

## Towards a Reference Model for e-Learning Governance

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**Abstract:** It is increasingly recognized that e-Learning is crucial to the success of organizations. In an era where the intellectual capital is considered to be the most valuable asset of a company, surprisingly not too much attention is given to the risks and threatens faced by e-learning endeavours. The ultimate goal of e-learning is to enable the business by delivering the knowledge, skills and attitudes (SKA) that the business needs in a cost-effective way. The critical role that e-learning is playing calls for a specific focus on governing it. To this end, we are launching the term e-Learning Governance (a new concept). e-Learning Governance can be defined as the responsibilities and practices carried out with a view to providing strategic direction to an institution's e-learning initiatives, ensuring that established objectives are achieved and risks managed properly, as well as that resources allocated are used responsibly. We need to go beyond methodologies for developing e-learning modules and extend the governance principles to all stages of e-learning. What we need is a Reference Model, independent of technical platforms, organizational structures and pedagogical frameworks, which is proposed in this paper. Our Reference Model conceptual framework encompasses an e-learning information architecture, processes and sub-processes and governance rules and metrics. We exemplify how the governance rules and metrics can be used to control and secure e-learning systems. Further research is being carried out in the Database Lab at PUC-Rio to specify the Reference Model in detail.

**Keywords:** e-Learning, Governance, reference model, control, risk

**Resumo:** e-Learning, cada vez mais, está sendo reconhecido como crucial para o sucesso das organizações. Numa era onde o capital intelectual é considerado o ativo mais valioso de uma empresa, surpreendentemente não se dá a devida atenção aos riscos e ameaças presentes na adoção de e-learning. O objetivo primordial do e-learning é capacitar o negócio através da entrega dos conhecimentos, habilidades e atitudes que o negócio necessita de uma forma eficaz em custo. O papel crítico que o e-learning está desempenhando requer um foco específico em governá-lo. Dessa forma, estamos lançando o termo Governança de e-Learning (um novo conceito). Governança de e-Learning pode ser definida como as práticas e responsabilidades exercidas com o objetivo de se dar uma direção estratégica às iniciativas de e-Learning de uma organização, promovendo o atingimento dos objetivos estabelecidos e a gerência adequada de riscos, bem como o uso responsável dos recursos alocados. Faz-se mister ir além de metodologias para desenvolvimento de módulos e-learning e se aplicar os princípios de governança a todos os estágios de e-learning. Necessitamos, assim, de um Modelo de Referência, independente de plataformas tecnológicas, estruturas organizacionais e abordagens pedagógicas, o qual está sendo proposto neste trabalho. O arcabouço conceitual do Modelo de Referência propõe uma arquitetura de informação, processos e sub-processos de e-learning, bem como regras e métricas de governança. Exemplificamos como as regras e métricas de governança podem ser usadas para o controle e segurança de sistemas de e-learning. Essa pesquisa está sendo desenvolvida no TecBD da PUC-Rio para a especificação do Modelo de Referência em detalhes.

**Palavras-chave:** e-learning, governança, modelo de referência, controle, risco

## I. INTRODUCTION

Undoubtedly, the development of the knowledge workers' skills and abilities is fundamental to generate a sustainable competitive advantage. The ultimate goal of e-learning is to enable the business by delivering the knowledge, skills and attitudes (SKA) that the business needs in a cost-effective way. However, implementing e-learning is complex. Implementing e-learning is about project management, change management and risk management [1]. The success of e-learning can be related to business successes and more businesses are recognizing e-learning's ability to build knowledge and develop skills while reducing the costs associated with training.

e-Learning expenditures in organizations have grown dramatically in the last five years. The factors which have motivated it are [2]: (1) Global Economy: this creates the need for a corporate knowledge base and learning tools accessible everywhere; (2) need for skilled workers: jobs are requiring an increasingly better-educated workforce; (3) shortage of skilled workers: the supply of skilled workers is less than its demand, so that organizations must be able to train quickly new workers; (4) "free-Agent" mentality: the lack of employee's loyalty to their employers so that organizations recognize that marketable skills are more attractive than lifetime employment; (5) training viewed as a benefit: workers value more organizations which give them the opportunity to learn new skills; (6) stretched workforce: workers are willing to pursue their educational needs beyond their offices.

In view of this context, adopting e-learning is no doubt critical to the organization's mission. If organizations want to be successful in e-learning endeavours, they should apply governance principles on it.

There are a number of definitions for Corporate Governance. In [3], we find a definition for Corporate Governance: "it is about how the organization achieves its purpose. It involves the meaning of organizations and how they fulfil their purpose. It has elements of leadership, stewardship, ethics, security, vision, direction, influence and values. Corporate Governance is about protecting stakeholder interests in the organization".

