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GLOBAL BEST PRACTICES

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Governance

Chapter 2

2.1 Introduction

A few years ago, Nicholas Carr caused a big stir with his controversial article "*Does IT Matter?"* The author argued, amongst other things, that the strategic importance of IT in the business had decreased, as it became commonplace, cheaper and standardized. His opponents argued that Carr's vision was nihilistic and wrong, and that ICT would only become more important.

In his new book "*The Big Switch: Rewiring the World, from Edison to Google"*, Carr takes his ideas to the next level. He argues that IT will grow out to be a utility model, with a large number of computer functions being provided through the internet as a public utility. Carr expects that the IT department will change, and predicts that the focus will merely be on managing information, with the IT department functioning as some sort of connector between the software services and business projects.

Regardless of whether you agree with Carr or not, the fact is that the tasks of IT are changing, with the focus shifting more and more towards the strategic role of IT. A question such as "what is the added value of IT in an organization?" is now very common.

In recent years, many IT departments focused on controlling their internal processes. Having more and more processes and functions in place, organizations are shifting their attention to creating value. The launch of the first ISO standard on IT governance, in 2008, is a sign that the discipline of IT governance will be attracting increasing attention in the near future. IT will be increasingly supporting the business, collaborating on a strategic level, to be able to move through change processes more quickly.

This chapter covers different aspects of IT governance. Together, the six articles illustrate recent developments in a field that will probably be turbulent for years to come.

CONTENTS

The articles in this chapter cover six different aspects of IT governance:

- **Does ROI matter? Insights in the true business value of IT**
  Author: Gilbert Silvius (Utrecht University, The Netherlands)
- **Managing IT chains in large organizations: A transition process**
  Authors: Enzo Ciriello (Mansolutions B.V, The Netherlands), Michel van den Bempt (Mansystems Netherlands B.V.) and Kars Hadderingh (@Home B.V, The Netherlands)

SHORT SUMMARIES

In this article **De Haes and Van Grembergen** analyze and discuss how contemporary organizations are implementing IT governance. They also describe the impact of these implementations on business-IT alignment, based on scientific case research, delphi research and extreme case research.
The article features a validated list of 33 IT governance practices, insights into the effectiveness and ease of implementation of these practices, a minimum baseline of IT governance practices, an IT governance roadmap and balanced scorecard.

LeClair describes how to create governance that will be responsive to environmental changes. He also explains how governance exists at strategic, tactical and operational levels within an IT project, and the limits of ability at each level. He uses a well known story from history to illustrate concepts of governance that apply to IT.

According to the authors **Kroon, Van der Zee, De Jonge and Van Solkema**, organizations are increasingly working together in networked co-operation and in virtual alliances. Often, IT has a critical role in making such relations successful.
This implies new challenges for IT governance, since the achievement of successful results is not guaranteed by traditional models and IT governance best practices. A fresh approach is needed and a paradigm shift seems inevitable. The authors try to identify what IT governance looks like within an Extended Enterprise.

Liefers, Sturm and Van Burk discuss the combination and integration of measures in order to achieve a future-proof integrated compliance systemic, a Strategic Regulatory Management Approach. They address the issue of third parties demanding improved IT control of organizations and provide an overview of relevant stakeholders, laws and regulation. They also include the results of field research. The authors finally conclude that the successful organization of future-proof compliance is not just a fairytale, but a distinct possibility.

Silvius provides a comprehensive overview of IT valuation approaches and their assumptions, and describes the pros and cons and their applicability, given different characteristics of IT investments.
According to Silvius, the business value of IT is an important consideration in the decision-making process of (IT) projects. However, in this valuation process, the concept of Return of Investment (ROI) is widely misinterpreted and mistrusted. This article presents a compact schedule that helps to select the relevant valuation method, based on the characteristics of the project.

With the transition from a stovepipe-oriented IT landscape into a service-oriented IT landscape, the complexity of IT has increased. In this article, **Ciriello, Van den Bempt and Hadderingh** explain how to manage the interdependency of (chained) IT components as a way to ensure the overall performance of business-processes. One of the important questions they answer is how organizations make the transition to IT chain management.

2.2 Best practices in IT governance and alignment

IT governance is high on the agenda, but many organizations are struggling to make it a reality into day-to-day operations. Steven De Haes and Wim Van Grembergen show how the research reported upon in this article provides new insights into IT governance implementations and its impact on business-IT alignment, and offers hands-on material for practitioners to address the IT governance challenge.

INTRODUCTION

In many organizations, information technology (IT) has become crucial in terms of the support, sustainability and growth of the business. This pervasive use of technology has created a critical dependency on IT that calls for a specific focus on IT governance. IT governance consists of the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategy and objectives.

Today, IT governance is high on the agenda in many organizations and high-level IT governance models are being created. However, having developed a high-level IT governance model does not guarantee that governance is actually working in the organization. Conceiving the IT governance model is the first step, implementing it as a sustainable solution is the next challenging step. Once a specific IT governance model is chosen and implemented, it should, as indicated in the above definition, ensure that IT sustains and extends the business goals, or in other words, ensure that IT is aligned to the business needs. The IT governance implementation challenge and the subsequent impact on business-IT alignment constitute the core domain of this article.

The results reported in the article are based on in-depth research executed at the Information Technology Alignment and Governance (ITAG) Research Institute of the University of Antwerp Management School (UAMS). This paper only reports on some key findings of the research. For more information, contact the researchers at the email addresses provided at the end of the article.

RESEARCH QUESTIONS AND METHODOLOGY

The focus of the general research was: How are organizations implementing IT governance to achieve a better alignment between the business and IT? For reasons of validity, the research was primarily executed in the Belgian financial services sector, but it is felt that most conclusions are applicable to other information-intensive sectors worldwide as well. The general research question was translated into two detailed research questions:

- **RQ1: how are organizations implementing IT governance?** Having developed a high-level IT governance model, this does not guarantee that governance is actually working in the organization. Conceiving the IT governance model is the first step, implementing it

into the organization is the next challenging step. IT governance can be deployed using a mixture of various structures, processes and relational mechanisms. IT governance structures include structural (formal) devices and mechanisms for connecting and enabling horizontal contacts between business and IT management (decision-making) function (e.g. steering committees). IT governance processes refer to the formalisation and institutionalisation of strategic IT decision making or IT monitoring procedures (e.g. IT balanced scorecard). The relational mechanisms, finally, are about the active participation of, and collaborative relationship between, corporate executives, IT management, and business management (e.g. training). Relational mechanisms are crucial in the IT governance framework and paramount for attaining and sustaining business-IT alignment, even when the appropriate structures and processes are in place.

- **RQ 2: what is the relationship between IT governance and business-IT alignment?** As discussed above, the goal of IT governance is all about achieving a better alignment between the business and IT. The ultimate question, therefore, is whether the implemented processes, structures and relational mechanisms enable the achievement of business-IT alignment. It is important to recognize that each of the applied processes, structures and relational mechanisms serve specific or multiple goals in the complex alignment challenge. However, dividing the IT governance framework into smaller components, and solving each problem separately, does not always resolve the complete problem. A holistic approach towards IT governance acknowledges its complex and dynamic nature, consisting of a set of interdependent subsystems (processes, structures and relational mechanisms) that deliver a powerful whole.

The research strategy was based on a triangulation of multiple research methods: literature research, pilot case study research, delphi method research, benchmark research and extreme case research. The research started with analyzing literature research and describing six pilot case studies: KBC, Vanbreda, Sidmar-Arcelor, CM, AGF and Huntsman. Next, an expert panel composed of 22 consultants (delphi research), senior IT and senior business professionals, were asked to provide their input regarding the “perceived effectiveness” (0=not effective, 5=very effective) and the “perceived ease of implementation” (0=not easy, 5=very easy) of a predefined set of IT governance practices. The respondents were also asked to provide the top ten most important IT governance practices which are, in their opinion, crucial elements or a minimum baseline of an optimal IT governance mix. The following research step was aimed at exploring the relationship between IT governance implementations and business-IT alignment. This phase started with creating a business-IT alignment benchmark for the Belgian financial services sector based on a sample of ten Belgian financial services organizations. From the results of this benchmark, four extreme case organizations were selected (two high performers and two low performers in terms of business-IT alignment), in which a workshop was organized (extreme case research) to measure the maturity of the IT governance practices that had been applied, based on a generic maturity scale from zero (non-existent) to five (optimised). The data collected allowed for detailed cross-case analysis, looking for causes that could explain why some organizations achieved a higher business-IT alignment score compared to other organizations.

FINDINGS OF THE RESEARCH

From the pilot case studies, different drivers for adopting IT governance were identified. An important one was certainly the need to comply with Sarbanes-Oxley requirements, which

impacts heavily on the control environment in IT. Other important drivers for IT governance were the push to achieve economies of scales after mergers and acquisitions, and budget pressure resulting in a smaller budget for new projects. The challenge, of course, is then to optimally assign the remaining budget to projects and activities that are delivering value to the business. Finally, some pilot case companies mentioned that the IT governance project was more of an exercise in formalizing and structuring existing mechanisms that had already been applied.

How are organizations implementing IT governance?

The case and delphi research revealed that organizations can leverage a wide range of structures, processes and relational mechanisms in order to implement IT governance to support business-IT alignment. The research reveals a list of 33 IT governance practices at the level of strategic and executive/senior business and IT management. It should be noted that this list is not be exhaustive and the practices at operational level are discarded in this research. These practices are shown in the first two columns of table 1, with Sx being the structures, Px being the processes and Rx being the relational mechanisms.

The research demonstrated that, according to the expert group, some of the addressed practices are more effective or easy to implement compared to others (see columns at the right in figure 2). The five practices that are perceived as being the most effective for the Belgian financial services sector are “IT steering committees”, “CIO reporting to the CEO/COO”, “CIO on executive committee”, “IT budget control and reporting” and “portfolio management”. All these practices were also identified as being relatively easy to implement. The least effective practices are “IT governance assurance and self-assessment”, “job-rotation” and “COSO/ERM”.

Some practices were perceived as fairly effective but not easy to implement. Good examples in this high-effectiveness/low ease of implementation domain are “benefits management and reporting” and “charge back arrangements”. Another interesting case here is “CobiT®”. This framework is receiving a lot of attention both editorially and in the field, but it did not come out very high in this research. However, there are indications that CobiT is a very solid framework to work with. CobiT is a framework which has a higher level of abstraction compared to other, more detailed, practices referred to in this research. The good news for CobiT is that many of the detailed practices identified in our research are integral parts of its framework, certainly the ones that are indicated as being very effective (such as “IT steering committee”, “portfolio management”, etc.).

An interesting finding to pinpoint is that many IT governance definitions stress the prime responsibility of the board of directors in relation to IT governance, while these results reveal that the mechanisms to achieve this (“IT expertise at level of board of directors” and “IT strategy committee”) are rated relatively low in terms of perceived effectiveness. This can possibly be explained by the fact that making the board of directors more IT literate is not easy to achieve, which is confirmed by the second to last score in terms of ease of implementation of “IT expertise at the level of the board of directors”. The results of this research raise questions on how financial services organizations realize this board involvement in practice.

If averages are calculated for effectiveness and ease of implementation for all the structures, processes and relational mechanisms (see figure 1), it appears that structures and processes are in general perceived as being equally effective. However, it seems that IT governance

		Effectiveness (from 0-5)	Ease of implementation (from 0-5)
S1	IT strategy committee at level of board of directors	3,67	3,40
S2	IT expertise at level of board of directors	3,14	2,18
S3	(IT) audit committee at level of board of directors	3,22	3,40
S4	CIO on executive committee	4,38	3,56
S5	CIO (Chief Information Officer) reporting to CEO (Chief Executive Officer) and/or COO (Chief Operational Officer)	4,50	4,21
S6	IT steering committee (IT investment evaluation / prioritisation at executive / senior management level)	4,69	3,35
S7	IT governance function / officer	2,93	3,11
S8	Security / compliance / risk officer	3,28	4,06
S9	IT project steering committee	4,03	4,01
S10	IT security steering committee	2,82	3,61
S11	Architecture steering committee	3,04	3,14
S12	Integration of governance/alignment tasks in roles&responsibilities	3,18	2,63
P1	Strategic information systems planning	3,82	2,82
P2	IT performance measurement (e.g. IT balanced scorecard)	3,97	2,76
P3	Portfolio management (incl. business cases, information economics, ROI, payback)	4,13	2,67
P4	Charge back arrangements – total cost of ownership (e.g. activity based costing)	3,28	2,40
P5	Service level agreements	3,47	3,13
P6	IT governance framework COBIT	3,36	2,42
P7	IT governance assurance and self-assessment	2,79	2,54
P8	Project governance / management methodologies	4,10	2,94
P9	IT budget control and reporting	4,13	4,00
P10	Benefits management and reporting	2,85	2,36
P11	COSO / ERM	2,39	2,04
R1	Job-rotation	2,35	2,36
R2	Co-location	2,79	3,01
R3	Cross-training	2,76	2,82
R4	Knowledge management (on IT governance)	3,24	2,68
R5	Business/IT account management	3,79	3,36
R6	Executive / senior management giving the good example	3,88	2,81
R7	Informal meetings between business and IT executive/senior management	3,79	3,88
R8	IT leadership	3,89	2,82
R9	Corporate internal communication addressing IT on a regular basis	3,43	3,69
R10	IT governance awareness campaigns	2,83	3,14

Table 1 Validated list of IT governance structures, processes and relational mechanisms

structures are viewed as being easier to implement compared to IT governance processes, although in many cases they are closely related. A good example here is the “IT steering committee”, which is a crucial element to build up a “portfolio management” process, but the steering committee is perceived as much easier to implement compared to the whole “portfolio management” process. Relational mechanisms are also perceived as being easier to implement compared to IT governance processes, probably because some relational mechanisms can have a very informal character (e.g. R7: Informal meetings between business and IT executive/senior management).

The delphi research also brought up a list of IT governance practices, that can be regarded as a minimum baseline to implement IT governance. This suggests that, in implementing IT governance within a specific financial services organization, these minimum baseline mechanisms may play an important role. These practices are “IT steering committees”, “CIO on executive committee”, “IT portfolio management”, “IT budget control and reporting”, “IT strategy committee”, “strategic information systems planning”, “IT leadership”, “CIO reporting to the CEO or COO”, “IT project steering committee” and “project management methodologies”.

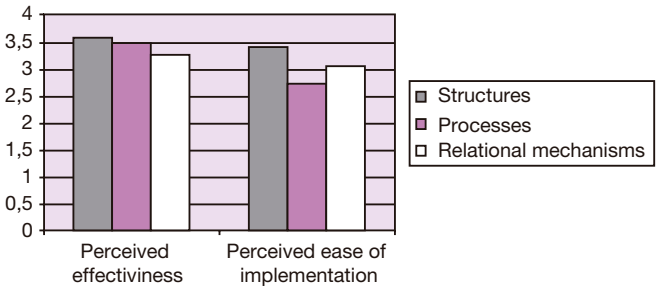

Figure 1 Average effectiveness and ease of implementation

It was surprising that only one relational mechanism was reported in this minimum baseline (“IT leadership”), while many authors on the subject stress that the relational mechanisms are crucial enablers for IT governance. A possible explanation is that, just as in writings on the subject, less detailed knowledge and expertise is available on relational mechanisms, which often have a more intangible and informal character. On the other hand, it should be noted that many other relational mechanism, such as “business-IT account management”, “senior management giving the good example” and “informal meeting between business and IT executive/senior management”, attained very positive scores in terms of effectiveness and ease of implementation and should, therefore, certainly be considered when complementing the minimum baseline.

It is also important to point out that the previously mentioned minimum baseline should be regarded as a holistic set of practices, contributing as a whole to better business-IT alignment. This insight explains why some of the individual practices, such as the “IT strategy committee”, received individually a lower score for effectiveness. Its value however is constituted in it being part of the minimum baseline, enabling the other practices to operate and be effective.

What is the impact of IT governance on business-IT alignment?

After measuring alignment in ten Belgian financial services organizations, it appears that the overall business-IT alignment maturity is 2,69 on a scale of 5 in the Belgian financial services sector (figure 2).

The benchmark contained two organizations with a relatively high business-IT alignment maturity compared to the overall average (high performers, I-J) and two organizations with a relatively low business-IT alignment maturity compared to the benchmark (low performers, A-B). The other six organizations were all situated around the overall average. An interesting consideration here is what the desired target would be for the financial services sector. There is no literature available in this domain, but taking the high-dependency on IT into account, one could argue that at least a maturity level 3 would be required, which implies standardized and documented processes and procedures.

Figure 2 Business/IT alignment maturity benchmark

In all of these extreme cases, it was assessed at which maturity level (on a scale from 0 – non-existent to 5 - optimized) the organization was applying each of the 33 IT governance practices discussed earlier. When comparing the averages of maturity of IT governance practices (structures, processes and relational mechanisms) in those extreme cases, it appears that in general the high performers have more mature IT governance structures and processes, as illustrated in figure 3. This figure also shows that on average the processes were less mature than the structures, indicating that it is more difficult to implement processes compared to structures, a point which was also covered in the previous section.

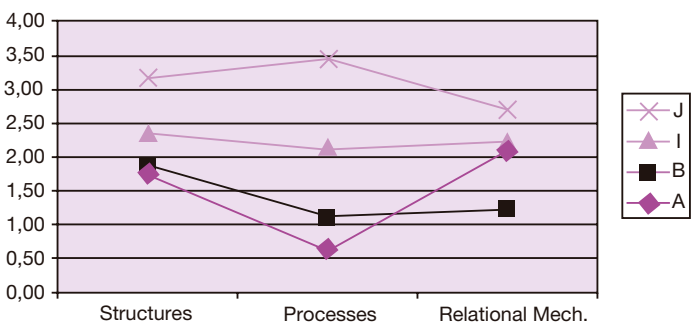

Figure 3 Comparing extreme cases (1)

It was also shown that the organizations with low business/alignment maturity actually had a lot of practices in place, though the average maturity of these practices was below maturity level 2, as shown in figure 4. This might indicate that those IT governance practices with a maturity level lower than 2 have a limited impact on business-IT alignment.

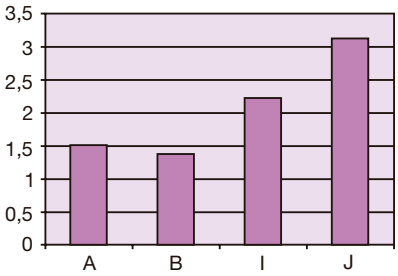

Figure 4 Comparing extreme cases (2)

The impact of relational mechanisms on business-IT alignment maturity was not clearly demonstrated in this research (cf. figure 3). However, it was found that the two high performers had started their IT governance implementation many years ago and had arrived at a point where many structures and processes were embedded in their day-to-day practice. At that time, the importance of relational mechanisms becomes less of an issue. The relational mechanisms are more likely to be important in the initiating phase of IT governance, in which the two low performers were situated.

Analyzing the high performers in more detail revealed that they distinguish themselves by a set of IT governance practices that were also proposed in the delphi research as minimum baseline IT governance practices. From this earlier defined set of ten minimum baseline practices, seven appear to be clearly present and mature (above maturity level 2) in the high-performers. This reduced set is called the *key minimum baseline* and constitutes the following practices: “IT steering committee”, “IT project steering committee”, “portfolio management”, “IT budget control and reporting”, “CIO reporting to the CEO/COO”, “project governance/management methodologies” and “IT leadership”.

An interesting IT governance practice that was not used by any of the organizations, although it is promoted by experts and thought leaders as being very important, is the “IT strategy committee at the level of the board of directors”. This practice is advocated as a framework to ensure that the board gets involved in a structured way in IT governance issues. During the interviews, three out of four organizations stated that board involvement in IT governance is not feasible and probably not required. The representatives of the shareholders are more concerned with the core financial services activities and less worried about (operational) IT issues. Another IT governance practice that was indicated as not being relevant for alignment purpose was “COSO/ERM”. While this was recognized as probably a very good framework for general internal control, its value to governance or its impact on alignment did not appear at all.

RECOMMENDATIONS FOR PRACTITIONERS

There is no real “silver bullet” (the ideal way) for implementing and maintaining effective IT governance within an organization. Having developed a high-level IT governance model does not imply that governance is actually working in the organization. Conceiving the IT governance model is the first step, implementing it into the organization is the next challenging step. A key question is: how do you get started?

To address the latter question, this research defined a key minimum baseline composed of seven IT governance practices that can be regarded as the necessary framework to

implement IT governance. It was demonstrated by this research that high-performing organizations, in terms of business-IT alignment, are leveraging these practices as "necessary" components in their IT governance framework. Each financial services organization should at least have these IT governance practices in place, regardless of other contingencies. Of course, these "necessary" (key minimum baseline) practices should be supplemented with other practices to build up a "necessary and sufficient" IT governance framework. This "necessary and sufficient" framework will be different for every organization, depending on size, culture, etc., but it is best to focus on those practices that are perceived as highly effective and relatively easy to implement, such as an "IT governance officer/ function", "service level management" and "business-IT account management".

In this domain of "sufficient" IT governance practices, a lot of relational mechanisms also emerge, such as "knowledge management" and "senior management setting a good example". Indeed, in the initial stages of an IT governance project, a lot of attention should be given to relational mechanisms to ensure the commitment of all those people involved in the process. Once the "governance culture" is embedded in the implemented structures and processes, these relational mechanisms require less attention. It is also important to point out that, in order for the IT governance practices to be effective, they should be at least at a maturity level 2.

Special care is required when considering IT governance practices that are effective but which can be more difficult to implement. An interesting case in this area is "CobiT". It is a framework which has a higher level of abstraction compared to other, more detailed, practices referred to in this research. The result is that many of the detailed practices referred to in this research are an integral part of CobiT's framework, certainly the ones that are indicated in this research as being very effective (such as "IT steering committee", "portfolio management", etc.). A conclusion from this is that CobiT is likely to be a very good repository from which practitioners can derive and select a "necessary and sufficient" set of IT governance practices.

It became clear from the case study research that to get IT governance effectively started in the organization, it should initially be regarded as a project, with a formal project organization supporting it. Once the IT governance practices are embedded into the day-to-day operations, this project approach is not required any more, moving the organization into a sustaining mode. It should, however, be taken into account that the introduction of a new concept or methodology (such as IT governance) into an organization often raises resistance. To manage this, it is important to initially place the emphasis on relational mechanisms and to have a senior sponsor in the organization act as the IT governance guru. Based on the experiences from the case study research and the conclusions coming out of this research, the following high level ten-step IT governance implementation roadmap is suggested:

1. Obtain ownership/sponsorship at senior management/executive level.
2. Create awareness of the IT governance initiative with senior and operational management within both business and IT, and encourage their involvement.
3. Launch the IT governance project, providing a formal project organization including project manager.
4. Assess the "as-is" situation (what is already in place?).
5. Define the "to-be" situation, i.e. what will the ideal IT governance state look like?
6. Quickstart the IT governance project with the seven necessary IT governance practices (highly effective, easy to implement).

7. Focus on relational mechanisms during the initial phases to manage resistance.
8. Improve the IT governance framework to create a necessary and sufficient IT governance framework.
9. Shift the focus from relational mechanisms to improvement of the structures and processes once the IT governance framework gets embedded into the organization.
10. In parallel, introduce a performance management system (balanced scorecard) to continuously monitor and improve the effectiveness of the IT governance framework.

CONCLUSIONS

As a general conclusion, this research revealed that IT governance is indeed high on the agenda and that organizations with a mature mix of structures, processes and relational mechanisms achieved a higher degree of business-IT alignment maturity compared to other organizations. Some detailed conclusions were drawn regarding IT governance structures, processes and relational mechanisms. It was demonstrated that it is easier to implement IT governance structures compared to IT governance processes. It also appeared that relational mechanisms are very important in the early stages of an IT governance implementation project and become less important when the IT governance framework gets embedded into day-to-day operations. This research provides a key minimum baseline of seven IT governance practices that each organization should at least have and supplement with practices that are highly effective and easy to implement. When an organization wants to implement these practices, it has to make sure that maturity level 2 is obtained as a minimum, to ensure that it positively impacts business-IT alignment.

A recommendation to practitioners resulting from these findings is that the best approach to implement IT governance is to start by setting up these seven key minimum baseline IT governance practices. This core set of practices should be supplemented with other key practices that are highly effective and relatively easy to implement. In the initial stages of such IT governance project, sufficient attention should be given to relational mechanisms to ensure the commitment of all the involved people in the process. Once the "governance culture" is embedded in the implemented structures and processes, these relational mechanisms require less attention.

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2.3 Shop Floor IT governance

In this article Glenn LeClair explains how to create adaptive governance that will be responsive to environment changes. He also addresses how governance exists at strategic, tactical, and operational levels within an IT project, and the limits of ability at each level. He will use a well known story from history to illustrate concepts of governance that apply to IT.

INTRODUCTION

Governance and governance models have become the currency of the IT consulting world over the last few years. Competing definitions fight for acceptance. Is governance: A framework? An architecture? A process model? A best practice? Can it be bought? Are there governance modules in applications that can be implemented? Industry publications are full of complex analogies and diagrams that describe effective models of IT governance. The only visible conclusion is that, apparently, good IT governance is geometric.

