Enterprise Architecture in Higher Education Institutions: A Preliminary Review

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1. Enterprise Architecture (EA) and EA Framework

An enterprise is defined by [1] as 1. A unit of economic organization or activity, or 2. A systematic purposeful activity. The definition of enterprise adopted in this article is: An enterprise may be considered as an organization, be it for-profit or non-profit, with complex relationships /dependencies among its resources - people, products/services, policies/procedures and platforms. An enterprise strives to deliver the products (including services), executing the procedures by utilizing the platforms (including enabling technologies and finances) to its customers, thus fulfilling the organization strategies set by the stakeholders.

An architecture is the arrangement and integration of the individual enterprise resources such that the synergistically interaction among the resources resulted in the fulfilment of the enterprise strategies. A formal definition by [2] is "fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution". EA provides a conceptual roadmap (or blueprint) for an enterprise to reach the desired future states as dictated by the strategies. EA not only keeps track of all the enterprise components but also enables assessments of the components in terms of configuration and performance whether they can contribute or constrain the progress towards the achievement of the enterprise strategies [3].

EA requires a framework (standardized methodologies) consisting of principles and practices for the creation and implementation of EA. Figure 1 illustrates several EA frameworks that have been developed in various domains such as military (DoDAF), company (TOGAF, Zachman), government (FEAF) and manufacturing (GERAM) [4]

DoDAF = Department of Defence Architecture Framework [5]

TOGAF = The Open Group Architecture Framework [6]
Zachman = Zachman Framework (after John A. Zachman) [7]

FEAF = Federal Enterprise Architecture Framework [8]

GERAM = Generalised Enterprise Reference Architecture and Methodology [9]

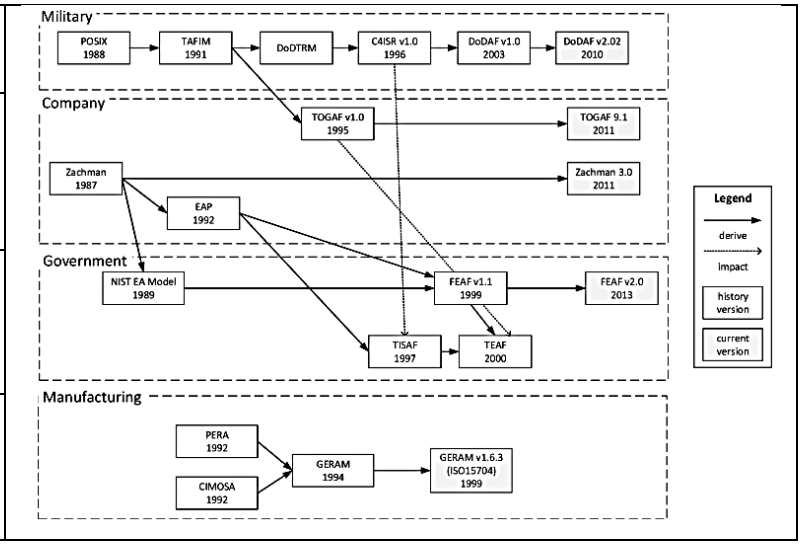

Figure 1 *Enterprise architecture frameworks for various domains*

2. EA and Higher Education Institutions (HEIs)

A higher education institution (HEI) is an enterprise and faces challenges similar to other business entities, such as revenues and expenditures, reputation or ranking, funding allocation, enrollment, quality of graduates and compliance to authorities [10].

A survey of more than 20 countries by [11] noted that EA is widely accepted and implemented in public HEI. While some general EA frameworks such as TOGAF, Zachman and Gartner are adopted, specific ones such as CAUDIT and NORA pertains to selected regions. The chosen EA framework differs geographically as shown in Table 1.

Table 1 *Major EA frameworks implemented in HEI*

General EA	TOGAF (The Open Group Architecture Framework) [6]
	Zachman [7]
	Gartner [12]
Specific EA according to regions	CAUDIT (Council of Australian University Directors of Information Technology) [13] Australia, New Zealand, the South Pacific, Timor Leste and Papua New Guinea
	NORA (National Overall Reference Architecture) [14] Saudi Arabia

The four major inter-related architectural domains commonly covered in an enterprise architecture are [6]:

- **Business architecture** defines the business strategy, governance, organization, and key business processes of the organization
- **Applications architecture** provides a blueprint for the individual systems to be deployed, the interactions between the application systems, and their relationships to the core business processes of the organization with the frameworks for services to be exposed as business functions for integration
- **Data architecture** describes the structure of an organization's logical and physical data assets and the associated data management resources
- **Technical architecture** describes the hardware, software, and network infrastructure needed to support the deployment of core, mission-critical applications

These four major domains were mapped to the reasons for the EA implementation in HEIs [15] and is shown in Table 2:

Table 2 *Reasons for EA implementation in HEI*

Architecture Domain	**Reasons for using EA in HEIs**
Business architecture	• Develop long term partnerships with partners and customers
Applications architecture	• To improve teaching and learning process • Promote systems interoperability, integration and data consistencies • To improve quality of services

Data architecture	• Manage IT assets and resources
Technical architecture	• Planning for information technology infrastructure

3. Benefits of EA to HEIs

HEIs can benefit from EA implementation in three broad categories [16]:

a. **Organizational agility –** the ability of organizations to proactively fulfills internal customers' demands through products and services customization. This agility can be achieved by eliminating redundant processes and adopting new technologies that leads to resource utilization maximization and job scope overlapping minimization.

b. **Competitive advantage –** the ability to generate higher return on investment than competitors, better strategic alignment of business and IT than competitors and more success in integrating strategy and execution than competitors. Cost reduction and technology standardization may contribute towards this competitive advantage.

c. **Increased values -** the ability to deliver better customer service and experiences based on a deeper knowledge of the customer.

4. Concluding remarks

The Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) [17] has embarked on a national EA for the public sector known as MyGovEA [18]; yet there's none or little work has been done about EA in public HEI in Malaysia. It is high time for the Malaysian Technical University Network (MTUN) to spearhead research on EA for HEI in Malaysia.

Even though EA seems to be good management tools and it has reportedly been accepted and implemented in HEIs, it is better to take it with a pinch of salt as EA may be the fad of the century [19].

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