An emerging term, and related to this, is Enterprise Governance. This one is used to describe a framework that covers both the corporate governance and the business management aspects of the organization [4].

By having examined a number of definitions for Governance, we believe its essence is control. As stated in [5], Governance can be equivalent to Control, not as a specific control activity, but as an environment. Control encompasses all the means used by an organization to direct, restrain, govern and monitor its various activities.

So, e-Learning Governance has to do with applying control principles in the delivery of the knowledge, skills and attitudes (SKA) that the business needs with ethics, security, direction, cost-effectiveness, quality etc. We understand that the critical role of e-

learning in the Knowledge Era calls for a specific focus on e-learning Governance. We are launching this new term and working towards a Reference Model for e-Learning Governance.

In line with [6], e-Learning Governance can be defined as the responsibilities and practices carried out with a view to providing strategic direction to an institution's e-learning initiatives, ensuring that established objectives are achieved and risks managed properly, as well as that resources allocated are used responsibly

Intuitively, management wants to have control over its business. PGL, in an attempt to govern the design and development of e-learning contents, has strived to develop a sound instructional design methodology for e-learning contents [7]. The ISDMeLO methodology [8] was also proposed to this end. But in order to be successful, we need to go further and apply the governance or control principles in all stages of e-learning. But how can we govern something we do not know it completely? Many organizations are still experimenting with e-learning, using different approaches, applying different technologies and models for the delivery of e-learning contents. That is why we need a Reference Model on which governance principles can be applied. Bearing this in mind, we are developing a Reference Model for e-Learning Governance to help in the application of governance principles. As stated in [9], individuals and institutions are looking for guidance on improving their e-learning processes. The author believes that "a flexible process model is needed to encourage the development of effective educational technology resources independent of technical platforms, organizational structures and pedagogical frameworks". We share the same views.

This work aims at proposing a Reference Model for e-Learning Governance. The remainder of this paper is organized as follows. In Section 2, we present the steps undertaken towards a Reference Model for e-Learning Governance and the foundation for the proposed Model.. In Section 3, we give an overview of our Reference Model components. In Section 4, we detail its conceptual framework and give an example on how to control and secure e-learning systems by applying the governance rules and metrics prescribed by the Model. Finally, Section 5 presents some concluding remarks.

## **II. TOWARDS A REFERENCE MODEL FOR E-LEARNING**

In order to develop the Reference Model, the following steps were taken:

- defining the characteristics of a reference model
- searching for control and auditing standards for e-learning
- structuring the e-learning function in processes and sub-processes so that governance principles could be applied
- adapting the ISDMeLO methodology [8] for the design of e-learning contents in the context of e-learning processes
- defining the main e-learning information flows and their attributes to build an information architecture
- assessing possible risks in the e-learning processes;

- proposing control and security standards to address identified risks
- proposing governance rules and metrics for e-learning
- adapting an e-learning maturity model [9] from the academic to the corporate sector

The Reference Model for e-learning Governance is grounded in well established concepts and techniques, such as:

- **e-learning foundation (Pedagogy, IT, Content):**

Based on our experience in developing e-learning contents to be consumed at a distance, we have reached the conclusion that the trilogy, that is, Pedagogy, Information Technology and Content, are the pillars which sustains e-learning contents [10]

- **COSO Model**

There are many control models, but the dominant model in use today is the COSO model [11]. COSO was first, and because it has been endorsed widely, COSO is used as a general model to discuss internal control and risk. It defines internal control, describes its components, and provides criteria against which control systems can be evaluated. Two major goals of the report are to establish a common definition for control which can be used by many parties and to provide a standard which can be used by organizations to assess and improve control systems.

In [12], we find a succinct description of the CobiT and SAC documents..

- **COBIT (Control Objectives for Information and Related Technology)**

This document was developed by the Information Systems Audit and Control Foundation (ISACF) to serve as a reference for the application of IS security and control practices, so that management can benchmark the security and control practices of IT environments, users can be assured that adequate controls and security measures exist and auditors can substantiate their opinions and advise on IT security and control measures. The primary drive for the development of this standard document was to enable the development of clear policy and good practices for IT control throughout industry worldwide.

- **SAC Report**

This report gives a definition for the system of internal control, describes its components, provides several classifications of controls, describes control objectives and risks, and defines the role of the internal auditor. The report provides guidance on using, managing, and protecting IT resources and discusses the effects of end-user computing, telecommunications, and emerging technologies.