Figure 1 shows a sample of theoretical governance models:

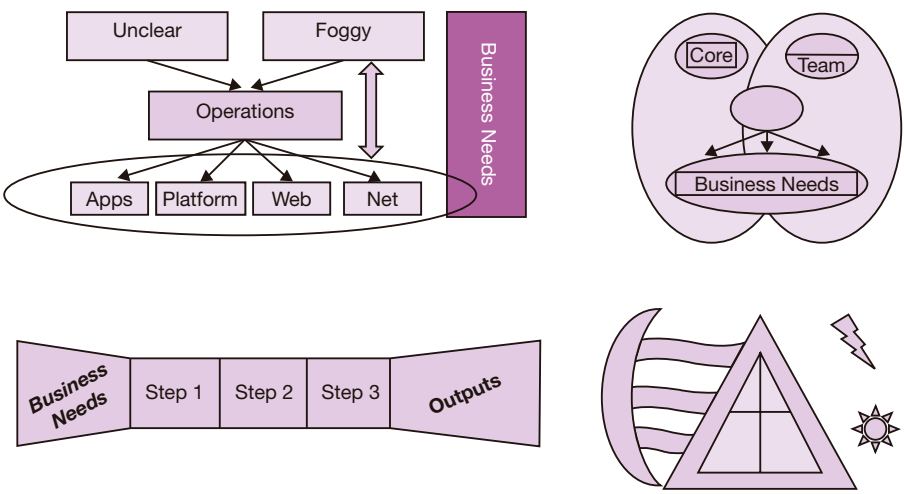

Figure 1 Sample theoretical governance models

Another common conception is that effective governance can be achieved with some combination of the "alphabet soup" of current process models. Do you have ITIL®, MOF, CobiT®, SOX, PMBOK® or any of the more sophisticated number/letter versions of ISO? Beyond the industry standards, there is the unending sea of vendor-specific approaches that promise effective governance "out-of-the-box". Why can't popular software suites be delivered with a "governance module" that delivers functional IT governance across

the enterprise with minimal external assistance? For that matter, if you have a strong and experienced management hierarchy, doesn't that replace a governance model?

To pull back from the details and look for answers, governance is like wellness. Some components are operational in nature (diet, exercise, etc.), some have tactical elements (environment, healthcare, lifestyle), others are more strategic and long term (genetics, aging). The reality is that good IT governance is a reflection of the unique attributes of your enterprise. What are the inherent risks of your industry? What are the critical drivers for your business? Who are the key stakeholders (internal and external) and what demands do they place on IT?

In a business environment, a better analogy is to relate to the IT Factory. The mature world of manufacturing has evolved a long history of business models at the Strategic/Tactical/Operational (STO) levels. There is useful guidance in this experience to help navigate to successful IT governance.

Governance defined

IT governance is simply corporate governance applied to the management of Information Technology resources. In this light, governance is the formal process of defining the strategy of the IT organization and overseeing its execution to achieve the goals of the enterprise.

The key elements of governance are:

- **Strategic** - Vision, goals/priorities, measures; value proposition and service portfolio; resource approaches and commitments; change management plans. Aligned/synchronized with the enterprise strategy, including other key asset strategies.
- **Tactical** - Decision rights framework and mechanisms. Translation into aligned and synchronized tactical/operational plans; closed-loop monitoring and control, and accountability in terms of regulatory compliance. Translation of priority guidance into applicable rules.
- **Operational** - Standards and documentation. Roles and responsibilities, schedules, checklists, and relevant metrics. Tools and rules. Escalations and exceptions. Quality and availability, frontline customer service. Balancing priority and requirements.

GOVERNANCE AND THE IT FACTORY

In the IT Factory, there are three critical activities:

- **What do we manufacture?** – A strategic decision based on a list of key factors; what does the market demand, what type of equipment do we have, what is the configuration of our plant, what changes do we need to make the product, what legislation do we have to comply with, etc.
- **How do we make IT?** – A tactical decision based on working "within the box" of operational capabilities that the strategic layer provides for. The amount of flexibility at this level can vary. The development of a portfolio management process will require input from both strategic and tactical layers.
- **Do it** – Run the factory on a day-to-day basis (operational management), follow the defined processes, and monitor and manage quality. This is the action/sense and respond layer on an ongoing basis. Quality, availability, consistency, and efficiency are the domain of this layer.

WHAT ABOUT PROJECTS?

Historically, there has been a significant amount of effort spent on the management of IT projects. The ambition of every IT operations staff was to be assigned to a high profile project and get "out of the trenches" of daily ops. Projects are an operational expression of a strategic/tactical desire for change. In this light, project delivery becomes an operational activity of equal importance with the rest of daily operations.

Project scoping, funding, and resourcing are essentially tactical activities that relate to the priority of the project. At the strategic level there are programs and portfolios rather than individual projects. Strategic goals and direction are generally too large to fit within an individual project effectively. The conflict between projects and operations requirements must be resolved with the proactive application of priority/escalation rules at the tactical layer to prevent "project gridlock".

THE GOVERNANCE "TOOLKIT"

As the art of IT governance matures, it has spawned a wealth of tools for the practitioner's toolkit. As any good production manager knows, the best way to run an efficient operation is to define the tools necessary to achieve the required outputs, and then provide them to the workforce. Unfortunately, the standard approach in governance has been to attempt to adopt one toolset and use it for all situations. Even worse, the initial selection of that tool is often based on dubious sources (experts, tradeshows, seminars, and trade publications) rather than an understanding of the unique environment of the organization they are to be used in. Buying tools from the catalog or the TV ads can be an enjoyable pastime, but you end up with a basement full of shiny, unused tools and still need that special screwdriver you don't have (substitute shoes for tools as applicable).

Let's take this opportunity to open up the IT governance toolkit and sort out some of the high profile contents by their attributes:

Acronym	Benefits	Attributes	Strategic/Tactical/ Operational
PfM (Portfolio Management)	IT alignment with business. Resource alignment and priority/ decision support tool	Logical, consistent approach to balance resources and business priority	Mostly strategic as a approval and decision tool Tactical as guidance for priority
CobiT (Control Objectives for Information Technology)	Recognized industry "checklist" for SOX compliance and "due diligence" of governance processes	Well documented checklist of key areas of governance	Strategic as a roadmap to elements of governance Tactical as a checklist for compliance
SOX (Sarbanes Oxley Act)	Legislation to improve corporate governance and transparency	Mandatory but the details are largely undefined with regard to IT	Strategic as overseeing compliance is an executive responsibility

Acronym	Benefits	Attributes	Strategic/Tactical/ Operational
ITIL (Information Technology Infrastructure Library)	Best practices for definition and delivery of IT services	Well documented and supported by training. No mandatory requirement to implement all processes. Use what delivers benefits	Largely tactical and operational. V3 starts to discuss strategic concepts.
PRINCE2/PMI (Project Management Methodologies)	Accepted approaches to deliver project outcomes while meeting resource, timing and quality commitments	Well documented and supported by training. Focus on delivery of requirements and management of resources.	Operational (in the context of this article) with some tactical elements relating to PfM updates

In addition, there is a laundry list of "supporting actors" eager to jump into the toolkit, including:

- business service management
- business technology optimization
- enterprise architecture
- IT asset management
- IT security management

The important concept is to find the appropriate tool for the job. The challenge is to understand the issues of the organization in question, and the context in which it exists, before selecting any of the governance tools.

- Nobody would argue that project management is unimportant, but is it appropriate as a tool to manage daily operations?
- Portfolio management is critical to set priorities and focus resources on key business requirements, but it is not appropriate for the generation of a new strategic direction.
- ISO 20000 certification may be a requirement for successful bids on customer contracts, but will it improve customer support in the medium term?
- SOX compliance is mandatory for many businesses, but does it improve service availability?

A PROPOSED GOVERNANCE MODEL

At its simplest level, governance is the allocation of resources and decision rights to achieve an objective. From a real-world situation, we can construct an IT-based model that demonstrates successful governance.

Company

A manufacturing company that utilizes "Direct to Consumer" web-based ordering as one channel to the market.

Business Issue

Executive management has set a guiding principal for the business units that channel revenue will be maximized by providing superior service rather than by direct price competition.

The management of the Direct to Consumer Channel has determined that one critical factor for success in this market is the response time of the web ordering service. There is a market segment that will not shop merely on price if orders are not processed and confirmed quickly, followed by immediate shipment of the order.

IT department response

The business case for reduced response time is given priority by business leadership as a key tactical priority to achieve the strategic goals. The IT strategic leadership assesses the priority of this request, utilizing portfolio management tools to allocate resources. The result indicates that three other projects will be delayed or one terminated to deliver this requirement.

The business team is presented with the alternatives, described in business terms and related business impacts, along with the recommended path forward. The IT business case is built with supporting information from the IT tactical group (cost estimates, staff requirements, etc.). The business decision is to end one project of low priority rather than increase overall IT spend.

This step is a critical value generator for the business in the long term. Making a conscious decision to end a project and re-allocate resources rather than just delay a series of projects is a major success. Most companies would agree that the business would be happier with fewer IT projects delivered and faster delivery. Making a clear (fact based) decision early is the hallmark of good governance processes.

If we can assume that this new project clears the bar, it must now be planned in detail to comply with all existing IT standards. The standards are created at the tactical level to create useable solutions that adhere to strategic guidance like “all technology solutions will be based on standard technology from three vendors.” In a decision rights-based model, any group that is presented with a situation within their span of control needs no additional approval to make the decision. In this case the project manager engages the architecture group to design the infrastructure. As long as the approved technology is used, no further approval is needed. If the business requirements demand outcomes beyond the approved technology, the decision needs to be escalated back to the strategic level for approval of the exception, or a modified outcome on the business case.

As this project winds its way down into the delivery process, it presents new decisions to operational units. Each decision is made in reference to the operational span of control and the priority of the project.

- Change windows are allocated to this project ahead of lower priority work.
- Staff resources from the cancelled project are re-allocated, released, or otherwise re-directed.
- Programming and testing resources are procured.
- Hardware, software, and communications resources are procured.
- Vendors are engaged or long term support contracts created.
- Operational impacts are defined prior to implementation and adequate support models created and resourced.

In all cases, the relevant groups do not have to request permission to make the necessary decisions or take action. The presentation of the request is sufficient. In manufacturing

terms, this is Kanban management. Kanban is a visual planning method used for production management, simplifying the approval process to the presence or absence of a key artifact (the empty bin is all the approval you need to fill the bin with products). The presence of an empty bin is the signaling system to trigger action.

The curse of modern business is the "Don't Spend Money Alert". Most experienced staff know that if this alert arrives in Q1, it will be a difficult year. In an environment that is making mature use of priority, the business impact of financial restraint is understood at the executive level. Project can be terminated or slowed based on priority, making the decisions business-based rather than technology-based.

To return to our one dimensional model, the project will spin out to its final delivery with all the usual trial and conflict resolved before it starts. As with any project, the definition of the business benefits to be delivered should be in the plan (and be measurable, objective, consistent, reliable, and presented in a logical intuitive format). This is the necessary feedback from the operational level to the strategic level on the effectiveness of the portfolio management approach.

Escalation and feedback loops are often unwelcome guests at the governance table. These are the mechanisms by which the reality of the life imposes itself into plans. Escalation exists to deal with immediate issues that require resolution to prevent delays, excess costs, etc. Often escalations are the results of weak planning, uncontrollable partners in the delivery chain, or invalid early assumptions. Any governance process must include clear escalation channels and ownership to resolve issues quickly.

A feedback system should always include the generation of metrics. This is the foundation of a "sense and respond" business. Factory metrics are usually based on production efficiency and cost. We all know the elaborate rules in place to produce financial metrics, right to the level of annual financial statements. IT metrics should be generated to the same standards of integrity and transparency. How many meetings have been called to resolve an issue created by "dueling metrics"? As a rule, no metric should be created that is not attached to a clear outcome, a target and an action plan if the target is not achieved.

An effective "Decision rights" model simplifies the management of the enterprise, ensures that valid escalations are resolved quickly, and that all results are properly measured and actions taken. By taking an integrated view of the requirements, and ensuring alignment from the outset, the strategic objectives can be translated by the governance tools from the toolkit into effective tactical and operational actions.

CREATING A "CENTER OF MEDIOCRITY"

It doesn't take long to find examples of failed governance, either in IT or in the real world. Recent history is littered with failed companies, failed technologies, the "dot- com" bubble, the Savings & Loan crises, not forgetting the "sub-prime meltdown".

In 1941, the Japanese Imperial Navy launched a successful attack on the US Pacific fleet at Pearl Harbor. In spite of a similar attack by the Royal Navy on the Italian fleet a year earlier, successful simulated attacks as a part of war games, and good intelligence, the US forces were not prepared. Briefly, what were the STO failures that lead to this event?

Strategic

The US government understood that it was pressuring Japan by withholding commodities (steel and oil) and access to the Panama Canal. They did not understand that the Japanese government was effectively controlled by military interests, or the level of risk than this government would accept to further its interests.

Tactical

Pearl Harbor was a fleet repair and re-provisioning centre, not an armed fortress. The Army was responsible for protecting the ships in harbor, the Navy was to sail out and project force to deter the enemy. The Army and Navy commanders didn't share intelligence, or even establish a joint command structure. Although many planes were available, none were assigned to patrol the area for threats. There was no sense of urgency in spite of clear warning signs. The Navy moved the ships from California to Hawaii to pressure the Japanese, but then left them all lined up in the harbor, defenseless. Lack of equipment was not the problem, lack of intent and preparedness were.

Operational

Procedures were not in place to connect radar sites to communications centers or airfields. Equipment was in place, but defensive batteries had no available ammunition. Guns had not been placed as it was feared they would offend local landowners. The defenders responded quickly with the tools they had once the attack began, but they could not overcome the failures at the tactical and strategic layers. As usual, heroes were created by exceptional demands on ordinary people.

Governance guiding principles

One practical approach to "Shop Floor" governance is to start with a set of guiding principles. These principles should create the necessary environment for effective governance implementation:

- Governance should be "fit for purpose", not "one size fits all".
- Understand the culture of your organization, find a compatible governance model.
- Governance is a means, not an end.
- Responsibility matrices should be clearly defined.
- Decision authority should be assigned and not corrupted without exceptional reason.
- Set priorities early and communicate any changes quickly.
- Define the governance tools you require in terms of what they deliver.
  - Don't try to force fit a tool for a purpose it was not designed for.
  - Don't implement the "governance tool of the moment".
  - Strive for a balanced solution.
  - Don't expect that you will ever be finished.
    - Governance is a process, not a destination.
  - Expect that a significant amount of effort and attention will be needed on an ongoing basis.
- Construct a solid, reliable issue escalation process that directs issues to the appropriate person immediately.
  - Don't confuse escalation with notification.
    - Escalation – Something needs immediate attention from a specific person to resolve.
    - Notification – Events are occurring that the organization should be aware of. Decisions are not requested.

Return to the shop floor

Back on the shop floor, the workers are waiting for the line managers to authorize the tools to use, and the managers are waiting for the executive owner of a budget to initiate the search project.

Lost in all this discussion of governance models and decision rights is the fact that a good workman can craft a quality result with a variety of tools and most of us would not know which tool was used. When you change the tools, you must expect a period of adjustment. Any discussion of governance and change is not complete without knowing the effect of change on the organization. As new governance models are considered for use, there is an old idea in play:

> *"It must be considered that there is nothing more difficult to carry out nor more doubtful of success nor more dangerous to handle than to initiate a new order of things; for the reformer has enemies in all those who profit by the old order, and only lukewarm defenders in all those who would profit by the new order; this lukewarmness arising partly from the incredulity of mankind who does not truly believe in anything new until they actually have experience of it."*
>
> *Machiavelli*

Changing the internal relationships between the key actors can be very disruptive to the entity. Moving to a process-oriented measurement culture can be very traumatic for some groups. Do not lose sight of the fact that the organization must continue to operate, with outcomes similar to the existing ones, throughout the period of change. Policy makers must craft effective strategies to minimize the adjustment period and deliver promised business benefits.

Change on this scale is a long term project, not something to be completed in three to six months. Actively consider breaking the implementation down into manageable components that can be proven to show measurable benefits. Select your governance tools based on the culture of your organization and the demands of your environment. Beyond the mechanics of industry standards, regulatory compliance, and business alignment is the factor of leadership. Good IT governance requires leadership (no, you cannot substitute management). Good IT governance is an elusive target, a shifting balance of strategy, tactics, and operations in response to long term priorities, short term escalations and the continuous pressure of business demands. Select the right tools, put them in the hands of experienced staff, and try not to be startled when the process is sometimes less than perfect.

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2.4 A new paradigm for IT governance in the Extended Enterprise

Organizations are increasingly working together in networked cooperation and in virtual alliances. Often, IT has a critical role in making such relations successful.
This implies new challenges for IT governance, since the achievement of successful results is not guaranteed by traditional models and best practices of IT governance. In this article the authors will answer the main question: What does IT governance look like within an Extended Enterprise?

INTRODUCTION

It is almost an understatement to say that we live in an era of radical change, characterized by the rise of abundant information and widespread technologies. Changes can be found in the products and services we buy, in the distribution channels we use, in the payment systems we employ, and so on and so forth. Also, the ways in which companies do business, the ways in which they are organized and managed have all changed beyond recognition. We identify this as significant business transformation.
The traditional organization model is characterized by a familiar pyramid structure, a functional set-up, a hierarchical control, and hard organizational boundaries. This model is practically gone. The long-established integrated “pyramids” have been shown to be too cumbersome and rigid to respond quickly and adequately in times of radical and enduring external change.
Organizations are increasingly working together in networked cooperation and in virtual alliances. Many strategic and long term relations, both formal and informal, are thus established. Often, IT has a critical role in making such relations successful.
This implies new challenges for IT governance, since the achievement of enduringly successful results from the cooperating organizations – defined as Extended Enterprises – is not guaranteed on the narrow basis of traditional models and best practices of IT governance. A fresh approach is needed and a paradigm shift seems inevitable.

In short, we will have to find the answer to a fundamental new question: What does IT governance look like within an Extended Enterprise?

A complex and, to a large extent, unknown domain is waiting to be explored. We will have a look into the problem background, then present the results from our research, give an insight into the findings and finally provide you with practical recommendations.

A new board with pieces is set. Let us now explore the rules of the game!

THE EXTENDED ENTERPRISE

Surviving in a networked world

Organizations are increasingly unable to succeed on their own in a world that is becoming larger and more complex. It is often undesirable and perhaps even impossible for organizations to deal on their own with the required economies of scope, scale and especially skills, without help from complementors[1]. They, therefore, enter into partnerships to cope with more sophisticated customer demands, products and services.
As a result, virtual organizations and configurations of networking organizations flourish. The basis of the virtual and networking organization is a structure, or even a culture, of cooperating centers working together, either temporarily or in a more or less permanent framework, according to specified and agreed patterns; hence the term 'network'. One of the interesting aspects of this is that both customers and suppliers are seen as part of the network. The term 'virtual' refers to the fact that an organization is no longer formed by, for example, one or more physical buildings, workspaces and distribution channels. Rather, a virtual organization is present, callable and accessible anytime, anywhere, often using information technology (IT). The terms "networking organization" and "virtual organization" are complementary. But they are also part of the same phenomenon, and are both made possible by modern-day IT. Accessing all kinds of information from any location and using any device provides the opportunity to communicate about anything and with anyone who is part of the network; these are preconditions for the existence of such organizations. We have coined these structures of virtual, networking organizations The Extended Enterprise, as shown in figure 1.

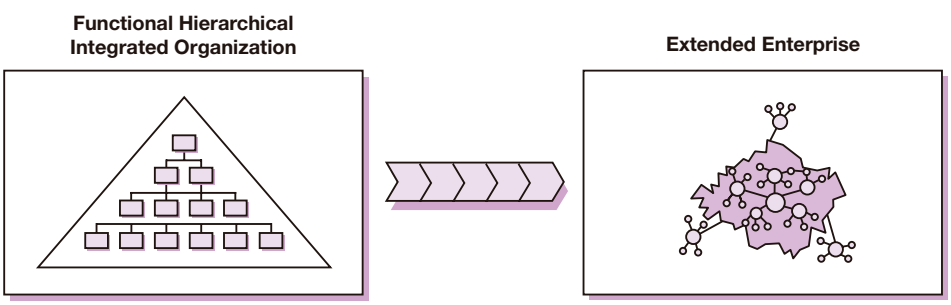

Figure 1 Business transformation towards a networked world

Permeable, blurring organizational boundaries have replaced the conventional hard ones. Enabling IT has made other ways of interacting and transacting possible.
The hierarchical command and control management style had to make a place for a complex series of explicit and implicit arrangements, contracts and agreements between the cooperating centers of the Extended Enterprise. These cooperating centers might be called "partners", forming all kind of partnerships across the Extended Enterprise. Indeed, the terms "Partnership" and "Partnering" are becoming increasingly popular when describing relationships between suppliers and buyers. However, some devil's advocates warn not to overrate such relationships. In their opinion, suppliers want to be, or become, preferred

[1] Complementors is a term used to describe businesses that directly sell a product or service that complements the product or service of another company by adding value to mutual customers; for example, Intel and Microsoft (Pentium processors and Windows). Complementors are sometimes called "The Sixth Force" (from Porter's Five Forces model).

suppliers and establish a lock-in situation by increasing switching costs and by preventing competitors from doing business with "their" clients. On the other side, as devil's advocates would say, buyers are most interested in establishing partnerships as a way to lower fees for the rendered services. Their main goal is to obtain discounts because of the "partnership" status.

Partnership typology

We are not talking about pure and plain customer–supplier relationships here. Parties that engage in Extended Enterprises develop "real" partnerships.
Of course a distinction can be drawn among the different types of relationships between organizations. For research purposes, we used a relatively straightforward typology of relationships. Three different types have been defined, as illustrated in figure 2:

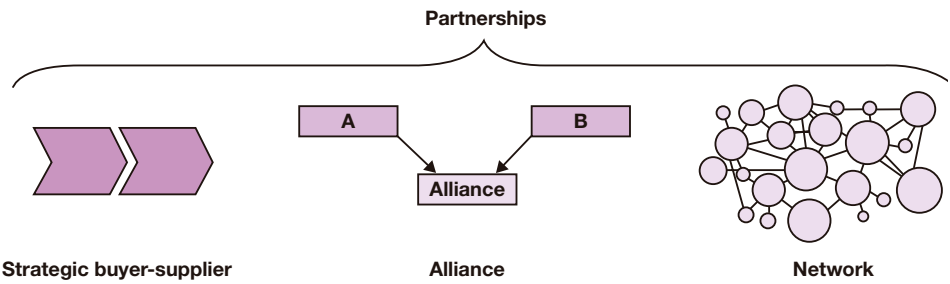

Figure 2 Extended Enterprises are based on three types of partnerships

- **Strategic buyer-supplier** – A long-term, contractual relationship involving two organizations in which one partner delivers a specified product or service to another party for payment. In these partnerships, risk and uncertainty are limited with regard to the transaction. The goal of the relationship is to obtain cost savings. Coordination of these relationships typically takes place on either an operational or a tactical level.
- **Alliance** – A relationship between a limited number of organizations in which each organization runs a risk with regard to its investment and/or the expected revenues of the cooperation. The typical goal of this relationship is to develop a new product, market or process. The legal form may be a joint venture. Alliances are typically coordinated at a strategic level.
- **Network** – A relationship among three or more organizations, characterized by interdependence among the organizations involved (the relationship between A and B can affect the relationship with C). Typically, the goal here is to combine knowledge to deliver complex solutions to clients. Other goals may include achieving knowledge exchange or standardization.

Of course, the types we define here are stereotypes, and stereotypes seldom exist in pure form. In practice, many relationships are hybrids of more than one category. For example, there are many forms of strategic supplier relationships. Alliances are often embedded in networks. Nonetheless, these three types adequately provide a basic reference point for looking at partnerships in practice.

For our research, we explicitly excluded organizations resulting from merger or acquisition and Shared Service Centers. All of these types of cooperation imply an integration of

corporate structures and activities (for example, by creating a new organization that blends the goals of two original organizations) according to the traditional pyramid mechanism. This differs fundamentally from the Extended Enterprise, where only virtual cooperation and integration is implied.

Drivers for partnership

Why do organizations partner with one another? A number of traditional reasons for partnering exist, while some of the fundamental aspects associated with moving business towards the network economy boost the need for partnering (in particular globalization and technological innovation). Obviously, a combination of drivers can be observed in practice as well; they include:

- access to new and foreign markets
- increased efficiency
- lower R&D risks
- access to specialized competencies
- serving individual, complex consumer needs
- hedging against missing out on a technology
- setting the standard

Strategic buyer - supplier relationships are typically driven by the need to bundle complementary, specialized competencies. They combine high levels of efficiency on top of securing access to specific competencies and specializations in a global business landscape. Alliances also profit from bundled complementary skills and competencies and from benefits arising from operating in a global market. Alliances can successfully serve complex customer needs and provide end-to-end solutions for, say, e-commerce and e-business demands. Networks tend to focus on a single driver, for example the competence driver. In this case, network partners are supposed to bring in different but complementary competencies. Through the initiation and development of mutual projects, network partners benefit from shared R&D results. Another example is the focus on setting common (technology) standards. In so doing, the network provides a way for all participants to hedge against missing out on a technology.

A NEED FOR NEW RULES

What is IT governance?

IT governance means specifying the framework for management rights and accountabilities regarding IT-related decisions.

Promoting mutual coordination between units and geographies, and uniformity of IT processes, products and services, IT governance thus includes the entire spectrum of positions, coordination mechanisms and decision making processes which encourage desired behavior in the use of IT, see figure 3.

IT governance covers all strategic IT domains – principles, architecture, investments, applications and infrastructure – and can be modeled in various styles (from “monarchy” to “feudal” to “federal”) according to the needs of the enterprise.

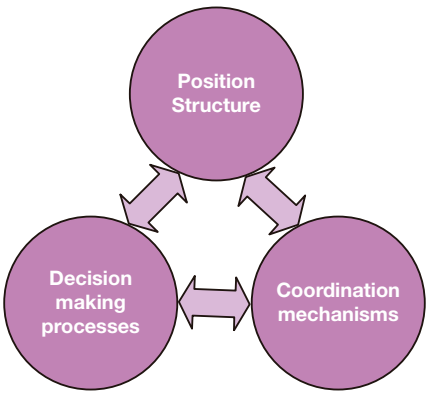

Figure 3 IT governance framework

A PARADIGM SHIFT FOR IT GOVERNANCE IN THE EXTENDED ENTERPRISE

With respect to the management of Extended Enterprises, finding the correct balance between structural and relational management instruments is imperative. Both hard and soft aspects must be integrated in Extended Enterprises where appropriate. This, of course, not only applies to general management and enterprise governance, but also to the management of IT and hence, to IT governance in the Extended Enterprise.

