

ENTERPRISE ARCHITECTURE: COMPELLING REASONS TO START

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1 INTRODUCTION

The significant complexity of much IT environments is well known: large technology diversity and redundancy utilized for a wide variety of dispersed and disjointed systems and networks. A considerable cost level is associated with this complexity. Often, these costs amount to more than 80% of the total IT cost level, leaving little room for new developments. Complexity and its associated cost are likely to grow exponentially. Hence, without special measures, the complexity and associated costs will become increasingly unmanageable. Further, change efforts will entail an avalanche of subsequent cascading effects, whereby a disproportionate amount of human and financial development resources continuously need to be allocated to interface and infrastructural aspects. Further, the inability to integrate different customer, supplier and partner interfaces and processes, and their associated data sources, sentences the organization to ineffective customer and operational business process management.

Moreover, and arguably more important, such an IT environment makes it difficult, or even virtually impossible, to accommodate business growth and adaptation in an expedient manner. Hence, the situation poses severe limitations regarding business *integration*, *agility* and the ability to *change*. These latter aspects will become increasingly crucial in view of new business models (e.g. e-business, network economy, customized production and customer relationship management, supply chain management, shared services operation), whereby interdependence and integration are essential aspects for frictionless cooperation and collaboration within the business environment. A fundamentally new form of IT governance will thus be required.

The new business environment can be characterized as a network of interacting and collaborating customers, employees, business partners and suppliers. Appreciably, the new IT-driven business and organizational designs confront corporations with unprecedented, multifaceted many-to-many *interdependence* and *integration* problems. This notion of frictionless cooperation and collaboration between various entities in the network entails specific requirements for IT deployment. As indicated earlier, increased business dynamics call for business *agility* and the ability to *change*. The briefly reviewed developments point to a number of IT requirements that ultimately boil down to: (1) reduce time to market of new business functionality, (2) ensure seamless interoperability an interconnectivity of systems, networks and information sources, (3) enable business and organizational integration, agility and the ability to change, and (4) reduce IT complexity and costs.

2 THE NEED FOR REFORM EVIDENCED

2.1 Benefits questioned

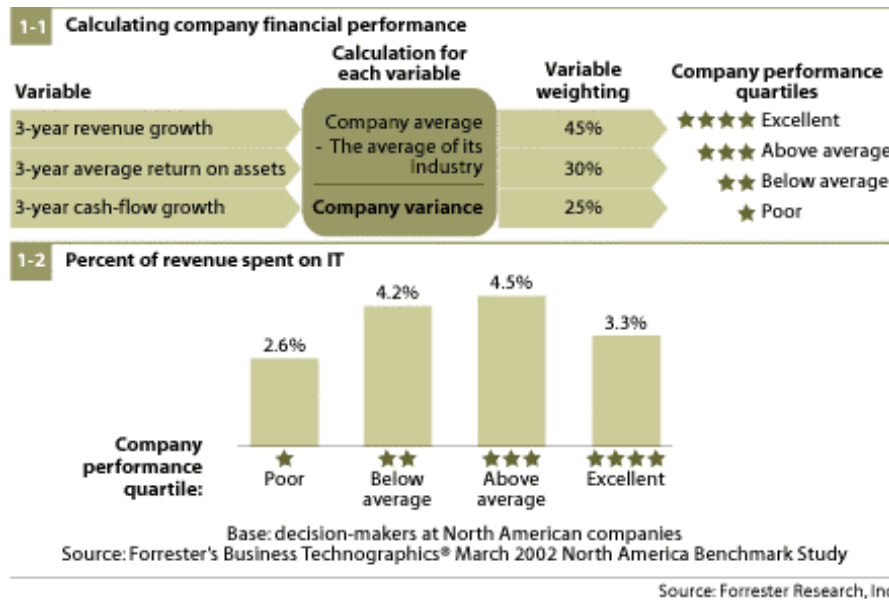


Figure 1. IT spending levels and company performance.

