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A Framework to Evaluate E-learning Based on Social Networking

Yassine Jamoussi*, Zuhour A. Al-Khanjari and Naoufel Kraiem

Department of CS, Sultan Qaboos University, Oman RIADI, University of Manouba Tunisia

***Corresponding author**

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Giant freshwater E-learning based on social networking, adaptive web-based educational system, evaluation approaches, measurement.

A B S T R A C T

E-learning based on Social Networking has become one of the most important educational systems. Many of these systems are built around Adaptive Web-based Educational System (AWES). In this paper, we emphasized mainly on three problems of the current approaches of evaluation in the field of the AWES: i) limits of the specific measures in the adaptation since the way these measures are generated not being explicit or traceable, ii) a not consideration of the facet Social networking during the evaluation of the performance of adaptation of these systems and iii) the not consideration of the meta-adaptation. To remediate to these problems we propose a framework of specific measure to the adaptation which takes into account various aspects raised in the problem.

Introduction

The root of e-learning is not paradigm shift from what went before but growth and development from previous practice and theory (Harasim, 2000). Also, Social networking is definitely not a new phenomenon in the field of teaching and learning. It could be, however, claimed that at some point in history we forgot the importance of social network in the learning process (Liccardi et al., 2007). This phenomenon does not affect only the way how learner perceives education based on Social Network but also affect how training establishment can achieve their goals related to e-learning. All these reasons require greater attention to the evaluation of e-learning systems (Zaidieh, 2012).

The system evaluation is not only the last phase of the process of software development, but also it should be seen as an important information source throughout the complete software life cycle

(Nielsen,1993). Traditional evaluations approaches, said global, do not supply a feedback on the performance of the various components of the system (Brusilovsky, et al., 2004). In order to understand better the evaluation results, layered approaches have been proposed to separately evaluate adaptation components of adaptive systems. This idea comes from Totterdall and Boyles (1999), who first phrased the principle of layered evaluation, "Two types of assessment were made of the user model: an assessment of the accuracy of the model's inferences about user difficulties; and an assessment of the effectiveness of the changes made at the interface". More recent approaches identified several adaptation components and therefore more corresponding evaluation layers.

The existing evaluation's approaches were mainly interested in measures allowing to estimate: i) the validity of the inferences at the level of the user model, deducted during the usage of the system, ii) the rigidity of the system by the analysis of the structure of the model of the domain and iii) the exactness and the errors of the predictions were made by the system and the degree of selectivity and accuracy during the research for appropriate contents. To answer the already quoted points, a measurement framework built so as to clarify the initiative of generation of the measures. The remainder of the paper is organized as follows: Section 2 presents some related works. Section 3 introduces the layered evaluation approaches. Section 4 is devoted to the measurement framework. Section 5 describes the measurement process. Finally, section 6 concludes this paper and outlines future work.

Related work

For decades, various methods have been applied in educational research to analyze and study the social networks and e-learning. Social networks exist on the Internet websites where millions of people share interests on certain disciplines, and make available to members of these networks various shared files and photos and videos, create blogs and send messages, and conduct real-time conversations. These networks are described as social, because they allow communication with friends and colleagues study and strengthen the ties between members of these networks in the space of the Internet. The most famous social networks around in the world are Facebook, Twitter, MySpace, and others (Liccardi et al., 2007). This study explores possibility of using social networking technology to enhance learning in different levels of education ((Liccardi et al., 2007).

A recent study of the potential for semantic modeling of learners explores using Semantic Web-based social networks to facilitate the automatic and dynamic creation of students' networks within large online communities. Enriching the semantics of network and membership descriptions can provide valuable information. This can be used to assist in tuning group allocations, enabling the network to be used for specific educational objectives. Social networking applications which incorporate Web 2.0 technologies demonstrate affordances, which could be available to utilize within the classroom. These operate with paradigms which are different to those observed within conventional e-learning tools. However utilizing social networking tools (or applications) with large student groups might present problems. An advantage of increased awareness or appreciation of the complexity of typical observed behaviors in a social learning environment may enhance the academic's ability to manage the tools (Liccardi et al., 2007).

The study of social networks within a learning domain encompasses the processes of social learning that occurs when a self-selecting group of people who have a common interest in a subject collaborate to share ideas or find solutions. It proposes an understanding of the impact social networks have on the learning experience, it is worth a bit of discussion on how social networks are formed, what good application are there to support e-learning, and how students go about grouping themselves to benefit. Also, examines the experience of e-learning in my university environment to know to what extent the student are aware about the e-learning through social networking application and to what extent they use it during their study (Zaidieh, 2012).

Networking software has been developed to serve different purposes; the most common are: 1) to create and maintain the social network of either on-line or real-life friends, and 2) to re-unite past friends. Software that allows users to maintain a social network of friends (both on-line "friends" and real-life mates) is very popular nowadays. Facebook supports more than 30 million active users with an average growth rate of 3 percent weekly since January 2007 (Firstly, 2012). Orkut (Liccardi et al., 2007) works much like Facebook and requires "friend" status to access information; however, text can be added to a user's wall by non-members. MySpace (Firstly, 2012). is a compromise of the two by offering an interactive, user-submitted network of friends, personal profiles, blogs, groups, photos, music and videos. These examples give a brief idea of the impact social software applications have on both local and global communities. Co-authoring: Wikis allow users to collaborate online on shared ideas.