What is the difference between IT governance in an integrated enterprise and IT governance in an Extended Enterprise? Does IT governance in an Extended Enterprise differ as much from IT governance in an integrated enterprise, as the way in which an Extended Enterprise differs from an integrated enterprise?
We believe it does. A fundamentally new paradigm for IT governance is needed, as the characteristics of an Extended Enterprise cause existing certainties to fall away and existing models to fail.

Whilst establishing IT governance within an integrated enterprise, the board or management can traditionally hold on to certainties that are implicit in the organization model, making up the current governance paradigm:

- The structure – characterized by the familiar pyramid structure, a functional set-up, hierarchical control and hard organizational boundaries – makes it possible to arrange not only the formal decision rights with regards to IT, but also the escalation mechanisms to enforce the decision making processes.
- The carefully implemented IT service management or IT development processes (that is, ITIL®, CMM, ASL and BiSL frameworks) describe which decisions can be taken by whom, in what sequence and based on which defined inputs.
- A variety of both formal and informal consultative bodies (for example project board or change advisory board) exist to facilitate management decisions on IT.

These “certainties” define the way in which management decisions regarding IT are usually made. They do not have to be invented or designed each time and provide a firm framework to rely upon. Apparently a particular culture (a set of rules of behavior) exists to which everyone knowingly or unknowingly conforms; decision making regarding IT is based on widely supported paradigm “this is how we do things here”.

The problem statement

When an Extended Enterprise arises, a new configuration with a new field of influence is originated and suddenly this governance paradigm is no longer valid. It turns out to be too cumbersome and rigid to respond quickly and adequately. A number of aspects have to be revisited:

- Management and organizational structures are no longer in place by default; there is no hierarchy to fall back upon for formal decision making.
- Formal and informal processes/procedures are not agreed upon upfront and no longer work as expected.
- Facilities, and particularly IT resources, are no longer in place and are not connected as one would expect. Information and systems used to base decisions upon are no longer available when needed.
- The user community (consisting of users from all constituent communities in the partnership) has to be redefined and its information requirements need to be assessed.

One might think that these shortcomings can be mitigated by the lessons learned in mergers and acquisitions. However, the goal of both mergers as well as acquisitions is to create a new integrated enterprise. This new enterprise can emerge in two different ways:

1. The new enterprise takes on the IT management characteristics of one of the constituent organizations in this acquisition. Even when it is called a “merger”, one “partner” commonly turns out to be to most powerful or influential.
2. A completely new set of IT management characteristics is developed for the new enterprise.

In both cases, however, a flat, two-dimensional model is used. The result is yet again a traditional integrated enterprise with little “extended” characteristics.

So what is different in an Extended Enterprise? Or, in other words, why is a third dimension needed and what could be the characteristics of that new dimension?

1. There is no simple relation or dependency between the individual “motivations” of the participating enterprises and the explicitly formulated goals of the Extended Enterprise itself. This is no surprise since the individual participating organizations do not disappear but simply participate in an Extended Enterprise when a real advantage is to be gained. For example, the publicly voiced goal of developing new services together can perfectly fit an individual target of simply cutting development costs!
2. There is no single hierarchy where all accountabilities and responsibilities ‘naturally’ come together. The lack of a hierarchical structure prevents vertical escalation in cases where relative priorities are unclear or a “chain of command” is normally presumed. The power to simply enforce decisions must be replaced by other ways of exhorting decisive influence;
3. IT decision making processes are often ‘optimized’ based on the internal criteria of an individual enterprise, and were not developed to be flexible enough to be linked to the processes of other organizations or agencies. Internal processes or procedures are often based on cultural assumptions (consensus vs. “executive power”) and coordination mechanisms like committees being in place. When processes do not only cross departmental boundaries but also cultural boundaries, additional organizational interfaces have to be put in place.

The Extended Enterprise differs from the situation of a merger or acquisition, as there is no “two dimensional overlap”. In figure 4 three enterprises are drawn as geometrical forms in three different colors, which seem to overlap in the middle. But, in reality, these organizations

only work together towards a common objective, while having no physical or organizational integration. Overlap would only occur when the organizations actually integrated their activities into a Shared Service Center or merge otherwise.

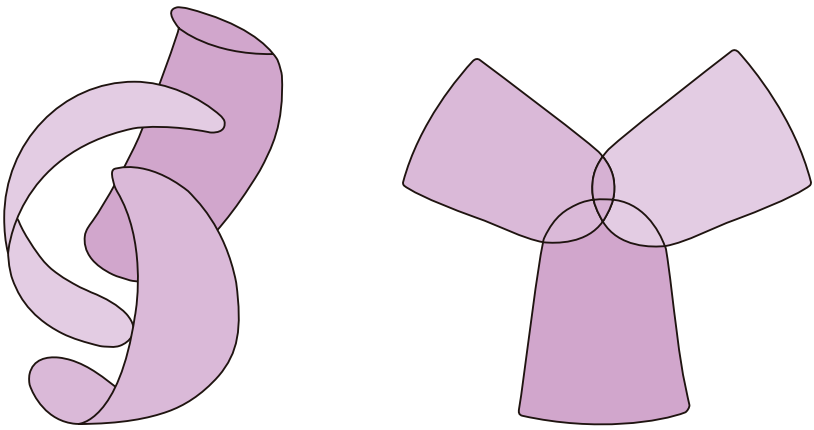

Figure 4 Apparent overlap of organizations

So a need emerges for a three-dimensional paradigm of “maximal freedom in a structured connection”.
We are looking for a paradigm in which all partners are free to pursue their individual aims whilst cooperating towards their shared goals. In this new paradigm, all partners in the Extended Enterprise are bound by common IT governance constraints that are related to their common activities or domains. At the same time, allowances should be made to provide maximum freedom for the activities or domains that are not common. As a result, partners conform to the IT governance structure, processes and coordination mechanisms associated with their common goals. These partners do not cross into each other’s space thereby infringing upon each other’s freedom.

Since this paradigm is based on the assumption that the traditional hierarchical structure is absent in many or most Extended Enterprises and that decision making processes will not suffice, this new paradigm will rely heavily on the use of proper “coordination mechanisms”.

OUR RESEARCH RESULTS

Discovering new ground rules

Triggered by currents in the management of Extended Enterprises (and the problems arising with it), we decided to investigate the consequences of Extended Enterprise cooperation for IT governance.
In order to gather information, a specifically-developed questionnaire was sent out to more than 400 CIO’s and IT decision makers in different market sectors. Also, interviews were conducted to provide an even deeper understanding as well as to uncover issues and motives that are impossible to capture with online questionnaires.

The hypotheses we built our research on were:

1. The IT governance structure depends strongly on the business motives for establishing the Extended Enterprise.
2. The more complex the Extended Enterprise, the more informal the underlying IT governance model.
3. In a strategic buyer-supplier partnership, formal IT governance is most effective.
4. An alliance partnership benefits most from a hierarchical control function (IT board).
5. In a network, an informal IT governance model is most effective.

First of all, many IT managers responding to our questionnaire indicated that they were familiar with Extended Enterprises. All of them could mention a specific cooperation as we described earlier in relation to Extended Enterprises, and could therefore respond adequately, providing valuable information on how IT governance is settled when organizations cooperate in the three ways described.

Research results

Extended Enterprises are mostly established between partners in the same business sectors; with various motives like market expansion, knowledge expansion, differentiation, cost reduction and flexibility. In most Extended Enterprises the business motive is significant for the IT governance that is implemented in the Extended Enterprise as illustrated in figure 5.

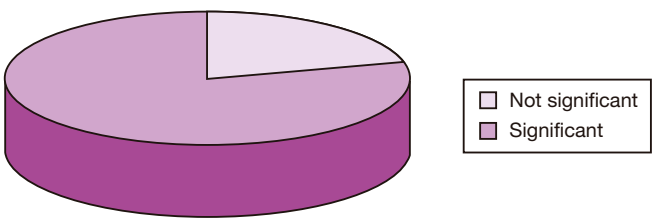

Figure 5 Significance of business motive for choice IT coordination mechanism

Based on the results of the questionnaire and the interviews, we concluded that even if the primary motivation for a partnership lies in the IT domain, the business motive for the Extended Enterprise defines the way IT governance is shaped and formed. IT governance and the governance of the Extended Enterprise are always aligned, either by first implementing IT governance, thereby influencing the business governance, or vice versa. There is no straightforward sequence in the activities of the implementation process.

We presupposed a linear relation between the complexity of an Extended Enterprise and the formality of the IT governance. However, the results of the questionnaire and interviews do not confirm this hypothesis. All our respondents consider the Extended Enterprise to be rather complex; regardless of whether the IT coordination mechanisms are formal or informal. We found that most strategic buyer-supplier partnerships have implemented formal coordination mechanisms. The organizations which have implemented formal IT governance are mostly satisfied with the impact.

Figure 6 shows the effectiveness of implemented IT governance.

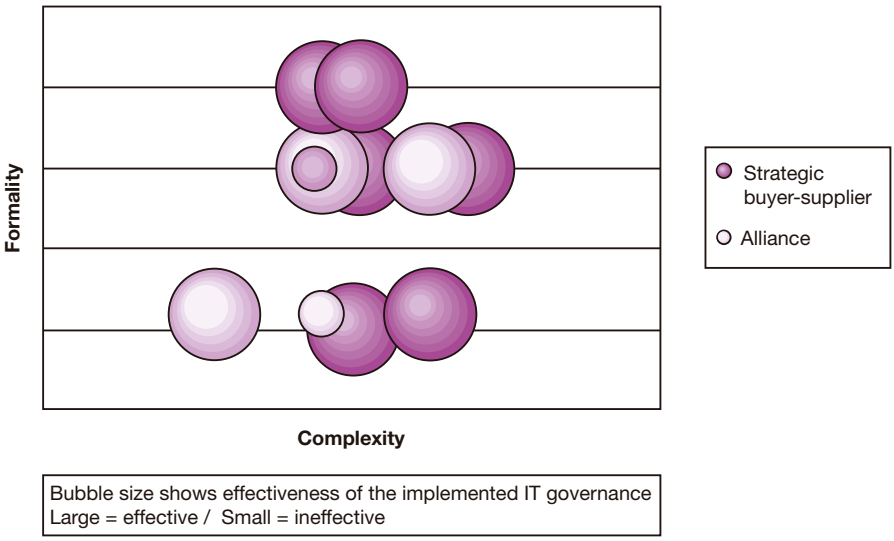

Figure 6 Effectiveness of implemented IT governance

Formal coordination mechanisms are:

- **tasks, rules and procedures**: mutual contracts and partnership agreements
- **performance levels as goals**: Service Level Agreements (SLA's)
- **hierarchy**: vertically oriented management

Informal coordination mechanisms are, amongst others:

	Function description
Direct contact	Use of the horizontal relation, where the members of the organizations involved try to solve problems through direct contact. This prevents unnecessary vertical escalation in the hierarchy.
Liaison role	For performing subtasks intensive and frequent contact is required, through which - for the mutual communication - a liaison role is created to maintain and improve contact between the involved parties.
Taskforce	Temporary team that is put togther when a problem can only be solved with joint effort in a team.
Team (permanent)	Permanent team. Inter-organizational team that tries to solve commonly occurring issues within a certain professional domain.
Coordinator/ integrator	A role to be fulfilled by a separate officer. This role focuses on the stimulation of the integration between the partners, however, without having control or formal power of decision. The coordinator/integrator coordinates decisions that are taken with regard to various areas but are, nevertheless, connected (for example, decisions concerning one product). The coordinator/ integrator maintains contacts, gives information and stimulates information sharing.
Integrator/ manager	A role to be fulfilled by a separate officer. This role is based on limited but binding authority, for coordinating the decisions taken with regard to various areas between cooperative parties. Next to this, the integrator/manager also has budgetary authority.
Matrix cooperation	Dual authority and reporting lines, where decisions are taken jointly and on the basis of equivalence between partners.

Table 1 Informal coordination mechanisms

In alliances, most organizations implement a non-hierarchical direction function to their satisfaction.

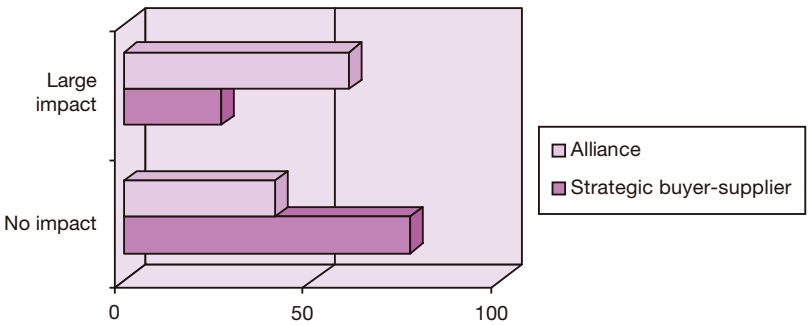

Figure 7 Impact on internal IT governance

The majority of the respondents state that the IT governance model of alliances has no impact on the internal IT governance model. However, unlike alliances, the IT governance model of strategic buyer-supplier relationships does have an impact on the internal IT governance, see figure 7.

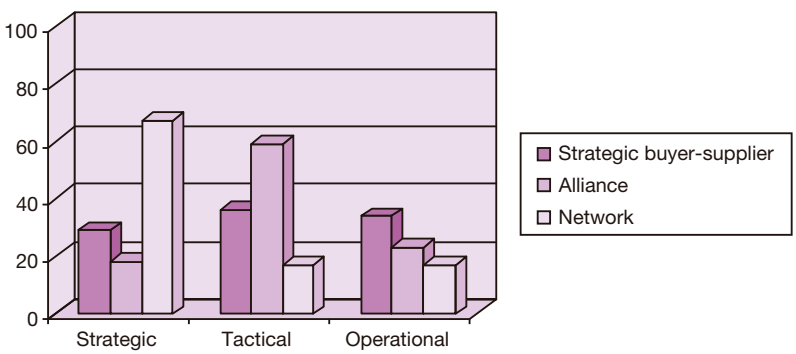

Figure 8 IT governance implementation

The level on which the IT governance model is implemented differs between the different types of relationship, as illustrated in figure 8. The respondents that were in a strategic buyer-supplier partnership have distributed the IT governance implementation almost evenly over strategic, tactical and operational levels; on the other hand it appears that the focus in alliances is mostly on the tactical coordination level and in networks on the strategic level.

All questionnaire respondents considered their extended enterprise to be information intensive, meaning that lots of information is shared between partners. In strategic buyer-supplier partnerships, the information is shared on operational as well as on tactical and strategic levels, see figure 9.
Resources (information, people and systems) are shared between most partners in an Extended Enterprise, shown in figure 10. Almost half of the Extended Enterprises have joint information services and systems that are in place to support core processes.

In alliance partnerships, mostly tactical information is shared. For core processes the majority of the respondents state that information is shared. However, only a minority indicates that joint information systems and services are in place.

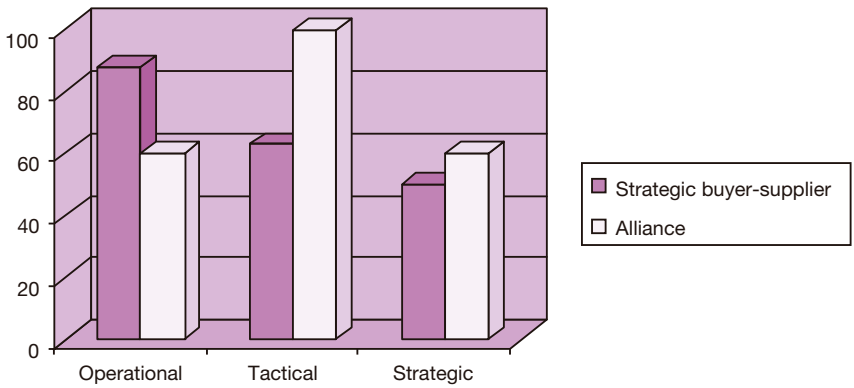

Figure 9 Sharing Information

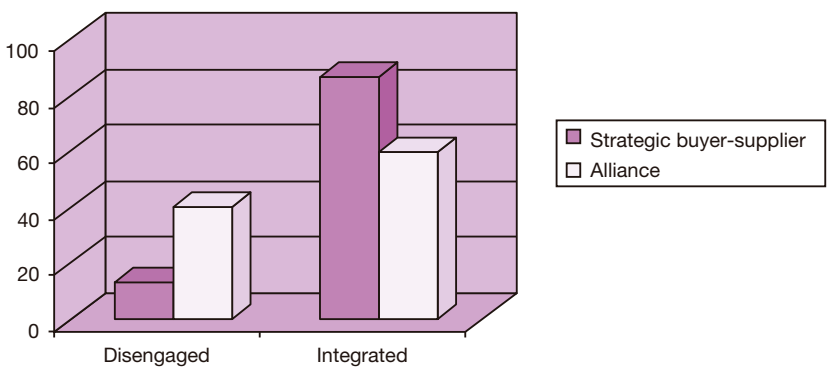

Figure 10 Sharing resources

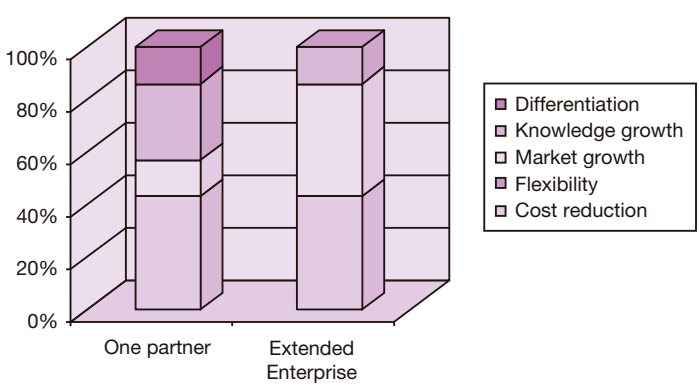

Figure 11 One partner's motive versus mutual motive strategic buyer-supplier

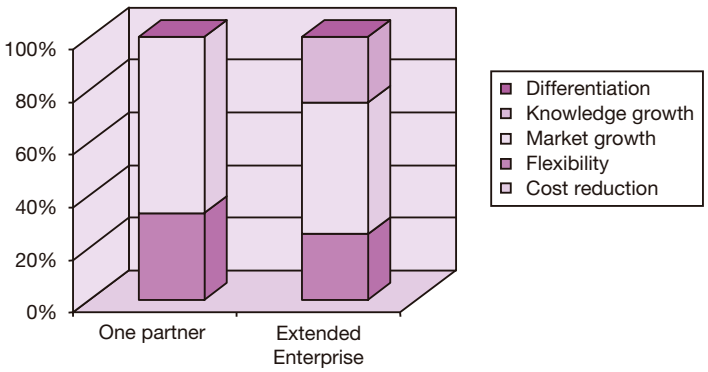

Figure 12 One partner's motive versus mutual motive Alliance

The research clearly indicated which business motives drive the Extended Enterprises. Strategic buyer-supplier partnerships aim in almost 50% of the cases for cost reduction (see figure 12). Market growth also drives many Extended Enterprises.
But there are also one partner business motives, often differing from the shared goals. Where individual drivers differ significantly from the common drivers, hidden agenda's of individual partners arise, leading to subtle political strategies to ensure the achievement of own goals in spite of the explicit, shared goals.
In alliances, where partners are more or less equal, this phenomenon becomes even stronger.

Finally, the effectiveness of coordination mechanisms was measured against the business goals driving the Extended Enterprise. Later, below these findings, we will return to underpin the definition of effective IT governance in the Extended Enterprise.

In the interviews, we found that the coordination mechanisms are chosen based on various aspects:
- the business motive for cooperation
- the type of Extended Enterprise
- previous experiences with IT governance within the organization itself

The interview results show that the process of implementing IT governance models in Extended Enterprises is different from implementing them in a single organization. If there is a dominant partner in the Extended Enterprise, the implementation of the IT governance model does not appear very different from the implementation of the internal IT governance of the most powerful party. However, if partners are more or less "equal" (plain level playing field), the implementation process will have the characteristics of a negotiation process, covering politics and "power play".
A partner's power in the Extended Enterprise appears to be determined by the amount of invested capital, resources, knowledge and people. Equal partners in an Extended Enterprise organize their IT governance based on the partnership's goal.

GETTING OIL IN THE MACHINE

Towards the effective use of coordination mechanisms in the Extended Enterprise

The need for a paradigm shift, combined with the research results, lead to a new vision on how organizations can be successfully interlinked.

As described, Extended Enterprises are interlinked organizations that need to be coupled but at the same time require freedom of movement to realize their own business goals. This phenomenon can be graphically drawn as interlinked concave shells. Viewed from above, these organizations have virtual overlap, which represent the areas in which cooperation, and subsequent interaction, is expected. These can be in any area, such as finance, marketing, IT or human resources (or any combination of these). An immediate consequence is that in these areas, alignment of behavior is needed in order to achieve the results and reach the objectives of the Extended Enterprise. In other words, in order to succeed "extended corporate governance" is needed.

The need to make arrangements and have agreements on the common business areas can be depicted by an axis, connecting the concave shells. In the 3d view, the cooperating organizations look like concave shells spinning around an axis (see figure 13). This implies a certain degree of freedom of movement, which is needed to achieve the organization's own business goals. But also, it shows that the organizations cooperating are interlinked by an axis of governance.

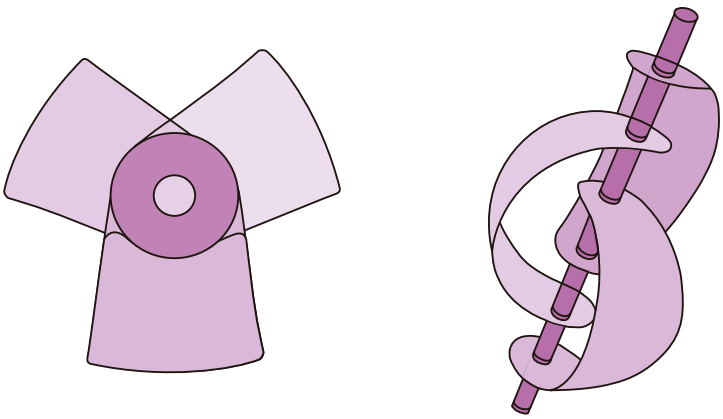

Figure 13 Vision on the Extended Enterprise: restricted freedom

Organizations that do not follow the rules of the "Extended Governance" will fall off and the harmonious spinning of the various partners will stop.

Extended Enterprise Governance drives the associated IT governance, which can be described as one part in the governance arrangements. Extended Enterprises are information-intensive, which implies the need for a substantial IT governance framework. Within such a framework, coordination mechanisms are essential when settling IT governance across organizations' borders. A definite set of positioning structures is hard to establish and decision making processes take a long time to agree upon. Coordination mechanisms can, therefore, be described as the oil in the machine: they are the oil "on" and "around" the axis of governance promoting mutual dynamics and helping organizations to "spin successfully".

The IT governance in the Extended Enterprise Framework

What factors influence the effectiveness of IT governance mechanisms in the Extended Enterprise? Which coordination mechanisms are effective in which situation?

There is no simple formula. We found in our research that Extended Enterprises are encountering several issues when establishing governance agreements, and specifically, IT governance agreements.
Our research proves that the business drivers for establishing the Extended Enterprise have a big influence on the IT governance agreement.
When a business driver is compulsory (for example law), it is proven that the cooperation often turns out to be awkward. In this case, IT governance is less effective when compared to strong, common business motives driving the Extended Enterprise.
In general, a model (framework) can be established to describe the relation between the main influences.
The framework subsequently shows three blocks (see figure 14):

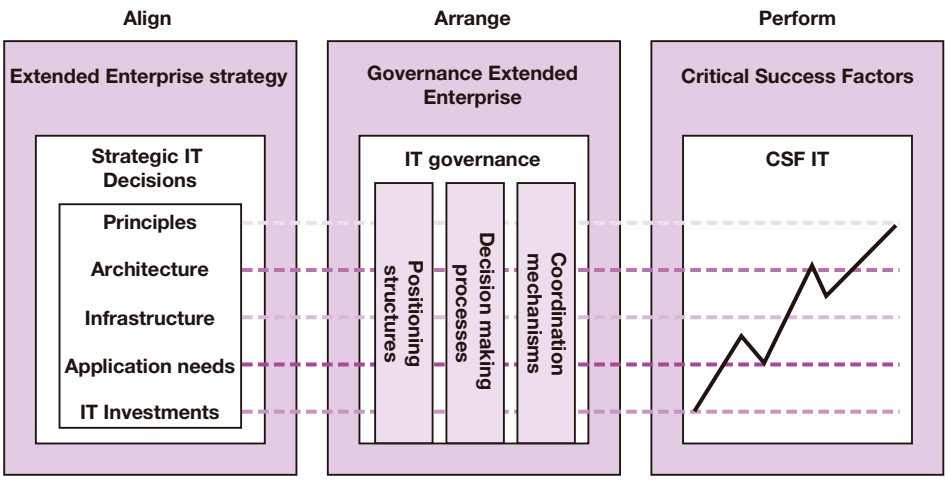

Figure 14 New framework for IT governance in the Extended Enterprise

1. **Align**: Which IT decisions have to be taken in order to ensure effective management and IT utilization?
2. **Arrange**: Who will have to make these decisions?
3. **Perform**: How can these decisions be made and how can they be monitored?

The framework clearly states that business drivers determine the Extended Enterprise strategy. This strategy defines how to manage common business areas, including IT (which can be described in terms of IT principles, architecture, application needs, investments and infrastructure). It also determines the governance of the Extended Enterprise, including IT governance. In other words, IT governance must be aligned with business governance.

The effectiveness of the governance of the extended enterprise and the IT governance arrangements – which are a means of providing the answer to the question "is IT supporting the Extended Enterprise effectively?" – need to be measured periodically. In order to do this, Critical Success Factors need to be defined, which enable the performance monitoring of the Extended Enterprise. IT governance designers need to be explicit on how IT governance will contribute to organizational performance goals in order to measure the quality as well as the effectiveness of IT decisions.