The need for reform is in our view evidenced by various analyses. We will briefly discuss a few. First an analysis among 300 companies regarding IT spending levels and company performance provided results shown in figure 1. Remarkably enough, the companies performing in an "excellent" manner showed a relative spending level that was marginally higher than the "poor" performing companies. We submit that the excellently performing companies were able – through proper business and IT governance – to derive more business value out of their IT developments. All too often expensive IT resources are used in sub-optimal and non-integrated processes, thereby creating an enormous complexity and associated cost level. Hence, the malady seems managerial, not technological. As Strassmann observes "there is a basic flaw in the ways that IT is planned, acquired and then managed" [2003]. Second, the ineffective deployment of IT might also further be argued from the observation that over the years the investments in IT have generally not produced measurable improvements in corporate performance, such as expressed by productivity, the ratio of total assets over revenues, or the ratio of transaction costs over total costs of goods [Pisello and Strassmann 2003]. The label "computer paradox" is given to the phenomenon that "there is no correlation between investments in IT and profitability, or other key measures of business success" [o.c.]. Apart from possible debates over the validity of traditional business performance measures, the paradox mentioned seems a serious indication of the issues mentioned before: ineffective business and IT strategy development, planning and execution. Finally, these observations are corroborated by an MIT analysis showing that companies that "merely" introduced IT systems in the existing organizational environment did not reap productivity benefits, but companies that in conjunction with the introduction of IT systems also changed the organizational arrangements, such that IT and the organizational environment are optimally matched, realized considerable productivity gains [Steenhoven and Zuurmond 2004]. Enterprise performance is thus not primarily a function of the technology used, but is

a function of the total quality of the organizational arrangements of which technology is an element [Witteloostuijn 1999].

Since IT evidently matters, the competitive advantage lies with those companies that effectively deploy IT to improve current business processes, to enable different business processes, or to enable a different business. This is the core purpose of IT governance, which necessitates a specific business and IT governance framework, discussed below. Contrary to often held beliefs, strong business and IT linkage is in our view conditional for effective IT governance, rather than its goal. This condition rests on deep-seated beliefs about the value of (information) technology for business survival and growth.

2.2 Outsourcing

The literature about outsourcing experiences provides a mixed portrait of more or less success [Lacity and Hirschheim 1994]. Based on the analysis of successful outsourcing cases, the primary condition mentioned is the ability to properly manage outsourcing, not only relative to the customer/supplier interface regarding contractual, transactional, and operational issues, but also – and arguably more important – from the demand and supply perspective. An aspect frequently emphasized in this respect is the clear separation of the “what” and “how” question, hence separation between the definition of what IT solutions should provide, and how they are developed and implemented [Beulen et al. 1994, Buijs et al. 1996, van der Zee et al. 1997, 1999]. Success cases regarding outsourcing indeed showed clear delineation of processes, roles, and responsibilities in this respect [o.c.]. These conditions again point to proper governance. Without adequate governance, the situation sketched in the previous section is likely to worsen. Hence, central IT governance is considered essential when IT supply is largely outsourced [Poels and van Veen 2003].

As Giga Research points out, the Enterprise IT Architecture function should provide design assistance and guidance early in the development process [Leganza 2003]. Said guidance entails the issuing of an initial project-start document outlining the desired architectural approach. Outsourcing will not diminish that role. Rather conversely, outsourcing transfers certain activities to the external domain, which, without adequate governance, are prone to a supplier beneficial focus. Rightly so, the Meta Group strongly recommends independent design review prior to committing any development to an outside party [Carros 2003]. Compliant IT architecture must thus be secured.

2.3 New legislation

IT developments have opened up an enormous array of new possibilities for information exchange and transactional activities. All sorts of risks are inevitably associated with these possibilities. These risks are of an operational, privacy, security, financial and legal nature. Understandably therefore, various regulatory requirements – either governmental or otherwise – are, or will be enforced to address these risks. Likely areas for legislation will be those regarding: the protection of privacy sensitive data, cross border data flows (e.g. pertinent to financial transactions), general data security and transparency, and economic protectionism.