Researchers used the Facebook to be designed and implemented to enhance teaching pedagogy as well as create an engaging learning environment. Social networking technologies such as Facebook allow members to participate in a learning environment where the learning process can occur interchangeably from both inside and outside of the classroom. The results, there are benefits for successful use of social networking in education for both students and instructors. For students: some degree of informal learning through informal communication, support for collaboration, feedback on thoughts and collaboration independent of space and time. For instruction: gaining feedback from students and constant communication with students and produce an effective instructional technology for their customers. So, networking technology can be used effectively to foster a culture of learning, as a learning tool for both students and teachers. Furthermore, in the future, the social-networking sites will have the significant potential to expand teaching and learning out of classroom (Aroyo et al., 2006).

The implications of resent research paper extend into both research and practice. More research needs to be conducted in the area of social learning presence, in both on-line and traditional educational environments. Research was intended to determine the extent to which the perception of social presence influences student satisfaction, student motivation and other attitudinal factors. The research tends to explore some analysis for students' actual cognitive and effective learning goals. From the instructors' perspective, research needs to be conducted to determine the effect of social presence in facilitating course design. Then come the question of how social software can be

effectively used to achieve these targets (Wegerif,1998). Nowadays, researches attempt to investigate the impact of social networks on the student learning experience based on a survey involving students and lecturers. Our goals are to explore student learning experience when they are part of a social network. We aim to understand the perception of social networks as well as analyze its role and utility in learning. Also, to study the social media and to see to what extent it is good for e-learning. Moreover, what is the effect of applications to support e-learning through social media. To what extent the social media tools are important for e-learning.

Layered evaluation approaches

Layered approaches have been proposed to separately evaluate adaptation components (layers) of adaptive systems. This idea, as we previously mentioned, comes from Totterdell and Boyle (1999) then it was adopted by several authors in the literature. Brusilovsky et al., (2004) advocates a *layered evaluation framework* where the evaluation is decomposed into layers corresponding to the high layers described above:

- *the interaction assessment layer*, where only the assessment of user interaction is being evaluated. For instance a question here can be stated as "are the user's characteristics being successfully detected by the system and stored in the user model?"
- *the adaptation decision making layer*, where only the adaptation decision is being evaluated. For instance a question here can be stated as "are the adaptation decisions valid and meaningful, for selected assessment results?"

It has been noticed that to successfully select the right adaptation, the previous knowledge of the learnerss has to be taken into account. Similarly Weibelzahl (2003) proposed an evaluation framework of six steps:

1. Evaluation of reliability and external validity of input data acquisition used to build the user model.
2. Evaluation of the correctness of inference mechanism and accuracy of user properties.
3. Appropriateness of adaptation decisions, which may concern with how to adapt the interface, how to change the layout, what additional information should be provided, which commands to offer, how to tailor the presentation, etc.
4. Change of system behaviour when the system adapts (in which way does system behaviour change in comparison to the normal division of labour?).
5. Change of user behaviour when the system adapts (does the user change his/her behaviour when the system adapts in comparison to the normal division of labour? In which way?).
6. Change and quality of total interaction. The main concerns with usability. How is the interaction quality? Does it change? Is the user satisfied?

The last evaluation step can only be interpreted correctly if all the previous steps have been yet completed (this is especially important in the case of finding no difference between an adaptive and a non-adaptive system). Adaptivity is supposed to reduce the complexity of the interaction and therefore they also measure the user's behaviour by means of measures of complexity to demonstrate the complexity reduction. For instance, the number of clicks to reach a goal can be

used as a measure since an easier interface provides shorter paths to the goals. However, in addiction to objective measures, a correct interpretation also requires subjective criteria, such as the user's preferences for one of two versions, or a standardized usability questionnaire. Paramithys, and Weibelzahl (2005) suggest a modular approach to the evaluation of adaptive user interface as well. They exploit a high-level model of adaptation made up of the following components:

– interaction monitoring,
– interpretation/inferences,
– explicitly provided knowledge,
– modeling,
– adaptation decision making,
– applying adaptations, transparent models & adaptation "rationale",
– automatic adaptation assessment.

Jameson (1999) in his overview of types of empirical studies distinguished between studies that do not require a running system and studies with a system. The former can benefit from results of previous research, early exploratory studies and knowledge acquisition from experts, while the latter requires controlled evaluations with users and experience with real-world use. All the empirical studies, besides, should address questions concerning:

– *correctness of assumptions about users relied on by inferences techniques:* can the general assumptions about users be shown empirically to be correct?
– *appropriateness of inference techniques used:* are the techniques used well suited to dealing with the inference tasks faced by the system?

– *adequacy of available data:* is there typically enough data available about each user to enable the system to make useful inferences about her?
– *adequacy of coverage:* does the system take into account enough of the relevant input data and user properties to be able to make a useful number of adaptation decisions?

– *appropriateness of adaptation decisions:* do the adaptation decisions that the system makes on the basis of decision-relevant properties actually improve the quality of the user's interaction with the system?