This immediately clarifies, in all layers within the (IT) organization, who is responsible for specific results and how performance evaluation takes place.
Measurements can be easily incorporated into formal balanced scorecards, which need to incorporate the Critical Success Factors set up by the cooperating parties.

A closer look at coordination mechanisms

Adequately designed coordination mechanisms enforce desired behavior on IT decisions and will thus lead to favorable results in terms of added value for the business.
In other words, proper use of coordination mechanisms is one of the keys to successful IT decision making. In this paragraph we will describe how and when coordination mechanisms become effective in Extended Enterprises.

Business drivers

We found the effectiveness of coordination mechanisms is different for each business motive driving the Extended Enterprise.
For example, when cooperation is driven by a need for market expansion, only two out of ten coordination mechanisms are proven to be effective: direct contact and the establishment of a liaison role (both being informal mechanisms). Another example is Service Level Agreements (SLA's); they are very common and rated as very effective by many respondents from those Extended Enterprises where the aim is cost reduction or knowledge expansion.

In table 2 the effectiveness of coordination mechanisms is summarized:

Coordination mechanism	Cost reduction	Market expansion	Knowledge expansion
Tasks, rules and procedures	+	-	+
SLA's	+	-	+
Hierarchy	-	-	+
Direct contact	+	+	+
Liaison role	+/-	+	+
Taskforce	+	+/-	+
Team (permanent)	+	-	+
Coordinator/ integrator	-	-	+/-
Integrator/ manager	+	-	+
Matrix cooperation	-	-	-

Table 2 Effectiveness of coordination mechanism per business driver

This leads to the following statements:

- Extended Enterprises based on knowledge expansion will be able to utilize many coordination mechanisms effectively (only the matrix cooperation will not work).
- Matrix cooperation was found to have little effectiveness in different settings and within different business drivers.

However, not all business motives for cooperation are shared. Cooperating organizations can have their own individual drivers for cooperation, needing other coordination mechanisms over and above the most effective mechanisms that might exist for the shared business motive. This means that an organization's individual goals within the Extended Enterprise

need to be aligned with the common business drivers in order to design well functioning coordination mechanisms.
In addition, as stated earlier, individual business goals can lead to political strategies, especially when partners are equal in terms of power.

Culture
Coordination mechanisms also need to fit within the culture of participating organizations. Strong hierarchical coordination via IT boards, SLA's and procedures – which were often mentioned by our interviewees as being the expected characteristics of effective IT governance – will only reach its goal when the participating organizations cope with a hierarchical way of working and will accept (external) authority.

Final remarks
In addition to the research's analysis and results, interviews have shown that some other influences also play a role when it comes to cooperation and establishing the IT governance. These factors co-determine if and how coordination mechanisms will be effective. They need to be kept in mind when reaching new agreements and settling governance issues.

Dutch government institutions are cooperating to realize the so-called "Elektronische overheid" ("Electronic Government"), a project that aims to bring public administration services to citizens "any time and anywhere". The cooperation can be viewed as a network. The national government department needs to work together with local authorities to achieve a new way of delivering services to citizens. Their cooperation is strongly characterized by deliberation and decision making on the basis of consensus. It would be unthinkable and highly ineffective to establish IT governance based on strong hierarchical principles. In this context, the establishment of a common architecture board and cross-organizational project teams are expected to be far more effective.

1. **Equality**. Partners who differ strongly in terms of power, knowledge or budget, will be subject to a field of influence, wherein the strongest partner sets the rules of the game. This will affect the cooperation and make it appear that the establishment of IT governance within an organization is based upon a hierarchy that determines the relations. Only when partners are equal in power do the business drivers influence the IT governance in a rational way. Strategic buyer-supplier relationships tend to be less equal than alliances. Networks are also characterized by differing levels of equality.
2. **Trust**. Trusting partners is fundamental to cooperation, specifically when cooperation goes beyond simple agreements on buyer-supplier, or on contracts that are target-based. Trust can be characterized as an emerging force in the increasing number of Extended Enterprises and is inherent to risk sharing. Trust is different from risk mitigation but can, however, be complementary to it. Risk can be minimized by the establishment of both formal coordination mechanisms such as SLA's (which are used in most Extended Enterprises) and informal mechanisms.
3. **Stability**. A strategic setting and a long period of cooperation determine the way partners cooperate and set rules. Short term cooperation makes it difficult to establish well-designed, specifically modeled coordination mechanisms, while a stable Extended Enterprise enables evaluation cycles and stimulates the settlement of proper coordination mechanisms.
4. **Maturity**. Experienced partners tend to overrule "new" partners. A remarkable difference in the cooperation's maturity will have a negative influence on the results of this cooperation.

CONCLUSIONS AND RECOMMENDATIONS

The rise of the Extended Enterprise phenomenon is a symptom of the postmodern network era. The Extended Enterprise differs fundamentally from traditional, pyramid style organizations and requires a fresh approach when it comes to governance of IT decision making. We have identified this as a dramatic business transformation.
Our research showed that IT decision makers recognize this trend and that a "paradigm shift" is needed. Traditional literature and models don't sit easily alongside this new setting. A new approach is needed, to define the arrangements needed to govern IT effectively.

The concave shells model depicts a new approach to IT governance, it being the axis interlinking cooperating organizations. We developed the "IT governance in the Extended Enterprise Framework" which underpins the fact that IT governance must be aligned with the cooperation's strategy, and that critical success factors must be defined to measure results and ensure that evolution of the IT governance arrangements actually happens. Within this vision, coordination mechanisms form the oil "that keeps the machine turning", rather than formal structures and process descriptions.
We discovered that Extended Enterprises are sensitive to business drivers, both in defining their extended enterprise strategy and in settling effective coordination mechanisms.

Coordination mechanisms differ in style and application and are strongly related to the organizational culture. We separated formal and informal coordination mechanisms. Based on the vision, the framework and specific research results, some practical recommendations can be given when it comes to coordination mechanisms.
For example, in order to reach business goals in an alliance that is focused upon cost-reduction, a formal, proper and restrained IT governance approach needs to be taken (for example through SLA's and hierarchical coordination mechanisms). When common product development or market expansion is sought, more spacious and liberal IT governance principles are needed to attain the projected business results.
Service Level Agreements are very common and effective in many Extended Enterprises. However, when market expansion is driving the cooperation, SLA's will be much less effective.

We believe Extended Enterprises are ready to be approached as full grown entities. In this article, new rules of the game have been explored. Organizations struggling with governance issues in cooperation and virtual environments can now rely on a new paradigm and get to grips with IT decision making.

Let the games begin!

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2.5 Future-proof compliance: Fact or fable?

The sharply increasing interest in IT governance is particularly caused by the need for organizations to keep up with external requirements: also known as "compliance". Rudolf Liefers, Johan Sturm and Daniel van Burk analyze the situation with regards to compliance, and its relevance to IT service management.

INTRODUCTION

Events that have a social impact (such as fraud and terrorist attacks) tend to be reflected somewhat later in new and amended legislation, or in increased enforcement of existing rules. Recent examples are the Sarbanes-Oxley Act (SOX), Corporate Governance regulations (e.g. LSF, Tabaksblat), Privacy legislation, Basel II, Computer Crime Act and Intellectual Property Law. Rules and supervision are not the exclusive preserve of government authorities. Organizations too make demands on one another, for example in outsourcing relationships, and require one another to discharge a burden of proof in the form of, say, a SAS 70 certificate. Also voluntary standards, like ISO 27001 for Information Security have an increasing impact on organizations. Finally, software suppliers are taking an increasingly critical look at their customers in terms of the burden of proving legal use of software. In recent years the various market sectors have therefore been inundated with new requirements and rules. And in the wake of the rules come the regulators wanting to know whether the rules are being complied with. Many of the rules are retranslated into requirements for ICT provisions and procedures. A key question is how to future-proof the compliance with the rules for the organization concerned.

EXTERNAL REQUIREMENTS FOR CONTROL OF IT

Compliance is here to stay. It follows that even after the initial surge of interest in compliance has receded, the need for demonstrable compliance with the requirements continues to exist. The events that have impacted society as referred to above, and the legislation introduced to deal with them, have therefore changed something fundamental in the IT field. This is because demonstrating control of the development and management of IT has become an *external* obligation involving the imposition of requirements on the quality of IT by the authorities and their regulators. Usually this concerns the confidentiality, integrity and availability of IT, but it is also about the verifiability of procedures and processes. Demonstrable compliance with laws and regulations will continue to require everybody's attention in the years ahead, as demonstrating a compliant status will become – and indeed often already is – a recurrent annual phenomenon. It follows that investigating ways of reducing the costs of compliance is increasingly important.

THE PLAYERS IN THE COMPLIANCE FIELD

The differing compliance laws and regulations and their regulators give rise to a diversity of requirements that necessitate regular auditing. However, the aim and scope of the

examinations by the different auditors vary greatly. It is not always entirely clear who examines which aspects and why. Moreover, the questions asked by regulator B's auditors may well seem very familiar following a previous visit by regulator A's auditors. And what is at least as troublesome is that the different laws and regulations are not always completely consistent. However, it is the IT organization that is responsible for tackling these matters as effectively and efficiently as possible.

As laws and regulations constitute, as it were, an organically created "patchwork quilt", it is hard to devise an unambiguous way of classifying all the individual items of legislation. Factors of relevance to the classification are the identity of the players, what laws and regulations they have introduced and how they affect IT. Table 1 contains a list of players. It is not intended to be exhaustive, and merely provides a picture of the players in the compliance field.

Players in the compliance field	Character
Government authorities: often drafters of laws and regulations	
Domestic Legislator	Legislation per country (mandatory)
Non-domestic Legislator (e.g. US)	Direct effect – for companies listed/located in the US Indirect effect – through requirements made, for example, by US companies
European Union	Legislation (mandatory), either direct effect or indirect effect through implementation and enforcement of EU-legislation within EU-member states.
Regulators (supervisors): although regulators are not legislative bodies, their "power' to grant or withhold approval means that their rules do in practice have the same weight as legislation.	
Central banks (oversight of banking sector)	Regulations (mandatory)
European Commission	Supervises compliance with directives by member states
Financial Market Authorities (e.g. Securities and Exchange Committee, Autorité des Marchés Financiers)	Regulations (mandatory)
Court of Audit (audit office)	Requirements viewed from verification perspective (imperative advice)
Data Protection Authorities	Testing regulations (advisory role), Official investigation and Enforcement (mandatory)
Auditors	Requirements viewed from verification perspective (imperative advice)
Self-regulation: the rules of trade associations often serve as standards in society. You may deviate from them in specific cases, but only for good reasons.	
Trade associations / Industry trade groups	Advisory role (fairly imperative character)

PERSPECTIVES OF LAWS AND REGULATIONS

Laws and regulations always tend to be drafted for different purposes and from different perspectives. It follows, almost by definition, that the resulting requirements are either not coordinated or overlap with one another. A well-known example from outside the IT sector concerns the case of a restaurant proprietor who was barred by the local authority from putting his refuse out on the street to await collection, but was then told by the Public Health Inspectorate that it could not be kept on the premises! And then there's the well-known

example relating to floors: according to occupational safety standards they must have a rough or textured surface, but according to the hygiene legislation they must be smooth. Various laws and regulations differ from the laws described above in that a change in the burden of proof is necessary. Instead of the law enforcement agency having to show that an organization is *not* complying with the law, the organization itself has to show that it is complying. A well-known example is the "in control" statement that a company draws up for SOX.

LAWS AND REGULATIONS REQUIRE CONTROLS

As laws and regulations on IT management are more principle-based than rule-based, little in the way of specific controls are required. However, an organization must still take whatever steps are necessary to ensure that it is in control itself. SOX requires an "in control" statement for this purpose. In this document, which is prescribed by law, the management of the organization declares that they have introduced such controls that they are in control of their organization. For this purpose, the organization itself should design an effective control framework and check the controls. This may seem to give an organization a great deal of latitude for designing "something" and then concluding that it approves it. However, it does compel an organization to assume its own responsibilities and to determine its policy and introduce controls on the basis of a risk analysis. An organization cannot make do with simply implementing a prescribed set of controls in the hope that this will be sufficient. This responsibility placed on the organization for taking the right measures on basis of a risk analysis also applies, in addition to SOX, to the requirements of Central Banks (Basel II) and personal data protection requirements (Privacy legislation).

FROM CONTROL FRAMEWORK TO ORGANIZATIONAL MEASURES

The control framework specifies the control objectives that the organization must fulfil. To ensure that these control objectives function in practice, use can be made of methods, techniques and best practices already frequently applied. A distinction is made in this connection between requirements and practices:

Requirements	Practices
To define the control measures, use can be made of the Control Objectives of CobiT and ISO 27001 (Information Security Management System, formerly BS 7799-2). The ISO/IEC 20000 (formerly BS15000), introduced some years ago, also provides a framework of standards, in this case for IT service management. How laws and regulations are complied with can be reported by reference to these requirements.	For the design of the controls, use can be made of the best practices in the field of IT processes and service management, of which many are available. Examples are ITIL®, ISO17799 (Best Practices for Information Security Management – to be converted into ISO 27002) and ISO/IEC 20000 (best practices for service management).

Although this classification does not provide an unambiguous picture of specific standards per organization, it does create standardization for the various sectors. Organizations that have to comply with SOX regulations often apply CobiT®, IT service providers often apply ISO 17799 and software developers often apply CMM and ASL in order to meet the statutory criteria. Some of these standards can be verified and certified externally (ISO), whereas others can be checked internally or externally without specific certification. To comply with these standards, the IT organization must be properly structured and work systematically.

Here too, various models are applicable. For the time being the best approach is to use the standards frameworks already applied within an organization and to "map" (adapt) them to the applicable legislation. Existing processes and procedures should be used wherever possible rather than, for example in the case of SOX, a separate and entirely new change management process for the SOX-critical applications.

LAWS AND REGULATIONS IMPACTING IT SERVICES

A collection of laws and regulations apply to various organizations. This is regardless of the nature of the business operation or the object of the organization. There are also laws and regulations drawn up specifically for a given sector, for example banks or the telecoms industry. These laws will increasingly also apply to parties outside the sector concerned, mainly as a result of outsourcing.

The previous sections have examined the manner in which many organizations have dealt with the use or re-use of, for example, best practices and formal standards in recent years. Table 2 combines the authors' knowledge of relevant laws and regulations, the impact these have on IT Services (and hence on IT service management) and the best-known formal standards with which the identified aspects can be completed.

The table is not intended to be exhaustive, but it does provide an overview of the "problems" and possible "solution lines" for a number of important regulatory requirements. The aspects impacting IT Services can vary per domestic legislation. In the table, the most common aspects for each kind of legislation are mentioned. For each aspect a reference is included to the IT service management process primarily involved (in accordance with ISO20000), to which responsibility can be assigned. A reference has also been included to the processes of CobiT and the chapters of ISO17799, setting out applicable controls that can be used to meet the criteria.

Legislation	Aspects impacting IT Services	ISO/IEC 20000	Cobit	ISO17799
Confidentiality (security, privacy, intellectual property)				
Computer Crimes Act	Adequate security measures	Security	DS5	4
	Policy on dealing with computer-related security incidents	Incident	DS5	13
	Monitoring use of corporate network	Security	DS13	10
	Keeping evidential material (logging and traceability to persons)	Capacity	DS11	13
Copyright (IP[1])	Distribution of computer programs	Release	AI7	12
	Copying security	Security	AI2	11
Privacy Act (protection of personal data)	Determining responsible person versus processor	Service L.	PO4	7
	Appropriate security	Security	DS5	4
	Code of conduct for internet and e-mail use	Security	DS7	8
	Obligations and liability of processor	Service L.	PO4	6
	Limitation on transferring data outside the EU	Security	DS11	10
	Maximum periods for retaining data	Capacity	DS11	7

[1] *IP = Intellectual Property is a generic term for various rights, including copyright.*

Legislation	Aspects impacting IT Services	ISO/IEC 20000	Cobit	ISO17799
Telecommunications Act	Reporting electronic communication service	Service L.	PO1	6
	Cooperation in tapping (widely differing rules per country)	Security	DS5	10
	Securing networks, services and personal data	Security	DS5	4
Integrity (trustworthiness, transparency, control)				
Public Tender Regulations	Transparency, objectiveness and non-discrimination in procurement	Supplier	AI5	6
Electronic Trade Rules	Extent to which agreement can be consulted	Continuity	DS11	10
	Authenticity and integrity of agreement	Security	DS5	10
	Time of conclusion of agreement (correct system time)	Security	DS13	10
Sarbanes-Oxley PCAOB standards regarding IT General Controls	Program Development	Release	AI2	12
	Program Changes	Change	AI6	12
	Computer Operations	Continuity	DS13	10
	Access to Programs and Data	Security	DS5	11
Accounting rules, IFRS (Financial statements obligations) related IT General Controls	Access security	Security	DS5	11
	Division of responsibilities	Security	PO4	10
	Change management	Change	AI6	12
	Continuity measures	Continuity	DS4	14
Availability (continuity, stability, accessibility)				
Tax legislation	Approval of conversion	Change	AI7	12
	Minimum retention periods	Capacity	DS11	7
Basel II (Operational risks)	Security risks	Security	DS5	4
	Continuity risks	Continuity	DS4	14
Anti Money Laundering	Transactions retention period	Capacity	DS11	7

Table 2 An overview of the "problems" and possible "solution lines" for a number of important regulatory requirements

The paradox of control

At a time when the control of IT has received more and more attention owing to the pressure caused by the transparency trend and new laws and regulations, a good many new models and best practices have emerged. Five years ago many organizations were primarily engaged in introducing or refining service management processes on the basis of ITIL best practice. Nowadays, organizations can choose from a multiplicity of models and best practices. ISPL, ASL and BiSL were introduced, and CobiT experienced a sharp revival as a consequence of SOX. The BS/ISO standards for security and service management are also generating increasing interest. All these models and best practices have different aims and areas of attention, but they also overlap to a certain extent. In practice, use is made at various places in the organization of one or more of these models, often without individuals or departments being aware of what the others are doing. That is until they discover the duplication and decide that it would be more practicable, say, for incident handling within the ITIL, ASL and BiSL processes to be coordinated, since they cannot be viewed separately from one another. It is debatable whether the control of the IT processes actually increases as a result of the

introduction of all these different processes and controls, or whether the organizations are in danger of losing their grip on them. This is what we call the *paradox of control.*

FINDINGS FROM THE VARIOUS COMPLIANCE SURVEYS

In the period from June 2005 to April 2006, the IT Management Department of the Dutch Computer Society (NGI) carried out a survey on how the increased focus on compliance was impacting upon the management of information provision. Another survey in the same field was carried out by our company. It examined the scope for combining the legislative and regulatory requirements with the internal IT governance requirements in a single compliance framework. Both surveys produced interesting findings.

Subject	Findings
Unclear requirements	The general perception is that there is still no clarity about the true impact of compliance on IT service management. Organizations still have no clear idea of what laws and regulations really influence how IT Management is implemented and what this influence consists of. Nor is a distinction always made between the legislative and regulatory requirements placed upon information systems and the requirements made of IT management. A factor to consider in relation to this is that many laws and regulations provide few, if any, specific standards which must be complied with. In addition, the accountability requirements differ quite considerably from one law or regulation to another. Finally, it is unclear to many people what additional laws and regulations are in the pipeline and what consequences they will have.
Compliance costs are high	Compliance with laws and regulations seems for the time being to entail considerable costs and efforts. The effort needed to be compliant is much greater in some organizations than others. The extent of the past chaos often determines the full cost of IT compliance.
Reorganizations make compliance projects difficult	Many IT organizations have merged with one another in recent years. Often there have been reorganizations. Sometimes different procedures are used for the same process because this has come about historically. In such cases the effectiveness of control measures must always be demonstrated separately.
Control positions found to have been axed in economy cuts	In the years before control legislation came to the fore, companies economised on overheads such as process management activities by making efficiency improvements. An example is the closure of internal control departments at many companies. The attention paid to the costs of compliance is strengthened by the fact that legislation not only requires a one-off investment but also generates overheads that recur annually.
New positions	New roles and positions occur in organizations as a consequence of the introduction of new laws and regulations. The compliance officer is a role/position that is found in many organizations. Strikingly, it is hard to discern a trend in the manner in which compliance assurance activities are structured in organizations (central or non-central, line or staff, high or low in the organization). Clearly, some form of best practice has not yet evolved.
Use of best practices	In defining the control measures, many organizations employ frameworks and best practices already used by them. Where possible, they are adopted and/or tightened up in order to demonstrate compliance with the requirements of the laws and regulations.

This shows that the introduction of new legislation and regulations has a major impact on IT service management. It is evident that many are still seeking to strike a balance between the effort expended and the result to be achieved. More experience of this may possibly be gained in the next few years. However, what effect future laws and regulations will have on IT service management is uncertain at this point.

TOWARDS A FUTURE-PROOF COMPLIANCE STRUCTURE

It can be inferred from the survey results described above that, when it comes to compliance, many organizations could still benefit greatly from:

- obtaining clarity about the requirements that must be met and coordinating these requirements
- configuring these requirements in a framework that combines internal and external requirements, and allows external accountability that meets the requirements of the regulators
- making choices about which frameworks and best practices to apply and, above all, not to apply
- reducing organizational and procedural complexity in such a way that a simpler and more uniform set of measures is sufficient.

The steps described above help to incorporate the laws and regulations now in force into the business operations in an efficient manner. At the same time, the organization concerned can obtain the benefits of a more professional system of managing the information supply. This represents an important step forward in relation to the present laws and regulations. It has also been found that many organizations do not know what new requirements they may be facing as a result of new or changing laws and regulations. But what everyone seems agreed upon is that a good many are certainly in the pipeline.

EXTENDING COMPLIANCE SHELF LIFE

This raises the question, how organizations should respond? In view of the changeability of the “patchwork quilt” of laws and regulations, the multiplicity of regulators and the responsibility of the organization itself for demonstrating compliance, people can easily find themselves in the position of having to start a new compliance project each year. This creates a real danger of a situation in which they are engaged in ‘reinventing the wheel’!

The key is to configure a Corporate Compliance Programme in which compliance with laws and regulations is firmly embedded in the existing processes within the organization, see figure 1. In this way the organization gets a proactive IT Compliance Programme which forms an integral part of the ordinary IT processes. The existing processes can then be reviewed periodically and, if necessary, adjusted to take account of altered regulations. A Corporate Compliance Programme of this kind enables the organization to manage the compliance issue on the basis of internal controls, translate the external requirements into internal requirements, make improvement projects possible and ensure that the internal process quality is visible to external stakeholders. The initiative again lies with where it belongs, namely in the organization itself. This is a good deal more effective than constantly reacting to laws and regulations. A Corporate IT Compliance Programme must be positioned correctly within the organization and, in view of the overarching interests, it makes sense to place it at CIO level.

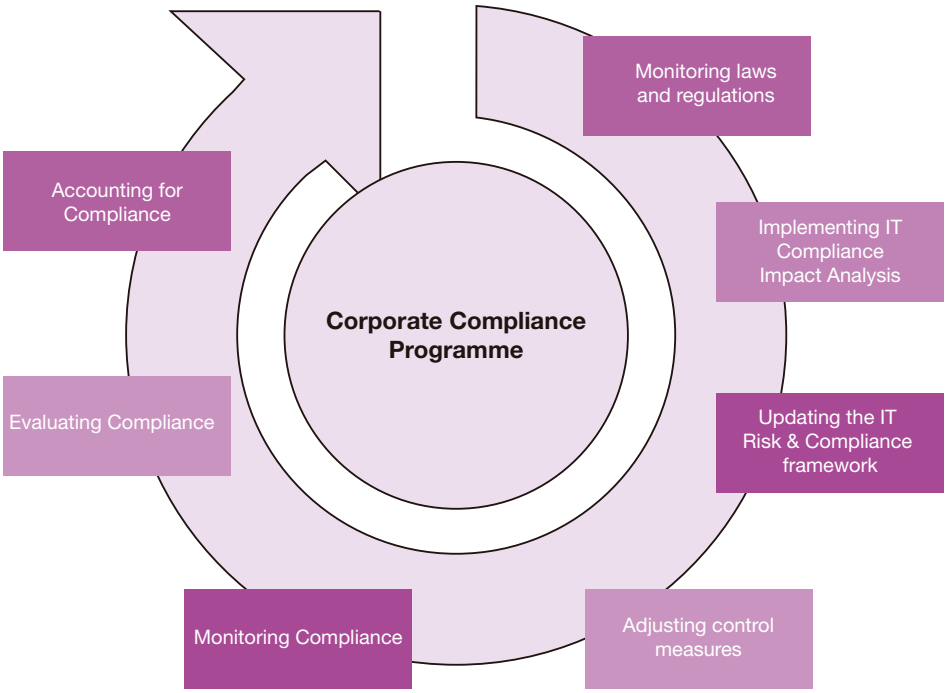

Figure 1 A Corporate IT Compliance Programme

A Corporate IT Compliance Programme consists of at least the following steps:

- Monitoring laws and regulations - By keeping a check on the external requirements and developments, such as explanations by regulators and case law, the organization can respond to changes proactively.
- Implementing IT Compliance Impact Analysis - The impact of external requirements is translated into internal requirements for the control of IT. This is part of the organization-wide business impact analysis.
- Configuring/updating the IT Risk & Compliance framework - On the basis of the internal requirements the requisite measures are determined by mapping on the control mechanisms used within the organization. This concerns, for example, CobiT®, CMM, ITIL®, PRINCE2™, etc.
- Adjusting control measures - The defined control measures are introduced, or tightened up still further, within the existing control mechanisms.
- Monitoring compliance - The effectiveness of the measures is monitored. For this purpose, use is made of the existing monitoring mechanisms in the form of KPIs and management reports.
- Evaluating compliance - A periodic evaluation is carried out to determine whether the aims of the Corporate IT Compliance Programme are being achieved.
- Accounting for compliance - The manner in which the organization complies with the laws and regulations is reported and communicated to stakeholders such as regulators.

