

# ADVISOR<sup>®</sup> – Meta-Modeling Tool for Individual Instructional Design

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## **Abstract:**

*Instructional design is one of the main challenges today's teachers face when giving up classical classroom-based teaching for ICT-supported education, for e-learning based teaching. Not only the didactical methods used earlier have to be changed, the teaching process is different due to new forms of communication among virtual groups. Beside these aspects, further problems during this transformation are derived from the question how to reuse lecture notes and slides of the classroom teaching in order to be able to provide them in a multimedia-proper way through a Learning Management System. As the answer to these upcoming questions this paper introduces a meta-modeling platform called ADVISOR<sup>®</sup> [1,3].*

## **1 Introduction**

The situation teachers face today might be titled as “the stone age of e-learning”. Authoring of multimedia learning objects needs high expert knowledge and it means high expenditures and a small group of teachers with according capabilities. After having created the learning objects there is a huge number of Learning Management Systems that allow students to have access to those learning objects.

But what happens in between? Teachers must feed the Learning Management Systems manually, then designing the course structure within the LMS, this calls for sophisticated technical knowledge. The didactical aspects are put behind the technical limitations of such systems.

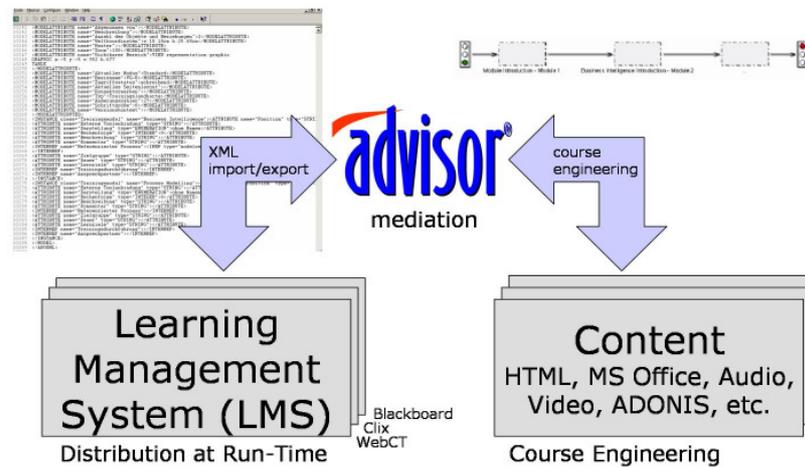
This situation needs a mediation tool, that supports teachers in following terms:

- Easy, graphical design of courses, using didactical templates
- Easy management of learning objects
- Easy reuse of learning objects
- Standardized export of courses for easy provision within a Learning Management System
- Evaluation of designed courses in terms of times and costs for quality assurance

In the following chapters first the tool ADVISOR<sup>®</sup> will be introduced. A procedure model for courseware engineering then highlights the teacher support in this field. Finally three different methods implemented in ADVISOR<sup>®</sup> will show the practical usage before closing with a conclusion and general outlook.

## 2 ADVISOR<sup>®</sup>

In order to provide these functionalities ADVISOR<sup>®</sup> was implemented, as shown in Figure 1:

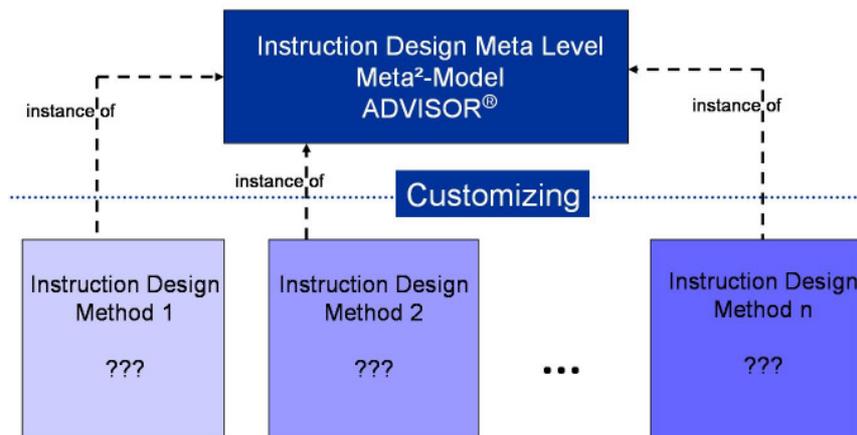


**Figure 1:** ADVISOR<sup>®</sup> as mediator between Content and LMS

Since instructional design or course engineering, although based on very strict theories, allows very individual implementation, no one method can be defined that suits all teachers needs. ADVISOR<sup>®</sup> therefore has been implemented as a method independent tool, that first of all allows the design of an individual course engineering method.

ADVISOR<sup>®</sup> was an Esprit project in the field of Learning and Training 1998 - 2000. It was co-ordinated by BOC Ltd. and supported by the European Commission. It involved several European insurance and consulting companies and the University of Heidelberg. The meta platform is still in development at the University of Vienna and BOC Ltd..

ADVISOR<sup>®</sup>'s main feature is its method independence. This means that, starting from the ADVISOR<sup>®</sup> meta tool level arbitrary instructional modeling tools can be derived. Such tools are represented by so-called method libraries, which allow particularly the definition of arbitrary modeling languages without any programming effort. [5] Figure 2 sketches the idea of the meta level tool:



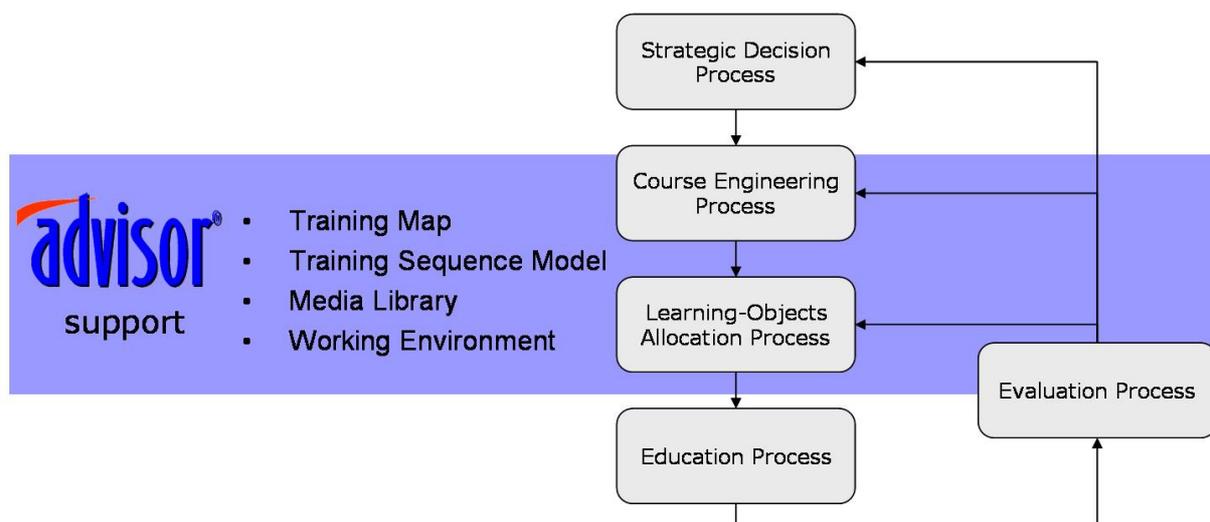
**Figure 2:** ADVISOR<sup>®</sup> as method independent meta-level tool

### 3 Course Engineering – A Procedure Model

Course engineering can be compared to software engineering in order to receive high quality courses and here also different procedure models might be applied. A general model was developed at the University of Vienna that contains following steps:

- Strategic Decision Process
  - At this stage the decision about which courses are to be taught are made.
- Course Engineering Process
  - This level is the instructional and didactical design of courses with its subunits like, modules, lessons, etc. Here not only the teaching process is to be defined but the social interaction like group-works, chats, online assignments or real life meetings are to be conceptualized.
- Learning-Objects Allocation Process
  - After having the general structure of courses, existing learning objects are to be allocated and referenced to the according lessons of a course.
- Education Process
  - The education process covers the execution of courses.
- Evaluation Process
  - Evaluation is always necessary in order to assure quality of the course. For the evaluation data should be obtained during the education process about times, costs, quality of materials, feedback of students. Based on the results of the evaluation stage, either the strategic decision or the course engineering might be run again, in order to allow continuous improvement of courses.

