

ABSTRACT

Enterprise Architecture increases the efficiency of administrative processes within institutions and lessens the administrative burden faced by the staff during these processes. It is at the heart of any good enterprise strategy, providing the supporting system to an institution's further mission and strategy. It must be stable, consistent, accessible, and aligned to the educational activities using current and future technology. Enterprise Architecture is a high-level, strategic technique designed to plan for change at the enterprise level. It depicts the organization both as it is today and as it is envisioned in the future. In this article the authors highlight application of Enterprise Architecture in education system and its advantages.

INTRODUCTION

A system must co-exist effectively with several other systems within an organization. If systems are not integrated well they will conflict with one another and cause each other to fail. Therefore an application must minimally be developed so that it doesn't cause adverse effects on other systems. Every system must be built ideally to take advantage of and to enhance a shared infrastructure, to fit into existing environment and to reflect the future vision for the organization.

When teachers work under the assumption that they can do anything they want, and can use any technology they want, then chaos typically results. Functionality and information will be duplicated and reuse will occur sporadically if at all. Enterprise Architecture avoids this confusing situation and creates an effective management of the coordination of educational processes within institutions and lessens the administrative burden faced by all the staff during these processes. Enterprise Architecture is at the heart of any good strategy, providing the supporting system to an institution's further mission and strategy. It must be stable, consistent, accessible, and aligned to the educational activities using current and future technology.

ENTERPRISE ARCHITECTURE

Enterprise Architecture (EA) is emerging as a new organizational model for the use of Information Technology (IT) within an enterprise. It is a framework that continuously aligns technology services with changing goals and objectives of the institution based on standards (people, process and technology). It provides a common language to communicate and allows IT organizations to more strategically improve operational processes and efficiency.

Enterprise Architecture consists of the various structures and processes of an organization. It establishes the institution-wide roadmap to achieve an institution's mission through optimal performance of its administrative processes within an efficient information technology (IT) environment. It is essential for evolving information systems and developing new systems that optimize the institution's mission value. This is accomplished in logical terms (e.g., mission, administrative functions, information flows, and system environments) and technical terms (e.g., software, hardware, and communication).

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Simply stated, Enterprise Architecture is a high-level, strategic technique designed to plan for change at the enterprise level. It depicts the organization both as it is today and as it is envisioned in the future. It is a blueprint for systematically and completely defining an organization's sequencing plan for transitioning from the current (baseline) to the desired (target) environment. The institutional blueprint also assists in optimizing the interdependencies and interrelationships among an organization's administrative operations and the underlying IT that supports the operations. It is the socio-technical make-up of an entire organization.

WHY ENTERPRISE ARCHITECTURE?

The benefits of Enterprise Architecture can be summed up using three words: better, faster, cheaper. It is important to realize that the better, faster, cheaper (BFC) benefits come at a price. To be successful for the institution, EA must establish processes and systems that recognize the diverse needs of the various kinds and levels of organizational units. It provides a mean for creating and maintaining synergistic relationships within the institution. Alignment of IT to the institution's strategy ensures the adoption of technology aligned to the changing educational strategy and mission. The improved planning and reduced complexity of EA will establish a process that simplifies researching, building/acquiring, maintaining and retiring of technology.

TRADITIONAL ENTERPRISE ARCHITECTURE

Traditional Enterprise Architecture (EA) is well-aligned to the corporate focus which includes a coordinated central strategy, and a consistent decision-making process. It relies on the following key principles:

- (i) Having a **coordinated strategy**, against which the Architecture can be aligned
- (ii) **Centralised decision-making** for architectural issues
- (iii) **Standardisation** on a particular set of technologies

In other words, traditional EA can be described as making consistent decisions aligned to a central strategy.

This is very similar to the corporate focus, but very different from the educational institution focus.

In an institution, where innovation and individuality are critically important, traditional Enterprise Architecture runs against the grain of freedom and diversity. Compared to the institution focus, the key principles of EA are not well aligned.