When configuring a Corporate Compliance Programme an organization can make a virtue out of necessity by using the increased professionalism to enhance the IT services and increase transparency. IT Compliance controls provide this transparency. This yields information about the quality of the internal process and provides a good basis for further professionalization. If

it transpires that, for example, the process of granting authorizations is strongly fragmented, this provides an opportunity to be of real service to the business. In this way, the Corporate Compliance Programme can be the driving force behind improvements to the IT service.

IT COMPLIANCE PROCESS AND FRAMEWORK

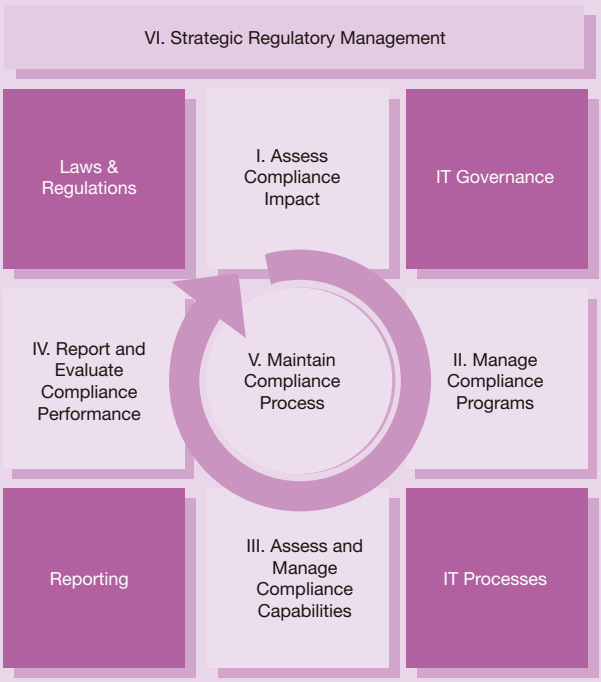

Figure 2 COMPRIS

Enabling IT services that become, and remain, compliant with various regulations is of great business relevance. Responding on every new or altered piece of legislation will cause new requirements; in turn, this also often leads to new or changed methodologies regarding the control measures. This large inefficiency can be avoided by making use of an integrated IT compliance process that ensures adherence to all compliance requirements that are introduced by the various parties (government, supervisory bodies, auditors, customers, etc.).

Assurance of compliance is realized by relating external requirements to internal IT policies, standards and procedures. The mapping of all the requirements from separate laws on a single compliance framework (e.g. based upon CobiT) delivers a set of controls, which are integrated into the current IT processes, thus achieving compliance with the laws and regulations. This IT Control Framework supports assessing the IT processes against the requirements and the generating of compliance reports for the different stakeholders. An integrated IT Control Framework facilitates compliance impact assessment, compliance program management, compliance capabilities assessment, compliance performance evaluation and reporting, compliance process maintenance and strategic regulatory management. This approach, based on current good practices is called COMPRIS, Compliance regarding IT Services.

FUTURE VISION: STRATEGIC REGULATORY MANAGEMENT

Earlier in this article the question was raised of how organizations can ensure that new laws and regulations do not disrupt the efficient implementation of compliance controls. The theory about strategic regulatory management provides information about the possible strategic reactions of companies to laws and regulations, with a view to maximising the economic result. These strategic reactions concern the skills and procedures that are available to an organization and enable it to operate in an environment, both internal and external, in which the management activities associated with the supply of information have to meet certain requirements. As regards the internal orientation, this is about the skills and procedures that are, or can be used, to achieve or aim for the optimum result in complying with laws and regulations. With regards to the external orientation, this is all about ways of influencing the introduction of new laws and regulations.

Various strategic reactions are possible:

- **Non-existent (ad hoc)** - No strategy has been defined for adjustments to the requirements in laws and regulations.
- **Reactive** - The added value of compliance is maximised by ensuring that internal processes match the regulatory requirements efficiently and effectively.
- **Anticipatory** - Efforts are made to anticipate changes in the law and regulations by building up a knowledge lead, thereby enabling the organization to adopt new procedures quickly and gain an advantage over other organizations that respond more slowly.
- **Defensive** - The organization uses its influence to hold back undesirable laws and regulations, or maintain the status quo.
- **Proactive** -The organization uses its influence to shape new laws and regulations in such a way that they turn out to be favourable for it.

The reactive and anticipatory strategies are internally oriented, whilst the defensive and proactive strategies are externally oriented. A combination of an internal and an external strategy can therefore be chosen. In practice, organizations appear to opt for different strategies depending on the laws or regulations concerned and their specific interests. Organizations that wish to prevent their embedded control framework and compliance process from being disrupted by new and changing laws and regulations should, therefore, take active steps to reflect on the most appropriate strategy.

IN CONCLUSION

The possibility of organizing future-proof compliance is therefore not a fable. By operating cleverly, organizations can avoid the need to design a new control framework for each new law or regulation. If controls are carefully configured and tested, organizations can account of the requirements of several regulators without duplication of effort. The need to satisfy external requirements can also be translated into an internal benefit, because the external supervision and media attention have placed the professionalism of ITV organizations high on the management agenda. In short, the time is ripe to use this momentum to assign the priority and implement quality improvements that have been long desired but often not approved.

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2.6 Does ROI matter? Insights in the true business value of IT

The business value of IT is an important consideration in the decision-making process of (IT) projects. In this valuation process however, the concept of Return of Investment (ROI) is widely misinterpreted and mistrusted. In this article Gilbert Silvius presents a compact schedule that helps to select the relevant valuation method, based on the characteristics of the project. He provides a comprehensive overview of IT valuation approaches, their assumptions, pros and cons and their applicability, given different characteristics of IT investments.

INTRODUCTION

The business value of information technology (IT) is a topic that is cause for much discussion. Skepticism roars again in the boardrooms of many companies, as the e-business hype exploded in the face of many "believers" of the new-economy gospel. Without strong technological developments to thrive upon, and an uncertain economic perspective, the pressure on IT budgets is high. For investments in IT, the requirement of sufficient returns and a clear "business case" is even more severe than before. Several surveys indicate that the issue of measuring benefits of IT investments is a concern in many organizations (Whitling et al, 1996). Measuring IT benefits and value is frequently reported as one of the most important issues for senior IT management. (Brancheau & Wetherbe, 1987; Niederman, Brancheau & Wetherbe, 1991; Watson, Kelly, Galliers & Brancheau, 1997).

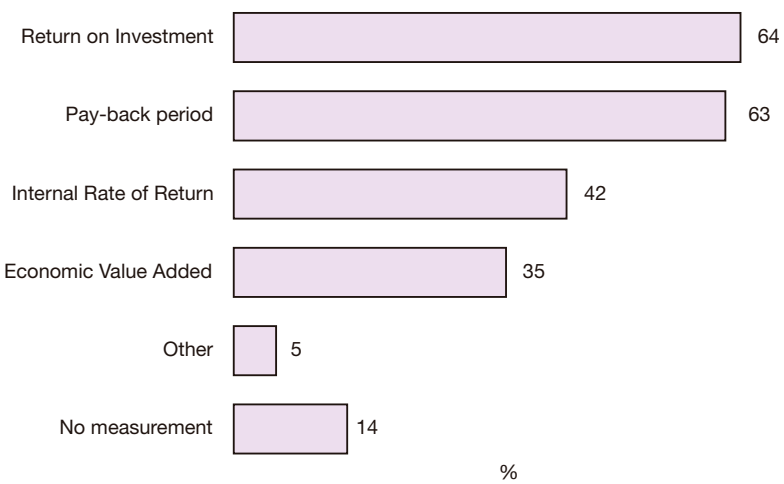


Figure 1 Use of investment evaluation methods by CFOs (Paul & Tate, 2002)

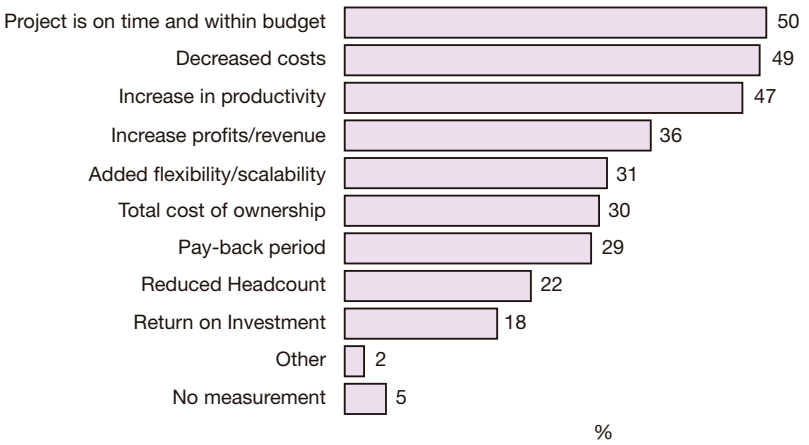


Figure 2 Use of investment evaluation methods by CIOs (IDG Research & Getronics, 2002)

Based on research into "the changing role of finance executives regarding Information & Communication Technology" (Paul & Tate, 2002), it can be concluded that CFOs use typical financial methods to evaluate IT investments. Over 86%, of the 288 CFOs who responded, claim to use traditional capital budgeting methods like Return on Investment, Pay-back period, Discounted Cash Flow and Internal Rate of Return. The strong use of financial appraisal techniques is also found in surveys of Ballentine et al. in the United Kingdom (Ballentine et al, 1997) and Wong and Behling in Australia (Wong and Behling, 1997). However, CIOs tend to estimate the use of these financial methods to be a lot lower. Of the 456 CIOs and senior IT managers who responded in the research into 'the issues and challenges facing senior IT executives' (IDG Research & Getronics, 2002), only 18% indicated using Return on Investment. For the CIOs, the mere effects of the investment, like decreased costs and increased productivity, topped the list.
The different results of the research illustrate the problems in capturing the full business value of IT investments in an understandable measure. This article aims to give some insight into the concepts, possibilities and limitations in this quest for value.

THE QUEST FOR BUSINESS VALUE

In the research into the value of IT, two approaches can be distinguished: the variance approach and the process approach (Davaraj & Kohli, 2002).

The variance approach

The variance approach measures the relationship between IT investments and organizational performance in terms of higher revenues, lower costs, improved market share, etc. This approach focuses on the "what" question. *What* is the relationship between IT investments and organizational performance? Over the years, a vast amount of work has been done regarding this relationship. Several studies showed that the relationship between IT investments and organizational performance could not be proven (Loveman, 1988; Salmela, 1997). This result became known as the "IT productivity paradox" (Brynjolfsson, 1993). Probably the best known statement about this paradox was given by Robert Solow when he stated: "You can see the computer age everywhere but in the productivity statistics". Notorious as this "IT productivity paradox" may be, it does not turn up in all studies on IT returns. Table 1 provides an overview of selected firm-level studies.

Study	Data Sample	Findings
IT and Firm Performance		
Strassmann (1990)	38 US companies	No correlation between IT spending and firm performance.
Loveman (1994)	60 business units in 20 US companies	IT investments add nothing to output.
Barua et al. (1995)	Same as Loveman (1994)	IT improves intermediate output if not final output.
Brynnjolfsson and Hitt (1993)	Large US manufacturers	Gross-marginal product of IT is over 50% per year in manufacturing.
Brynnjolfsson and Hitt (1995)	Large US manufacturers	Firm effects account for half of productivity benefits of earlier study.
Lichtenberg (1995)	US firms, 1989-91	IT has excess returns; one IS employee can be substituted for six non-IS employees without affecting output.
Brynnjolfsson and Hitt (1996)	367 Large US firms	Gross return on IT investments of 81%. Net return ranges from 48% to 67% depending on depreciation rate.
Brynnjolfsson and Hitt (1996)	370 US firms	IT investments increase firm productivity and consumer welfare, but not profitability.
Dewan and Min (1997)	300 Large US firms	IT is a net substitute for both capital and labor, and shows excess returns relative to labor input.
Black and Lynch (1997)	1621 US manufacturing establishments	Productivity not affected by presence of particular management practice, but by implementation, especially degree of employee involvement.
Brynjolfsson et al. (1998)	Sample of Fortune 1000 US firms, 1987–94	The stock market value of $ 1 of IT capital is the same as $ 5 - $ 20 of other capital stock.
Gilchrist et al. (2001)	Sample of Fortune 1000 US firms	IT productivity is greater in IT producer firms, than in user firms and in durable manufacturing.
Gilchrist et al. (2001)	French firms	Gross returns to IT investments are positive and greater than returns to non-IT investments.

Table 1 Selected firm-level studies of IT returns (Dedrick et al., 2003)

The advantage of this approach is that it reveals statistically "proven" effects of IT. These effects are of particular relevance for the development of economic policy.
The disadvantage of the approach is that the effects are valid in general, but might not appear for a particular investment in a particular company. This notion is illustrated in table 2, which shows another overview of firm-level studies.

However, these studies analyzed the returns of IT investments in combination with organizational and process changes. The results of these studies show that the return on IT is influenced by the organizational transition that accompanies it. The same IT investment can therefore have a positive return in organization A, and a negative or neutral return in organization B. This raises the question of how IT is used in an organization; a question that is better addressed by the process approach. Therefore, for corporate decision-makers the variance approach is of limited use.

The process approach

On a company level more insight in the "how" question is required. *How* do IT investments improve organizational performance? This question is addressed in the process approach (Mooney et al, 1995).

Study	Data Sample	Findings
Organizational Complements and IT Returns		
Bresnahan et al. (2002)	400 Large US firms, 1987–94	The effects of IT on labor demand are greater when IT is combined with particular organizational investments.
Brynjolfsson et al. (1998)	Sample of US firms, 1996	Decentralized organizational practices, in combination with IT investments, have a disproportional positive effect on firm market value.
Ramirez et al. (2001)	200+ US firms	Firm use of employee involvement and total quality management enhances IT returns.
Francalanci and Galal (1998)	52 US life insurance companies, 1986-95	Productivity gains result from worker composition (more informational workers) and IT investments.
Deveraj and Kohli (2002)	8 hospitals, over 3 years	IT investment combined with business process reengineering positively and significantly influences performance.
Tallon et al. (2000)	300+ US firms, 1998	Perceived business value of IT is greater when IT is more highly aligned with business strategy.

Table 2 Selected firm-level studies of IT returns if combined with organizational transition (Dedrick et al., 2003)

Soh and Markus synthesized the different models of the process approach into a comprehensive framework for the IT value creation process (figure 3, Soh & Markus, 1995). This article is constructed along this framework. First, we will explore the relation between IT expenditures and IT assets: the IT conversion process. In the next section the organizational impacts of IT will be discussed in the IT use process. The following section considers the relation between IT impact and organizational performance: the question of IT valuation. The article will be concluded with a model for combining different investment valuation methods in the decision-making process, and a proposal for a more balanced understanding of the characteristics of an IT investment.

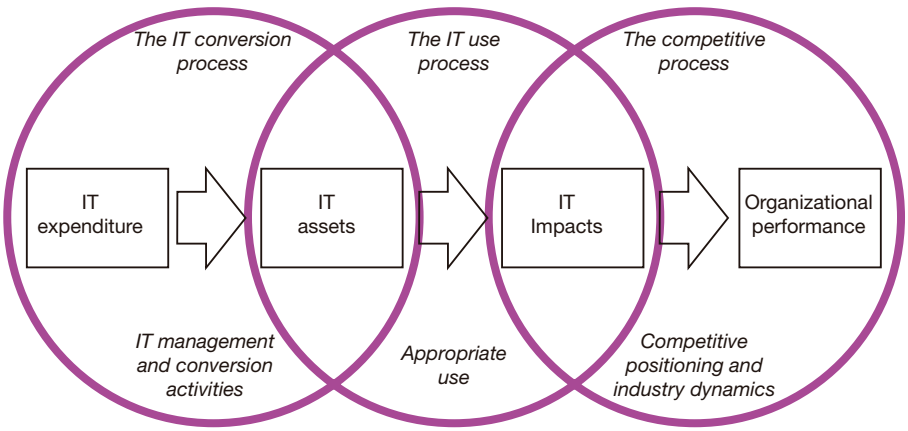


Figure 3 The Process approach for understanding IT value (Soh & Markus, 1995)

THE IT CONVERSION PROCESS

Total cost of ownership

The relationship between IT expenditures and IT assets is about the cost side of value. This cost reflects the IT Efficiency challenge; one of the most important challenges for CIOs and IT Executives:

How to minimize the cost of utilizing, managing and maintaining the current IT, whilst delivering the agreed "quality of service"?

A well-established concept in this area is that of the Total Cost of Ownership (TCO). TCO analysis originated with the Gartner Group in 1987, and has since been developed in a number of different methodologies and software tools. A TCO assessment ideally offers a final statement, reflecting not only the cost of purchase, but all aspects in the further use and maintenance of the equipment, device, or system considered. This includes the costs of training support personnel and the users of the system, costs associated with failure or outage (planned and unplanned), diminished performance incidents (i.e. if users are kept waiting), costs of security breaches (in loss of reputation and recovery costs), costs of disaster preparedness and recovery, floor space, electricity, development expenses, testing infrastructure and expenses, quality assurance, boot image control, marginal incremental growth, decommissioning, e-waste handling, and more.
Therefore, TCO is sometimes referred to as "total cost of operation". When incorporated in any financial benefit analysis, TCO provides a cost basis for determining the economic value of that investment.
TCO can and often does vary dramatically against TCA (total cost of acquisition), although TCO is far more relevant in determining the viability of any capital investment, especially with modern credit markets and financing.

Technology life cycles

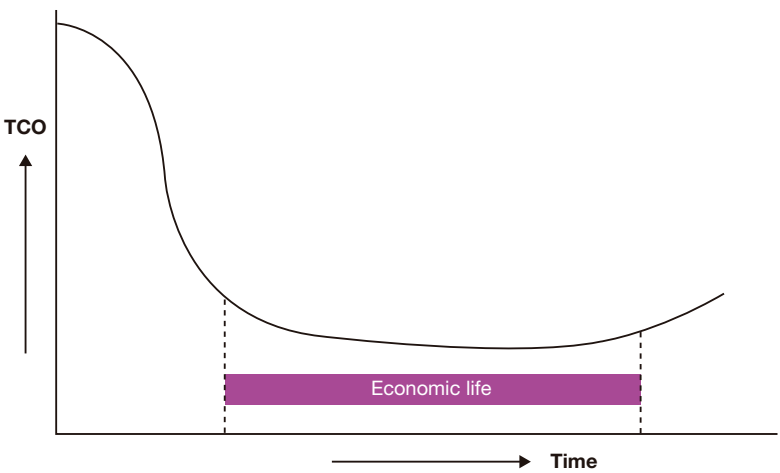


Figure 4 The expected relationship between TCO and the life cycle of a technology

One of the core concepts of the process approach is the time dimension of IT value (Bannister, 2001). Most technologies have a life cycle, ie value dissipates over time; utilizing available technologies which are as optimal as possible, and switching to new technologies at the right moment, are the keys to a minimal cost of managing and maintaining the IT in an organization.
The relationship between TCO and the life cycle of a technology is a less researched field (Davaraj & Kohli, 2002). Figure 4 shows the expected relationship between the TCO and the life cycle of a technology. In its younger years, the knowledge and utilization of a technology are less developed, resulting in a relatively high TCO. If the technology evolves into an industry standard, the TCO will decline as the technology matures. At the end of its life cycle the use of the technology will decline and the TCO will rise again as a result of scarcity of resources. Its economic life has passed and the technology is outperformed, probably both technically and economically, by a newer technology. Within a specific technology, a similar life cycle pattern can be expected for successive versions or releases.

THE IT USAGE PROCESS

Another key challenge for CIOs is the question:

How to maximize the "business value" of IT investments?

This challenge addresses not the efficiency of IT, but its effectiveness. How does IT contribute to the business strategy and goals?

The nature of the IT assets

A preliminary understanding about the impact of IT is that the relation between IT assets and business impact is not always straightforward, as illustrated in figure 5.

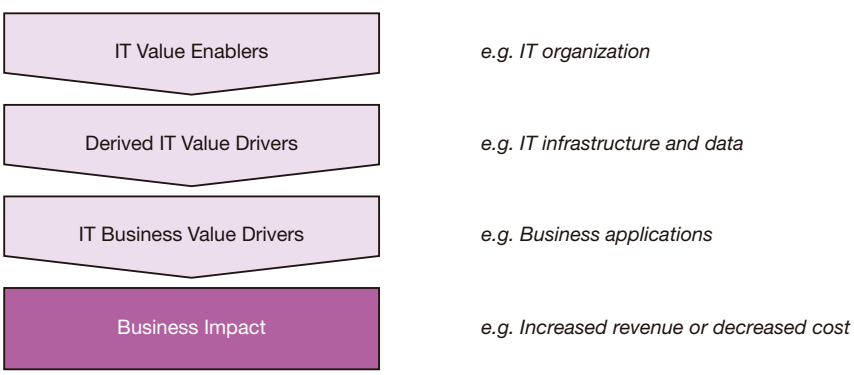


Figure 5 The complex relation between IT assets and business impact

Business applications will usually have an identifiable impact on business processes, but for components of the IT infrastructure, their effect is mostly indirect as enabler of applications. These "levels" of impact bring us to distinguish three categories of IT "value drivers". The first category, "IT Business Value Drivers" consists of business applications with a direct impact on the business. The second category is the "Derived IT value drivers" and consists of the

IT infrastructure and the data architecture of the organization. The third category, “IT value enablers”, consists of the variables regarding the organization of IT in the company.

The impact of IT

The impact of IT on business is rapidly shifting from an efficiency enhancing production factor towards a source of business innovation. This development is illustrated in figure 6. The changing role of IT has to be reflected in the way in which IT investments are evaluated. The traditional “IT-economics” focus on cost savings should evolve to also include productivity and business value drivers. This notion has inspired several authors (e.g. Hammer & Mangurian, 1987, Riggins, 1999, Smit & Silvius, 2001) to provide frameworks for identifying the value of IT solutions. From these frameworks, a common understanding arises, that IT can make a business more efficient, more effective, more flexible and/or more innovative. These four “sources of value” identify the way in which IT creates value for an organization. The four terms summarize the development of the value of IT over the past few decades. Starting from a calculation tool to improve efficiency in administrative processes, the opportunity arose to provide decision-makers with more detailed information much more quickly than before, hereby improving the effectiveness of the organization. In recent years, it has become clear that a revolutionizing technology like the internet can open up new markets, new products or provide new means of developing customer loyalty, thereby innovating the business of a company. Thus, an enabler of business IT developed into an innovator of business. The latest notion is that the lower cost of communication, which IT provides, enables organizations to swap resources more easily, e.g. moving business activities offshore, thereby enhancing the managerial flexibility.

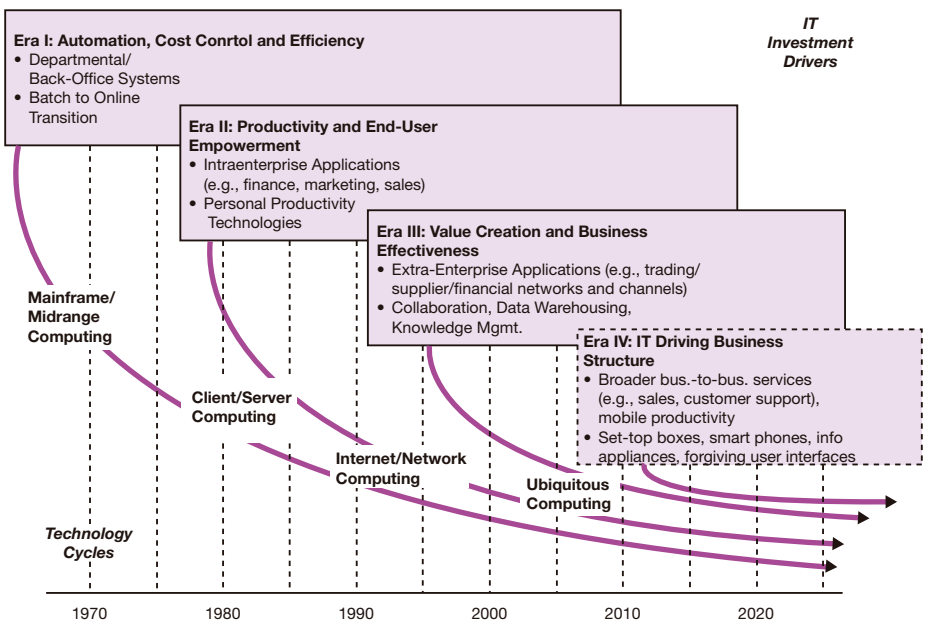


Figure 6 The development of IT (Gartner Group)

Thus, for a better understanding of the impact of IT on an organization, we should consider its effect in terms of efficiency, effectiveness, innovation and flexibility. Logically, these "sources of value" can be applied to the external positioning of the organization or to the internal business processes.
To understand the external positioning marketing, it is necessary to consider the four 'P's: *Price*, *Product*, *Placement* and *Promotion*. Combining the sources of value with these fields of competition provides a practical "grid" to identify the possible effects of an IT investment. For example, an IT system that allows a company to differentiate its prices is identified on the grid as having an impact in the field *effectiveness* combined with *price*.

To understand how IT adds value to the internal business processes, these processes are categorized in main business functions as illustrated in figure 7. The "Generic Business Model", as developed by James Martin & Associates, distinguishes as main business functions: *adding value*, *innovating*, *controlling resources* and *directing*. An example of an IT investment, with impact in the *directing* function, is the implementation of a management information system that allows for better decision-making.

