

## A template for implementing Information Security Management in university's educational services system



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### Abstract

A solution for security of the information had been always used due to the different threats in different eras. Such necessity has become more distinguished with the growth of technology. Also the emersion of management concept led to the more managerial approaches that make the "information security management".

The last approaches which are used for information security management are the holistically oriented approach. This document introduces a template in creating a methodology for implementing security management in university's educational service system that shows a holistic approach. This pattern comes from Enterprise Architecture frameworks and methods. So we want to compare EA frameworks and methods with our university's educational services system criteria to select one which is more conforming. This make it easier to produce a methodology based on EA methods.

In the first stage we introduce some information security management approaches which are most typical. Besides we have the brief introduction of Enterprise architecture concept. Then we explain the similarities and differences which clarify the applying of this concept. Also we have some criteria for comparing between Enterprise architecture's frameworks and methodologies. We select, and then we suggest a primary pattern for this system.

**Key words:** information security management, holistic approach, system of educational service, Enterprise Architecture

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### 1. Introduction

The importance of information security is an undeniable fact. Also in this era that management has become the subject of every science (because of its interdisciplinary nature), information security management is a hot topic. It is obvious that in every system which deals with information transfer, security is an essential issue. In this article, we

propose Enterprise Architecture (EA) to describe management of information security. Also we are going to suggest a template or a primary framework to implement information security management. Although, there has been other security management ISOs, frameworks and models discussing this field, none of these methods cover the especial needs in our intended area. Also, there are some problems in the nature of these frameworks and in their performance in organizations and for the information systems. Therefore, we decided to apply a holistic framework to acquire a comprehensive look at the different dimensions of security. We introduce the enterprise architectural frameworks as the primary pattern, and we are going to select our framework and methodology among the frameworks and methodologies of enterprise architecture.

At first the historical theories and their inability and low effect will be mentioned. Then the current frameworks of architectural enterprise will be introduced as a template in order to perform management of information security and they will be studied according to evaluation criteria. Finally the selected framework will be customized in university's educational services system.

## **2. Data and Material**

We have used the literature of this subject as a basis study to understand and pick up the gaps, problems and the reason for using any of them. In addition to our new idea in this paper, the important data of customized framework is achieved from the speaking and information exchange with the users of the university's educational services system and the specialist of security.

## **3. Research Methodology**

This research was conducted using historical, exploratory and case study approaches. These approaches are used by necessity.

## **4. Results and Analysis**

In the following paragraphs, historical theories of information security management (ISM) are explained in abstract. "Baskerville (1988) proposed four generations of security management approaches, namely checklist methods, systems engineering, systems modeling and social-technical approaches. Zuccato (2005) extended this list to fifth and sixth approaches namely business-technical approaches and holistic approaches respectively." [1]. Here, we introduce some models and approaches taken from different generations and describe why new approach needed to be created.

The intuitive approach and standards were subsets of approaches of the first generation. The problem with the intuitive approach was the lack of knowledge. In comparison with intuitive approach, checklists were better structured, but provide only baseline security [7]. Guidelines, also, have two problems. First the well-known ones were generic in scope, while organizations need methods tailored to their environment and operations. Second, they have not been validated but are fostered by an appeal to common practice, which is an unsound basis for a true standard [3]. Furthermore, the complete performance of these standards in organizations faces several problems.

Regarding the second and third generations, we refer to Structured Security Analysis and Design (SSA&D) and Automated Secure System Development Methodology (ASSDM). A main problem of these approaches was their strong technical focus.

Virtual Methodology is one of the approaches of fourth generations, which mostly focuses on social features so it lacks technicality. The approaches of fifth generation which are technical-business approaches neglect the social dimension. [6]

After reviewing literature of information security management, we follow the last wave in this area; exactly the holistic approach.

