weak link to business decision making	Support unit, very weak link to business decision making	ICT is vital for the organization and management is thus interested. Still, a "support unit" image dominates.
Organisations own statement	ICT supports business at an "adequate level".	Some indications about challenges in transition to new network centric architectures.	Rapid business changes are challenging. Management support could be better.
Consultant's evaluation of ICT management	The organisation has a long conservative tradition of ICT management.	Focus is in technology and system silos. Planning and management is not	The company has harmonized its application portfolio and business driven

	Business decision making comes in with greater investments, but in general ICT lives its own life. Now, more systematic planning has started, but does not lead to implementation. A reason seems to be still remaining weak linkage to business decision making.	business driven. This has been adequate for years. Now, as the organisation faces e-Government requirements to its whole extent, old ways seem not enough. The organization has reacted, yet business goals of ICT will be very hard to meet. No established business-ICT linkage.	ICT management is improving. Strategic ICT considerations have become mandatory to be competitive (market change). ICT management has changed from a separate cost pool toward more business integrated function.

4.2 How to improve – three stories

The second source of data was ICT trade newspaper articles (tabloids) published in the period the research project was conducted. These articles drew our attention because the large business organizations and facts about them had an obvious connection to the problem areas investigated in the research project. There seemed to appear an unintended series of similar stories published independently in two papers (*IT-Viikko* and *Tietoviikko*) repeating (thus amplifying) the same narrative. The findings are compared to the reality in the organizations we had direct access to.

Table 2 Three stories of organizations (translation into English by the authors of the paper)

Source: paper, issue, date Report title in English	Company information	The trigger of the change	What was done (including EA elements)	The point of the narrative
IT-Viikko 21/2003 22.5.2003 Cover: "The Concern reforms the basic system: Wärtsilä Centralizes its Workflow Support." Inside: "When Integration isn't enough: Wärtsilä rebuilding the whole [IT] foundation" (Published in a series of articles for the 50th anniversary of IT society Finland on "savvy IT solutions")	Wärtsilä Corporation 12 500 employees, several locations on 4 continents www.wartsila.com Ships and offshore installations, power plants, power supply for ships	One Workflow system implemented corporation wide (replaces existing ones). Other changes not directly linked to this, but taken on as general improvement	Introduction of standards, reduced number of applications, introduction of consistency in the ways ICT support is organized.	CIO as the promoter of the streamlining of ICT – on the other hand, finds to be seen in the organization also as the "police force" (control)
Tietoviikko 40/2004 7.10.2004 "IT Transformed into Business Infra. Fazer's first	Fazer Group 13 000 employees in 9 countries www.fazer.fi	Nomination of the first CIO in the group; ICT seen important for the business	New image for the IT function, strong emphasis on business alignment, introduction of	First nominated CIO as champion for the new profile of the IT function / corporate IT

CIO Remodels Basic Structures"	Food, catering, candy		group wide policies.	department
Tietoviikko 19/2005 19.5.2005 Cover: "The CIO of the year" Inside: "The manager of Ruukki" As part of featured topic: CIO	Rautaruukki Corporation 11 000 employees in 21 countries www.ruukki.com Iron, steel, metal components and services	Post-merger program "United" to achieve aligned corporate wide policies and consistent ICT support	Attempt to achieve a unified ICT for the corporation. Business driven approach, change management.	The CIO nominated as the "CIO of the year". Cited to be "not an IT manager but change manager", profiled as a 'change agent' of the organization

All three large organizations are internationally active manufacturing companies based in Finland. The stories were published in the period 2003 – 2005. The research project or the project group had no connections to the organizations described in the secondary data.

5. Analysis

A general theme in the studied organizations A, B and C seems to be the separation of ICT decision making from the business management. Additionally, holistic ICT management is weak, especially the management of ICT assets like emphasized in the enterprise architecture based approach. ITIL and CMMI are used for IT process quality and better performance, but are weakly linked to e.g. IS planning activities. Communication between business and ICT managers is sporadic. ICT fulfils daily requirements and is manageable, but planning of future competencies and ICT enabled business development is at the best fragmentary.