A prime example of regulatory enforcement is the US government so-called Sarbanes-Oxley act (SOX), specifically known as US Public Accounting Reform and Investor Protection Act. This is considered the most sweeping legislation affecting publicly traded companies since long, and is designed to reduce fraud and conflicts of interests, while at the same time increasing financial transparency and public

confidence in the markets. This legislation requires: (1) a statement of management's responsibility for establishing and maintaining adequate internal control over financial reporting, (2) that financial statements be complete and accurate, (3) that processes used to generate statements are accurate and meet accepted industry standards, and (4) that the material information that is used to generate periodic reports be retained and made available to the public. The whole idea is about improving transparency and accountability in business processes and corporate accounting, and involves detailed possibilities for auditing and assessment.

Said legislation specifically speaks about "electronic communications", which by definition involves a wide variety of IT systems subject to regulation, ranging from accounting systems, general ledger systems, supply chain management systems to ERP systems. Specifically, Electronic Content Management, or Electronic Records Management plays a vital role. Since IT is the backbone of the (financial) processes that the legislation aims to regulate, this regulatory activity has an enormous bearing on IT. Establishing compliance – as determined by the auditor – is not a one-time affair. Rather, every new (financial) system or upgrade of existing systems must demonstrate compliance, hence requires new certification. Clearly, these legislative requirements entail specific forms of (IT) governance.

2.4 Technology developments

A wide variety of technology developments can be witnessed, ranging from the Internet as the ubiquitous information utility, the semantic web, pervasive computing, wireless, grid computing, biometrics, contextual collaboration, web services, service-oriented development of IT systems, to computer telephony, to name but a few. These developments show different time scales regarding their ultimate maturity and impact. Nonetheless, they share a common characteristic: the developments will ultimately affect the manner through which business and IT processes are developed, executed and maintained in a significant and often disruptive way. From an end-user perspective, these developments will be manifest pertinent to: (1) consumer and employee interaction, (2) information exploitation and exploration, (3) process dynamics, and (4) information integrity.

In and of themselves, these developments call for proper governance in order to administer technology introductions adequately and uniformly, such that their potential business value can be effectuated. Moreover, for a considerable part these developments also entail the provisioning of externally supplied services. Hence, the observations about governance relative to outsourcing similarly play a role.

3 NEW WAYS OF GOVERNANCE

As indicated, the situation described is partly due to the historic developments of IT systems and networks, as well as the inherent immature nature of some of the underlying technology. Nonetheless, we submit that the majority of the IT complexity is the inevitable result of ineffective – largely decentrally focused – IT and business governance. This calls for rethinking the whole spectrum of IT demand and supply functions and activities within the overall governance framework. A fundamentally different IT governance structure is crucial in view of the IT complexity mentioned, and is similarly crucial in view of the IT requirements posed by the new business environment.

3.1 Ideal governance characteristics

In view of the observations given in the above, the preferred way for governing IT design, development, implementation and operation is based on the following considerations:

1. The unfavorable consequences of the decentrally focused management philosophy and the (associated) complex and diffuse demand-supply interface must be removed. These consequences have been elucidated before: divergent, redundant, inherently uncoordinated and partly conflicting IT system and infrastructural developments, whereby process and information integration turns out to be cumbersome or virtually impossible. High business process costs as well as IT continuity costs are the inevitable result. Addressing these issues is an important prerequisite for effective sourcing of IT supply.
2. Modern business and organizational management requires an integrated horizontal, process orientation. As illustrated earlier, new business models characterized by labels such as e-business, globalization, network economy, extended enterprise, multi-channel interactions, supply chain management, shared services operation and so on, all necessitate “end-to-end” (integrated) customer and operational processes at various levels: technology, informational, as well as pertinent to the manner through which information is distributed. In view of this, the preferred way of IT governance should lead to an IT environment with the following characteristics: (1) *scalable* and *flexible*, such that the IT environment can be easily adapted to changing business demand and strategy (2) *integrated*, whereby connection to different technologies is easily arranged, such that end-to-end business processes as well as new business strategies are easily enabled, (3) *productive* and *agile*, thereby creating the ability for efficient and effective design, development and implementation (short time-to-market), and operation, (4) cost-effective delivery of quality of service, and (5) providing adequate levels of security.
3. In view of the increased rulemaking regarding corporations, both the functionality and deployment of IT systems must enable continuous compliance with regulatory and legislative requirements, as well as easy demonstration thereof.

