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TENCompetence Assessment Model and Related Tools for Non Traditional Methods of Assessment

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Abstract

There is no doubt that one of the main reasons for the low popularity of so called de-facto standards in learning environments is their complexity. One way of managing that complexity is to use the rule “divide and conquer”. This is the reason for making small tools supporting work of precisely targeted audiences like assessment designers, students, authors, stakeholders, decision makers and so on. The main idea behind TENCompetence Assessment Model is to be used as integration point of such tools making possible reusability of assessment artefacts. In this paper we present the TENCompetence Assessment Model and discuss the development of a set of software tools for non traditional competence development, which can be used to demonstrate how the model can be used for the implementation of different assessment methods. These tools play the role of the proof-of-concept tools in order to evaluate the usefulness of the proposed model and its specification. Their role is to evaluate and verify or reject the TENCompetence assessment model.

Keywords: Assessment model, lifelong competence development, portfolio assessment, 360 degree feedback

1. Introduction

In today's global world, the transfer of competence, information and knowledge is critically important. It is hard to get an overview of all possibilities of lifelong competence development and the new learning technologies that are available.

TENCompetence project aims to develop and integrate new pedagogical and organisational models for lifelong competence development aiming to build an European 'Infrastructure' based on integrated open source components [1].

One of the aims of the project is to offer new assessment methodology for competences [3], through analysis of the modern assessment methods, selection of

proper models and tools and design of basic assessment activities. As a result of the research in this direction so far, the TENCompetence Assessment Model was developed. We present in this paper the main components of this model, and give examples how the model can be used in practice. For this reason several proof-of-concept software tools were designed and developed, aiming to show how we can apply the TENCompetence Assessment Model for the implementation of different assessment methods like portfolio assessment, peer assessment and 360 degree feedback.

2. TenCompetence Assessment Model

The TENCCompetence Assessment Model aims to cover the life-cycle of the assessment process. It is described as a formal specification using UML diagrams. The model aims to give the possibility to implement various assessment techniques

which allow development and design of assessments that are specific to competence development [2]. It's very important, when applying the model, to make analysis and decide which of these assessment techniques are appropriate to assess the necessary qualities and attributes required for the specific role of the competence.

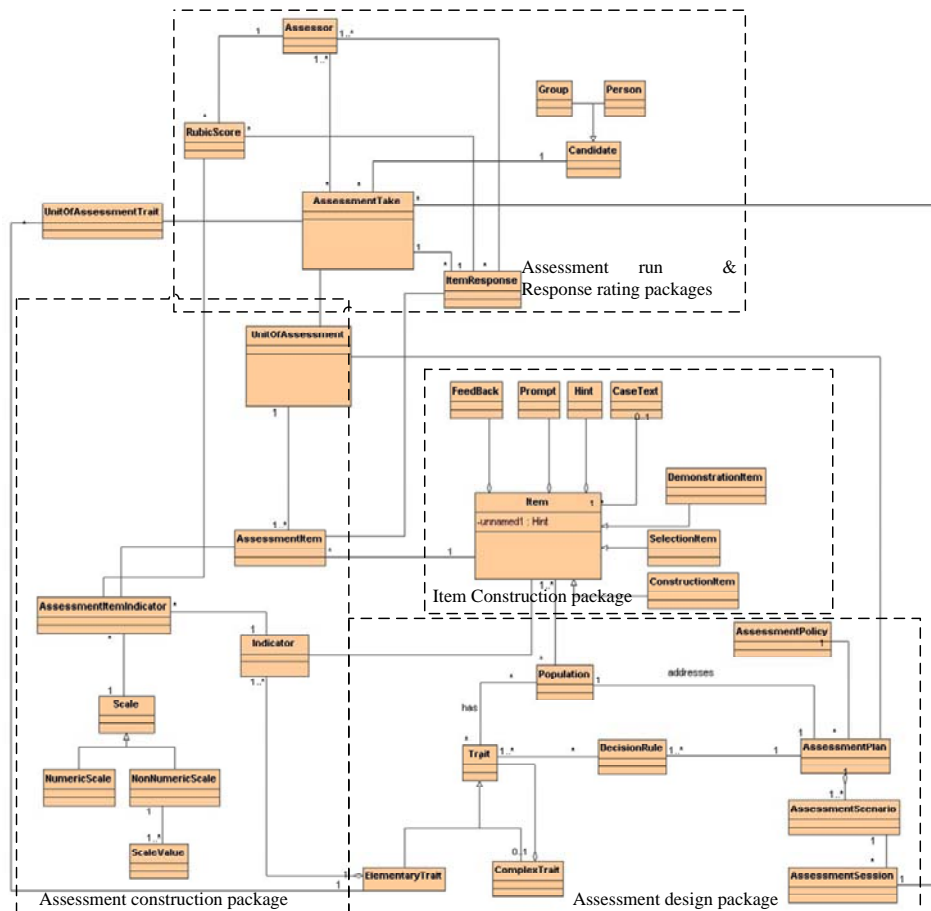


Fig. 1: The TENCCompetence Assessment Model

According to the *Assessment model* there are five main packages which describe all the functionalities of the assessment process (figure 1):

- Assessment design
- Item construction
- Assessment construction
- Assessment run
- Response rating

In the *Assessment Design* phase (or package) it is important to define Assessment Plan which is a complex object containing different factors and guidelines

from the pedagogical model of the assessment. The *Assessment Plan* focuses on specific traits of the individual person(s) or group(s) which are assigned to it, by using the decision rule as well as specific assessment policy which has to be followed.

