Modeling and Documenting Quality e-Learning Processes with eLup

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Modeling and documenting quality e-learning processes with eLup

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Abstract: The eLup software helps e-learning actors to structure and to document the quality approach adopted by their organization. The actors are able to reuse the knowledge of the European project e-Quality. They can start with the e-Quality information, adapt them to their needs and build their own model.
A user describes a quality approach with activities, roles, artifacts and workflows emphasized in his/her institution. Activities are described step by step by procedures, artifacts (required concrete inputs and produced results). Advice to implement quality approaches (quality criteria and best practices) are linked to activities and workflows. An original example presents the quality approach to index learning resources which was implemented at Montpellier II University.

Keywords: quality approach, e-learning, quality processes editor, Organizational Management of e-learning in Universities

Introduction

Quality assurance in European higher education is currently recommended by the European governments since the Bologna declaration in 1999. Since 2005, the European Network Quality Assurance has provided Standards and Guidelines for Quality Assurance in the European Higher Education Area [1]. Within the e-learning community, quality becomes a crucial question in order to face the major risks: students' failure and giving up. Quality has been also studied through e-learning technical standards.

In the e-Quality project[1], we designed and implemented the eLup editor software, dedicated to e-learning professionals. The eLup software helps the user to structure and to document the quality approach adopted by their organization. The user may start with the information delivered with the software, resulting from the knowledge gathered during the e-Quality project [2, 3, 4, 5, 6]. Then he/she adapts it to his/her needs, and adding his/her own information, build his/her own model. According to the European Quality Observatory, eLup helps the user to consider the following aspects: quality management, quality assurance and quality components [7].

The eLup editor (e-Learning Unified Process Editor) was designed and implemented to integrate and make consistent the information gathered during the project. The software was developed at Montpellier II University. The software is a model editor coupled with a database. It is implemented with Java, MySQL and XML technologies. The user interface is bilingual (English and French).

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[1] The European project e-Quality (www.e-quality-eu.org) is a MINERVA action of the SOCRATES program (110231 - CP - 1- 2003 - FR - MINERVA – M, 2003-2006).

To illustrate this article, we present an original example: the quality approach to index learning resources according to the French norm LOMFR. This example was implemented at Montpellier II University. In our opinion, it demonstrates the interest of the concepts used to model a quality approach, to facilitate the expertise transfer and to help an e-learning professional implementing effectively a quality approach.

1. How to model a quality approach ?

In common knowledge, quality measures the compliance of products with a norm (if there is one) or the expertise of the manufacturing process. More generally, quality is the set of features of products or services, in order to fulfill explicit or implicit needs. Learning services may be targeted by certified quality approaches.

A quality approach is a process which aims at taking into account the "customer" needs. It aims a continuous improvement rather than a limited measure of a gap between observed and wished state. Each process (or sub-process) is specified by activities which transform input elements into output elements (products or services). These activities make use of resources (human resources, equipment, methods…), cause costs and known risks [8]. Stracke analyzes in-depth process-oriented quality management [9].

The ISO/IEC 19796-1 quality standard is dedicated to learning, education and training [10]. Following ISO/IEC 19796-1, Pawlowski provides a method, the Quality Adaptation Model (QAM) to implement this standard in an organization [10, 11].

When describing processes this way, transparency principle "to say what will be done and to perform what is said" is easier to apply. Purposes to assess the activities part of the process are defined through quality criteria. The known risks are faced thanks to quality criteria. Quality indicators are measurement tools related to quality criteria.

In eLup, processes are described by activities, roles, artifacts and workflows. To emphasize a quality approach, activities and workflows are related to quality criteria and best practices. These concepts will be presented in section 2.

2. Modeling with eLup

The modeling language provides the following concepts: role, activity, artifact and workflow. To sum up, an activity is performed by a role. An activity requires input artifacts and produces output artifacts. Activities are structured into workflows according to the formalism of activity diagrams of UML (Unified Modeling Language) [12]. Each complex concept (activity or workflow) is related to quality features (quality criterion, indicator, commitments including measures to implement) and best practices.

2.1 To describe the processes

The first step is to describe explicitly a process. We illustrate this article with a detailed example about "indexing process", to be integrated into the Educational resources production.

Role : A role is recognized from behavior and responsibilities of a group of people who work together in an organization. We identity the following roles which take place into the Educational resources indexation, with respect to the French norm LOMFR [13, 14] (an application profile of the IEEE LOM standard [15]).