We think these premises inherently necessitate a shift from decentrally focused managerial IT control towards more *centrally* focused control. Evidently, this requires a delicate balance between central and decentral activities, whereby central rule making, planning and coordination regarding IT must be concurrently and coherently linked with decentral business developments. Nonetheless, as the Butler Group argues concerning effective IT governance, “departmental autonomy can only be exercised within a larger controlling framework” [Thompson 2003]. This concurs with many

publications and industry practices. Inevitably, this implies ceasing of local autonomy regarding the constructional aspects (*how*) of IT deployment. Hence, it is necessary "to switch the ultimate control back to the larger organizational framework" [o.c.]. Below we will briefly discuss what this framework must be.

In view of the present situation portrayed in the previous section, it seems clear that the value IT provides is not primarily a function of technology, but rather a function of the organizational conditions regarding technology deployment. Indeed, experiences indicate that "an effective IT governance structure is the single most important predictor of getting IT value" [Dragoon 2003]. Others have similarly stressed the importance central IT governance through a holistic and unified approach – from the top down – for IT architecture and infrastructure developments [Appel 2003, Buchanan 2003, Robertson 2002, 2003].

3.2 Three key functions

Various aspects of the central IT governance role can be mentioned. Ultimately however, they can be clustered around three closely related key functions: (1) Enterprise IT Strategy and Architecture Development, (2) Enterprise IT Planning and Portfolio Management, and (3) Enterprise Program Management [Allega 2003, Appel 2003, Bittler 2003]. The close linkage, integration and collaborative relationships of these functions are emphasized, as schematically shown in figure 2 on the next page. Noticeably, the key governance functions address the formal and structural aspects of governance. These are necessary, but not sufficient, as argued in a study among six financial services companies. High IT performance turned out to be associated with an IT innovation orientation and an effective IT governance mechanism that, in addition to its formal structure, also was characterized by high levels of social integration [Peterson et al. 2000]. Said social integration created an effective fundament for business and IT alignment.

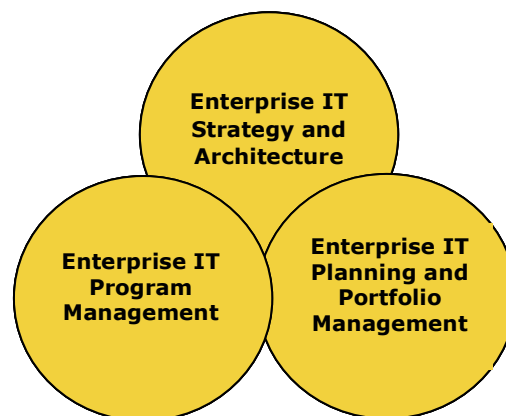


Figure 2. Three key IT governance functions.

Many organizations are following the pattern shown in figure 2. The Meta Group predicts that "by 2006, 25% of global 2000 organizations will integrate holistic enterprise architecture, enterprise program management, enterprise strategy/planning, and IT portfolio management into a common set under the auspices of the CIO's office" [Allega 2003]. Evidently, such approach is not restricted to commercial organizations as evidenced by the "National Association of State Chief Information Officers" in America [Picherau 2003]. External sources indicate that organizations will follow this structure, whereby these functions constitute the holistic,



formal and unified interface regarding IT demand and supply. These three functions must be complemented at the business side within similar functions, which we label as: Business Strategy and Architecture, Business Planning and Portfolio Management and Business Program Management. Jointly the IT and business functions enable the required strong linkage between business and IT strategy development, project planning and project execution. Additionally, said functions are instrumental for effective application and infrastructure life cycle management.

Within the scope of this paper, the Enterprise IT Strategy and Architecture function is specifically analyzed within the context of the new IT governance framework. The value and impact of Enterprise Architecture will also be argued in case of IT outsourcing. Discussing the main task areas is however outside the limited space of the current paper.