The emphasis of this paper is on the sixth generation of approaches that used to apply System Theory as the basis for its implementations up to now [1, 7, and 6]. The approaches of sixth generation can include several dimensions and so resolves parts of the problems mentioned above. However, we introduce Enterprise Architecture as the basis for holistic approach of information security management.

#### 4-1. *Enterprise Architecture:*

As mentioned before, we are going to use a holistic as well as flexible approach, to overcome the problems.

In fact, wherever a complicated and important existence or incorporation with specific requirements is asked for, a particular and comprehensive approach is needed to succeed in gaining favorite results. In construction, this has been called “architecture”. In organizations and information technology, enterprise architectural is used as the enterprise architecture of information technology [4].

It should be mentioned that by enterprise we mean every group of enterprises with common goals and operations. This group can include the whole organization or a distinct part of an organization or the duty domain of a system.

There are some similarities or compatibilities between information security management needs or requirements and EA’s specifications; some of them are: flexibility, multidimensional nature and particular requirements like continuity and layering.

The need to present organized thinking or logical structures to classify complicated information and to describe the concepts of architecture motivated the initiators of architecture to innovate different patterns and methods and enabled the architectural society to frame the architectural information into a framework and made it accessible to others as a scientific revised method. [8] In fact, architectural frameworks represent methods for organized thinking in complicated systems. [4]

The first enterprise architectural framework was Zachman’s framework. There are a lot of enterprise architectural frameworks which are abstracted from Zachman’s framework and are formed based on particular conditions and changes in Zachman’s framework. Among these frameworks, we are going to select the one which is complying more with our requirements.

Furthermore, to implement the process of enterprise architecture and passing from the current processes to the more favorable conditions, some techniques and methodologies have been defined, represented as enterprise architectural methodology. Some of these methodologies are based on a specific enterprise architectural framework and some can be used to perform several frameworks. Of course, some enterprise architectural frameworks use their own declared methodology to perform.

Although there are many EA’s frameworks and methodologies, we just need the framework that has a methodology. So, we have just these frameworks for evaluation:

- Federal (FEAF),
- TOGAF,
- TEAF ,
- DODAF/C4ISR,
- CIMOSA,
- SAGA,
- E2AF[4]

The reasons for selecting E2AF as a template for implementing information security management in university’s educational services system are divided into four categories; these reasons are used as criteria for the EA’s frameworks and methodologies comparison:

information security management dimensions (business, technical and social)[5], information security management concepts, their specification and the past approaches' problems.

In addition, there are some other reasons that belong to university's educational services system. These items are shown in table 1.

frameworks ☞	TEAF	CIMOSA	SAGA	FEAF	C4ISR DODAF	E2AF	TOGAF
university's educational services system specification ☞							
promoting system by system lifecycle phases	○	✓	●	○	●	○	○
information exchange	✓	✓	✓	✓	✓	✓	○
integration	✓	✓	✓	✓	✓	✓	○
use models to display	✓	✓	✓	✓	✓	✓	○
layered structure and power levels	✓	○	✓	✓	●	✓	●

Table 1. Enterprise Architecture frameworks comparison

As the above reason, E2A framework has more compatibility with ISM requirements. We introduce E2AF and its methodology in figure 1 and 2.