The measurement framework

According to (Fenton and Pfleeger, 1997), a measure is also effective and useful as its capacity to reflect our intuitive understanding of the phenomenon which is being measured. Consequently, building a measurement framework for the evaluation of AWES is widely associated with the understanding of the phenomenon of adaptation: interrelations, inputs, outputs, etc. As illustrated in Figure 1, an adaptive system of e-learning is initially an answer to the needs of training establishment side. Customer goals are operationalized during the usage of the system by means of learners' needs adaptation. Concretely, it is done by the implementation of one or several adaptation methods and adaptation rules. Consequently, the adaptation performance lies on its capacity to align the system to training establishment and to social network needs. Our research adopts this definition of the performance of adaptation.

The proposed measurement framework evaluates the adaptation performance by measuring the degree of alignment of the system to the needs of the learners and to the needs of decision makers. In our

approach, alignment between models is used in order to concentrate on the concepts and not on the instances. As far as the use of models is widely spread in the industrial world, this approach, although based on abstractions, seems to us completely adapted to resolve concrete problems.

Description of the measurement framework

Multi-layers evaluation approaches were essentially interested to system efficiency according to the user facet. Furthermore, they focused only on adaptation execution level and they are unconcerned with meta-adaptation which deals with mechanisms or methods that affect adaptation. For that reason, we propose a multi-facets measurement framework as shown in Figure 2. The system is evaluated according to both facets: Social network and Training establishment. Moreover, adaptation methods level in addition to adaptive learning Services and adaptive learning contents levels are considered. Therefore, three levels of the framework are perceived according to social network facet and Training establishment facet.

We are interested in our study to the Method and Service levels of the proposed measurement framework. Standards such as SCORM, LOM, as well as the other research works were interested in learning contents.

Measurement construction

We propose to study the alignment between meta-models related to a given level in order to elucidate measures that characterize the performance of adaptation at this level.

Meta-models alignment for measurement construction

Several authors were interested in the definition of links between elements of meta-models such as (Pohl, 1996; Bunge, 1977; Ralyté, et al., 2004). According to (Bézivin, 2004), given two meta-models A and B containing partially the same concepts. It is possible to realize the alignment of these meta-models by extracting the common part. This is called by (Etien,2005): mapping link. This link expresses equality between similar concepts of different meta-models. The authors base themselves on the fact that it is not rare that two meta-models allowing to model different entities have certain number of common concepts. It is so possible to define correspondences between concepts of the same nature but belonging to different meta-models.

MM_1 and MM_2 are two meta-models. We say that a concept X ($X = \{x_1, x_2, x_n\}$) of the meta-model MM_1 Maps (M) with a concept Y ($= \{y_1, y_2, y_n\}$) of the meta-model MM_2 if for each i, there is an isomorphism hi such as $x_i = h_i (y_i)$. The use of an isomorphism allows surmounting the problems related to the fact that x_i and y_i can belong to different domains.

$$X \; M \; Y \Leftrightarrow x_i = h(y_i) \; \forall \; i \in [1, n] \quad (1)$$

Representation and description of the measures

The quality models establish the first representations of measurement frameworks in the field of software engineering. These models aim at

Figure.1 Interaction between the various facets of the system

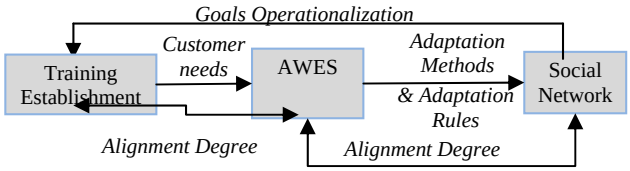


Figure.2 Measurement Framework

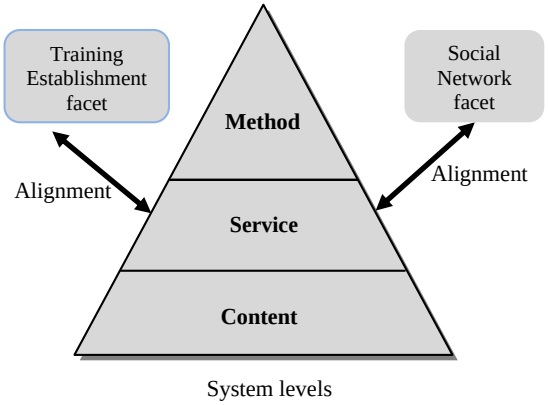
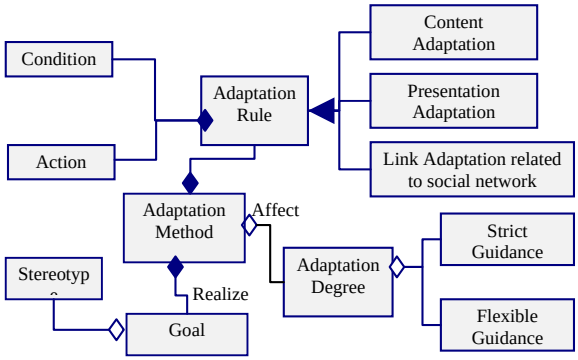


Figure.3 Method Meta-model



describing complex quality criteria of the software by dividing them into more manageable sub-criteria and organizing them in the form of tree with attributes abstracted in the superior levels and more concrete attributes at the lowest levels. This idea is described by the models FCM (Factor-Criterion-Measure) which were introduced the first time by McCall et al., (1977) and Boehm et al., (1978).