MODERN ENTERPRISE ARCHITECTURE

Gartner the world's leading Information Technology Research and Advisory Company has identified seven properties that differentiate emergent architecture from the traditional approach to EA:

- (i) **Non-deterministic:** In the past, enterprise architects applied centralised decision-making to design outcomes. In emergent Architecture, they instead use decentralize decision making to enable innovation. EA decision making is a good management precept, rather fashionable and applicable to de-centralised any organization.
- (ii) **Autonomous actors:** Enterprise architects can no longer control all aspects of Architecture as they once did. They now recognize the broader business ecosystem and devolve control to constituent-business stakeholders.
- (iii) **Rule-bound actors:** In the past enterprise architects provided detailed design specifications for all aspects of EA; now emergent architecture establishes only a minimum set of rules. Every EA seems to build its own rules which are not many.
- (iv) **Goal-oriented actors:** Previously, the only goals that mattered were the corporate goals but this has now shifted to each stakeholder acting in their own best interests.
- (v) **Local Influences:** Actors are influenced by local interactions and limited information. Feedback within their sphere of communication alters the behaviour of individuals. No individual actor has data about all of an emergent system. EA increasingly coordinates rather than dictates.

(vi) **Dynamic or Adaptive Systems:** The system (the individual actors as well as the environment) changes over time. EA designs emergent systems sense and responds to changes in their environment. That looks like the talk about agility.

(vii) **Resource-constrained Environment:** An environment of abundance does not enable emergence; rather, the scarcity of resources drives emergence. Abundance inhibits emergence or, motivation comes from scarcity.

EDUCATIONAL INSTITUTION AS AN ENTERPRISE

An institution is an enterprise of people, processes and systems and as such can benefit from best practices. The core activity of an institution is teaching and learning, research, and community engagement. All application of IT within the institution exists to enable it to carry out this core activity. It is vital that the EA approach is aligned with this core activity. Management information and administrative systems should provide direct support to the core activity of the institution, wherever possible. At the same time, the ability of management information and administrative systems must be aligned through the EA process.

The unstructured information contained in an institution web site is efficiently maintained by providing appropriate, easy-to-use tools. There is a single version of enterprise information that campus stakeholder can easily subscribe to and use. Information is appropriately accessible anytime, anywhere in areas where internet access capability allows for such access. Faculty can access easy-to-use tools that allow them to appropriately store, maintain, and share information for academic and research purposes. The knowledge of the institution is appropriately protected and archived for future use. Information is securely accessed and privacy laws and regulations are followed in all aspects of information management.

EA breaks the boundaries created by processes that fall within the preview of several campus departments

or internal-external organizations.

The management of these processes is an integrated task involving both academic and administrative staff as well as information technology staff. Academic and administrative processes are documented, and this documentation is an integral part of the development and maintenance of the technology services used to support them. Technology is used to assist in all aspects of process design, modeling, deployment, execution, and management and these tasks are integrated and serve the needs of administrative staff and technology staff in supporting these processes. Academic and administrative processes requiring information technology are built using shareable components that allow changes to be implemented with agility in response to changing campus needs. Process analysis will ensure effective knowledge transfer and management and brings changes in the workforce. Through the e-learning programme, the institutions can explore the use of EA within education and explore the application of Enterprise Architecture within the context Higher Education and communicate activities and outcomes as experience is gained. Thus, EA facilitates the integration of internal and external processes and sees the institution as an ecosystem, and introduces change in a natural way to enable the activity continuity.

UNIQUE CHALLENGES IN HIGHER EDUCATION

The higher education environment has some unique challenges, which set it apart from other industries. Some of these unique challenges that are relevant to Enterprise Architecture in a research-oriented university include:

- Devolved decision-making and budgetary control
- A requirement for diversity
- Innovation, which requires agility and adaptability; it can't necessarily be built into a plan
- Many distributed stakeholders are involved in a decision; there isn't always a clear hierarchy for decision-making

These four factors may all affect the approach taken with EA.

Enterprise Architecture within a research-oriented university environment can benefit from the following modern approaches. This includes:

- Greater involvement with the community
- Democratic or decentralized decision-making
- A focus on the process

APPROACHES USED IN EA

An organisation has to focus on the following approaches rather than focusing on the tools and techniques used in Enterprise Architecture.

(i) The most important aspect of EA in Higher Education is people: In EA, this includes working relationships, understanding the individual pressures and drivers within the organisation, and influence. These factors are often more important than technical excellence, level of detail or a good process. While all of these are important, time spent developing and maintaining working relationships is often of more value than other Enterprise Architecture activities.