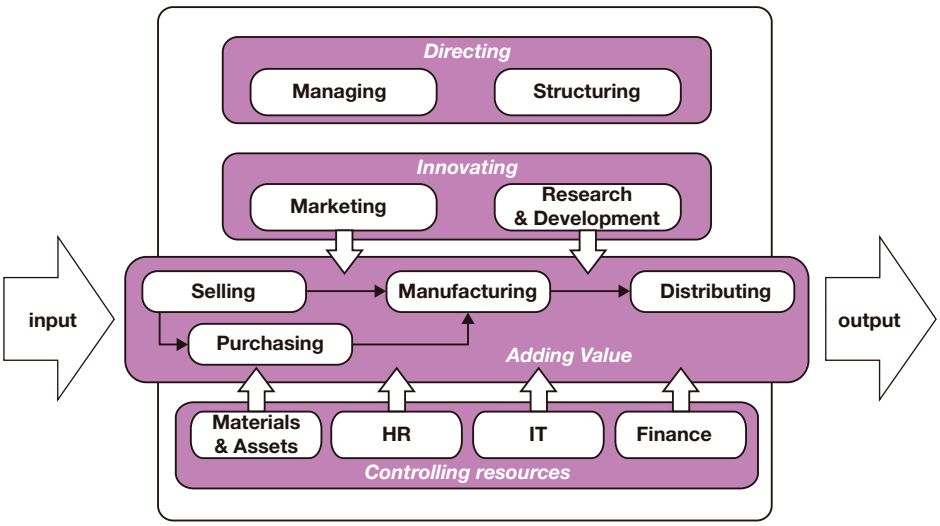


Figure 7 The Generic Business Model

When the variables of the "external impact", the four 'P's, and the variables of the "internal impact", the business functions, are plotted across the sources of value, a graphical grid can be constructed to identify the impact of IT investments on an organization. This "IT value grid", as illustrated in figure 8, with a number of sample impacts, provides a useful aid to understand, communicate and discuss the impact of an IT investment. Without this understanding, any discussion about the value of IT will be without foundation.

Business and IT alignment

After creating a thorough understanding of how an IT investment influences the business, the next step is to understand the returns on this impact. Since IT itself has no returns (the returns are always in "the business"), it is helpful to have a close look at the business. First of

4 sources of value

	Efficiency	Effectiveness	Innovation	Flexibility
Price		Enable for price differentiation		
Product		Enable for customization	Enable build to order	
Promotion	Enable one-to-one marketing		Create new promotion channels	
Placement		Enable when/where you want delivery		

4 dimensions of competition

Value Adding	Increase use of production resources	Allow for outsourcing	Create new channels	Allow for deferral of investments
Innovating	Allow for interactive marketing		Allow for collaboration	
Directing		Speed-up decision making		Be informed anytime, anywhere
Controlling	Automate supportive tasks			Increase scalability of resources
resources				

4 groups of business processes

Figure 8 The IT value grid (Smit & Silvius, 2001 and Targowski, 2004)

all, the strategy and goals of the business have to be considered. After all, this is the strategy with which IT should align.

In modern business strategy literature, three dominant strategies are identified: *Product Leadership*, *Customer Intimacy* and *Operational Excellence* (Treacey and Wiersema, 1997), as illustrated in figure 9. In an *Operational Excellence* strategy, the organization wins if it realizes high volumes with low costs, resulting in low prices. IT investments that create business efficiency (for example an ERP system that optimizes the utilization of resources), are particularly relevant in this type of strategy. In a *Product Leadership* strategy, the Unique Selling Proposition of the company is that of high quality of products and services. For these companies the ability of IT systems to enable this quality would therefore probably be of greater value than the efficiency of the company. For example, a smart warehouse management system that enhances order fulfillment by optimizing stock levels could fit this strategy. Finally, in a *Customer Intimacy* strategy, the organization will benefit most from IT

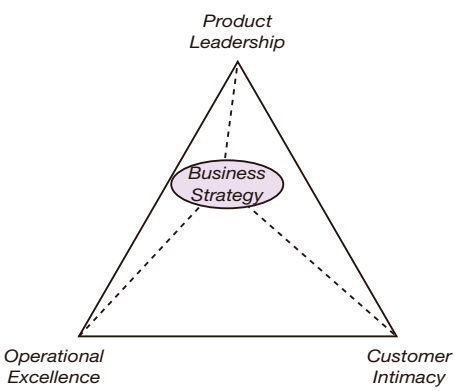


Figure 9 Typology of business strategy

systems that strengthen their ability to tailor their offer to the customer's needs. An example of such a system could be a CRM application for a fashion retailer that allows him to capture the measurements, preferences and buying history of his individual customers.

The way in which business strategy gives input to the evaluation of IT investments can be summarized as follows.

Dominant Business Strategy		Corresponding dominant source of value
Price Leadership	<>	Business Efficiency
Product Leadership	<>	Business Effectiveness
Customer Intimacy	<>	Business Innovation

Table 3 Relationship between Business Strategy and dominance of the sources of value

A possible weakening of the preceding argument is that all "sources of value", efficiency, effectiveness, innovation and flexibility, are always relevant, regardless the strategy. This is true of course, but the analysis of the business strategy provides an indication of the relative weight of the criteria used in the evaluation of IT investments. However, we should add that another angle is missing: the business process.

Not all business processes "make the difference" in the strategy of a company. In the typology of business processes provided by the Generic Business Model (figure 7), typically the "adding value" and "innovating" processes create the Unique Selling Propositions of the organization. Logically, the impact of business strategy on the valuation of IT investments will be most relevant for investments in IT systems, with an impact on these "adding value" and "innovating" business processes. Supporting processes like facility management or personnel administration are also important, but do not typically have a direct effect on the external positioning of the organization. For IT investment supporting these business processes, "business efficiency" will therefore be the most important source of value.

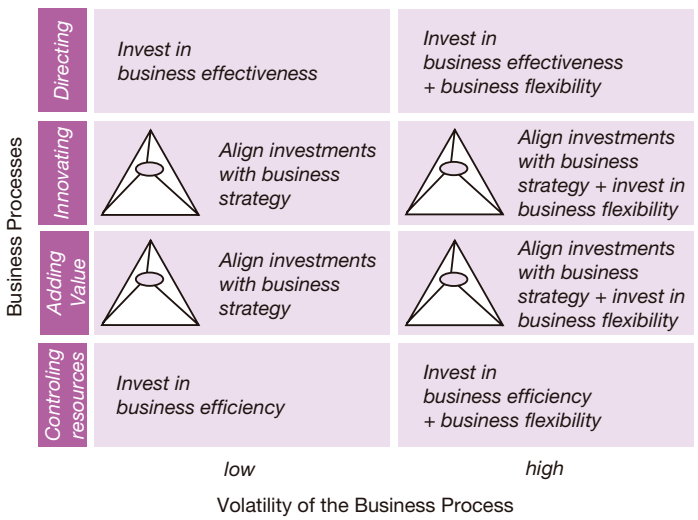


Figure 10 The relation between business processes, business strategy and the sources of value of IT investments

Adding the volatility of the business function can further expand the alignment between the sources of value and the business process. Logically, the more volatile the business process, the more valuable the flexibility that IT can add to that business process.
An overview of the relationship between business strategy, business processes and the sources of value of IT can be illustrated as shown in figure 10.

Several studies also show the nature of the "adding value" business processes as a factor of influence in the value of IT investments. Studies that show returns on IT investments (Harris & Katz, 1991) typically concentrated on information-intensive industries like financial services, whereas studies that concentrated on manufacturing or information non-intensive industries (Loveman, 1988; Olson & Weill, 1989) found no returns from IT.

Unintended impact

IT investments tend to have not just intended impact, but also unintended or unexpected impact, or side effects. For example, an investment in innovative technology can raise media attention and lead to free publicity in professional journals. This publicity can, in its turn, enhance the familiarity of the organization amongst the public, and increase company pride amongst employees. Figure 11 provides a comprehensive model for this kind of analysis of the (unintended) impact.

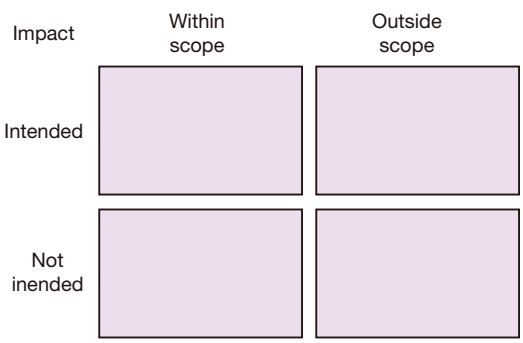


Figure 11 Impact analysis

Investment proposals will logically address mainly the intended impact within the scope of the project. But it can be of value to also imagine what possible side effects can occur; both positive and negative.

THE IT VALUATION PROCESS

After creating an understanding of the impact of IT on business and the relevance of this impact in relation to the business strategy, the issue of valuation is next on the list. This is a typical economic issue for which it is irrelevant whether the investment is in IT or in any other resource. As long as the effects of the investment are understood, calculating the value of it is merely a financial technicality.
This sounds almost too good to be true. Indeed, it is not quite that simple. Financial valuation methods all have assumptions and limitations, which caused both practitioners

and academics to develop (e-)valuation methods that consider more than just the financial aspects. After considering over fifty evaluation methods, Renkema en Berghout (1996) grouped these methods into four categories:

- financial methods
- multi-criteria methods
- ratio methods
- portfolio methods

Financial methods

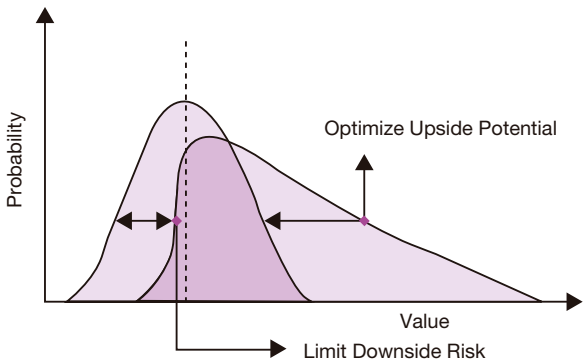
The group financial evaluation methods comprise of the traditional economic investment selection and valuation methods. Table 4 provides an overview of these valuation methods and their most important qualities and limitations.

Valuation method	Qualities	Limitations
Return on investment	Easy to calculate Easy to interpret (a simple percentage) In line with the financial administration	Outcome sensitive to amortization method Ignores the time-value of money Ignores risk
Pay-back period	Quite easy Intuitively coping with risk	Ignores part of the revenues Simplistic, does not determine value
Internal Rate of Return	Includes the time-value of money Easy to interpret (a simple percentage) Based on cash-flows	Complex Not in line with the financial administration Ignores risk Multiple outcomes, or none, possible
Discounted Cash Flow / Net Present Value	Includes the time-value of money Based on cash-flows Copes with risk	Complex Complex to interpret Not in line with the financial administration Not conclusive in case of projects with different durations
Economic Value Added	Includes the opportunity value of money In line with 'shareholder value'	Value calculation based upon one of the other methods Not in line with the financial administration

Table 4 Overview of Financial valuation methods

The shortcomings of these methods are especially clear when IT investments are made that impact the organizations market proposition. In this arena it is hard to make informed decisions when many variables are in flux. Traditional calculation methods are all limited in their ability to cope with risk and managerial flexibility. For example, if a project proves to be a success, it can be speeded up. If, however, the market deteriorates, the investment outlays of the project can be lowered or postponed. Despite the logic of this, in reality, management adapts plans based on actual conditions all the time, this flexibility is not adequately valued in any of the valuation methods mentioned earlier. The result is an inadequate decision process for new projects. In some cases, this even results in competitive investment proposals being rejected. Therefore, it is clear that companies need to come up with new ways of judging IT investments.

A new insight is provided by the Real Options Valuation (ROV) theory. In the ROV an additional value is calculated on top of the Net Present Value (NPV) of a project. This



Downside risk is limited by enabling investors/ management to abandon the investment or to wait with future investments. Upside value is optimized by enabling investors/ management to expand investment, to progress with projects or to seek other opportunities for the initial investment.

Figure 12 The effect of real options on value (Smit & Silvius, 2001)

"flexibility value" valuates the "optionality" of the investment. Optionality reflects the ability to alter the investment outlay and the timing of outlays based on changes in the competitive environment. ROV treats the possibilities of adapting the investment plan as (real) options.

The *opportunity* to invest can be seen as a call option, involving the right to acquire an asset for a specified price (investment outlay) in a future moment. A call option gives the holder the right, for a specified price within a given amount of time, to exercise the option to acquire the underlying asset. The techniques derived from option pricing, quantify the management's ability to adapt its future plans to capitalize on favorable investment opportunities, or to respond to undesirable developments in a dynamic environment by cutting losses.
A valuable insight that can be gained from option theory is the effect of changes of the variables of the investment on the value of the investment. An interesting fact is that, for example, an increase in the volatility of the returns decreases the NPV, but increases the ROV.

Another addition to the traditional valuation methods is the notion that the returns of an investment are not only influenced by the organizations' own decisions, but also by the decisions of the competition. For example, the first telecom operator that implements an innovative new service will enjoy temporary, "first mover" advantages that the other players will miss when they implement the same service. Combining the real options approach with game theory, taking into account competitive counteractions, closes the gap between traditional corporate finance theory and strategic planning. Management investment decisions are made with the explicit recognition that they may invite competitive reaction, which in turn impacts the value of the firm's investment opportunity. The strategic value of early commitment in such cases must be set off against the option value of waiting and may potentially justify early investment.
A "grab the dollar" game, for example, is a strategic context that is often associated with IT investments. Firms obtain a negative payoff when they end up investing simultaneously. "Grab the dollar" illustrates the situation where the current market prospects are only favorable if one of the players invests, but simultaneous investment results in a battle with an expected negative payoff. Only the first player captures the dollar (e.g. patent), but when they

all enter the market, they all end up losing the battle. A dominant firm has an advantage to win this simultaneous game.

Based on the insights provided by the real options and game theories, the traditional NPV calculation can be and should be expanded to include the effects of managerial flexibility and competitive behavior.

This "Expanded NPV" can be calculated as:

Expanded NPV = NPV + Flexibility value + Strategic value

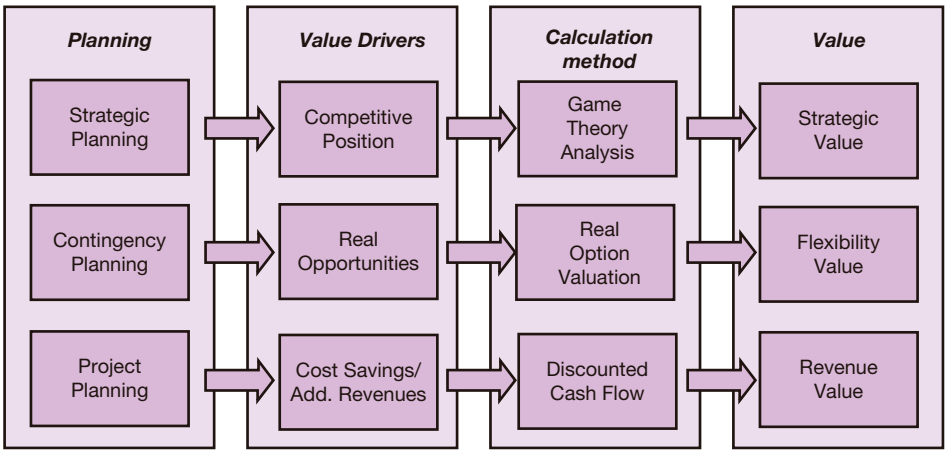


Figure 13 A complete valuation framework

Figure 13 summarizes this more complete valuation framework. This framework provides a better understanding of the value of IT investments.
What does this mean for the calculation of the value? In theory, the knowledge is available to calculate a "complete" value according to the framework. However, this calculation will be complex and hard to understand in boardrooms. It is a drawback not to be taken lightly. The tendency to fall back on simple and comprehensible calculation methods leads to systematic underestimation of the value of IT investments, especially when their effects are more than just efficiency improvement. This pitfall should be well understood. Financial theory cannot just provide us with a simple and undisputed figure or percentage that expresses the complete value of an investment. It is therefore the opinion of the economist Professor Michael Brennan that *"it is better to have the approximately optimal solution to the right problem than the exact solution to the wrong problem!!!!"* (Actual quote on the 2000 Real Options Group conference, May 2000).

Multi-criteria methods

Multi-criteria methods are a reaction to the problems of capturing the full value of IT investments in just financial metrics. These methods aim to identify different relevant aspects of value and risk in order to enable a thorough and an informed discussion.
The most important method using multiple criteria is information economics (Parker, Benson & Trainor, 1988). This method is as suited to evaluating a single project as to a portfolio of projects. It is built on a step-by-step evaluation process.

Step 1. Determine the evaluation criteria
In this step the management of the organization determines which criteria to use in the evaluation of IT investments. One or more of the financial criteria described above will be logically included in the set, but less measurable criteria as "strategic fit", "competitive advantage" will be also be part of the model. Parker, Benson and Trainor identify criteria in two domains: business (= demand) and IT (= supply).
Suggested criteria in the business domain are:
+ Return on Investment
+ Strategic Match
+ Competitive Advantage
+ Management Information
+ Competitive Response
-/- Organizational Risk
Suggested criteria in the IT domain are:
+ Systems Architecture
-/- Definitional Uncertainty
-/- Technical Uncertainty
-/- Infrastructure Risk
In this model the '+' criteria contribute positively to the "value" of the investment, whereas the '-/-' criteria are considered risks and contribute negatively.

Step 2. Determine the relative weights of the criteria
The importance or 'weight' of the different criteria may not be equal. Therefore, Management has to decide upon a weight factor for each criterion. The weight is expressed on a scale from 0 (not important at all) to 5 (very important).

Step 3. Evaluating the different investments
Based upon the set of criteria and weight factors, each project or investment is given a score on all of the criteria. This may seem like a very arbitrary score, but Parker and Benson provide situational descriptions for each score. It is crucially important that the scores are underpinned in this more objective way, in order to create acceptation for the results of the evaluation process.

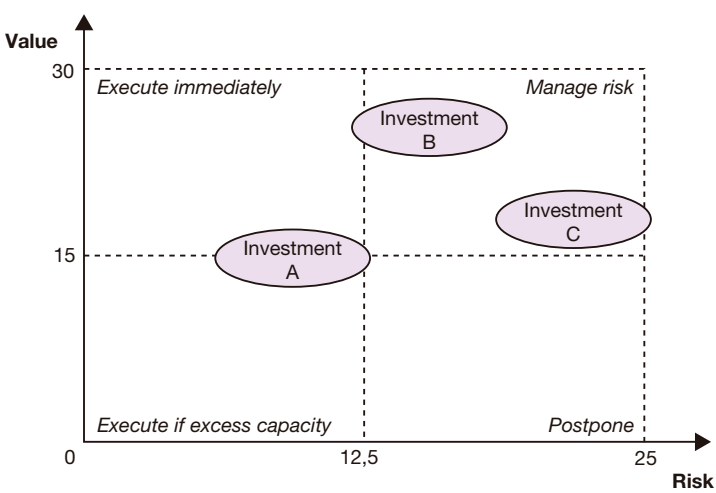


Figure 14 An Information Economics presentation

Step 4. Presenting the results
The results of the evaluation process can be presented in a graphically attractive way. The scores of the '+' criteria are totaled to a score representing the "value" of the investment, whereas the scores of the '-/-' criteria add up to a total "risk" score. Combining the two scores in a two-dimensional graph provides management with a concise overview of the investment portfolio. Based upon their preferences regarding the risk-return relationship, priorities can be determined and investments selected.

Ratio methods

Different from the financial and multi-criteria methods are ratio methods; these are not aimed at evaluating a specific investment or project, but at finding the "right" level of total IT costs in an organization. This level is expressed as a ratio, e.g. IT costs/total revenue or IT costs/employee. The outcome of these ratios should be considered relative to the same ratios at competitors or for one organization in time. Lower or higher scores on these ratios than comparable organizations are not necessarily right or wrong, but should give reason for investigation and discussion.

The most prominent author on ratio methods is Paul Strassmann. This former CIO developed sophisticated ratios for specific industries. A limitation to the applicability of these ratios however is the availability of (public) data required for the ratios.

Portfolio methods

In 1981 F. Warren McFarlan suggested analyzing and managing IT investments and projects in terms of revenues and risks using portfolio theory, as was done in the financial world (Warren McFarlan, 1981). "Portfolio theory" referred to the 'modern portfolio theory' as developed by Markowitz in 1952 (Markowitz, 1952). Although appealing, the use of this insight did not really take off until the Clinger-Cohen Act. This Act states that the management of IT in US government institutions "*must reflect a Portfolio Management approach … and decisions to terminate or make additional investments are based on performance much like an investment broker is measured and rewarded based on managing risk and achieving results*." Now, although the difference in characteristics between financial investments and IT investments does imply limitations to the applicability of portfolio theory, some useful insights could be derived (Van Rossum and Silvius, 2006).
An important insight in portfolio theory is the understanding that the value of an investment will be influenced by other investments or assets in the portfolio. In other words, investment decisions are not taken in isolation. Whereas all other evaluation methods study the value of an investment as an autonomous value, portfolio methods study value of investments in conjunction to other investments and assets; an insight that appeals to the common sense when considering architectural aspects. Portfolio theory also points out the importance of having a structured process in place for the continuous evaluation of the total portfolio of IT investments and projects.

A COMPREHENSIVE VALUATION MODEL

All methods described in the last section have their specific qualities and drawbacks. Based upon an understanding of these different qualities, the different methods can be combined into an overall model to facilitate the evaluation process from idea to portfolio. Figure 15 shows this model. Ideas for IT investments are individually evaluated using a multi-criteria method that includes a financial method. The proposals that meet the criteria are then evaluated as a portfolio, in relation to all other proposals, projects and assets. In this portfolio

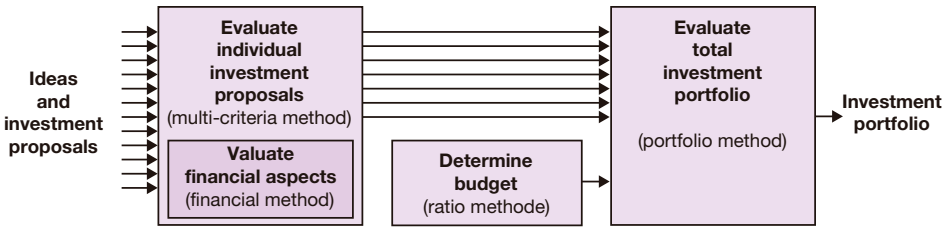


Figure 15 Application of the different methods

evaluation one of the limiting factors will be the available budget. A ratio method is used to determine this budget.

However, given the specific qualities and drawbacks of the different methods, it remains to be seen whether even an overall model would deliver satisfactory results. IT investments, projects or assets can have many different characteristics. The criteria for selection or exclusion, and the weight of these criteria, can therefore also differ. It could make good sense to select, for example, a specific investment because it is risky and another investment because it is safe. Or, to accept that a certain level of risk could be completely acceptable for an investment in new marketing channels, but totally unacceptable for an investment in a new payroll system. Different types of investment require different considerations. Therefore, the characteristics of an investment should be added to the discussion about valuation methods.

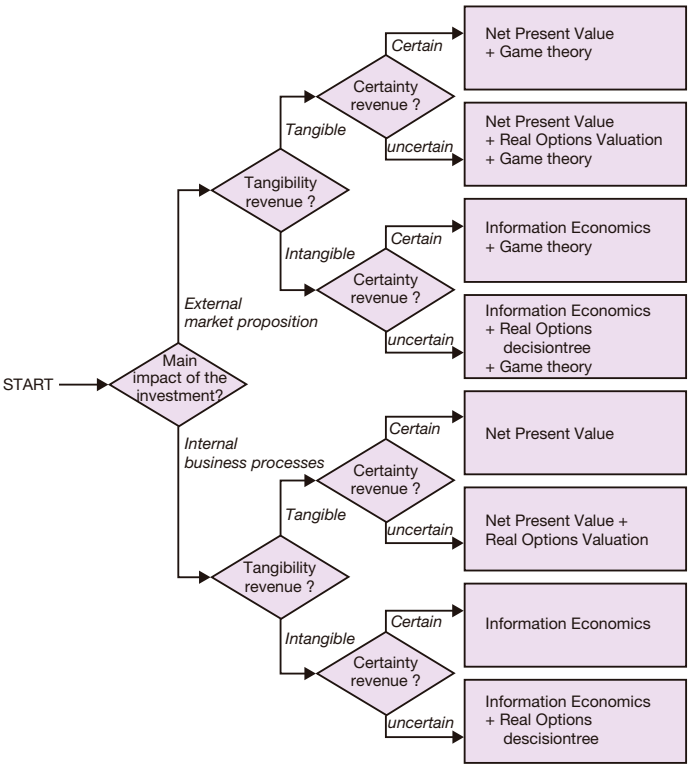


Figure 16 Different types of investment require different considerations

A typical classification of characteristics could be:
- the impact of the investment (external market proposition vs. internal business processes)
- the tangibility of the revenue (tangible vs. intangible)
- the certainty of the revenue (certain vs. uncertain)

Based upon these three characteristics, a decision tree can be constructed to select the most suited valuation method (figure 16).

CONCLUSION

The value of IT is a much discussed and often misunderstood subject. This article aims to add new understanding to the discussion by providing an overview of theoretical and practical insights. We developed a practical grid in understanding the impact of IT investments on the organization, showed the conceptual relationship between IT value and business strategy and discussed various evaluation methods.
Different evaluation and valuation methodologies reveal different aspects of value. However, we are still far away from a simple and easy-to-understand calculation method, unveiling the complete and true value of any investment. A boardroom focus on simple Return on Investment metrics therefore should be qualified as either mismanagement or macho-talk. This opinion may not be very satisfying, but it is not without grounds. A last insight to be added is the characteristic of the investment under scrutiny. For an IT system with a mainly internal "business efficiency" impact, the evaluation method used may be a different one than for an IT system with significant impact on the external positioning of the organization. Company executives should therefore focus their attention on creating a thorough understanding of how an investment in IT impacts the business of the organization, instead of focusing on oversimplified value calculations based on questionable assumptions.

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2.7 Managing IT chains in large organizations: A transition process

With the transition from a product-oriented IT landscape into a service-oriented IT landscape, complexity increases. Managing the interdependencies between (chained) IT components becomes even more necessary to ensure the overall performance of your business processes. Enzo Ciriello, Michel van den Bempt and Kars Hadderingh explain the concept of IT chain management that will help in structuring the dependencies and keep you in control.