The model FCM is built in the form of high-level factors which are decomposed into criteria of low level, easier to understand than factors. Afterward, measures are proposed for these criteria. The values determined by these measures are accumulated up to the root of the tree to obtain the values of the quality attributes of the superior levels. To describe and understand the utility of the measures, Fenton and Pfleeger emphasizes important questions which should be answered before proceeding to a measurement process (Paramythis and Weibelzahl, 2005):

- Why to measure?
- What measures to adopt?
- How to measure (tools, techniques of collection and technical analyses, actor)
- When the measures should be made?

Measurement process

As we described earlier, measurement process is based on the alignment between meta-models. At each level, measures are generated resulting to mapping between the meta-model representing the system at the focused level with respectively the Training establishment meta-model and the Social network meta-model. For that purpose, we are going to define in the following sections the adopted meta-models at facets and the formalization of the measurement process.

Facets and levels Meta-models of the measurement framework

We present in what follows the meta-models associated to both levels "Method" and "Service", and to both facets "Training establishment" and "Social network".

Method meta-model

The Method meta-model is presented in Figure 3.

In Figure 3, the concept "Adaptation Method" is related to the Goal, Adaptation Degree and adaptation Rule concepts. The latter consists of condition and action as recommended by the model AHAM and Munich Reference Model and it is associated to three adaptation types: content adaptation, presentation adaptation and navigation link related to the social network. The adaptation method aims at satisfying the needs of the user which are collected by the adaptive system in the user model which is classified by stereotype. It stores information about goals, knowledge, preferences and experiences of the learner. In this Method meta-model, we are interested to the goal attribute which represents with the Knowledge attribute the main characteristics managed by current AWES. Finally, an adaptation method affects the adaptation degree according to which the guidance proposed to the learner is strict or flexible.

Social network meta-model

The social network meta-model (Figure 4) is centered on the learning session concept which describes the progress of the adaptive system. Adaptation is deployed with a specific flexibility degree and it acts

on a set of learning activities according to learner model characteristics. One activity is associated to a set of learning concepts and navigation links.

Training establishment meta-model

The training establishment represents essentially the company which is going to launch an e-training. This enterprise proceeds to a distance learning of its employees to reach goals which are the source of its motivation. The Business Motivation Model (BMM) is a standard of the OMG (2008) which models the means, the goals, the action plans and the factors which influence a business process. We were interested in our work in the part called "End" of this meta-model (see Figure 5). The End can be a Vision or a Desired Result. The Vision is a global image of what the organization aims at being or at becoming. The Desired Results, are Goals and more specific Objectives than the company, or a part of the company goals to reach. The Training Establishment actors are:

1. The decision-makers who introduce the training objective
2. Teachers, tutors and learners who use the e-learning system.

Compared with an Objective, a Purpose on a longer term tends to be qualitative rather than quantitative and general rather than specific. The Purpose represents generally a strategy of the company, expressed by the decision-makers and it is quantified by the Objectives. Compared with a Purpose, an Objective tends to be on the short term, quantitative rather than qualitative and specific rather than general. It represents the way of realizing the purpose thus it is achieved by the learners. A Vision, on the contrary, is rather wide to be directly measured by the Objectives. An Objective must be measurable and finished in a space predetermined time.

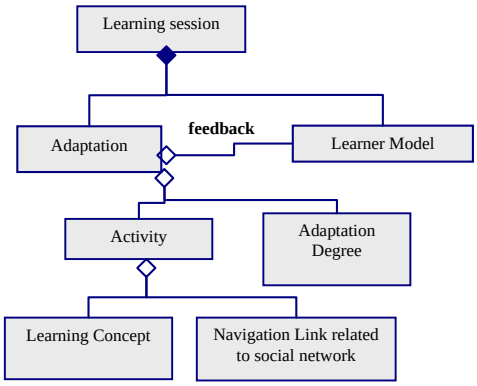
Service meta-model

To describe the features proposed by AWES we are based on IMS-LD (IMS Learning Design) [IMS-LD, 03] specifications. This standard proposes a meta-model for the implementation of learning situations or units of learning. A method, as stated by IMS-LD, illustrates the progress of the unit of learning such as a lesson or a course. A play which can be a lesson learning session, a problems resolution, or an experiment is divided into one or several acts. An act (read a text, draft a document or still make a synthesis) can be carried out by several actors who can assume various roles at the various moments. Every role has to realize a partition which consists of a certain number of activities. Furthermore, all the roles must be synchronized at the end of every act before handling the following act. IMS LD does not manage the aspect hypermedia of an adaptive system of e-learning (hypertext structure, navigation links, etc.), but he focuses on the educational activities. The Figure 6 illustrates the IMS-LD meta-model.

Modeling the measurement process with MAP formalism

Adaptation performance measurement is considered as an alignment degree assessment of the system to both Training establishment and Social network facets. As, the system is being perceived at several levels, we firstly consider the alignment at the Method followed by the Service level.