(ii) Just enough Architecture: It is often better to have just enough information to work with, rather than to have everything later. By its very nature, Enterprise Architecture can never be perfect, as it is based on incomplete information. Because of this, it is better to make a start and work from it, rather than trying to deliver everything. Most importantly, the focus of an organisation can often shift more quickly than the Architecture; by working in small pieces, it is possible to adapt to a changing focus.

(iii) Collaboration : Take a collaborative approach to developing Architecture. Architecture should be done by involving a wide range of people. It makes the subsequent tasks easier. It also makes it possible to improve the output. Moreover, being actively involved in the process is an effective way to informally improve governance.

(iv) Architects are not universal problem solvers: Architecture often isn't well understood by the

IT community, so it is easy for an architect to be seen as a general "problem solver". Because of this, an architect may often be asked to be involved, or be responsible for pieces of work which are not related to EA. Similarly, if the scope of EA is not well defined, it is very easy for the focus of the role to "wander" into related areas. This situation is not ideal, as it can slow down the progress of Architecture dramatically. An architect should focus on Architecture-related work.

(v) Focus on the process: People can be more likely to support an outcome if they understand and support the process. For those issues that may cause disagreement, it is helpful to first gain agreement on the process, and then start working on the solution. The steps that will be taken to resolve the issue should be clearly described. For example, this might include forming a small working party, reviewing the various options against an agreed set of evaluation criteria, and producing a recommendation that needs to be endorsed by a particular decision-making authority.

(vi) Build, don't reinvent: - As Architecture is a creative process, there may be an appeal to start from scratch, or to reinvent everything. Sometimes there may be good reason for doing this, but it is seldom the case. There is an enormous amount of work that can be used as a starting point, from which to build. This includes, most importantly, the organization's current state, as well as internal and external standards, template, frameworks and models. As a general rule, an architect can work efficiently by starting from existing architectural material and building from it.

(vii) Tools and techniques are generic : The standard tools and techniques used in Enterprise Architecture can be applied equally to all organizations - higher education or otherwise. This includes the tools, standards, models and methods available. Like any set of tools or techniques, those used in Enterprise Architecture should be chosen for the job at hand. It is important to understand the toolset and its purpose, so that the right

tools can be chosen or adapted. Similarly, it is important to understand one's own objectives and approach, to help to decide which tool is most suitable.

FUNCTIONS OF ENTERPRISE ARCHITECTURE

An Enterprise Architecture of an institution performs the following functions:

- (i) Captures facts about the mission, functions of an institution in an understandable manner to promote better planning and decision making.
- (ii) Improves communication among the institutions within the enterprise through a standardized vocabulary.
- (iii) Provides architectural views that help communicate the complexity of large systems and facilitate management of extensive, complex environments.
- (iv) Focuses on the strategic use of emerging technologies to better manage the institution's information and consistently inserts those technologies into the institution.
- (v) Improves consistency, accuracy, timeliness, integrity, quality, availability, access, and sharing of IT- managed information across the institution.
- (vi) Highlights opportunities for building greater quality and flexibility into applications without increasing cost.
- (vii) Achieves economy of scale by providing mechanisms for sharing services across the institution.
- (viii) Expedites integration of legacy, migration, and new systems.
- (ix) Ensures legal and regulatory compliance.
- (x) Helps to understand the long-term needs and drives of change for an organisation.
- (xi) Defines the major structures and types of structures, how they relate and how they can be

integrated into an organisation that will change over time.

Article

CONCLUSION

Universities and colleges are increasingly complex socio-technical systems that are hard to change and yet they face enormous pressures to increase operational efficiencies and to adapt to new challenges. The current IT environment in Higher Education is characterized by increasing demands, with constrained resources. In recent years, it has become apparent that a key benefit to be gained from Enterprise Architecture is the ability to support decision making and it brings together business models and technical models in the education system. It is possible to trace the impact of organizational change on the systems, and also the business impact of changes to the systems. Delivered successfully, Enterprise Architecture has the potential to allow both the Business and IT strategies in Education System to enable and drive each other. Therefore, effective Enterprise Architecture may be regarded as one of the key means to achieving competitive advantage through information technology.

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