INTRODUCTION: UNDERSTANDING THE PROBLEMS

The cable and telecommunications industry is very dynamic and turbulent nowadays, as anyone will recognize. The business model in this sector changed from supply-driven into a demand-driven model. The industry is very competitive, with very demanding customers, many new products and services emerging rapidly, and ever changing underlying technologies. This ensures a very stimulating and challenging environment, both for people and IT.

To cope with this turbulent environment, many cable and telecoms companies started restructuring their organizations and processes. Logically, IT had to follow.

An important step in this restructuring is the introduction of so-called "chain management". Chain management is optimizing the co-operation between the departments or partners within a "chain of processes". This chain management can be roughly seen as the next step after the transition of a product-oriented organization into a process-oriented organization. A chain of processes typically forms so-called end-to-end processes: starting with a customer request or action and ending with the fulfillment of that request or result of that action.

Major goals of chain management are:
- focus on the customer
- improvement of the performance of the organization
- fast introduction of new services and products (short time-to-market)
- becoming more cost-efficient
- adding value to the organization

The implementation of chain management has an impact on the organization culture, the processes, the management, and, last but not least, the IT. Of course, when the processes within an organization have changed, this will impact the way in which IT has to support those processes. Implementing chain management at process level requires an implementation at IT level as well. The latter, the so-called IT chain management, is the subject of this paper.

The developments within the cable and telecoms industry do not stand alone. Other industries have also experienced this need for chain management and implemented it. In this

paper we will use the cable and telecoms industry for our examples, and to illustrate these developments.

@Home, a Dutch cable service company, started a number of years ago, with the introduction of (process) chains, based on the eTOM model. This also led to a corporate data model and a corporate (best of breed) IT architecture. Motivation for @Home was the growing fastidiousness of the customers, and the growing number of products and new techniques. The business focus changed from supply-oriented into demand-oriented.

This article will first sketch the developments in the IT arena within large companies. This will be used in section 2 (IT chain management) to show how IT chain management can help in these environments to keep or achieve control of IT. Section 3 (Recognizing the need for IT chain management within the organization) will describe how the need for IT chain management can be identified. And subsequently, section 4 (How to make the transition to IT chain management) will provide a five-step program on how to introduce IT chain management within a company. Section 4 also shows how ITIL® V3 and the Service Oriented Architecture (SOA) Governance can help with implementing IT chain management. Finally, some general guidelines are given in section 5 (Tips and tricks) to help keep IT chain management as simple as possible. The paper ends with a summary and some conclusions.

A short history of IT architectures within large companies

Automation within large companies started way back with stand-alone IT systems. This is what we typically call “islands of automation”. Separate parts of the business processes were supported by stand-alone IT systems. Of course, very soon the need arose to interconnect the separate IT systems.

There were two major solutions for interconnecting the stand-alone IT systems: either using larger IT systems that comprised larger parts of the business processes, or using interfaces to connect the different systems and allowing them to support the business processes together. A combination of both of these options was generally adopted. The results were big monolithic IT systems and IT stovepipe solutions.

Interfaces between different systems became a fragile part of the IT infrastructure, on all different levels: from physical networking up to the application level. At application level, the interdependencies of the different systems caused vulnerability. If one system changed, the interface and the connected system had to be changed as well. Also, if one system failed, in many cases the interface and the connected system failed as well. Of course, mechanisms like modularity and encapsulation were used as much as possible to prevent these flaws. Nevertheless, the number of interfaces were and are limited as much as possible.

Using large monolithic IT systems limits the number of interfaces between different IT systems, because many “would-be” interfaces are realized internally in one and the same IT system.

An IT stovepipe solution means that only the IT systems that together provide the IT support for one type of company product or service, are strongly interconnected. This also limits the number of interfaces.

The need for more flexible IT solutions led to the breakdown of the large monolithic IT systems into smaller applications or modules (and eventually to the SOA approach). This also

provided an opportunity to introduce a “best-of-breed” policy, where the best IT solutions are chosen per specific function.

The shift in many companies from product-orientation into process-orientation caused the breakdown of the IT stovepipes. No longer could these companies support their process-oriented organization by product-oriented IT stovepipes.

The evolution of stand-alone IT, via large monolithical systems and stovepipes, into process-oriented IT is shown in figure 1.

In a process-oriented IT architecture many interfaces are needed between the different IT systems. Moreover, because of the need for flexibility and reuse, a current trend is to make the IT applications more modular, where smaller encapsulated components can be identified, providing separate IT services. This causes a further increase in the number of interfaces.

At an architectural level, different interfaces that need to exist between different IT systems or components cause a “spaghetti structure” in the IT systems: too complex to design, to build and to control. A solution for this is found in the middleware solutions, the enterprise service bus (EBS) construction, leading to “enterprise application integration” and eventually to “service-oriented architectures”. One of the main objectives of SOA is reuse of services. True reusable services limit the number of different interfaces required. It should be noted however, that the breakdown of applications into services may also easily increase the number of interfaces and dependencies between the IT components.

The current IT situation

Many companies are still in the process of breaking down the monolithic applications and developing the IT stovepipes into business process-oriented IT. Many companies have also taken some steps towards a SOA based IT: starting with the introduction of standard middleware, and trying to define and evolve towards reusable IT services.

However, just a few, large companies have realized a complete SOA based IT, and almost no large company has completely abandoned the large monolithic systems or all of the remaining stovepipes.

This leaves us with a very complex IT structure, with a lot of interfaces and a lot of interdependencies between the different systems (and SOA services).

The real issue here is: how can a company stay in control of IT, on the architectural, design and operational levels, when IT is so largely dispersed, as is the case in large companies today. Large companies typically have over 500 different IT applications, each of them at different stages.

In this article, we show that the identification of IT chains, and the organization of IT management according to these IT chains, offer a powerful help to keep or regain control over the highly hybrid IT within contemporary large companies.

To illustrate and explain the issues, we will use examples of the large cable and telecoms company in the Netherlands, as mentioned previously: @Home.

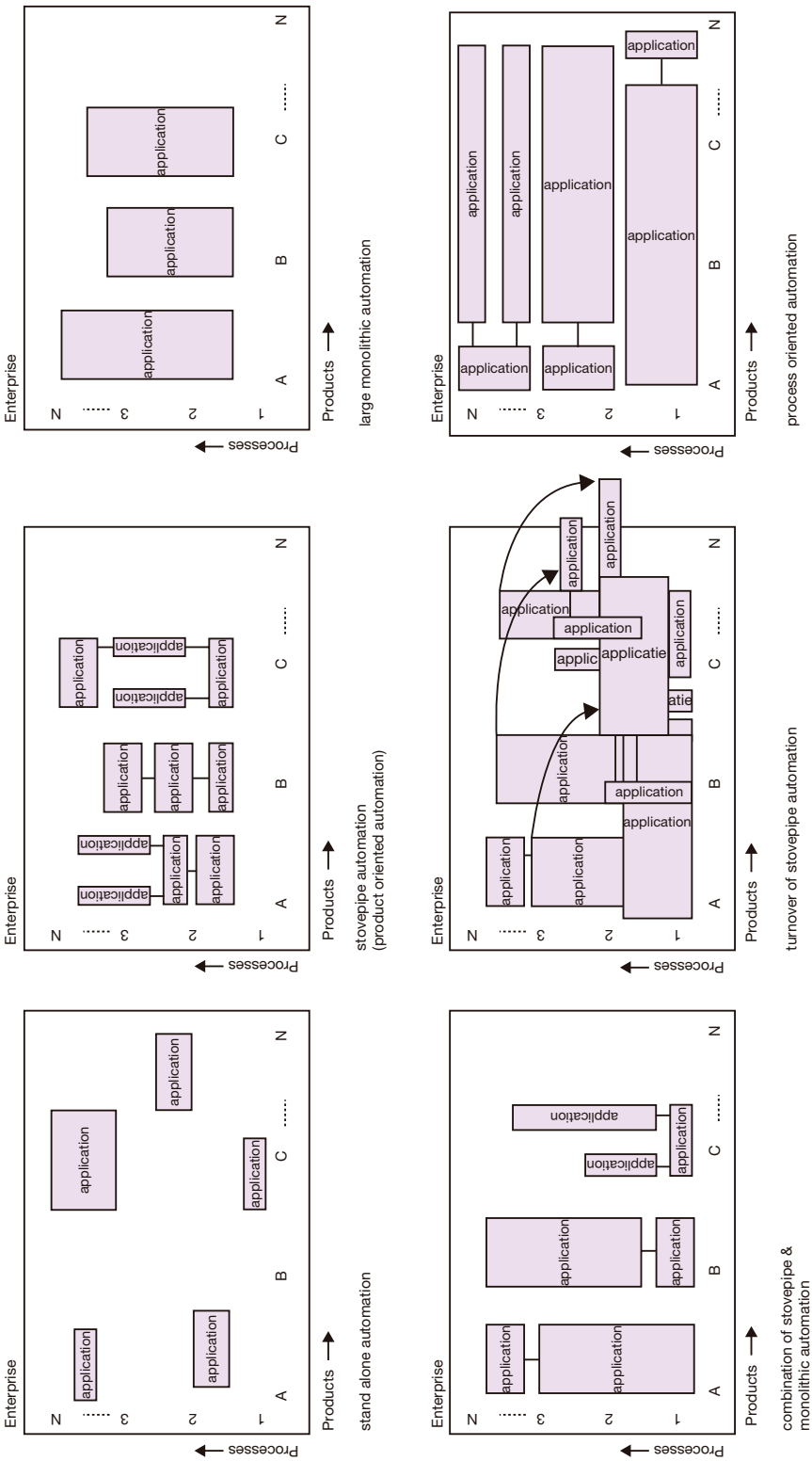

Figure 1 A short history of IT in large companies

IT CHAIN MANAGEMENT

As previously stated, many companies currently have their IT structured according to the different business processes of their organization. The different flows in the business processes of a company are supported by flows through the IT landscape: a *chain* or concatenation of IT applications (or SOA services) and interfaces.

We define an IT chain as a concatenation of IT applications and interfaces that together support an end-to-end business process within a company.

In this section we will show that these IT chains provide a valuable and natural means to structure and subdivide the entire hybrid IT supplies, in order to achieve control (divide-and-conquer principle).

As an illustration, we will look at the business processes in the telecommunications sector. Telecoms companies often use the eTOM[1] model to model their business processes. The eTOM model provides a decomposition of end-to-end business processes into component processes. Part of the eTOM model at the highest levels is shown in figure 2[2]. Note that a mapping exists of the ITIL (IT management) processes onto the eTOM business processes.

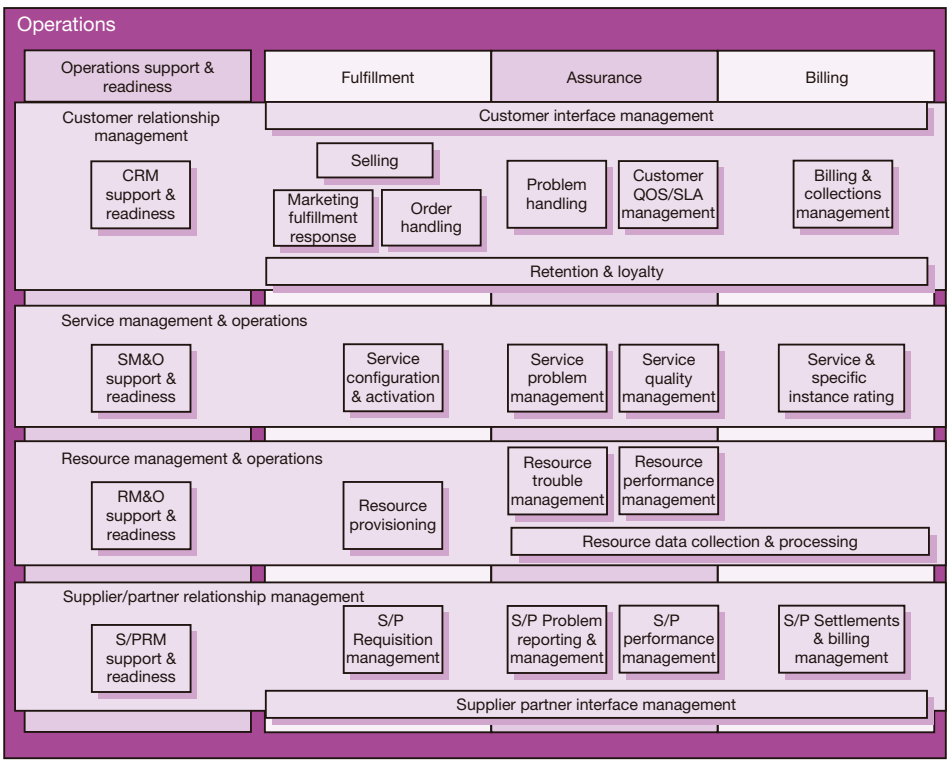

Figure 2 eTOM model operations part

[1] *eTOM = enhanced Telecom Operations Map (version 5), a TMF (Telemanagement Forum) standard for describing processes in the telecom sector.*

[2] *The eTOM processes are very generic and can also be used, without any problem, in other business areas.*

The business process *Assurance* is shown in figure 3. Here, also an example process flow is shown through the end-to-end business process: a customer reports an incident for a specific product or service[3].

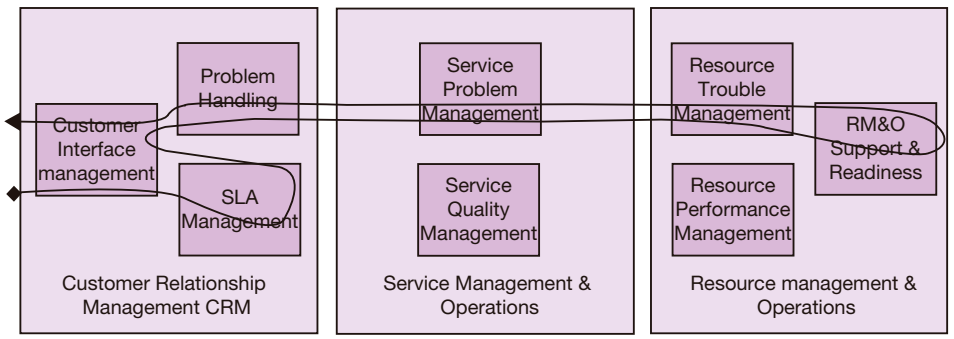

Figure 3 The business process "Assurance" in eTOM

Example: Steps in the incident process of figure 2

- The *Customer Interface Management process* checks whether the customer really is a customer of the company, and whether the bills are paid.
- The *SLA Management process* checks what SLA agreements are made with the customer, eventually determining within what time period the incident has to be solved.
- The *Problem Handling process*[4] starts requesting extra information from the customer.
- The *Service Problem Management process* decomposes the incident, guided by the construction of the distorted product. The incident 'trouble ticket' is enriched with extra information.
- The *Resource Trouble Management process* checks errors in the separate parts of the product, e.g. in the network elements (linecards, physical cables, routers, etc.).
- The *"RM&O Support & Readiness" process* plans and schedules an engineer, to replace a defective network element.

This business process Assurance is typically supported by different IT applications. The flow through the Assurance end-to-end business process is supported by a similar flow through these IT applications. This is shown in figure 4. In this example, the *IT chain* for service assurance consists of: CRM system-Trouble Ticketing system-CMDB system-Network Management system-Planning & Scheduling system, and the interfaces between them.

Within a large organization there may be several IT systems with the same functionality within one IT chain. The example in figure 4 is really too simple for large organizations. Often we see *stovepipe-remainders*: e.g. many different CRM systems for different parts of the business, possibly per product group.

With a pure monolithic IT system architecture, the dependencies of the different coding parts are solved or kept consistent within the monolithic applications themselves, leaving few external dependencies.

[3] *Note this is only one example, incidents can, of course, also have other triggers, e.g. network alarms.*
[4] *The eTOM "problem" is not equivalent to the ITIL "problem". It can roughly be seen as a combination of the ITIL incident, service request and problem.*

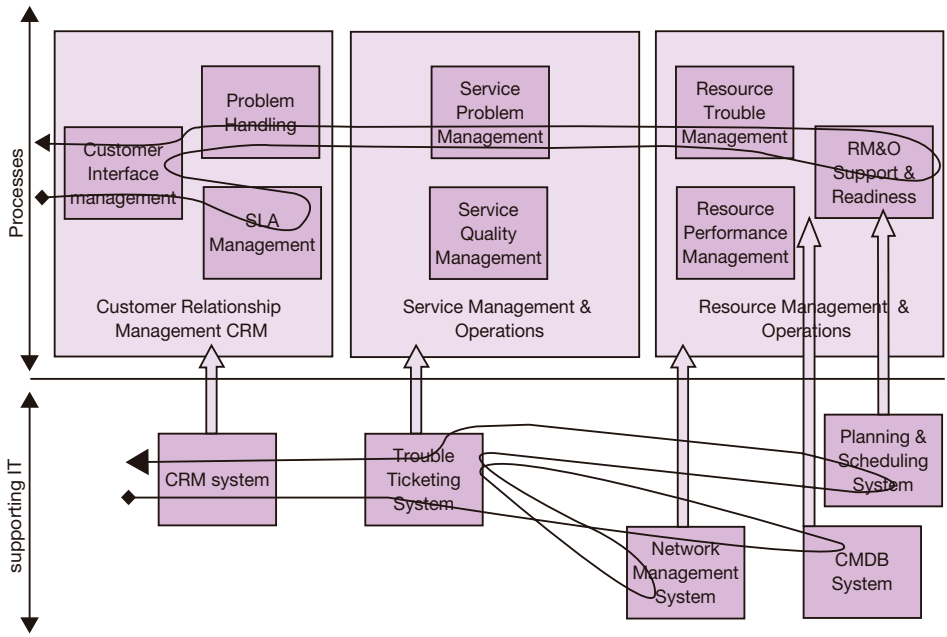

Figure 4 IT chain supporting the end-to-end process chain

With a pure SOA-based IT system architecture, the dependencies of the different coding parts are solved or kept consistent by extreme use of modularity and encapsulation; see SOA governance principles. Nevertheless, this is still quite a challenge.

With a highly hybrid IT system architecture, the biggest challenge is to control the different dependencies. Modularity and encapsulation are the hardest to enforce in this architecture-type.

Whenever IT applications are part of an IT chain, certain dependencies will arise between them (caused by the intrinsic dependencies within the end-to-end processes):

- **At functional level** - functionalities of one application are needed to ensure the right behaviour of another application.
- **At performance level** - the performance of one IT application within a certain IT chain can depend heavily upon the performance of another IT application within that same chain[5].
- **At robustness level** - the weakest link within a chain determines the strength of the entire chain; this is also true for an IT chain.

These dependencies between the different IT systems within a chain are not always clear and thoroughly documented, or managed.

Note that dependencies particularly occur between applications within one IT chain. The number of dependencies across the boundaries of an IT chain are far less (thus between applications in different IT chains).

[5] *Note: using synchronous communication across the interfaces between the different IT systems will increase the performance-dependency between these IT systems; using asynchronous communication will help to decrease the performance-dependency. However, asynchronous communication does not always fill in the functional needs of the interfaces.*

The requirements of the business, with respect to IT support, tend to be focused at the IT chain level, than at the individual IT application level. The business does not only want the individual IT applications to function well, but also wants the entire IT chain of applications to succeed. Thus, the business asks for IT chain management: managing the IT applications and their interdependencies, in order to provide IT support for an entire business process.

RECOGNIZING THE NEED FOR IT CHAIN MANAGEMENT WITHIN THE ORGANIZATION

The need for IT chain management can be identified both from a business perspective and from an IT/technology perspective.

When the business is in a transition from product-oriented towards process-oriented, IT has to follow this transition. IT chains are created that have to be managed in coherence. IT chain management can be seen as a last phase in the transition of the company from product-oriented to process-oriented.

When the required services at business level are not correctly translated to the IT level, in terms of applications and interfaces, this also indicates a need for IT chain management. Typically, in this situation, the individual application managers will simply point to each other if there should be (business) service failure or degradation.

When the IT organization of a company is in a transition phase, resulting in a very hybrid IT making IT management complex, this indicates a need for IT chain management.

When managing the individual IT applications of a company, a problem or incident may occur in one application which turns out to be caused by a problem or incident in another application. When these dependencies increasingly occur, and especially when they concern applications that are not directly adjacent, this also is an indication that IT chain management is needed within the organization.

Within @Home, the need for IT chain management clearly emerged as a consequence of the transition of the processes into process chains. This change started with the identification of the most important processes according to the eTOM model. These were clustered in so-called chains. After this, the processes were examined from a customer perspective. Subsequently, the Key Performance Indicators were determined per (process) chain. Next, requirements were made for the corresponding organization and supporting IT. The IT support started out with IT workarounds, and gradually migrated to new IT solutions.

HOW TO MAKE THE TRANSITION TO IT CHAIN MANAGEMENT

Once the need for IT chain management is identified, it is important to make an overall plan to implement this IT chain management. Implementing starts with awareness. Once people are aware of the larger chains that the IT applications are part of, they will understand that the coherence of the different applications imposes real constraints upon their own activities within the IT area. Both the *organization* and the *processes* of IT management within a company will have to be adjusted in such a way that the chains can receive sufficient attention, rather than just attention for the separate IT applications, interfaces and underlying IT infrastructure. Next, tooling for IT management will also need to be adjusted.

Major steps to implement IT chain management:

1. **Identify most important IT chains.** Be sure that the IT chains match the end-to-end business processes. Within the IT infrastructure of a large company many different IT chains can be identified. Only focus on the most important ones that match the most important business processes.
2. **Document the IT chains at different levels.** See also the configuration process in the section *Chain management within the ITIL v3 Service Transition stage*.
3. **Start "Culture and Awareness" program.** Working together within an IT chain presupposes that people understand both the IT chain they work for, and their colleagues within that IT chain.
4. **Make the IT chains controllable**
   - define SLAs on IT chain level
   - ensure monitoring of the IT chains on operational, tactical and strategic levels
5. **Make the development/evolution of these IT chains controllable**. Every change within the IT infrastructure of the company needs to be made in the context of the entire chain that the specific IT component belongs to.

Within @Home, a large Culture and Awareness program was begun for the overall process chain approach. The IT personnel also participated in this program. Essential to the process were the customer focus, customer-oriented thinking and acting. It included open house sessions, process training and weekly newsletters. It also proved to work well for IT personnel.

These five major steps have both organizational and process aspects. In this section we will first look at the organizational aspects of IT chain management. Subsequently, the process aspects will be elaborated upon.

Organization

Implementing chain management within an organization means a complete transition in thinking and acting, with the hierarchy of the company subjected to the chain processes. All employees have to be involved in the transition towards chain management. All departments get a pure "demand and supply" relation within the chains. A business chain manager is appointed for every major end-to-end business process.

The key responsibility of a business chain manager is the performance (in terms of results, quality and costs) of the end-to-end process chain, as opposed to the department manager who retains responsibility for the results of the individual department (providing results for possibly several different chains, based on demand/supply).

We can also identify a new role in the IT arena, that of the IT chain manager. They are responsible for the results of an entire IT chain.

Of course, an IT chain manager has to work closely together with the business chain manager. They are counterparts.

The IT chain manager has to facilitate the co-operation and co-ordination of the individual IT management groups. In order to do so, an IT chain manager can initiate and chair:

- **An IT chain management operational meeting** - a regular meeting of all application managers (functional and technical) and possibly all middleware managers; this concerns operational performance issues and operational dependencies between the different applications and interfaces.

- **An IT chain release board** - regular meetings to co-ordinate the different releases of the different applications and interfaces; in current practice in many large companies, releases of a specific application are only communicated and tuned with the adjacent systems; whilst releases in a system at the beginning of the IT chain can, in fact, easily affect the functioning of an application in the back-end of the IT chain.
- **An IT chain design meeting** - regular meetings to make sure that the design/renewal of one application in the chain is propagated to all other parts of the IT chain; in order to keep or get a consistent and integral design over the entire chain. Note: Since some applications may be part of several IT chains, this can be quite a challenge (e.g. a planning and scheduling application for assigning engineers for field-work can be part of both the assurance and the delivery IT chains).

Looking to the five IT chain implementation steps mentioned in the introduction of the section *How to make the transition to IT chain management*, the overall IT is responsible for steps 1 and 3, whereas the IT chain managers are responsible for the steps 2, 4 and 5.

Within @Home these different IT chain meetings were set up, in order to improve the co-operation between the different IT parts of the company.

A first sign of the need for these meetings was when, in an early meeting, the different participants turned out not to know each other at all. Note: This is not exceptional within IT departments of large companies!

However, these people need to work together in order to fulfill the business requirements. The added value of the IT chain meetings became clear within @Home very quickly.

The power of IT chain management really is in co-ordination and co-operation.

Processes

Implementing IT chain management impacts the IT management processes. This can be elaborated by looking at the different processes of IT service management as described in ITIL V3. The more business- and customer-oriented approach of ITIL V3 (compared to V2) makes it all the more suitable for implementing IT chain management.

Chain management during the entire IT service life cycle

IT chain management has to receive attention within all stages of the IT service life cycle.

It begins with the service strategy stage. Here, the business that the IT supports must indicate what the requirements are for IT, and which IT chains are essential to the business. The services needed for the business will be mainly delivered by a chain of applications rather than by the individual applications.

Subsequently, the service design stage will have to design a service based upon a chain of applications rather than solely based upon a single application. Here, the influence of changes (in a specific application) on services that are delivered by other parts of the IT chain has to be made crystal clear.

We continue to the service transition stage: the implementation of new services has to be done within the context of the IT chain that has to deliver the specific service. Even if only

one application has to be changed, the entire chain of applications may be impacted by this implementation.

Finally, in the service operation stage: the analysis of service interruptions or degradations must be done in the context of the entire IT chain, and cannot always be directly reduced to an incident or problem within one specific application in that chain. The error may be in one application, the cause may be in another application.

