

Enterprise Architecture: a Model for Business Data Management

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Abstract. The technological changes and the shorter life cycle of products force companies to continually adapt the production activities to the market needs and consequently update their information systems.

The alignment between the Business and IT is becoming even more complex and these areas are not always able to communicate among them. This process can affect the company's ability to quickly address the market needs and therefore jeopardize the foundations of its competitive advantage.

The introduction of an Enterprise Architecture (EA) is aimed at solving these problems and to correctly manage data, in order to create a solid structure on which the IT systems are based and the business draws to create and introduce new organizational approaches.

The objective of this paper is to provide the analysis of the state of the art in the field of EA, in order to identify, through the available literature, the most important aspects and the key features of this methodology, to collect and disseminate knowledge in this area and what may be the significant implications for the introduction of an EA in the company.

Keywords: Enterprise integration, Enterprise modelling, Enterprise Architecture, Enterprise design methodology, Architecture analysis.

1. Definition of EA

The changes to the market economy assigned a key role to the technology, by penetrating all areas where the company is involved and by impacting on the structure of many industries.

The competitive environment can be defined as a "global electronic" market where companies begin to perceive the significance of the process without the need to strictly define internal and external organisational boundaries while the organisational hierarchies become obsolete.

The literature offers the definition of EA as "a coherent whole of principles, methods and models that are used in the design and realisation of an enterprise's organisational structure, business processes, information systems and infrastructure" [1].

Changes in the environment, such as innovation, new competitors, globalization, new technologies, introduction of new business models and new regulations among others always exist, yet organisations should be capable of adapting swiftly to such changes. Enterprise architecture can help by providing management with insight and overview to embrace such complexity [2].

Since the second half of the '80s, the Enterprise Architecture has become a practice for the information technology professionals in large organisations, such as private companies in any sector or government agencies. Organisations that operates in competitive environments are becoming increasingly selective, they orient themselves to business solutions in areas such as IT with high rates of change in technology, processes and applications.

The enterprise architecture must be considered as a tool for governing the business transformations, in this context is very important governing enterprise transformations first and foremost entails the perspective on an enterprise as a purposely designed and implemented artefact. This enables the governing system to manage the enterprise transformation in terms of a clear goal, its current state and the desired future states of the enterprise. Doing so implies a perspective on properly governed enterprise transformation as being a form of engineering. This gives rise to the field of enterprise engineering [3] which is an emerging discipline that regards the design and implementation of enterprises from an engineering perspective. Two key paradigms underpin this discipline. The first paradigm states that enterprises are purposefully designed and implemented systems. Consequently, they can be re-designed and implemented if there is a need for change. The second paradigm of enterprise engineering is that enterprises are primarily social systems, supported by technical systems [4].

Over the years, EA has focused on strategic planning and business management. In the current economic and industrial global oriented context, companies need to frequently update their business processes and to respond to changes in market demand and technological developments.

EA has taken the role of “facilitator” for stakeholders to manage the engineering and the update of strategic planning systems and IT, in order to understand the mission, principles and management processes driving the acquisition, design and development of information technology in business contexts.

The Enterprise Architecture constitutes a simplified representation of the structure and organisation of the company through a model showing the main characteristics of the company (process, assets, information, etc...) that are analysed, reviewed, designed and implemented.

Hence, EA is not a simple set of technical standards to apply to the management processes and to the operation activities of the IT infrastructure, but must provide a regulation to manage the relationships between IT and the internal/external stakeholders of the company.

The main objective of EA is to describe the relationships between business process, information, applications and the underlying hardware infrastructure providing an environment for the introduction of new technologies .

2. Characteristics of the Enterprise Architecture

An Enterprise Architecture to be effective and usable at all levels of the hierarchical corporate structure must possess the following minimum requirements:

- to be controlled during its formulation or implementation in order to be able to verify the consistency with the requirements of key users within the company;
- to be easily understandable for the business management in order to monitor and analyse the problems emerged during the management of EA.