In core of the *Item Construction* package stays the *Item* which could be of different type, like QTI Item or demonstration item. Every item has one or more Indicator(s) assigned. For extending

it's functionality, *Hint* and *Feedback* are included.

In the *Assessment Construction* package the output is the *Unit of Assessment* which consists of one or more Items according to the Assessment Plan. It defines the type and value of the Scale which specifies how the candidate's response has to be translated into a score.

The *Assessment Run* package is the process where the candidate undertakes an assessment and his/her answers are recorded in the *ItemResponse* for every single Item. There are two main objects: *AssessmentTake* and *ItemResponse*.

In the *Response Processing* package the main object is Assessor. It is responsible for two major steps:

- transforming the candidate's response (Item Response) into a *rubric score* using the defined transformation rules
- calculating the *Assessment Indicator Score* (for each candidate – individual person or a group)

3. Assessment Model, Tools and Specifications

The TENCompetence assessment model is a simplified version of the OUNL/CITO assessment model [4]. The main reason for simplifying OUNL/CITO assessment model for use in the TENCompetence is that the

TENCompetence Domain Model [1] provides a larger framework into which the assessment model must be inserted. Some duplication of concepts and functions in the two separate models was identified, which force us to remove all these duplicate objects from the OUNL/CITO model.

The main difference (and consequence of the squeezing the OUNL – CITO model to fit into the TENCompetence domain model) is that we remove one additional stage (Decision making), which is not part of the assessment process itself, but rather of the assessment follow-up (what decisions we can take regarding further competence development of the person assessed). More technical discussion on how we come up with the TENCompetence model can be found in [8].

As a result, we define the TENCompetence Assessment model using UML diagrams. But in order to make this model able to be implemented in the real setting, we needed also to develop a data-centric specification of the model, using XML. This specification simplified the process of developing and interconnecting different tools, aiming to demonstrate the application of the model for developing the real-life implementations of various existing assessment methods. This is shown on Fig 2.

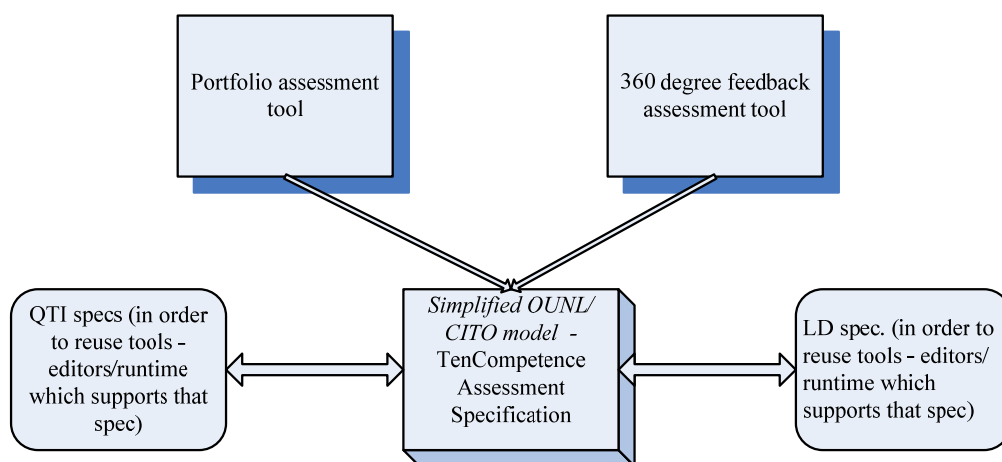


Figure 2: Relation between TENCompetence assessment model, QTI&LD specification and first proof-of-concept-tools

Table 1 Mapping between tools and specifications:

| Tool name | TenC Assessment Spec | QTI | LD |
|------------------------------|----------------------|--------------------|-------------------|
| 1. A360 editor/runtime | export/import | Export by TenC2Qti | Export by TenC2LD |
| 2. Portfolio assessment tool | export/import | Export by TenC2Qti | Export by TenC2LD |
| 3. TenC2QTI tool/service | import | export | LD2QTI |
| 4. TenC2LD tool/service | import | QTI2LD | export |

Mapping between different tools and specifications is displayed above in table 1. The main principle behind the tool-to-specification matrix is that the TENCompetence assessment specification can store and/or import QTI and LD specifications, but cannot create or do interpretation of these (or any other) specifications. This fact assures that format of external specifications will not be broken by the tools developed.

4. Current state of the tools

The purposes of these proof-of-concept tools are to prove and validate the TENCompetence model, and to show how it can be used to implement different assessment methods. We choose to apply the model for two such methods: 360 degree feedback and portfolio assessment.

The first tool is called Assessment Authoring editor.