- **Quality Auditing of online Learning – A Guide for AQTF Auditors from the Australian Flexible Learning Framework**

This guide was developed by the Australian National Training Authority (ANTA) to help auditors in reviewing the quality of online materials and verifying compliance with the Standards for Registered Training Organizations. It has 9 standards: Quality Training and Assessment, Compliance with Commonwealth, State/Territory legislation and Regulatory requirements, Effective Administrative and Records management Procedures, Access and equity and client service, the competence of the RTO staff, RTO assessments, Learning and assessment Strategies [13].

- **Balanced Scorecards**

[14] In the early 1990's, Kaplan and Norton developed a new approach to strategic management – the Balanced Scorecard. They recognized that the financial perspective should not be the only one to measure an organization results. They advocated that the organization should be viewed from four perspectives (Financial, Customer, Internal Business Process and Learning and Growth.). So metrics should be developed and information collected so that decision makers examine the outcomes of various measured processes and strategies and track the results to guide the organization and provide feedback.

- **The Capability Maturity Model**

The Capability Maturity Model developed by the Software Engineering Institute is a 5 level model for judging the maturity of an organization's software development processes and for identifying the key practices required to increase the capability or effectiveness of those processes. The five levels of the model are: Initial, Repeatable, Defined, Managed, Optimizing [15].

### **III- A REFERENCE MODEL for e-LEARNING GOVERNANCE**

A Reference Model is “a framework for understanding significant relationships among the entities of some environment, and for the development of consistent standards or specifications supporting that environment” [16].

To this end, we had first examined some reference models [16] [17] [18] and observed they have the following common characteristics:

1. They are written in a narrative way and may have a visual schema to facilitate the understanding of their components;
2. They give a definition for the terms and concepts which are basic to the environment being described;
3. They normally addresses their purpose and scope, intended audience and applicability;
4. They describe the processes or functions as well as information flows (detailed or not) for the environment being described;
5. They build an abstract view of what is being described, so that they can guide further implementation while not specifying them;

6. They aim at making it easier to understand the environment being described as well as its entities and responsibilities;
7. They can work as a reference point to evaluate the maturity of organizations with regard to the manner in which some subject domain is managed;
8. They help in identifying and elaborating related standards;
9. They are comprehensive and extendable.

Following this, we included in our Reference Model the following components: Purpose, Applicability and Audience, Terminology, Roles and Responsibilities, Conceptual Framework and Maturity Models.

- **Purpose:** A major purpose of our reference model is to facilitate the understanding of what is required to govern e-learning. We aim at defining the concept of e-learning governance and its conceptual framework so that it can serve as a reference point for those who wish to apply governance principles in the e-learning function.
- **Applicability and Audience:** This model is applicable to any organization which develops, buy or outsource e-learning services, content or technology. Although this Model can be applied to the academic sector, it was conceived bearing in mind the corporate world. Some adjustments would be required to adapt it to the academic context. We understand as the main audience for this Model, the Board of Directors and Management who have the primary responsibility for the results of e-learning activities. Auditors who are involved in assessing the adequacy and effectiveness of controls established by Management.
- **Terminology:** In order for the Reference Model's users be able to understand it we have provided them with basic definitions. These are: as for Governance: Corporate Governance, Enterprise Governance, E-Learning Governance; as for Risk Management: Risk, Risk Categories, Risk Management, Integrated Risk Management, Risk Mitigation, Risk Assessment, Risk Levels; as for Control: Control, Control Measure and Control Categories.
- **Roles and Responsibilities:** we defined the roles and responsibilities of the entities involved in the governance process for e-learning and classified them into Executive/Managerial, Administrative and Technical functions.
- **Conceptual Framework:** We defined the information architecture, processes and governance metrics and rules.
- **Maturity Models:** adapting from [e-learning maturity model] to the corporate sector, it has the following levels: Optimizing, Managed, Defined, Planned and Initial.

We will not go into detail of all Reference Model's components, since it would be too long. We will then look into the Conceptual Framework component which is at the heart of the Reference Model by showing an example in the next section.

#### **IV- AN EXAMPLE ON HOW TO CONTROL AND SECURE E-LEARNING SYSTEMS**

As stated in the previous section, the conceptual framework of our Reference Model has three aspects: the information architecture, processes and governance rules and metrics. We will show how we can control and secure e-learning systems by applying the third aspect of our Model conceptual framework, i.e., the governance rules and metrics. It is important to note that these rules and metrics are applicable to all and each e-learning process. In our example, we will use the *Delivery of e-learning modules* process which is part of the ISDMeLO methodology presented in a previous PGL DB Conference.