Figure 3 gives an overview of the procedure model and shows which stages are supported by ADVISOR®:



**Figure 3:** The Course Engineering Procedure Model and its support by ADVISOR®

The main focus of ADVISOR<sup>®</sup> is the provision of teachers with the functionality of support at creating new didactical models for e-learning, in order to realize the new aspects of information and communication technologies within instructional design.

Based on the idea of Business Process Re-Engineering ADVISOR<sup>®</sup>'s main functionality is to provide a platform for the realization of any modeling methodology in order to graphically design courses. It can be utilized as a professional management tool for designing and optimizing training processes and for managing training materials easily. [7]

The creation of new instructional processes is supported by a graphical modeling interface which allows teachers to represent different educational scenarios. Further the organizational model of any educational institution can be defined and referred to in different parts of the teaching process. Nevertheless ADVISOR<sup>®</sup> is regarded as a meta-modeling platform which can be easily extended by further functionalities.

This means that individual course engineering methods might be implemented at the ADVISOR<sup>®</sup> platform by

- defining models of different granularities like training maps and training sequence models,
- creating a content pool for teaching materials and learning objects,
- designing a graphical model for the working environment,
- creating further functionalities based on individual needs.

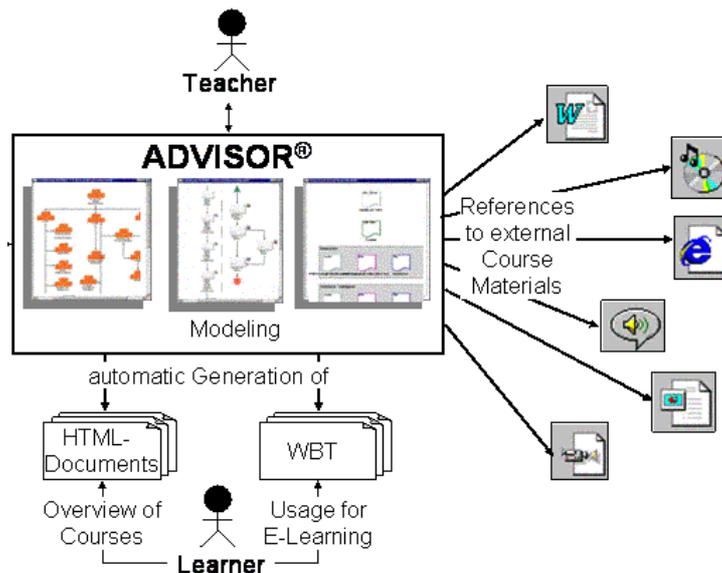
ADVISOR<sup>®</sup> also provides basic simulation algorithms that allow the evaluation of courses regarding times and costs. Export interface is also included in the platform in order to create HTML, XML and RTF documents for the provision of the teaching materials via a Learning Management System or within classical classroom teaching.