- The **librarian** looks for the relevant classifications and fills in the corresponding fields located in the "classification category" (category 9). For instance, with the application profile ([16]) used by the French Higher Education community, the Dewey classification is mandatory. The librarian also has to fill in the fields located in the "general category" (category 1).
- The **author** of the resource gives its educational characteristics (category 5 in the LOMFR), and fills in the Life Cycle Resource category (category 2). The author also describes the links with the others resources (category 7) (Fig. 1b).
- The **technical staff** fills in the technical fields associated to the resource: data size, required configuration, localization of the resources on the server (category 4).
- The **executive manager** specifies the copyright for resources (category 6), such as, a "creative commons" license [Creative commons]. S/he also validates internally meta-data (Fig. 1c) and fills in meta-metadata (category 3).
- The **repository manager** validates externally the metadata (their contents and the conformity with the technical metadata implementation)(Fig. 1c). If needed, an editorial board validates the contents before its insertion. The repository manager may complete the "meta-metadata category" (category 3).

Activity: An activity is performed by a role. It is described by steps, input and output artifacts. In Fig. 1a, the activity "Specifying rights" is performed by the executive manager who establishes the costs of resource use, the intellectual property rights, and the resource license.

Artifact: Artifacts are the documents and templates that are modified, used, created as an input or an output of an activity. We add to artifacts the tools needed to perform the activity. In Fig 1a, for example, we link licenses to the "Specifying rights" activity, such as "Creative Commons" licenses, well adapted to the educational resources.

Workflow detail: The activities may be grouped in a workflow detail in order to reach a higher level of abstraction, to better understand workflows. These activities are generally performed in parallel or in sequence. Artifacts can be used either as inputs or outputs of an activity.
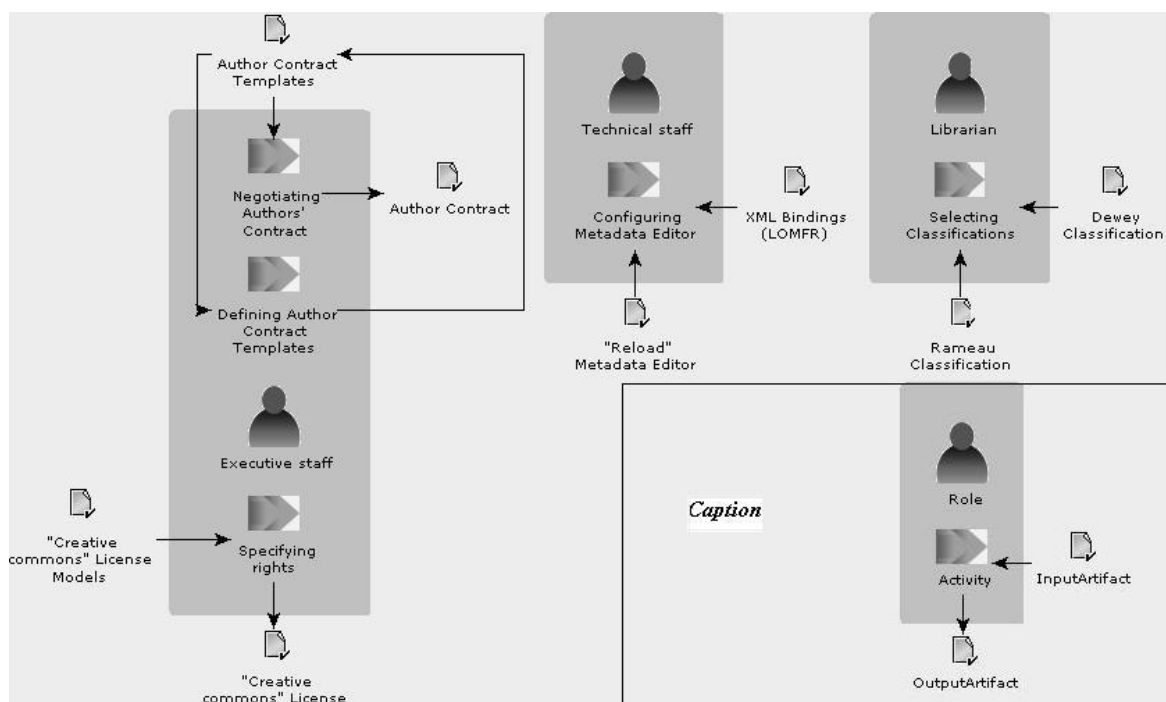

Fig. 1a: Workflow detail "Preliminary work"