Figure.4 Social network meta-model



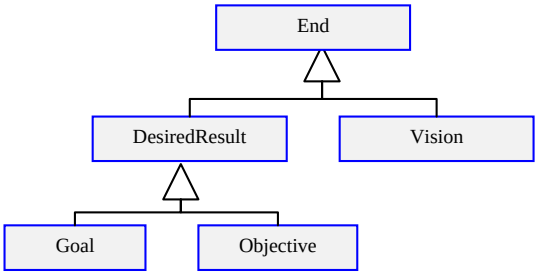


Figure.5 Training Establishment goals meta-model [OMG 08]

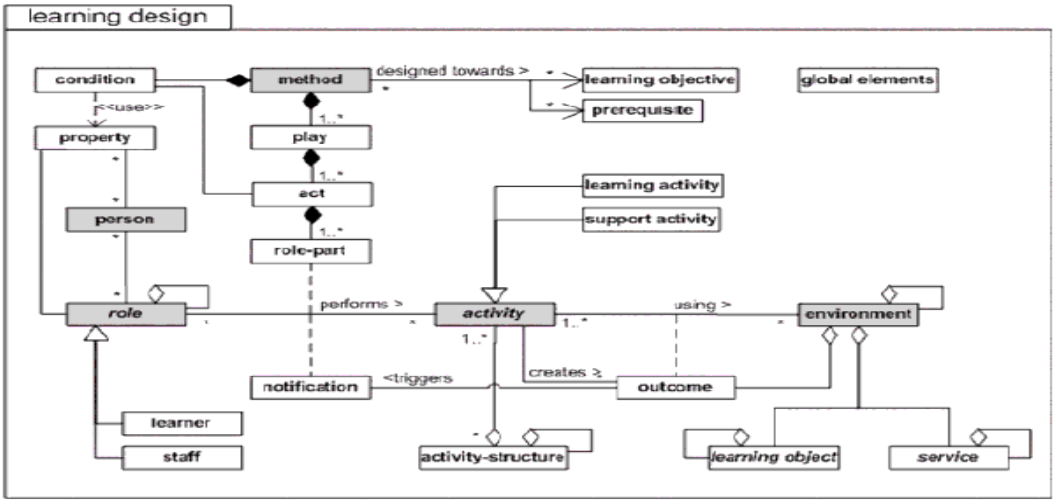


Figure.6 Service Meta-model [IMS-LD]