## 4 Teacher Support

ADVISOR<sup>®</sup> provides teachers the possibility to create model types with following functionalities:

- General overview of all courses provided by the educational institutions [7]
- Structuring the courses by creating sequences of modules, lectures and learning objects [4]
- Content management for the reusability of teaching materials
- Presenting and managing the human resources of the educational institutions by providing a organizational model [7]
- Design and definition of skills for students with respect to the visited course and for teachers with respect to the taught materials
- Linkage between these models in order to run simulation according to times and costs of the courses [2,6]
- Standard format exporting for the easy creation of web-based training

These basic functionalities allow teachers to create individual instructional design methods in order to easily meet the requirements of e-learning. Figure 4 shows a general overview of these basic functionalities of ADVISOR<sup>®</sup> :

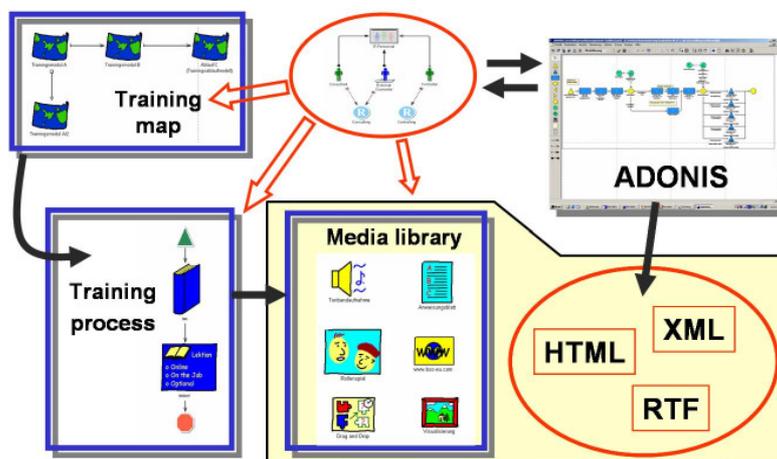


**Figure 4:** ADVISOR® and its functionalities

## 5 Methods in ADVISOR®

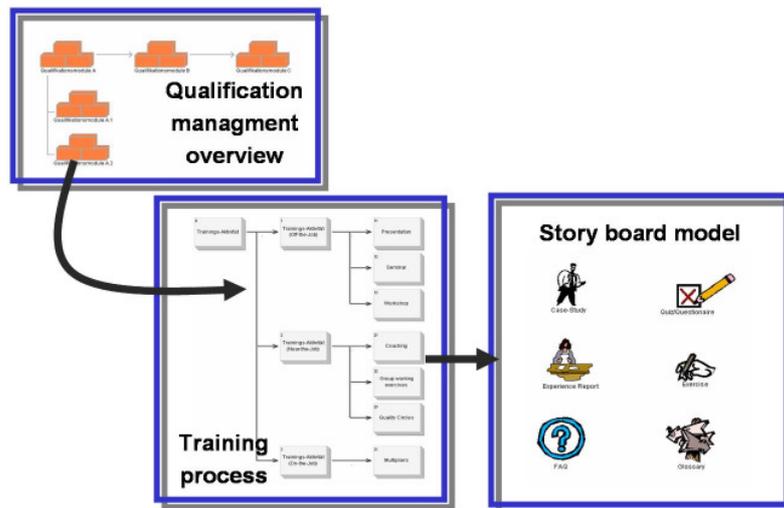
In the following different already implemented course engineering methods will be shortly introduced in order to show up the different possibilities of the meta level tool ADVISOR®.

The first implemented method was realized during the EU-project 1998-2000. A ready-to-use management toolkit for the industry was created, providing several basic functionalities. The main focus of this method was the provision of teaching materials based on the business processes of a company using a process management tool like ADONIS® [3]. Based on the business processes ADVISOR® provides the company with HTML, XML or RTF documents in order to support new employees by learning on the job via intranet. Figure 5 gives an overview of the interdependencies between the implemented model types Training Map, Training Process, Media Library and the Working Environment Model of the Company that uses ADONIS® for business process modeling:



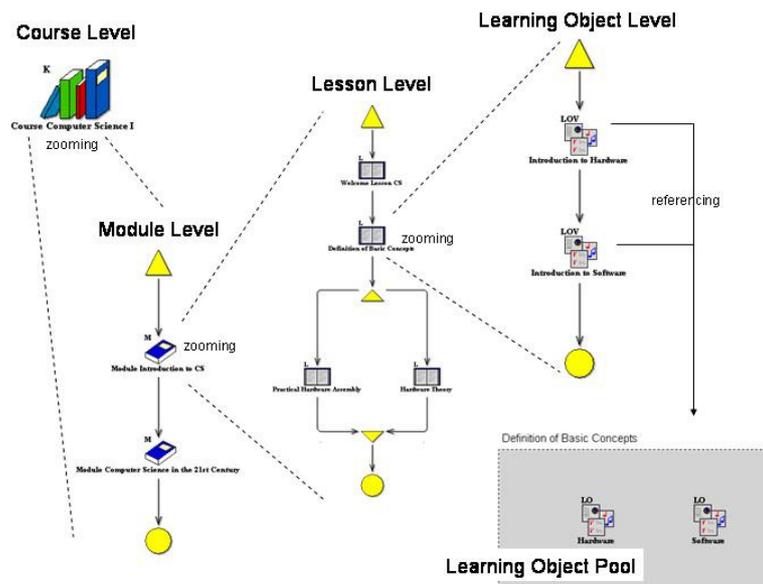
**Figure 5:** The First Method Implemented in ADVISOR®

During an internal project of the University of Vienna in cooperation with BOC Ltd., the first method for the educational industry was implemented. Here starting with a Qualification Management Overview model a map of all provided courses of a higher educational institute and interdependencies between them can be defined. Going into deeper detail so called Training Processes can be defined, in order to describe what happens in one course. The Training Processes consist of steps that are detailed defined within a Story Board Model in order to allow didactical instructional design, as shown in Figure 6:



**Figure 6:** Instructional Design Method for the Educational Industry

The newest implementation is within the eduBITE [8] project that is funded by the federal ministry for Education, Science and Culture (bm:bwk). Within this project a sophisticated instructional design method was implemented in ADVISOR<sup>®</sup>. This method consists of 4 levels, the Course, the Module, the Lesson and the Learning Object Level and a Learning Object Pool as shown in Figure 7.



**Figure 7:** The eduWEAVER method of the project eduBITE

## 6 Conclusio

To sum up it can be said that ADVISOR<sup>®</sup>, as an educational management tool, covers the needs of the whole educational industry. With it's functionalities instructional processes can be easily modeled and teaching material can be professionally managed. From existing training materials computer based or distance learning courses can be extracted and designed.

ADVISOR<sup>®</sup>'s emphasized flexibility derives from the meta-modeling possibility, that allows to develop different methods for course engineering.

The target group of ADVISOR<sup>®</sup> are independent training consultants, educational institutions like universities, virtual schools, and also the human resource development department of large companies in any industry, that provide in-company training.

### References:

- [1] ADVISOR: <http://www.boc-eu.com/advisor/start.html>
- [2] Bajnai, Judit; Lischka, Johannes: Simulation for E-Learning Engineering, to appear in the Proceedings of ED-MEDIA 2004, Switzerland
- [3] BOC Information Technologies Ltd., <http://www.boc-eu.com>
- [4] Cisco Systems, Inc., Reusable Learning Object Strategy, Definition, Creation Process and Guidelines for Building, Version 3.1, April 22, 2000
- [5] Junginger, Stefan; Rauch, Tobias; Kühn, Harald: The ADONIS – MQSeries Workflow Coupling – Integrated Design of Business Processes and Executable Workflows, appeared in Proceedings of the 8th European Concurrent Engineering Conference 2001 (ECEC'2001), Valencia, Spain, pp. 111-118
- [6] Junginger, Stefan; Kühn, Harald; Bartl, Florian; Herbst, Joachim: "Evaluation of financial service organizations with the ADONIS simulation agents", Proceedings of the 10th European Simulation Symposium (ESS 98), 1998
- [7] Karagiannis, Dimitris; Bajnai, Judit: ADVISOR<sup>®</sup> An Educational Management Tool, submitted to the Symposium Towards the New Education Society, Zvolen, Slovakia, April 2001
- [8] The eduBITE Project <http://www.edubite.ac.at>

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