The literature [5] classifies the architectures with reference to the scope of the application, in:

- functional or business architectures: directly developed and managed by the business management and derived from the strategic business objectives;
- technical architecture: technological components such as tools, software applications, computer systems and communications required to implement effective business strategies.

Usually, EA is developed from an "as is" architecture described by a set of objects capturing the conditions of the enterprise and specifically how to manage the business, technological, organizational, operational infrastructures and decision-making processes. EA uses modelling tools such as: flowcharts, graphs, charts, tables with key performance indicators, models and notes.

EA builds on the mission and on strategic plans and it is described by Langenberg and Wegmann [6] as a document that defines the strategy for changing the enterprise from the current baseline to the target architecture.

It is possible to schedule tasks simultaneous and interdependent and you can enter incremental processes that evolve within the enterprise, to define the "program", meaning all information systems within the company, their relationships, and their interaction to fulfil the company's mission, through which completely redefine and systematically transition from the current "as is" architecture in "to be" that describes a set of business objectives, conditions, and challenges [5].

The objectives to pursue with the transition to the EA target are mainly two:

- to support the business by focusing on innovation within the IT context;
- to streamline the organisation realising personnel costs savings and a reduction of not value-added activities.

The monitoring of progress in the transformational process must begin with the measurement of the initial operational capability of the company, to continue with repeated evaluation of key variables translated into economic terms in order to achieve the objectives set out in the work plan.

New products and services have to adapt the needs of increasingly different kind of customers, that are the drivers for the maintenance of internal management processes and indirectly the provision of the new and best IT applications and services.

3. EA and IT Governance

The Business Process Reengineering (BPR) initiatives improve the effectiveness of IT, often they focus on the structural aspects of processes and do not use indicators to show quantitatively the benefits; this prevents to fill a progress report on the process performance and it makes difficult to initiate corrections.

The indicators must be understandable to all the hierarchical levels of the organisation, from business management to project and middle managers to gather benchmarking data and information about best practices of the sector.

Most of the failures of some interventions to improve management processes are due to the fact that once the characteristics of improvement to be made to the process are established, the automatic corrective actions are not implemented.

There is no pre-established models of IT Governance, but is possible to define, according Bozzetti [7] the main areas of intervention:

- strategic alignment of IT with the business and assets of the company/organisation;
- control of the costs and the economic value developed by the IT;
- risk management of IT on-going and future projects;
- management of internal and external resources (IT Infrastructure, software, data, information, knowledge, employees and suppliers/software house);
- management and performance measurement, strictly related to IT or to the business and its activities (BPM, Business Performance Management).

To cope with these risks, the company must establish governance procedures, also extended to the IT area requiring to:

- assign the responsibilities of processes within the organisation only to those who have effective control levers;
- define the job descriptions;
- use a clear reporting system for all the organisational levels;
- review the processes for a continuous improvement to shelter from external changes.

The valuable contribution of Weill and Ross introduce the overlap between the strategic aspects of IT Governance and Enterprise Architecture, Enterprise Architecture could be viewed as the conceptual result of successful IT governance at a strategic level [8].

Within this context, EA becomes a model for the enterprise or a network of interconnected models, in order to transfer the mission and the objectives included in the strategic plans of the business management at executive level, promptly communicating the specification for the upgrade of the information system to the IT (information technology, applications, services) in line with the available budgets.

Hence, the EA is an expression of the business of the enterprise, of applications, of information, of the strategy adapted to the technological infrastructure and its management has to constitute a macro added-value, whose realisation is allowed only through the creation of an iterative process driven by the business strategy and the allocation of the information system.

4. Objectives of EA: alignment, integration and operational agility

The main objectives sought by the Enterprise Architecture are three:

- alignment of business/IT;
- integration;
- operational agility.

Across to these objectives, others lie, such as to inform, guide and enforce management decision within the enterprise, especially those for the evaluation and approval of IT investments.

The objective of the alignment is to develop a synergy between the chosen business strategy within the company and its IT processes. Doing this activity is not easy given the frequent updates of the business strategy in response to the competitive market changes [9].