In Fig 1a, the caption highlights the icons used for roles, activities and artifacts. The activities are located in the same dark area as they are performed by the same role. The direction of arrows between an activity and an artifact represents input or output links.
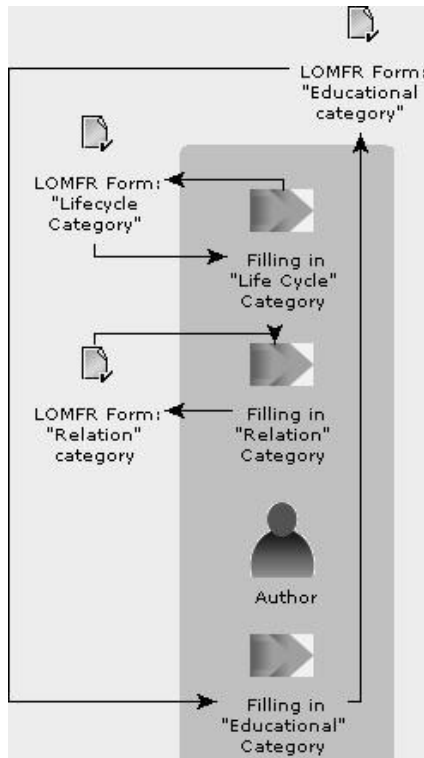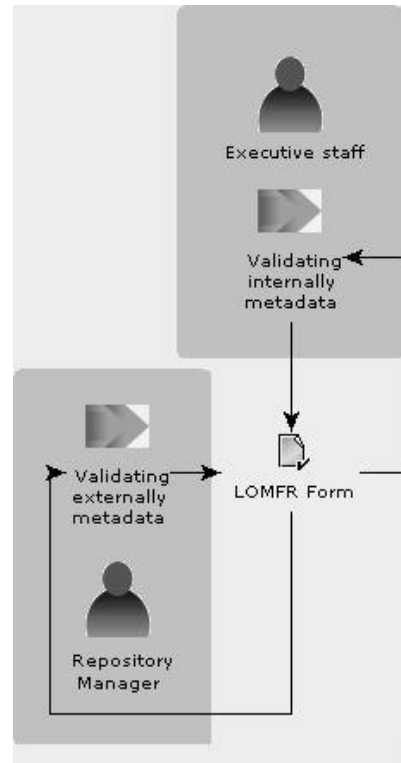

Fig. 1b: "Author's activities"

Fig. 1c: "Validating LOMFR file"

Workflow: A workflow is a sequence of activities which produces a result with an added value for each role involved in the workflow. In the workflow, sequences of activities are grouped in workflow details. These workflow details are possibly performed in parallel (Author's activities, Librarian's activities and Technical staff's activities in Fig. 2) or in sequence (Executive Manager's activities and Validation LOMFR form in Fig. 2). Some of them may be performed under conditions. A workflow is a sequence of workflow details that may be separated by tests. Using split and join nodes indicate that the workflow details may be performed in parallel.
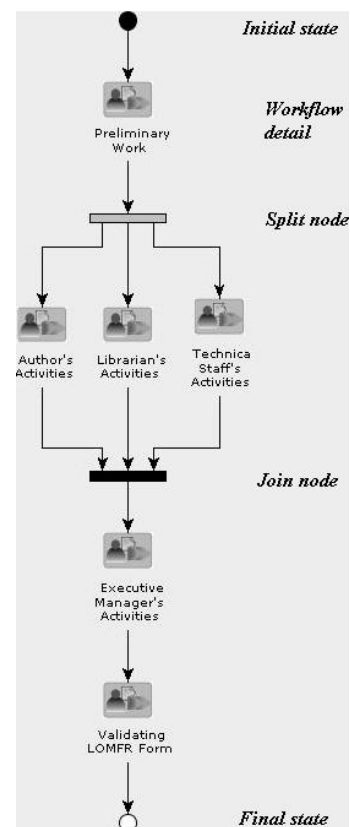

Fig. 2: "Indexing with LOMFR"

2.2 To implement quality criteria in eLup

Each entry describes a quality criterion that applies to one or a number of activities. For each Quality criterion, the charter shows a text presenting the criterion, comments, commitments to take this criterion into account, quality indicators related to the phase in the e-learning process to which they are relevant: before, during or after the learning event or no specific stage.

The organization of the following information comes from [6]. Entries to the General Quality Process Charter were imported to the eLup editor. Each entry describes a quality criterion that applies to one or a number of activities.

In eLup, the activities are the entry point for these quality criteria. The user indicates an activity; eLup retrieves the related quality criteria. So when a user learns of a composed activity, (a role, input and output artifacts and the steps), s/he can display the effective implementation of a quality approach in the quality window, linked to a quality criterion. S/he will dispose of the commitments to respect and the indicators used to measure the implementation of his/her quality approach. Fig. 3 shows a quality criterion linked to the activity "Negotiating the author's contract".

Fig. 3: A quality criterion linked to the activity "Negotiating the author's contract"

2.3 To link a best practice

In eLup, the activities, workflow details and workflows are the entry points of best practices. The user indicates an activity; eLup retrieves the related best practices. Fig. 4 shows the example of a best practice linked to a "Indexing with LOMFR" activity.