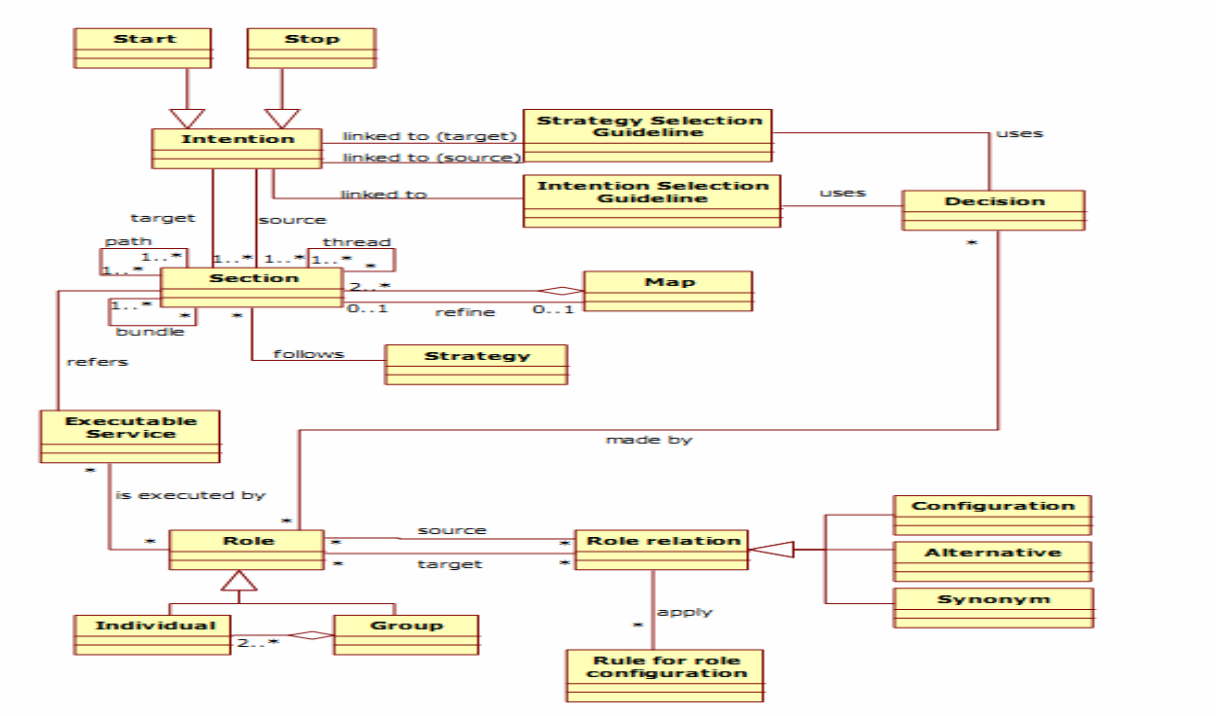


Figure 7: The map meta-model

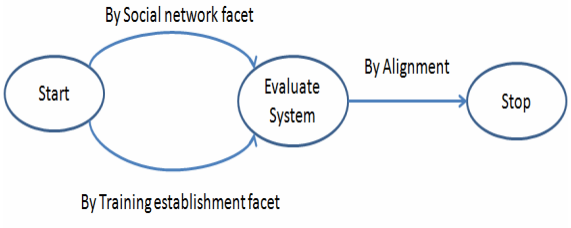
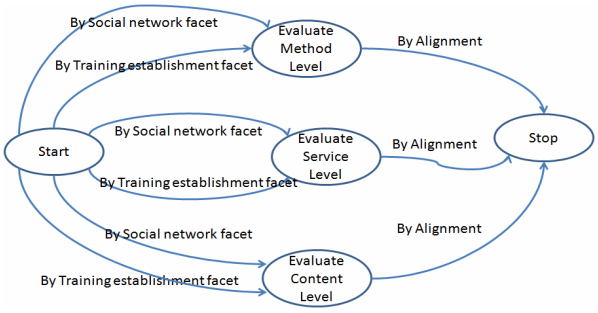


Figure 8: Evaluate System MAP



The Map representation system

In this section we first introduce the key concepts of a map and their relationships. Then we define map components as process chunks to be assembled.

A map is a process model expressed in intentional terms. It provides a representation based on a non-deterministic ordering of intentions and strategies. The key concepts of the map and their inter-relationships are shown in the (partial) map meta-model of Figure 7 which is drawn using standard UML notations.

A map is composed of several sections. A section is an aggregation of two kinds of intentions, source and target, linked together with a strategy.

An intention is a goal that can be achieved by the performance of a process. An intention is according to Jackson (1995), 'an optative' statement, it expresses what is wanted, a state or a result that is expected to be reached in the future We use a linguistic approach to define a template to formulate an intention. The linguistic approach inspired by Fillmore's case grammar (1968) and its extension by Dik (1989) view an intention statement as composed of a verb and different parameters which play specific roles with respect to the verb. The structure of an intention is the following:
*Intention: Verb <Target> [<Parameter>]**

Besides it was shown in (Rolland et al., 2003) that depending on the class of the verb, it is known which parameters are mandatory and which are optional. For this purpose, for every goal verb, a verb frame, which indicates the possible semantic functions for the goal's parameters have been defined: for instance remain [Qual,(Ref),(Loc),(Time)]. This frame means that « remain » is always followed by a quality, and optionally followed by a referent, a location and a time.

A strategy is an approach, a manner or a means to achieve an intention. It shall be noticed that the linguistic template for intention wording includes the parameter way which specialises into manner and means. It is the choice of the Map representation system to emphasise the role of strategies in process modelling.

A section is an aggregation of the source intention, the target intention, and a strategy. As shown in Figure 7 it is a triplet $<I_{source}, I_{target}, S_{source\text{-}target}>$. A section expresses the strategy Ssource-target using which, starting from I_{source}, I_{target} can be achieved.

This will represent each map as a directed graph from Start to Stop. Intentions are represented as nodes and strategies as edges between these. The graph is directed because the strategy shows the flow from the source to the target intention.

Also, the process meta-model for the measurement process using MAP is shown in Figure 8 and Figure 9.

It contains three core intentions "*Evaluation System*" in addition to *"Start"* and *"Stop"* intentions and by three strategies *"By Social network facet"*, "*By Training establishment facet*" and *"By Alignment"*. This MAP should by refined in Figure 9 as second level by three intentions "*Evaluate method Level"*, *"Evaluate Service Level"* and *"Evaluate Content level"*. The main purpose of using the MAP formalism is to simplify measurement process. The MAP model was introduced in this paper in order to model processes in a flexible way

Generation of measures at the Method level

We suggest studying the alignment between the respective meta-models of the Method level and both facets Training establishment and Social network. All the models on which our solution of this level bases is: the adaptation Method meta-model, the Social network meta-model and the Business meta-model. Alignments between these meta-models are illustrated by the Figure 10. The link "Maps" expresses this correspondence by connecting the similar notions which belong to different meta-models.

The alignment between the Method meta-model and the Business meta-model shows a mapping link between the notions «Goal " defined respectively in these two meta-models. The concept "Goal" of the Business meta-model is the one of decision-makers who introduces the training, as we explained it to the section 5.1.3. On the other hand, the concept "Goal" of the Method meta-model represents one or several learning goals realized by the adaptation method and this for each stereotype.

Consequently, the alignment of the adaptation Method to the Training establishment is estimated by measuring the alignment of Goals realized by the method for learner stereotype with the Training Establishment Goal expressed by decision-makers. We call this measurement criterion “Goals Alignment ".
On the other hand, the study of the alignment between the Method meta-model and the Social network meta-model shows a correspondence at the level of the concept "Adaptation Degree ". The alignment between the adaptation degree by the adaptation method and the adaptation degree which really satisfies users’ expectations and the needs is estimated by considering the measurement criterion "Adaptation degree alignment".

Measures generation at the Service level

We study herein the alignment between meta-models of the Service level and both Training establishment and Social network facets (Figure 11). The mappings between these meta-models concepts are considered.