It covers the following three phases of TENCompetence Assessment Model: Assessment design, Item construction and Assessment construction. This editor was used in the implementation of the 360 degree feedback assessment method. This method is used to measure an individual's performance by contrasting people's own self-assessment with the assessment done by other people. This assessment method uses questionnaires, which are developed and adapted for each individual participant. Each participant has to fill her/his own questionnaire, all filled questionnaires are compiled and analysed together, and after

that assessment report is prepared. The figure 3 presents the screenshot of the tool.

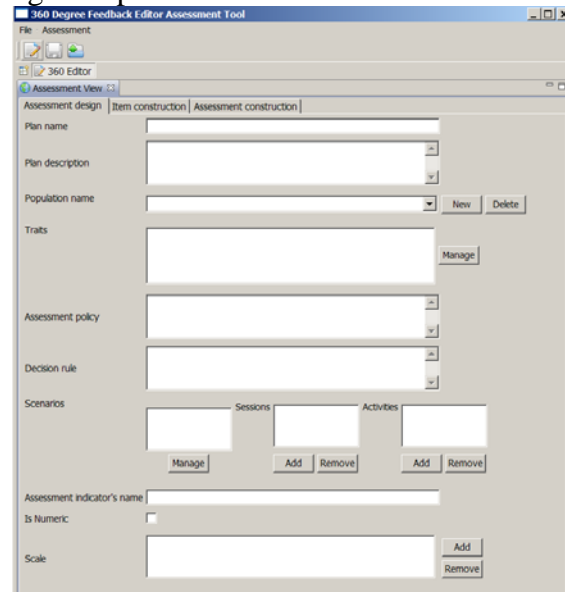


Fig. 3: Screenshot of 360 degree feedback tool

The second tool is called Run-time Assessment tool. It was used to implement Portfolio assessment method. The tool offers functionalities like portfolio assessment, portfolio editing, portfolio export/import, media player. There are seven sections in the portfolio structure: degrees, informal learning, competence/skills, work samples, experiences, anecdote observation and goals.

Both tools were developed as a Java Eclipse plug-ins (fig. 4). They were tested in the real settings and prove that the model is well designed and useful for using to implement different specific competence assessment methods [7].

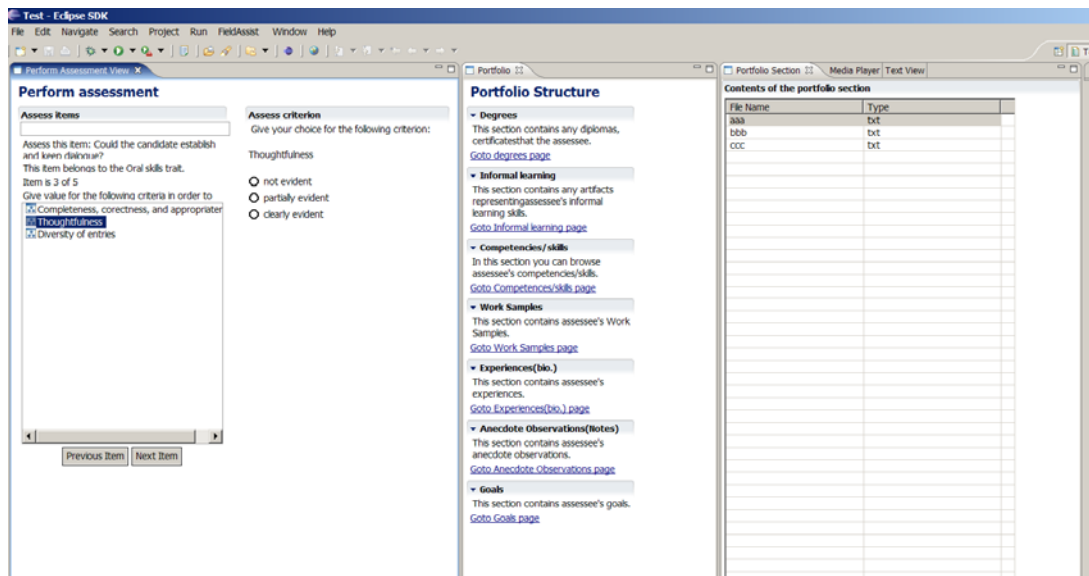


Fig. 4: Screenshot of portfolio assessment tool

5. CONCLUSIONS AND NEXT STEPS

The main point of this paper was to present the new assessment model and to show how, using proof-of-concept tools to work with this assessment model, we can apply it to implement different competence assessment methods.

The model describes the assessment process as a sequence of five stages, based on OUNL/CITO model. The main improvement is based on adding additional data-centric model, using XML. The model was validated using proof-of-concept tools, developed to show how we can use the model to implement different assessment methods, and how we can easily import and/or export assessment data between different tools and using different methods.

The completed assessment tools based on the current version of the TENCompetence Assessment Model provide a potential for further comparison with the assessment tools based on using different models and specifications, and namely IMS LD and QTI [5, 6]. This will help to establish the degree to which it is possible to use a sophisticated mapping mechanism to reduce the complexity of the modelling task to be carried out by the author of the assessment.

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