The best practices listed in the database at the end of September 2006 [4] were imported to the eLup software. The user can enter his/her own data in the quality criterion entry interface. Good/Best practices for e-learning have been studied in [17, 18, 19].

Fig. 4: A best practice linked to the workflow "Indexing with LOMFR"

2.4 Discussion

Thanks to these concepts, an internal view of the quality approach is given. eLup describes how each activity is performed. An activity is linked to a role to indicate "who is doing what". Furthermore, the activity is linked to artifacts which specify precise tools and documents useful to perform that activity.

The user can describe his/her process at different granularity levels: an activity is composed of steps; a workflow detail is composed of activities and a workflow is composed of workflow details. When linking quality criteria and best practices to these elements (activity, workflow detail and workflow), the user emphasizes concrete features directly related to carrying out the tasks involved in the processes. He/she avoids the pitfall of writing too abstract quality recommendations. So the user may place emphasis on concrete actions which improvement may be measured with quality indicators.

In [20], a user browses the quality repository according to the EQO Model. His/her query focuses mainly on the context (educational level, target group), the method features (process-oriented, product-oriented, competency oriented), the method (benchmarking, evaluation…) and the educational process. With eLup, the user browses the quality elements mainly from the processes (activities, workflow details and workflows). eLup is not designed to implement a specific quality approach, the user is guided to define concrete quality elements related to a concrete description of his/her organization. The user does not need in-depth knowledge about quality to use eLup. He/she becomes gradually aware of the quality dimension.

In addition, an external view can be supplied by a role named "quality manager" when describing his/her activities in the institution (fig. 5).

While describing the e-learning processes with eLup, the user is able to use his/her model before formalizing it with the current ISO/IEC 19796-1 standard. This approach is similar to the one recommended into the IMS Learning Design Best Practice and Implementation Guide when using UML use cases as a preliminary step [21].

QAM [10, 11] recommends different steps during the model adaptation phases: identify the actors responsible for quality, identify the relevant processes (in the ISO/IEC 19796-1 reference model), set quality objectives for each process, identify instruments and methods to achieve the objectives, choose metrics and indicators to assess and measure the success. With eLup, the steps are similar but the eLup method is mainly bottom-up. The different steps are: identify roles, activities, artifacts, aggregate activities into workflow detail then workflow details into workflow, link activities, workflow detail and workflow to quality criteria and best practices.
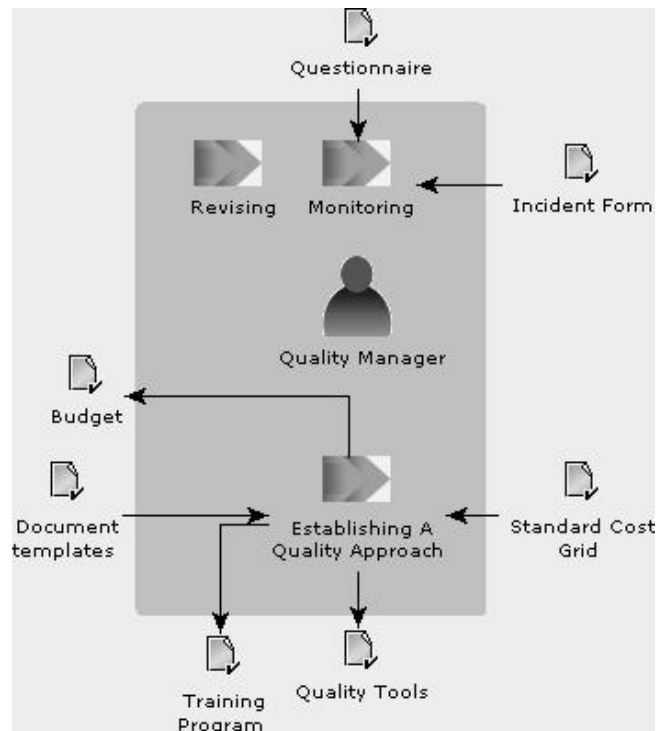

Fig. 5: "Quality manager's activities"

3. Conclusion

During the e-Quality project [22], the eLup software was implemented at the Montpellier II University. Thanks to eLup, an e-learning professional may structure and document the quality approach of his/her organization, helped by the knowledge modeled by the e-Quality consortium. The user can start with these information and build his/her own quality model. Insofar copyright issues allows it, it would be helpful to update the database with additional public information (examples from the E-XCELLENCE project [23], ISO/IEC 19796-1 criteria and processes list…).

On the e-Quality website[2], the reader may download the software, the user manual and the conceptual guide. We hope that this tool will be of a great benefit for the e-learning community.

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