4 ENTERPRISE IT STRATEGY AND ARCHITECTURE

In light of the purpose of this paper, we will focus below on the Enterprise IT Strategy and Architecture function – with specific attention to architecture – and not elaborate on the detailed scope and activities of the two other key functions mentioned. Based on the present outline however, it can be understood that the three functions form the *formal* and *unified* IT interface regarding business IT demand and IT supply. As previously indicated, the key functions are instrumental for effective application and infrastructure lifecycle management. The objective is to effectively manage the development, implementation, enhancement and ultimate replacement of IT systems and networks to support current and enable future business requirements.

4.1 Enterprise Architecture defined and operationalized

There are many perspectives on architecture. Likewise, many definitions exist. However, with reference to the governance issues addressed before, we view architecture as a *normative* concept that prescribes how things should *become*. Hence, Enterprise (IT) Architecture can be defined as a coherent and consistent set of principles and standards (patterns) that *guide* (IT) system design, deployment, operation and maintenance.

Various processes are associated with the Enterprise (IT) Architecture function, of which discussion falls outside our current scope. Nonetheless, the processes aim to deliver, and maintain the enterprise (IT) architecture and assure compliance. Contrary to the divergent approaches mentioned in the introductory section, Enterprise Architecture offers a “methodology that enables the use of common processes and unifies disparate companies into one cohesive organization” [Blowers et al. 2004]. Enterprise IT Architecture thus regards *coherence* and *consistency* pertinent to the cost-effective delivery of IT functionality in view of business *integration*, *agility*, and the ability to *change* [Hoogervorst 2003]. As such, Enterprise Architecture can provide a normative reference for standardizing operations in local subsidiaries in different countries, or aid in integration after mergers and acquisitions. The normative aspect of architecture implies that these issues are addressed in the design phase of initiatives. This is considered the most compelling argument for Enterprise Architecture [o.c.]. Further, new technology developments on one hand enable, and on the other hand coerce, organizations into utilizing Enterprise Architecture. Chief among these technologies is the “Service-Oriented” delivery of IT and business functionality. Finally, as indicated previously, organizations are facing renewed pressure from new legislation, such as the Sarbanes-Oxley act mentioned before. Enterprise Architecture is crucial for demonstrating compliance with legislation [Blowers et al. 2004]. As stated before, operationalizing the concept of Enterprise Architecture involves many processes, functions and competences. Also, a formal methodology needs to be defined and/or adopted, of which an Enterprise Architecture framework is of prime importance. One such framework is the DYA framework used by various organizations as a practical aid in implementing architecture thinking [Wagter et al. 2001]. Implementing an architectural approach implies significant efforts and addresses many aspects, ranging from processes to the organizational culture.

4.2 Group Commodity Infrastructure and Services

More and more IT solutions are not business specific. Put differently, a wide variety of different businesses can make use of the same type of IT solutions. In other words, IT

solutions are becoming “commoditized”. The non business-specific character requires an overarching group entity that addresses this shared infrastructure and services notion. Hence, an important part of IT strategy development regards the definition of Group Commodity Infrastructure and Services (GCI&S). These can be seen as a specific form of an architectural standard. Hence, the definition of GCI&S is an essential and integral part of the Enterprise Architecture function. Said definition can be based on various triggers, such as, general technology or industry trends, the initially identified need for new GCI&S in a specific business area, or the identification of common themes in business strategic (IT) plans.

4.3 The value of Enterprise Architecture

A number of reasons for Enterprise Architecture have been emphasized before. First, to create an IT environment that (1) reduces time to market of new business functionality, (2) ensures seamless interoperability and interconnectivity of systems, networks and data sources, and (3) reduce IT complexity and costs. Second, to enable business and organizational integration, agility and the ability to change. As such, Enterprise architecture bridges the gap between business strategy and objectives and technology implementation [Bittler 2003]. As the US General Accounting Office states: “effective use of Enterprise Architecture is a recognized hallmark of successful public and private organizations” [GAO 2003]. This office additionally strongly argues that without such an approach “lack of integration among business operations and supporting information technology (IT) resources lead to inefficiencies and duplication” [o.c.]. Within the US government domain, specific legislation (Clinger-Cohen act 1996) requires the embodiment of Enterprise Architecture as a means of integrating business processes and their supporting IT functions.