There is often a cultural gap in the business management capabilities and in the functionalities of information systems, which sometimes results in bad IT investment's decisions .

Strategic alignment focuses on the activities that management performs to achieve cohesive goals across the IT (Information Technology) and other functional organizations (e.g., finance, marketing, H/R, manufacturing).Therefore, alignment addresses both how IT is in harmony with the business, and how the business should, or could be in harmony with IT. Alignment evolves into a relationship where the function of IT and other business functions adapt their strategies together. Achieving alignment is evolutionary and dynamic. It requires strong support from senior management, good working relationships, strong leadership, appropriate prioritization, trust, and effective communication, as well as a thorough understanding of the business and technical environments [10].

The evaluation about the degree of alignment between the strategy and the IT is allowed by consulting the flowcharts, organisational charts, reports, graphs and comments used to adapt the business architecture accordingly to the systemic perspective of the company. It is also required to not exclude any kind of positions within the organisation chart and to involve them into the management strategy of the applied EA.

The integration is essential and implies the control of the company as a whole. Therefore, it is very relevant to have already mapped all the functional flows, business processes, information management, departmental systems and data repository. The definition of an EA has to constitute a collaborative process between the project team selected and the key users to manage the scheme.

The ongoing changes on customer choices, on relationships with suppliers and stakeholders are forcing companies to update their strategic plans, the organisational chart, the working methodologies and their own IT system [11].

Organizational agility, or the ability to execute innovations and competitive moves with speed, surprise, and competitive disruption has attracted significant attention as a business capability for competing effectively in the current business environments. Agile firms are resilient to shocks and upheavals in their business environments,

adaptive to emerging opportunities, and entrepreneurial in creating new business models or significant competitive moves. [12]

The company in order to manage the needs of alignment of business and IT, integration and operational agility can make massive redesign of management processes as a key lever of intervention available to the EA acting in parallel with the increasing frequency of the IT infrastructure [13].

5. Benefits derived from the introduction of an EA system

Firms usually justify enterprise architecture initiatives by identifying cost benefits. While cost benefit may be the easiest to measure, many other benefit of EA have been reported, including reduced development time, increased IT related risks and increase business discipline. But the grand prize, when it comes to EA, is strategic business benefit. Indeed, we would argue that EA is such a long, hard journey that firms shouldn't undertake it unless they can envision how EA will change the way they operate [14].

To build an EA model within the company allowing to obtain a reliable picture of its assets is relevant also to redesign and align the information system architecture to the business strategy and to provide the means to gradually evolve through independent projects.

The main benefits derived from the introduction of an EA system are:

- to translate the results about mission, organisation and processes derived from the mapping into a language understandable by the business management and to promote a more effective strategic planning and decision making;
- to improve the quality of communications between the business management and the IT area by developing a shared enterprise glossary;
- to provide architectural standard patterns to describe and model the complexity of large organisations and to facilitate its management activities;
- to increase consistency, accuracy, timeliness, integrity, quality, availability, accessibility and sharing of information managed by the IT related to the all the business functions of an enterprise;
- to provide tools for the objective evaluation of IT investments, considering benefits, impacts, alternatives, transaction cost and investment risks;
- to stimulate the development of higher quality software applications and flexibility at the same cost;
- to achieve economies of scale by providing mechanisms for the sharing of information services across all business areas.

The introduction of a EA system allows to better manage complexity. Similarly to the control of complexity at the organizational level, EA facilitates the management the complexity of the project, using the aspect areas, levels of abstraction, a modular

approach, up-front decision making, and standardized services, processes and systems [1].

6. Conclusions

In order to introduce an EA model is relevant to manage the different areas making up the company in a structured way, so the complexity of the business is simplified and the flexibility is increased. This model assigns a central role to the IT, becoming the facilitator field for the analysis of the performance of the business activities in a dynamic and continuously evolving context. It becomes essential to govern the information assets of the company in order to avoid the dispersion of the information, to maintain the consistency in the management procedures and to facilitate communications among different productive areas.