Alignment between the Service meta-model and the Business meta-model shows a mapping link between the notions "Objective" and the «educational objective". For that purpose, we retain in our work the criterion of measure: alignment of the educational Objectives. Besides, we note a mapping between the Service meta-model and the Social network meta-model at the level of the concept "Activity". For that reason, we retain the criterion: Activity alignment.

As done previously the questions "what measures?", "why to measure? ", "how measure?", and "when to measure?" are considered for the both generated measurement criteria.

Measurement Criterion: Alignment of educational Objectives

- What measures? The alignment of the educational objectives assess at which extent initial objectives expressed by the learner correspond to the final objectives obtained directly after the use of the system. The obtained results are studied by stereotype of learner. For this reason we propose to retain the measure: Rate of the educational objectives satisfied by stereotype.

Table 1: FCM model at Method level

Factors	Criteria	Measures
Training establishment	Goals alignment	Rate of satisfied Result goals
		Rate of satisfied Duration goals
Social network	Adaptation Degree Alignment	Rate of learner disorientation

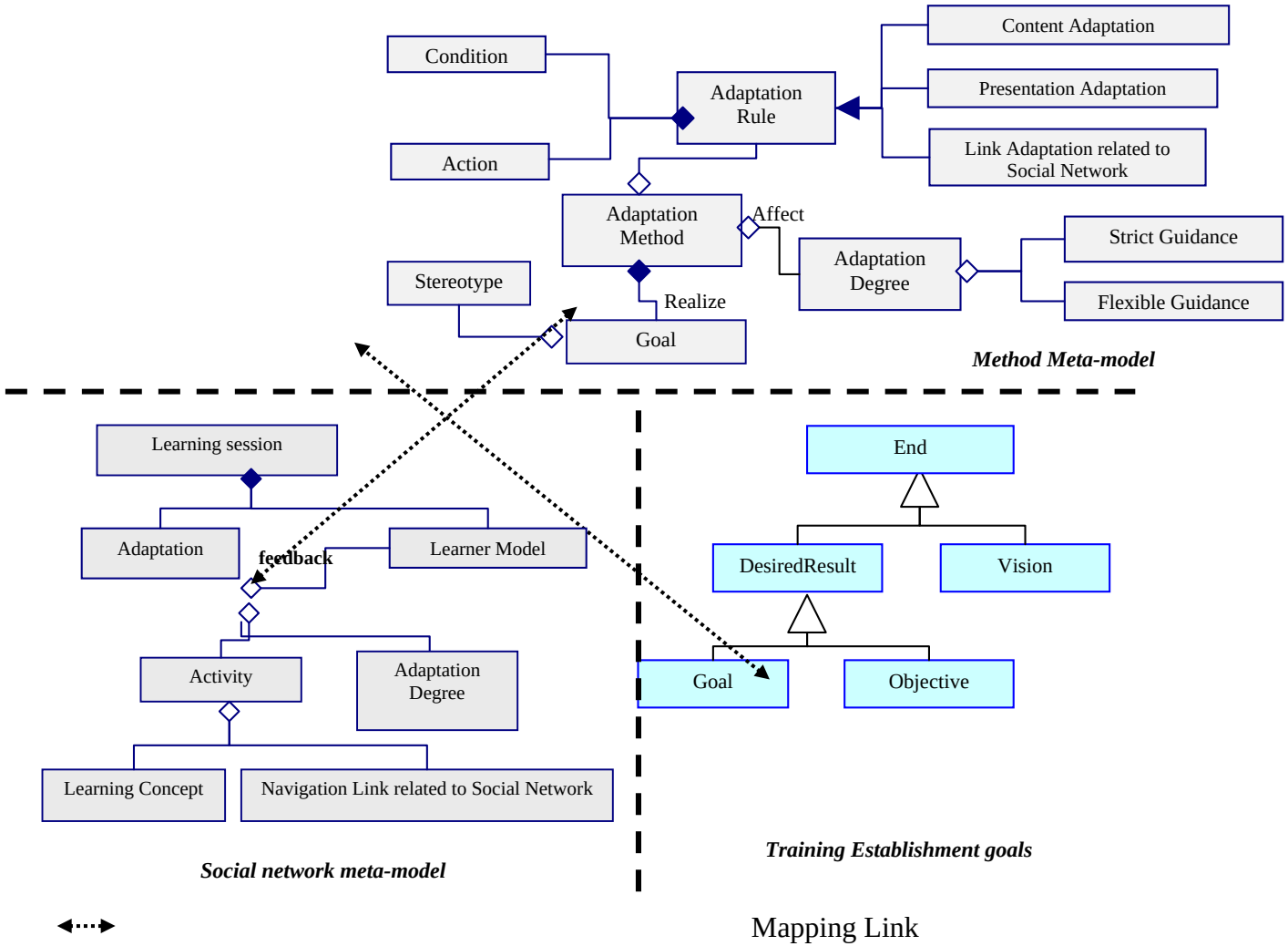


Figure 10: Alignment between Method, Training Establishment and Social network meta-models

Figure 11: Alignment between Service, Training establishment and Social network meta-models