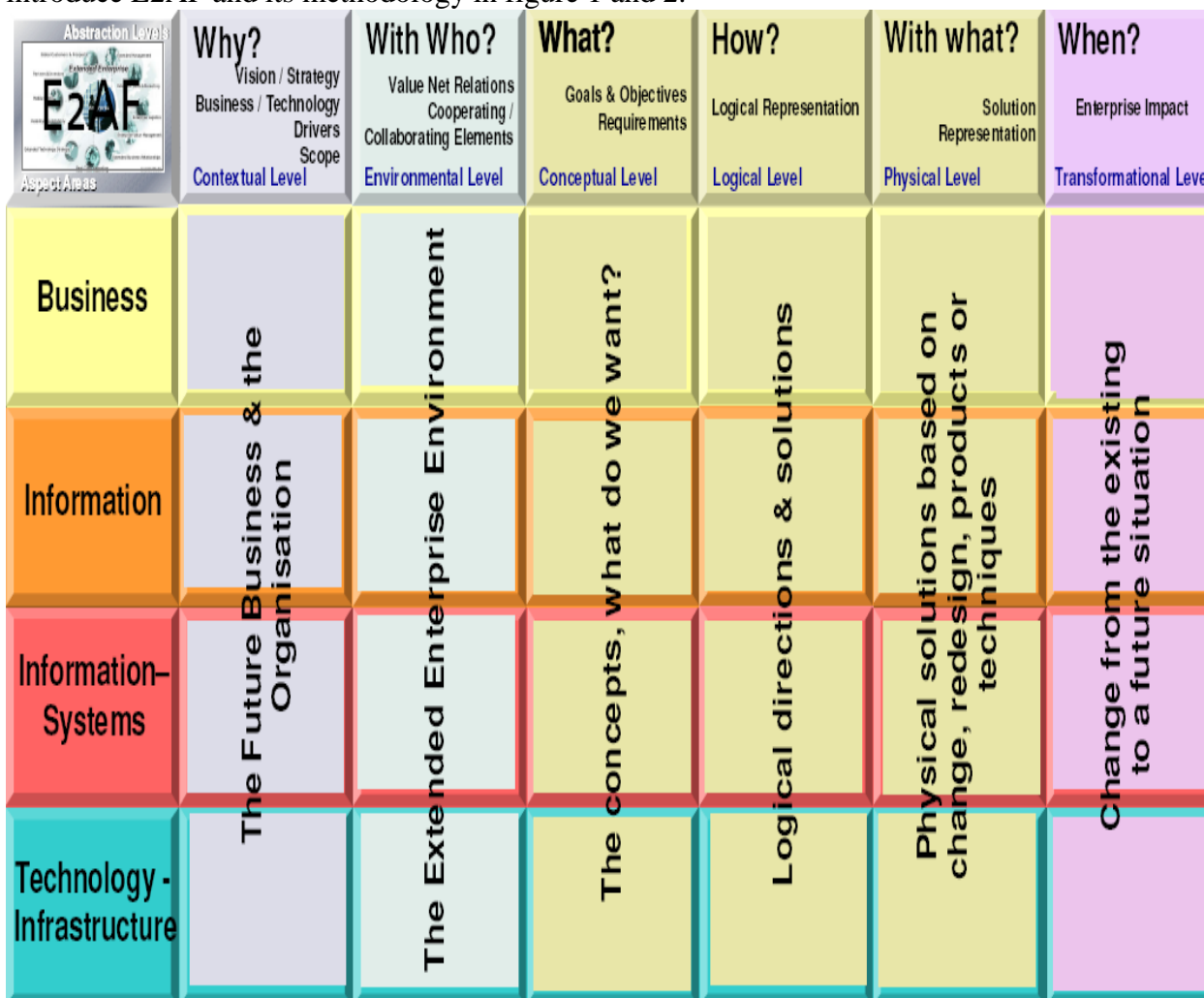


Fig. 1: Extended Enterprise Architecture Framework (E2AF).[9]