The investigation proposed in this paper aims to identify the theoretical aspects that distinguish the EA approach while the next step should be to validate this analysis from the practical point of view, through the study of business cases.

Within the competitive economic context, many companies adopted EA tools, aware of the need to manage the informational heritage and especially of the difficulties that arise from the communication between the company and the IT, this will be the object of study for a next paper.

7. References

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Practitioners of enterprise architecture, enterprise architects, are responsible for performing the analysis of business structure and processes and are often called upon to draw conclusions from the information collected to address the goals of enterprise architecture: effectiveness, efficiency, agility, and continuity of complex business operations.Â Business Model â€“ A business model describes the rationale of how an organization creates, delivers, and captures value. Read a case study here. Business Policy â€“ Formally documented management expectations and intentions. Policies are used to direct decisions, and to ensure consistent and appropriate development and implementation of Processes, Standards, Roles, Activities, IT Infrastructure etc. Request PDF | On Jan 1, 2013, Francesco Bellini and others published Enterprise Architecture: a Model for Business Data Management | Find, read and cite all the research you need on ResearchGate.Â We argue that enterprises need to simplify data management and reduce complexity as well as data redundancy. We propose a [Show full abstract] structured approach using the shearing layer concept with a unified data management to improve adaptability as well as maintainability. View full-text. Download citation. Enterprise Business Architecture components include business capability maps, value streams, process models, systems and applications, data, structure, and roles. Please review this article for additional details of the components of business architecture discipline. Why are Business Capabilities a vital part of Business Architecture? Companies need to be modeled on a stable foundation that is agnostic to the volatile processes and the ever-changing technologies. While the process is necessary to facilitate and consummate an interaction or a transaction, and while technology is needed to power In the case of Enterprise Architecture, these models describe the logical business functions or capabilities, business processes, human roles and actors, the physical organization structure, data flows and data stores, business applications and platform applications, hardware, and communications infrastructure.[citation needed]. The UK National Computing Centre EA best practice guidance[8] states: Normally an EA takes the form of a comprehensive set of cohesive models that describe the structure and functions of an enterprise.Â IT risk management â€“ Enterprise architecture contributes to the reduction of business risks from system failures and security breaches. Enterprise architecture helps reduce risks of project delivery.[15][19]. Examples[edit]. Despite the nomenclature, enterprise architecture, data architecture and business process architecture are very different disciplines. Despite this, organizations that combine the disciplines enjoy much greater success in data management.Â The Data Management Body of Knowledge (DMBOK), define data architecture as â€œspecifications used to describe existing state, define data requirements, guide data integration, and control data assets as put forth in a data strategy.â€ So data architecture involves models, policy rules or standards that govern what data is collected and how it is stored, arranged, integrated and used within an organization and its various systems.

Enterprise Architecture is complicated, but several frameworks, like TOGAF, simplify the process and structure. We break it all down for you here. Physical and cloud servers, applications, and enterprise software all must communicate and share data seamlessly in order to provide the customer a successful and satisfactory user experience. The holistic view of all these pieces is referred to as enterprise architecture. Guidance surrounding this implementation are often known as enterprise architecture frameworks (EAFs), which we are exploring from a high level in this article.

Abstract: The enterprise-wide management of master data is a prerequisite for companies to meet strategic business requirements such as compliance to regulatory requirements, integrated customer management, and global business process integration. Among others, this demands systematic design of the enterprise master data architecture. The current state-of-the-art, however, does not provide sufficient guidance for practitioners as it does not specify concrete design decisions they have to make and to the design options of which they can choose with regard to the master data architecture. This paper Architecture. as Strategy. Creating a Foundation for. Business Execution. Jeanne W. Ross. Enterprise architecture (EA) is a framework that consists of multiple processes to align business strategies with information technology (IT) architecture. It helps the organization standardize business operations and incorporate systems in different layers to achieve business goals and organizational benefits. Finally, the proposed model validated through an in-depth case study to get final confirmation and see the model fits reality.