ITIL V3 also identifies a continuous service improvement process. This is needed to provide for a managed IT chain in the longer term.

The overview of chain management within the IT service life cycle is illustrated in figure 5.

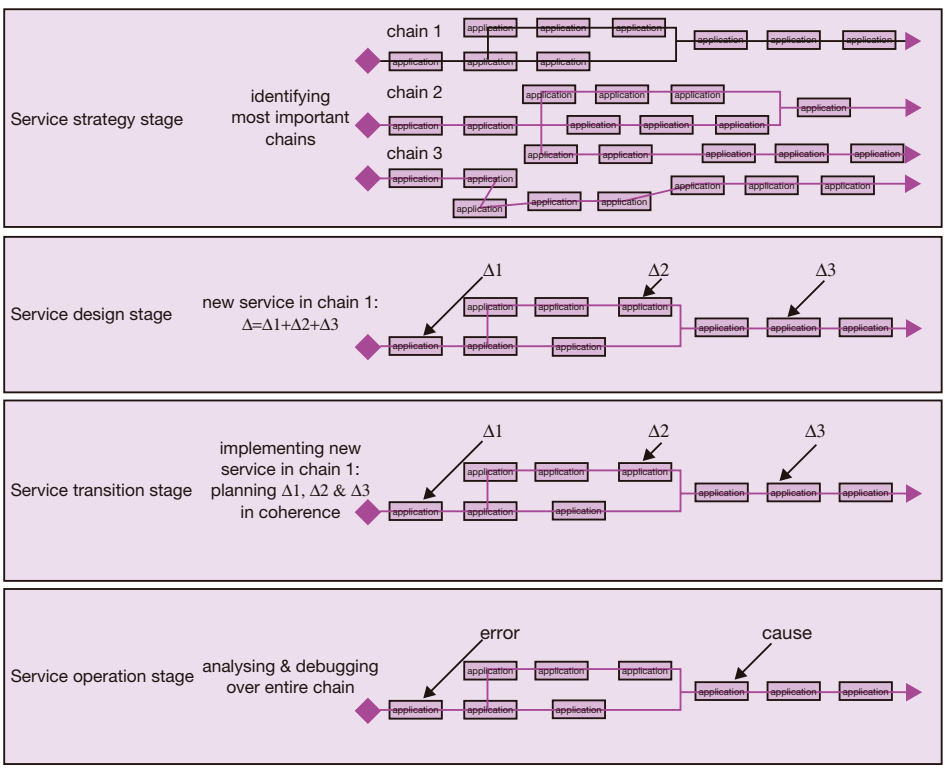

Figure 5 Overview of chain management in the different stages of a service life cycle

Chain management within the ITIL V3 service strategy stage

Within this stage, a precise understanding of the IT services that the business requires is necessary. Because of the developments that were indicated in the Introduction section, the business is increasingly asking services that go beyond the capacity of a single application, but need to be delivered by a chain of applications.

The strategy generation process should identify the need for IT chain management, and identify the most important IT chains for the business.

The service portfolio management process can focus on the services per IT chain, and try to evolve, from services that translate directly to an application, towards services defined at IT chain level.

The demand management process must be able to foresee major changes in the demand that may cause certain IT chains to be created, changed or cleared.

The new role of IT chain manager that was explained in the section *Organization*, can be seen as a special "product manager" role: taking responsibility for developing and managing services across the life cycle across an entire IT chain of applications.

Within @Home, the IT chain managers and IT service managers are part of the teams that, together, formulate the yearly and 5-yearly budgeting and business programmes, together with the business responsibilities. Here, the IT service strategy is determined or tuned.

Chain management within the ITIL V3 service design stage
Designing new IT services should be done across an entire chain of applications. An IT change should not be focused on changing a single IT application, but on changing the combined applications that, together, can provide the new service. Of course, ITIL is meant to work in this way; however, in practice, IT departments tend to focus on IT applications alone.

The service catalog management process must communicate a full view of the different services that the IT provides, ordered by the different IT chains that provide the services. This is an essential process in the transition to IT chain management: awareness within the organization (step 1).

The service level management process must be able to translate the service levels at IT chain level to service levels at the application and interface level. What does the requirement for a service mean for the requirements for the applications and interfaces (and IT infrastructure) that together make up the service? The service levels that were realized must also be reported at IT chain level rather than at application level.

Within @Home, the service levels for the end-to-end service-assurance process chain concern: customer-satisfaction, mean-time-to-repair, first-call-resolution, first-time-right, costs per service-ticket. These are translated to service levels at IT chain level, about performance, availability, number of incidents and problems and mean-time-to-repair for the entire IT chain. These are, in turn, translated into their equivalents at IT application-, IT interface- and IT infrastructure-level.

In phase 1, @Home established SLA Management.
In phase 2, measurements of the service level agreements were realized across all IT departments.
In phase 3, one centralized control-bridge was achieved.

Note that this way of working was not straightforward. The first time that the chain manager asked for a proposal for service levels, the IT service managers came up with application-specific service levels only, without any relation to an overall chain service level.

The capacity management process, availability management process and the IT service continuity management process all have to deal with this transition from IT chain level to IT application level.

Supplier management is another important process within the service design stage. Note that in the context of IT chain management this can have two forms:

- ensure that the IT services that IT suppliers provide are managed well and fit within the overall IT structure
- ensure that the IT of the business service suppliers that provide so-called "semi finished products" are managed well and fit within the overall IT structure; IT chains can thus cross the boundaries of a company, while the management of the applications in these chains still needs to be done in coherence

As an example of the latter option: @Home uses external call centers for some of their services. These call centers have their own supporting IT applications. These external IT applications are part of the IT chain of @Home. For example: these applications need information about the customers of @Home, their contracts, etc., and are therefore highly dependent upon the IT applications of @Home. Consequently, these external IT applications need to be managed as part of the IT chain of @Home.

Chain management within the ITIL V3 service transition stage

The service transition process goals are to minimize risks and maximize success in implementing the newly designed services. From an IT chain point of view, it is essential to implement new services within the context of an IT chain. Even applications within the IT chain that are not changed at all can be impacted by the roll-out of the new service and the adaptations in other applications within the IT chain.

The change management process is a key process here. It is a process that goes across the different life cycle stages. It is already important in the design stage to translate the RFC at service level to the different applications and interfaces within an IT chain. Next to this design issue, the challenge in the implementation process is to find a right way or sequence to roll-out the changes in the different parts of the IT chain. This is part of the transition planning and support process, and the release and deployment management process. The risks and costs of the roll-out sequence must be minimized, while speed must be maximized; often joint releases are needed because of dependencies in the IT chain.

The service asset and configuration management process needs to identify, control and account for all service assets and CIs. For IT chain management purposes, it is essential to have a correct administration of all IT chains and how these are structured at the different technical levels. This information must be available for all IT related roles. Current practice within many companies is for application managers only to know the direct interfaces of the application, and only at the highest technical level. An overview of all applications and interfaces and underlying IT infrastructures for one IT chain should be available at the different technology levels. The lack of this information significantly complicates the design task for new services, the implementation task for new services and the operational management task for existing services. For example, debugging may be very difficult if the underlying chain structure is not known. In many companies, major incidents can only be solved by first uncovering the technical structure of an IT chain, and the dependencies within that chain. For this, many different experts need to be gathered together, which can take up much time. Often, this knowledge is not well maintained, meaning that new staff have to

regain the knowledge from scratch. Catering for the IT chain configuration management data is step 2 in the IT chain transition process.

The knowledge management process within ITIL has the responsibility to make all IT related staff of a company aware of the IT chains, and to provide them with the right knowledge about these IT chains (step 1, together with the service catalogue management process).

The service validation and testing process must test services as a whole, against the SLAs and possibly OLAs. If the SLM process has succeeded in defining IT chain SLAs, the testing process must do "chain testing": what really needs to be tested is the entire chain of systems that together support a business process. It might very well be the case that the individual components function well, that adjacent systems and their intermediate interfaces function well, but that the entire chain is not functioning. However, in current practice, this chain testing is not often done.

For IT chain testing it is necessary that the testing environments of the individual applications are interconnected to form an IT test chain. A chain test plan and also a chain regression test needs to be made, and commitment needs to be given to this plan (resourcing, timing, etc.) by all of the involved systems and their management. This comprises both functional and performance testing.

In practice, there are several reasons why IT chain testing is not done:
- too difficult to get all parties involved and to get consensus for a test plan; the goals and interests of the different parties differ too much; higher management should push here
- too expensive to connect all testing environments in an IT test chain and also to manage it
- too time-consuming
- no clear view of which chain needs to be managed; this means step 1 and 2 of the IT chain transition process are not done properly
- no clear view of the functionality and performance requirements for an IT chain; this makes it impossible to make a test plan or to test adequately; this means that the SLM process was not done at chain level

However, IT chain tests may be more important than all other tests. Therefore, recommendations are to:
- make sure steps 1 and 2 of the IT chain transition process are done properly
- make sure the SLM process yields requirements at chain level
- make a test plan for the different chains, and educate people to perform these chain tests
- get commitment and permission to impose from higher management; directly relate chain test results to financial consequences; get business people involved; show the costs of malfunctioning IT chains

Chain management within the ITIL V3 service operation stage
The service operation stage goal is to deliver agreed levels of service to the business.

Firstly, the event management process has to ensure that all components of an IT chain, both applications and interfaces, generate events to indicate their status. These events can be combined to get a view of the entire IT chain. Here, again, the information from the configuration management process is needed.

Based upon events or upon customer notifications, incidents can be detected. Upon the occurrence of an incident, firstly, a so-called "root-cause analysis" has to be done: identifying which components of the IT chain have caused the incident. Note: the part of the IT chain where the incident is noticed may not be the (root) cause of the incident. In order to execute this "root-cause analysis" more in-depth knowledge and expertise is needed at the service desk than would normally be necessary. This means the shift towards IT chain management instead of IT application management requires more expertise at the helpdesk.

For problem management the situation is analogous: firstly, the domain of the root cause of the problem has to be determined. This means problem management also needs a central start/co-ordination point, just as the helpdesk is for incident management.

Note that the dependencies between different parts of the IT chain are an important reason to introduce IT chain management in the first place. Having a clear view on the dependencies within the different IT chains simplifies the operational management of IT enormously. This can be particularly seen within the incident management and problem management processes.

The existence of the dependencies within an IT chain imposes extra requirements to the monitoring of IT within a company. The next section is dedicated to this.

Tooling: end-to-end visibility

Apart from the operational processes mentioned in ITIL V3, other important operational activities are "monitoring and control" and "implementing the console management/ operations bridge".

The monitoring and control of an IT chain, as opposed to monitoring and control of separate applications and interfaces, is quite a challenge. In many large companies, IT management limits itself to management of applications and of interfaces (next to management of the IT infrastructure). However, if only the chain of applications and interfaces together can provide the required services, it will become essential to monitor and control the chain rather than just the individual parts.

Many companies have a blind spot when it concerns their IT: either active monitoring of the IT applications, interfaces and underlying IT infrastructure are absent all together, or it is limited to individual applications, interfaces and components.

What is really needed is an active monitoring of the entire IT chains. A dashboard is needed, where the entire IT chain can be viewed, as well as the applications and interfaces that form this chain. Tooling is needed to get end-to-end visibility.

In the market, professional tooling exists to provide this end-to-end monitoring (and control) of IT chains. However, the configuration of these tools takes much time and money. The relation between these monitoring tools and a so-called configuration management database (in ITIL V3 also called CMS: configuration management system) is a particular challenge.

However, there are less expensive ways of monitoring, which an organization can explore. Here are some options:

- Start with monitoring the log files of the different IT applications in the chain that are available, together with an overall view on the (static) structure of the IT chain. Manual intervention is needed to combine the information in the different log files.

- Use “ping” messages to check whether the different components in the IT chain are still up and running.
- Use “in-band” test messages through the entire IT chain. Test the throughput, the response times, etc., of these specific test messages.
- Use the monitoring and control tools that are available for the enterprise service bus system(s) used in the IT organization.
- Gradually evolve to a professional monitoring system that can first focus on the most critical systems within the IT chains, to monitor the “operational health” of the IT, as ITIL V3 refers to it.

ITIL V3 clearly states that a central co-ordination point may become necessary for monitoring and managing services. As became clear in the discussion of chain management within the different ITIL V3 processes, this is even more applicable for chain management. The “domain determination” process is particularly relevant at this point. Note however, that this requires more skilled expertise in this central co-ordination point.

However, it is remarkable that, within the cable and telecoms industry it is quite common practise to have an NOC (Network Operations Center) for telecoms services for the customer. Yet an Operations Center for IT services seems a lot further away. Note that such an IT Operations Center is exactly what is needed as a central co-ordination point. This is also the place where the monitoring and control tooling for IT belongs.

Within @Home, the need for one central co-ordination point was identified. In telecoms provisions, IT is now becoming an important integral part of the end-user services. For this reason, @Home chose to have one central management center for both the telecommunications/cable networks and the IT environments. The Network Operations Center was extended to also incorporate the IT Operations Center.

Use the SOA management concepts where possible

In a pure SOA IT landscape SOA governance is an absolute “must have”, to manage the SOA life cycle. However, if the IT landscape is not purely SOA and consists of a hybrid IT landscape, it is possible to extend the IT chain management with some interesting concepts of SOA governance. Within this chapter we will describe some of these interesting concepts within the SOA governance.

In essence, SOA governance is about defining a robust management framework and disciplining a set of rules to manage the implementation of a SOA and the SOA life cycle. So SOA governance does not only manage technical components or services, it is also about setting up a management framework as well.

SOA governance will focus on the overall structure of the strategic, operational and functional level. It will bring together the business, technology, processes and people involved in the end-to-end business process. This will make it possible to plan, make the right decisions, steer and control the implementation of a SOA more effectively according to the needs of the business. Bringing all of this together will also increase the awareness of the process-orientation within the organization. This awareness provides a solid base for good IT chain management.

Which concepts are interesting for IT chain management?

The SOA Center of Excellence

The SOA Center of Excellence will be a driving point of good SOA. Within the SOA Center of Excellence people from the business and IT are brought together to make decisions about the services to build or implement, driven by the business needs respecting the guidelines defined within governance. The Center of Excellence is responsible for the ROI of the SOA. So basically, the Center of Excellence defines what should be done, how it should be done, by whom it should be done and finally how to measure whether it is successful.

In relation to the IT chain management, it is important to combine the different IT management processes within the organization. Especially if you identified an IT chain and you know it will affect multiple IT management processes. The key factor here is that you need a Centre of Excellence to manage the interdependencies between these processes and IT, so you can make the right decisions when necessary.

Finally, the SOA Center of Excellence does not necessarily have to be large. In smaller organizations perhaps just one person will be sufficient. This person must understand both the business and the IT very clearly. They must be able to transform and translate the business needs into IT and make the right decisions. These kind of people are hard to find, but are very important to make the work a success.

The five main decisions made within the SOA Center of Excellence are:

- Which services should we do?
- Which services should we do first?
- Is this service really new and is it reusable?
- Who is going to pay for the service?
- Who is going to be responsible for the service?

Which service to start with? As the service-oriented architecture can really help you to increase your business agility, it will also increase complexity within your IT management. You cannot just leave your current IT issues behind and start building services like a madman. This should be done starting in a very simple way, in order to demonstrate the benefits of a SOA. Start with services that are very small and easy to implement and most important of all, services that solve real business problems. If a part of your organization is planning to start a SOA and starts designing services which are part of an IT chain, first address the decisions on which services to build within the meetings scheduled by the IT chain manager. This concerns steps 1 and 5 of the IT chain management implementation stages. See also the section *How to make the transition to IT chain management*.

Is this really a new and reusable service? You should really be sure that the services you implement are reusable. This is one of the main benefits of SOA, which will return your investment. Be sure you do not make multiple redundant services because you will get lost at the end. If you plan to implement services and enter the world of SOA, think about the services you have to develop very clearly. The services should be real business services, and should have the right granularity. Defining the granularity is not an easy task. At this point it is interesting to take the IT chain management point of view. If you have a good and clear definition of (large) IT chains, it will definitely help you define a better granularity. Be sure to design modular and encapsulated (loosely coupled) services.

Who is going to pay or is responsible for the service? As multiple IT chains can make use of the same services, it is very important to address the “owner” of a service. Who is going to

pay for the service? Who is responsible for the service? After implementing a service, pay attention that it will not become an "orphan" within your IT assets. Be sure that it will be a part of your IT assets and that it will be managed. Be aware of services within your SOA spanning multiple applications. In this case it is even more important to assign an owner to these services. As the service consists of multiple applications it is easy for the application managers to point at each other in the case of an error.

The concept of identifying roles within your organization

SOA governance will make you aware of domain ownership. Domains consist of multiple services that will be reused by (hopefully) many business processes, but the services within a domain share some common business cohesiveness. These domains are responsible for the development of their own services, and should enable other domains to consume the services. When other domains want to use the service of a specific domain, agreements should be made in the form of service-level agreements. Apart from domain ownership, other roles can also be identified to support the complete SOA service life cycle. See table 1.

Role
Domain owner
Domain service-oriented business analyst
Line of business representative
Domain developer and maintainer
Service tester

Table 1 Roles to support the SOA service life cycle (Source: "Improve your SOA project plan", IBM, Yvonne Balzer)

When domains are chosen they should be in line with the IT chains, i.e. per end-to-end business process. In this way, the hybrid IT may gradually evolve into pure SOA, where the IT chains can evolve into SOA domains. However, notice if a domain is not fully in line with an IT chain, the "domain owner" and "IT chain manager" (which are focused on the organizational part) may have separate rolls. The other roles mentioned above are more focused on a functional level and can thus be complementary to the IT chain manager.

Define a corporate data model

When making a transition from a monolithic application into a service-oriented or process-oriented IT landscape you will notice that your data models must evolve too. In a stovepipe environment, people tend to create data types and models within their own (stovepipe) perspective, not having to share information across other environments very often. So many times you end up with information which is understandable within your own environment, but unclear to others.

In the transitional phase from stovepipes into process- or service-orientation, information will become more and more shared. Having reusable services you can potentially benefit from not having the information stored redundantly. However, this indicates the need of a good and well designed corporate data model. So you must address that within the transition from stovepipes into process- or service-orientation. It is important that you manage the transition of your data model.

Implement a registry/repository
As you implement more and more services, join multiple IT assets and support more and more business processes, you will probably quickly lose the complete overview of the relations between the interdependent components. You do not know who is consuming these services. You do not know who is providing the services or related IT components. By implementing a registry and repository you will be able to stay in control and keep a total overview. Within your registry you can build your service catalogue, storing the action service definition, consumers and providers. From your IT chain management perspective, you will be able to define the impact when changing a service, or you will be able to see the impact when a service goes down more quickly.

The SOA service registry and repository is handled by the combination of ITIL V3 processes service catalogue management and service asset and configuration management.

Closing the chain management loop

In order to provide for a managed IT chain in the long run, a traditional feedback loop needs to be implemented at different levels: operational feedback loop, tactical feedback loop and strategic feedback loop.

This is elaborated in the continual service improvement (CSI) process of ITIL V3. This process can be applied to the different identified IT chains within the company.

TIPS & TRICKS

Earlier on, we showed that the IT chain concept is helpful in managing highly hybrid IT within a company. Apart from good IT chain management, it is also important to keep the IT chains themselves as simple and short as possible[6]. The simpler the IT chain, the easier the chain management, the better the performance of the IT chain.

Keep the IT chain simple and short

For keeping the IT chain simple, it is important to limit the number of dependencies within a chain as much as possible. Here, the concepts of modularity and encapsulation reappear. These are also the basis for the SOA guidelines for choosing services.

In practice, designers are often tempted to reuse an existing interface, in order to save time or costs. Or they make specific additions in terms of data or functionality. Of course, this is not how SOA should be implemented, and this leads to undesirable dependencies within an IT chain.

Another important guideline, in order to make the IT chain as short as possible, is to finish the process of the IT transition as described in the section *Introduction: understanding the problems*. Make sure all stovepipe-remainders are cleared, ideally leaving only one IT application per function. For example, instead of many different trouble ticketing systems, one trouble ticketing system will suffice.

Notice here that clearing a large monolithic system that has survived in the IT infrastructure up until now is a really hard job. Mostly these last survivors have tentacles that go deep into the rest of the IT structure. Many other (more up-to-date) applications are dependent upon

[6] *Albert Einstein: "Everything should be as simple as possible, but not simpler".*

the monolithic system. Even when the system itself is gone, its footprint may still be present in the concepts, structures and language that are used in other applications and also in reporting. This footprint can be a real drawback for renewing IT, and it should be removed, thus also removing unwanted dependencies within IT.

In order to get short and simple IT chains it is important that IT departments only go for uniform solutions. If an old system is going to be replaced by a new one, look for the uniform solution. Do not rebuild the old system with new technology. Do not let the old system dictate the requirements for the new solution, but look for the essentials of the processes that need to be supported. If the company uses a buy-policy instead of a make-policy, be sure to enforce a "common off-the-shelf" policy.

In terms of IT strategy, enforce an IT policy were the IT pollutant pays for cleaning the pollution. If the business needs a short-term IT solution that does not fit into the overall IT architecture, that business part also has to pay for implementing the long term IT solution that does fit into the IT architecture.

In terms of IT strategy, a so-called (Gartner) *Center of Excellence* combines the business representatives, the architects and the designers into one team. This is a powerful help to ensure that the guidelines given above end up with IT chains that are as simple and short as possible.

Business and IT alignment

Some recommendations to make the IT chains as simple and short as possible:

- Keep the processes uniform. As an example, the service process for a Cable TV subscriber should not differ from the service process for an internet subscriber. Only in the technical details, different activities show up. Do not let the business dictate diversity. Show the business responsible the costs of the diversity.
- Use one overall process model, one overall terminology and one data model, to keep the processes uniform.
- The business and the processes determine the requirements for the IT. However, the business and IT departments together have to weigh the requirements versus the uniformity of the IT and the costs of specials.
- If many different product combinations are sold as packages, it is essential to combine the processes of the different (sub) products into processes for the overall packages. Do not make special processes for every different package.

It is a joint responsibility of business and IT departments to make the IT structures within the company as simple as possible.

CONCLUSIONS

- The IT application structure of large companies is far too complex to manage as a whole. The "divide and conquer" principle must be applied here. The IT chains provide a good means to structure the entire IT application landscape, because:
  - IT chains are natural clusters of dependencies between the IT applications.
  - The business asks for well-operating IT chains rather than IT applications.
  - IT management increasingly becomes IT chain management rather than IT application management.

- IT chain management is especially important for large companies with a very hybrid IT.
- The ITIL V3 processes provide a helpful means to introduce IT chain management within a company.
- The SOA governance concepts provide some additional points of attention when introducing IT chain management within a company.
- For successful IT chain management, monitoring the IT chain is necessary. Without a good IT chain monitoring process, the IT chains are invisible, and so are all dependencies within the IT chains. The way in which the monitoring process is supported by tools may vary, but an IT chain monitoring process has to be in place in order to run the business.
- When implementing IT chain management you need an experienced IT staffing at the IT helpdesk. This is where root-cause analysis has to be done, to trace deviations of the regular or expected performance.

The power of the IT chain concept is in enabling co-ordination and co-operation of people, IT tools and processes. This all starts with *awareness of the process chains and the supporting IT chains* in the company.

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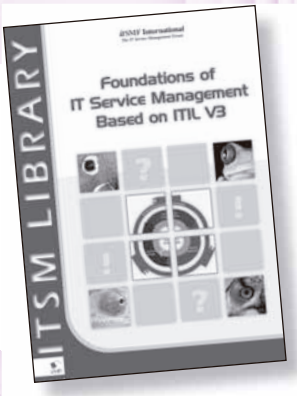

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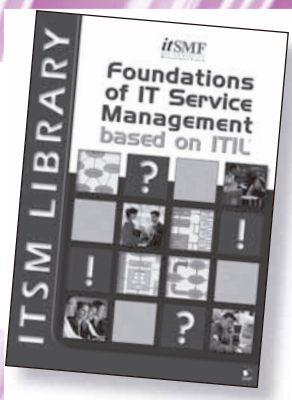

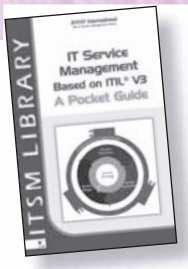

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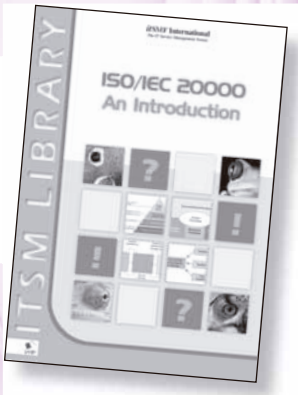

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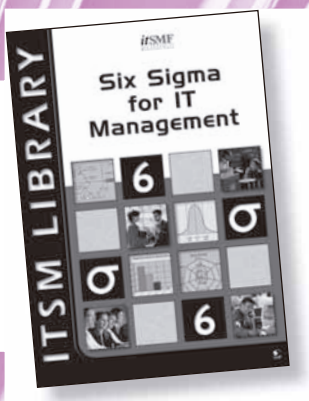

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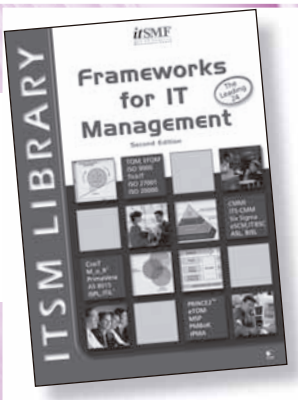

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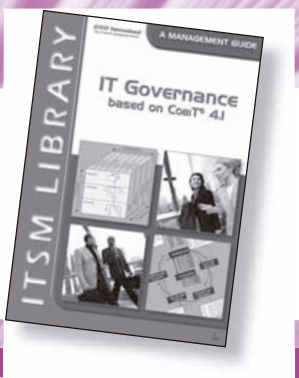

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