The ICT function makes its own managerial decisions without business management commitment. This is good enough to run the routines (IT governance and architecture governance), but problems will arise when long-term strategic decisions are needed, the coverage of which is the whole enterprise or large domains within it. In case A, this can be seen as unimplemented development plans. This reveals the need for a baseline enterprise architecture, with defined business, information, applications and technology architecture, and a consistent EA management and development, to get the strategic planning efforts into implementation. In case B, the weak link is seen as fragmented planning, as very few specialists (or none) in the organisation have a holistic picture of the entire business requirements and how the ICT support is currently organized: that is, the baseline EA. Both an ICT-enabled business development and a well-argued ICT development are difficult without one.

The differences between public and business organizations in their EA management can be seen (Hirvonen 2004), but it does not exclude the improvement needs: public organizations have the pressure to digitalize services according to e.g. e-government programs, and to improve their performance as well as private ones. Case C (a private company) has had to react to business environment changes, as the business is becoming increasingly ICT-dependent. Holistic planning approaches have been used and business management is increasingly involved in ICT decision-making. Yet a methodic approach to EA would also here support the efforts and help to institutionalize the EA management and joint planning and development. The used management models (ITIL and CMMI) in the studied cases seem to cover mostly technology related issues.

Organizational processes around business and ICT management can be drawn as a model for large organizations (Figure 1). A joined strategic management would consist of business strategies planning (strategy process) with the designing of the business architecture (i.e. business processes, services, high-level requirements). Another component in the strategic management is the high-level EA planning (EA management process) with information strategy, applications (or systems) portfolio management, and technology strategy. The IS strategic planning methods and tools (e.g. application portfolio models) can be used for the joined strategy work. The target of the strategy process and the EA management process is future success in business operations or organizational activities in general.

The strategy process is in interaction with the current business management (the management process), with the ICT management process interlinked to it. The targeted goal here is to successfully carry out current activities. ICT management includes the components IT governance, (that applies models like ITIL) and architecture governance (described e.g. in the TOGAF model), their overall goal being to provide ICT related services, and to maintain the applications and technology architecture.

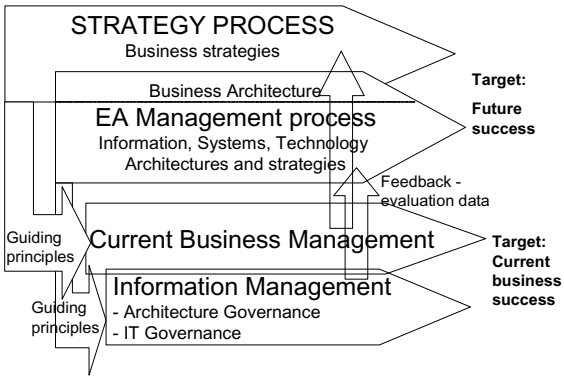

Figure 1 The interlinked management areas

In organizational capability development, the lower stages are characterized by dependency of certain capable individuals (Chrissis, Konrad et al. 2003). The analysis of the narratives on 3 companies' information management emphasize the role of individuals (CIOs) when striving towards a more mature state of comprehensive and business aligned ICT management. Tighter business link, ICT and business alignment and cost–benefit responsibility were mentioned in all stories. These are goals of management. Although the articles do not mention EA by name, several EA development aspects are mentioned: introduction of standards, application portfolio considerations, introduction of common technology policies, reduced redundancy and unified applications and technologies across the enterprise, which all aim at higher efficiency and lower cost of ICT. These are characteristics of comprehensive EA management (Spewak 1992; META Group 2002; The Open Group 2004).

EA is still a rather unknown concept and can be wrongly interpreted as only concerned with technology, as the enterprise information technology architecture EITA (Armour, Kaisler et al. 1999a; Perks and Beveridge 2003), or the enterprise wide technology architecture EWTA (META Group 2002). Yet the technology dimension is, although important, only one aspect in EA, and the other dimensions (business, information and applications) are equally significant - as well at the strategic planning level as in developing the organization processes and their ICT support.