Recalling our earlier observations, it is obvious that the importance of the drivers for Enterprise Architecture mentioned above can hardly be overstated. Activities that aim to realize these conditions are in our view therefore by definition valuable. What would be the advantage to allow the opposite to develop: different, non-compatible, disjointed, rigid and hard to change systems and infrastructure? Hence, it almost amounts to adding insult to injury by asking to justify the value of Enterprise Architecture. Numerous publications have argued the value of Enterprise Architecture, although well-documented and financially underpinned cases are scarce. Less documented reports about the value of Enterprise Architecture can however be found. For example, the “National Association of State Chief Information Officers has reported considerable savings through applying Enterprise Architecture and its subsequent technology implementations [Pichereau 2003]. The Butler Group argues in a similar vein: quicker availability of services, reduced development costs, diminished testing times, improved quality of deliverables, more predictability with regard to project costs, and reduced risks [Blowers et al. 2004]. Comparably, a MIT case study about a world leader in financial services reported about new forms of IT governance for multiple reasons, such as seamless service to customers across business units, reduction of time to market of new products and services, and reduction of costs. These drivers necessitated an enterprise-wide IT focus – with the “Office of Architecture” as an essential function – for the delivery of IT functionality through a shared services model [Weil and Woodham 2002].

A source of well-documented cases is presented by research of the Corporate Executive Board [2001]. The impact and value of Enterprise Architecture has been analyzed based on data from eight companies: FedEx, BP, US Department of the Navy, Dow Chemical, Ford Motor Company, John Hancock, KeyCorp, and Colgate-Palmolive. Rather impressive results were reported in a wide range of areas such as: improved developer productivity (+43%), faster realization of system interfaces (from

6 months to 3 days), reduced network traffic (-90% through messaging), reduced time to fix outages (-50%), reduced system downtime (-20%), reduced application maintenance and enhancement (-20%), improved project delivery (+60%), better project definitions (-67% project portfolio), enhanced re-use of existing designs (+200%), improved product roll-out (-50% time to market), faster information delivery (reporting from 26 days to 12 hrs). Finally, the Meat Group argues that from an overall company perspective, the IT costs per employee will on the average be 30% lower as a result of formally embedding the Enterprise Architecture concept [Appel 2003a].

Overall, the reported business benefits are significant. It must therefore again be stressed that the true value of Enterprise Architecture ultimately lies within the business domain: enabling integration, agility and the ability to change. Enterprise architecture and the associated technology implementations are complex and varied. Appreciably, as the literature indicates, formal quantification of benefits is most difficult [Leganza 2003]. Moreover, local deviation from enterprise architecture is often argued as more cost-effective. However, such approach provides short-term gain at the price of long-term pain and is the very reason for many of the drawbacks mentioned before. Nonetheless, the true value of enterprise architecture does not immediately show and is often qualified with scepticism [Paras 2003].

5 SUMMARY

A shift to a more central focus on IT governance has been argued from a number of perspectives: (1) the historically grown IT complexity with high associated costs and which is increasingly difficult to manage, (2) the requirements following from new business models that call for business integration, agility and the ability to change, (3) the generally questioned impact of IT deployment on business performance, (4) the shift towards outsourcing, hence obtaining IT services through external supply, (5) new stringent legislation, and (6) new high-impact technology developments.

Important elements of (IT) governance have been identified, with a specific focus on the concept of Enterprise (IT) Architecture, viewed as a *normative* discipline. As the Butler Group argues, "Enterprise Architecture provides a useful framework within which organizations can address their statutory and corporate governance requirements by better planning, ability to prove compliance, and providing a better understanding of the value of technology investments" [Blowers et al. 2004]. Again, "the consequence of a 'no architecture' approach in many enterprises is a proliferation of technologies and silos of different applications that are increasingly difficult to manage effectively" [o.c.].

Compelling reasons to consider the concept of Enterprise (IT) Architecture as an important element within an overall governance framework thus exist. Implementing such concept is complex and challenging. Embarking on a journey seems therefore a better metaphor than conducting a project. As indicated, the benefits of the journey are considerable.

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