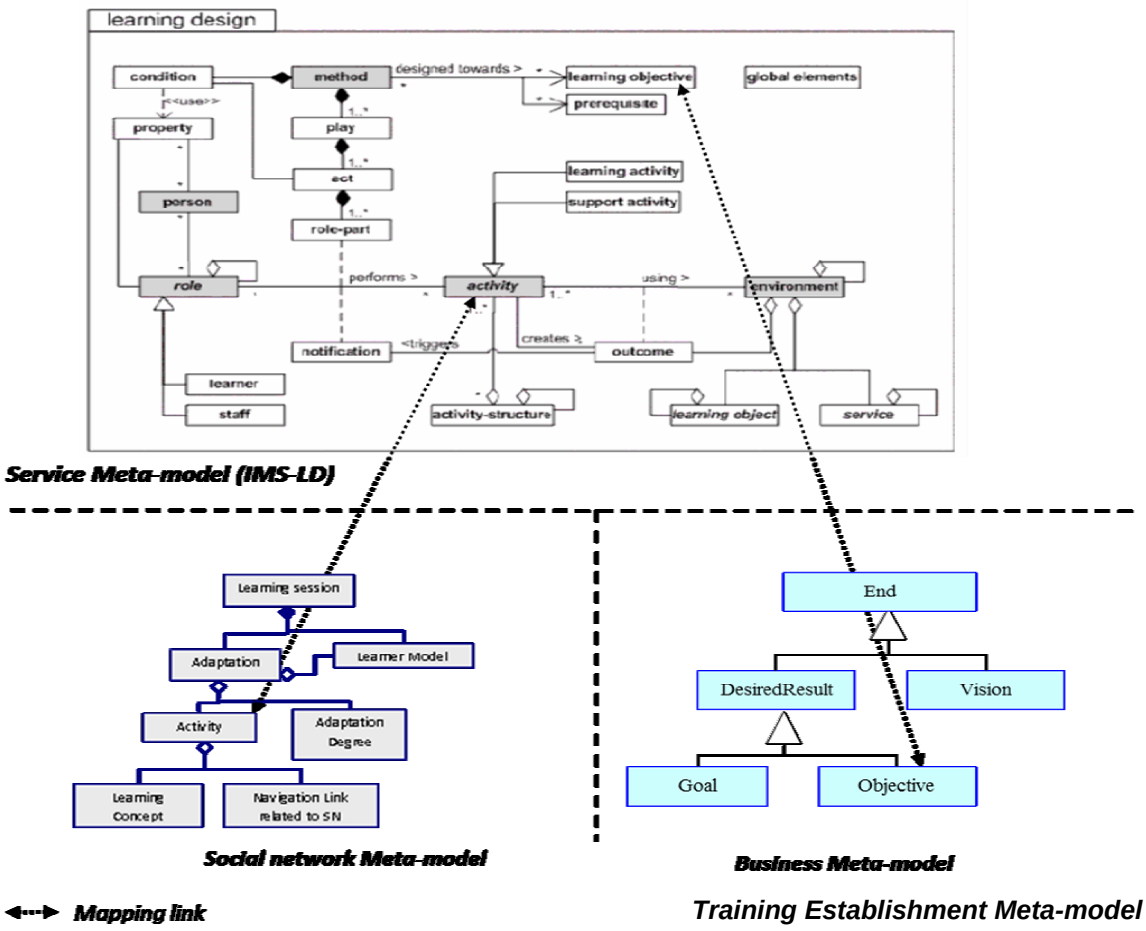


Table.2 FCM model at Service level

Factors	Criteria	Measure
Training establishment	Alignment of educational Objectives	Rate of the educational objectives satisfied by stereotype.
Social network	Activity alignment	Rate of navigation links accepted by stereotype and by activity
		Rate of the learning concepts accepted by stereotype and

- Why? To measure in which point the adaptive system allowed to reach the objectives of learning is essential to estimate the efficiency of this system.

- How? The tests and the quiz can be used to collect the opinions of the learners about their satisfied objectives by the system.

- When? This measure can be estimated at the end of the learning session.

Measurement Criterion: Activity alignment

What measures? The measure of the alignment between the activity proposed by the system and the activity which really satisfies the expectations and the needs of the learner is estimated by considering the reaction of this last one towards this activity in term of acceptance of the links of navigation and also proposed learning concepts. Accordingly, we retain both measures: Rate of navigation links accepted by stereotype and by activity and Rate of the learning concepts accepted by stereotype and by activity.

- Why? The adequacy of the proposed activities with the learner needs leads to a better learning.

- How? The possible techniques are: questionnaires, interviews and protocols think aloud.

- When? This criterion should be considered in conditions of execution or at the end of the learning session.

It present in table 2 the criteria and the measures that are generated at both Training establishment and Social network facets.

Conclusion

We have proposed in this study a measurement framework to Evaluate E-learning Based on Social Networking. This framework is compliant with layered evaluation approaches principles. The highest level of our framework is the adaptation method, since meta-adaptation influences strongly the system behaviour. The second level is interested to the Service aspect; adaptive services proposed throughout the learning process are described by means of IMS-LD standard. Finally, the lowest level of the measurement framework is interested to the learning contents. In our study we were interested on the first two levels and we considered standards such as SCORM, LOM, as well as the other research works were interested in learning contents. Both Method and Service levels are perceived according to training establishment and social network facets. Criteria and measures are generated at every level and facets by adopting the principle of alignment between meta-models as the adaptation performance was perceived as an alignment of the system to both training establishment and social network sights.

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