Our research is undertaken with the point of view of an ICT services provider, offering both consulting and systems development services. Therefore, the responsibility areas in the comprehensive ICT development, and the evaluation of both the business and ICT improvement efforts are of interest. Figure 2 shows the responsibilities of the end-user organization (client) and the provider of ICT services, with the target areas of ICT evaluation. The management and governance processes are the responsibility of the client. There are methods available for both architecture evaluation (Hirvonen and Pulkkinen 2003) and IT governance (some of which we mention in previous sections).

Planning (ICT consulting) projects deliver evaluation of solutions to given development targets that are evaluated against the baseline EA. Without this baseline, the evaluation is poorly grounded. Constructs developed in order to improve the baseline EA, and implemented systems are subject to IS development methods and respective evaluation tools. (Hirvonen and Pulkkinen 2003)

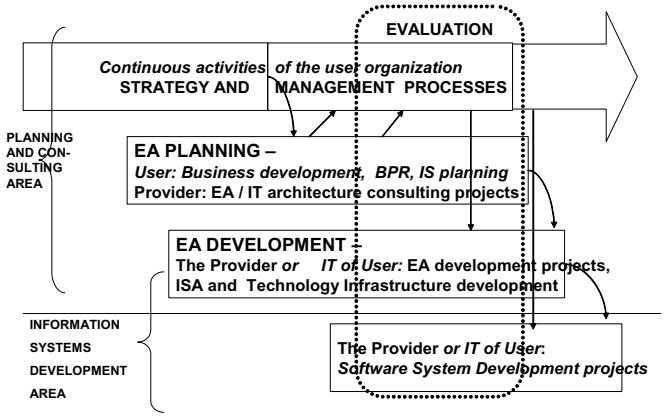

Figure 2 The processes of ICT management and ICT evaluation areas

6. Conclusions

We have examined large organizations and their problems in planning, implementing and managing comprehensive ICT support for their activities in a way that meets today's requirements set by their stakeholders and the current environment with market demands and technology advances. For this, different approaches are considered: strategic IS planning and IT governance methods, information or information systems management models and, last but not least, enterprise architecture as a comprehensive management approach to organizational ICT and its business alignment.

The setting up of a permanent link between ICT and business management and a platform for inter-exchange and joint planning seems to be a central problem in large organizations. The three case organizations investigated in our study are, unfortunately, most likely representative. The three "success stories" (secondary data) reveal that things can change, but the effort of strong individuals is crucial. To achieve institutionalization, established ways and means are needed not to be dependent on an individual's continuing effort. Comprehensive enterprise architecture (EA) management for which several methodological approaches are available (Pulkkinen and Hirvonen 2005) provides means and methods for the joint business and ICT development and also for the management of the comprehensive ICT support. We described the managerial processes involved in this effort, and their concerns. The overall strategy process of the organization guides it towards future goals, and the EA management process carries the long term planning and development of the comprehensive ICT support of the organization's activities. These processes guide and take feedback from the day-to-day business operations management process and the information management process.

EA methodologies and frameworks provide the needed holistic approach for joint business and ICT planning: a balanced examination of business, information, systems and applications, and

technologies (including infrastructure). EA planning takes place first at the strategic decision making level, to make decisions on business, information, applications and technology strategies. At a lower abstraction level, business operations and their ICT support are planned jointly, and the needed space for both business and ICT to decide on the details is provided. This is important, since neither business nor ICT management should be overruled in the joint planning. Government organizations have been active in developing the EA approach. However, it is by no means limited to the public sector. There are practice proven methods for comprehensive EA management well suited for private businesses also.

Viewing the large organizations in our examination, EA as a common framework of reference could be seen as a comprehensive tool that would provide a communication platform for joint business and ICT planning. The EA dimensions: business architecture, information architecture, applications architecture and technology architecture provide a common framework of reference for discussing the respective strategies, to set up the management of business processes and services as a part of the business architecture, and to map the ICT support, the applications, data storages and communications, to the processes and services. Thus established EA provides the possibility to allocate and evaluate the real costs and benefits of ICT assets. The technology dimension gives the opportunity to discuss the enabling technologies for business development, and valuate the competitors' or clients' technology solutions as a part of competitor and market analysis. An EA baseline is essential for the evaluation of ICT assets and future investments in them. EA management also provides a framework for the consideration of different models for IT governance, IS process improvement or other managerial tools.

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