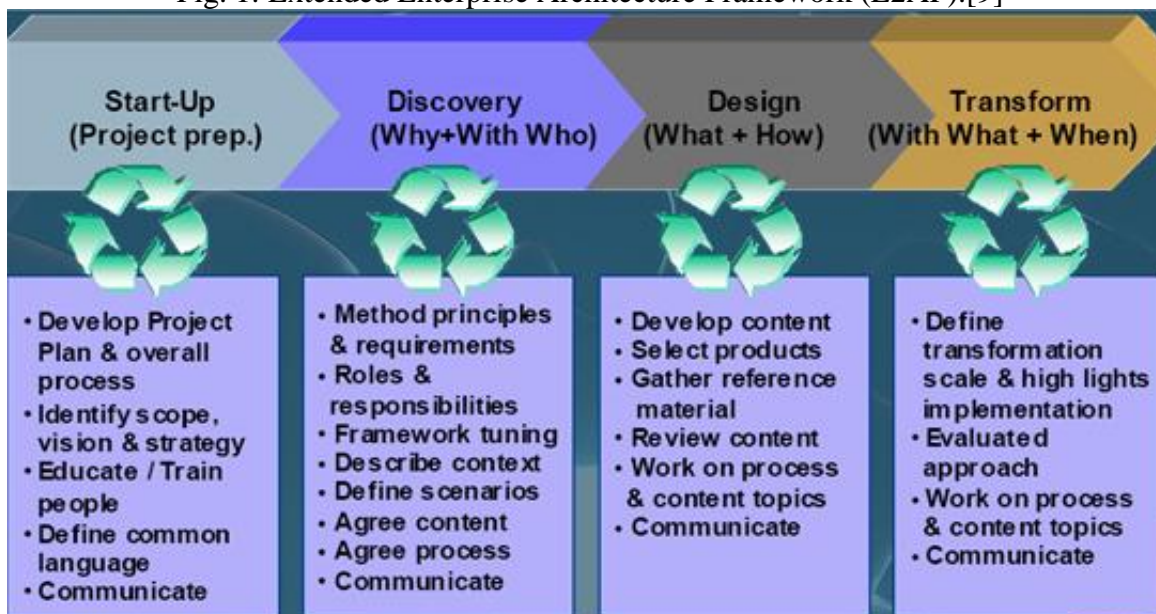


Fig. 2: Extended Enterprise Architecture methodology.[9]

E2A is a comprehensive framework that contains all the columns in Zachman framework (as a basic framework) and its methodology is match with frequent ISM process. This framework has four rows and six columns. Each column explains a conceptual main level and each row is a representative of an aspect in organization [4]. As we said later, the columns are match with Zachman's framework and the rows are business, information, information systems and technology infrastructure.

Sometimes, combining two or more frameworks or methodologies and using those in process may lead to a better result. Despite the fact that E2A's framework and methodology are recommended for implementing security management, in some cases organizations can use other frameworks according to their needs. For example C4ISR framework-usually used for crisis- or Levis methodology can both, to some extent, cover ISM requirements in implementation. Therefore, due to the needs of an organization, a proper framework or methodology will be applied.

#### 4-2. customized framework and methodology:

We should concern here the customization of this framework and make it applicable to being a template in implementing ISM in university's educational services system. Thus, we explain it by pictures of the E2A's customized framework and methodology for university's educational services system (Fig. 3 and 1). In Fig. 3, the columns and rows show exactly the EAF but the content is customized for implementing ISM in university's educational services system.



<b>E2AF</b>	Contextual level	Environmental level	Conceptual level	logical level	<u>Physical level</u>	Transformation level
business	The strategy of creation of trust in educational services system	Appointing value net relations in environmental level of educational service	Preservation of security of the processes of educational services system	Processes of educational services security, audit, appointing the role and identifier for people and resources	Resources of preserving security in	Changes or incidents
information	Increasing confidence for authenticity and safety of information	Appointing necessary informational exchanges in environmental level	Universality, preserving confidentiality, controlling information access of educational services system	Cryptography And digital signature	Informational resources and their taxonomy	Necessary information about evolutions
Information systems	System integration, creating trust in exchanged information	Appointing information systems and necessary environmental interactions	Security and confidentiality of interaction with informational system, indentifying it	Designing secure system	Requirements of creating system	System changes
Technology infrastructure	Creating infrastructure for offering services in proper trust level	Appointing linkages and infrastructures of environmental net	Appointing security goals regarding infrastructure	providing infrastructure	Hardware specifications and software specifications	New and required infrastructures

Fig. 3: security framework for university's educational services system (pink color=privacy, violet= governance, blue= security)