As stated before, governance is about risk management. So, if we wish to control and secure our e-learning systems, our first step is to identify and assess possible risks. Then we need to implement some control and security measure to minimize it. The higher the risk, the more controls are needed. That is why our Model allows some flexibility in the implementation of control measures. It can be mandatory, recommended or considered if the risk is high, moderate and low, respectively.

But the concept of governance requires more than risk mitigation. We need some measures to tell us whether this process is functioning properly and whether it is likely to achieve its goals. To this end, management needs to be aware of the critical success factors for getting these processes under control. In order to evaluate e-learning processes, key goal Indicators are needed for monitoring achievement of e-learning process goals as well as Key Performance Indicators for monitoring performance within each e-learning process.

So far, our Reference Model rules and metrics help in managing risk and in measuring the process success and performance. But it goes beyond and incorporates two other variables, that is, Control Assessment and Corrective Action. These variables are needed to contribute to the optimization of the e-learning function and they are provided by an independent entity such as Internal or External Auditing. The Control Assessment variable informs the audit opinion on controls, which can be satisfactory, not satisfactory and unacceptable and the Corrective Action indicates the audit recommendation to bring controls to a level that can protect identified risks adequately. The same way that the Control and Security Standard variable allows for some flexibility, here again the Corrective Action variable can assume the values of mandatory, recommendable and considered. This ensures that a cost-benefit analysis of audit recommendations is considered prior to implementing them.

In order to make the understanding of our Reference Model governance rules and metrics easier, we show below an example of each variable. Before going into the example itself,

it is important to bear in mind the trilogy of e-learning and, as such, the majority of the e-learning processes have technological, pedagogical and content-related aspects.

For the process *Delivering e-learning modules*, we can state that, from a technological perspective, it should protect the confidentiality, availability and integrity of e-learning contents.

One of the possible events which might occur is course interruption, due to some technical failure, what would impact the learner satisfaction. One of the possible control and security measures to prevent it, would be to develop contingency plans to prevent course interruption. The table below shows the governance rules and metrics with examples.

***Delivering e-learning modules: Governance Rules and Metrics***

<b>Risks</b>	The probability of an event or action may adversely affect the organization, preventing it from achieving its business objectives. It is measured in terms of consequence and likelihood. So, the higher the probability and impact of the event, the higher is the risk. It can assume high, moderate and low values. e.g.: course interruption
<b>Control &amp; Security Standards</b>	These are mechanisms established by management that aim at minimizing risks. They can prevent something to happen or they may detect that some negative event happened. It can be mandatory, recommended or considered for implementation. e.g.: development of contingency plans for course continuity
<b>Critical Success Factors</b>	The most important things or actions for management to achieve control over and within a process. It can assume high, moderate and low priority values. e.g.: skills and tools are available to provide course continuity
<b>Key Goal Indicators</b>	Define measures that tell management whether a process has achieved its business requirements. It can assume high, moderate and low priority values. e.g.: reduced downtime
<b>Key Performance Indicators</b>	Define measures to determine how well the process is performing in enabling the goal to be reached. It can assume high, moderate and low priority values. e.g.: time invested in preparing contingency plans
<b>Control Assessment</b>	The audit opinion on the adequacy and effectiveness of controls established by management. It can be satisfactory, not satisfactory or unacceptable. e.g.: Controls are not satisfactory: A number of cases were identified where course downtime was more than 20 minutes, impacting the learners' motivation
<b>Corrective Action</b>	The audit recommendation and agreed corrective action by management. It can be mandatory, recommendable or considered. e.g.: a contingency



	plan should be developed and regularly tested to help ensure course continuity
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## V – CONCLUSION

E-learning is, no doubt, critical to enable one organization's mission. However, governance is needed to help ensure the success of its endeavours in implementing e-learning. So, it is good business to adopt e-learning governance. But it is difficult to govern what we are still experimenting. That is why we need a Reference Model on which we can apply the governance principles. This model should be solid, in that it has consistent rules and metrics, and flexible enough, so that it allows management to decide on the level of control to apply in its e-learning business.

Our work aims at developing a Reference Model which is independent of technical platforms, organizational structures and pedagogical frameworks

The proposed Reference Model is a document, as any other reference model, and has the following elements: Purpose, Applicability and Audience, Terminology, Roles and Responsibilities, Conceptual Framework and Maturity Models for e-learning governance.

In this paper we have shown how the governance rules and metrics of our Reference Model can help in controlling and securing e-learning systems.

Further research is being carried out in the Database Lab at PUC-Rio to specify the Reference Model in detail.

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