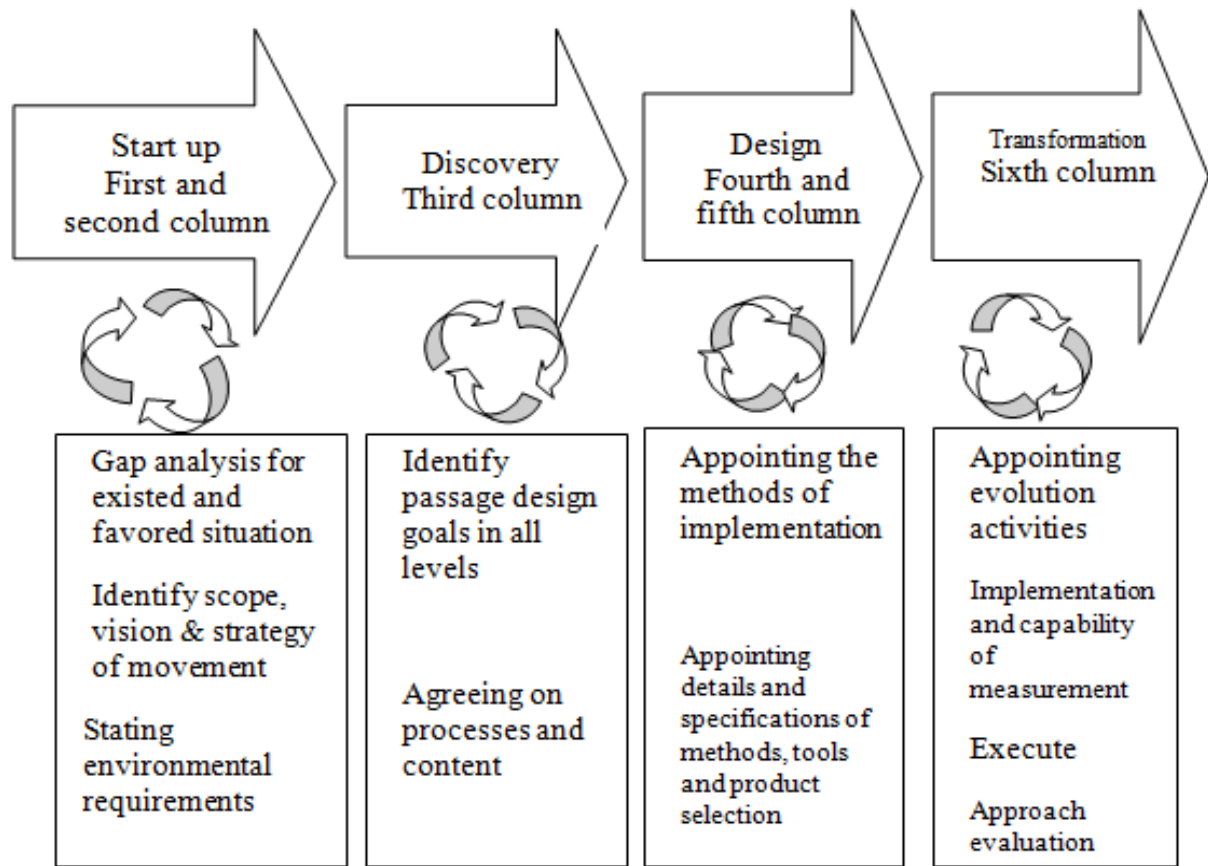


Fig. 4: the passage method in ISM implementation for the university's educational services system

Such comparison and customization have never been carried out this way and in similar researches only the university's systems have been analyzed [2].

Finally, it should be noted that this customized framework can be established under holistic methods such as crisis management cycle.

## 5. Conclusions

In this paper we propose the novel idea of implementing management in information security area. This novelty is the use of EA's frameworks for ISM. Here we select one of these frameworks and their methodology that is closer and more applicable in university's educational services system. Also we customize this framework and its methodology for university's educational services system.

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