# Production engineering for video based e- and m-learning content

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ABSTRACT: The production of multimedia e-learning content usually requires considerable working time and know how. An interdisciplinary project team at two Berlin Universities has developed a cost effective production process with the objective of creating professional rich media learning units integrating multiple distribution channels. The presentation will give an overview of the process engineering and a software development project in the area of authoring and transforming e-learning and m-learning content. It will especially focus on the part of efficiency-driven video production for two e-learning courses at an international virtual university.

## INTRODUCTION

The main questions in developing video based content for learning (or educational) presentations involve costs, efficiency and quality. This article describes the results of improving the production process for video authoring taking the above parameters into account.

Figure 1: Videobased e-learning unit from elective course »Knowledge Management« at VGU.

The following questions arise:

- How can producers of learning material design the global production process under the restrictions of limited resources and inexperienced staff members?
- How is the video production, post production, authoring and distribution for creating professional telecast content organized?
- How can a low cost recording studio for the production of video based learning content be equipped and configured?
- How is it possible with process definitions and standardized sequences to obtain the greatest possible availability and independence from limited disposable staff and personnel fluctuation?
- How can the MOCCA-Project help to quickly shorten the production process?

## CONTENT PRODUCTION

In our article (1) we describe a generic procedural model for the production of reusable and standard-compliant E Learning offerings developed for the Virtual Global University [2], the PELO-Model. It provides a procedural framework for the integration of several micro process layers which support nearly all parts of learning material production. Commencing from this Meta Model the production of professional SCORM compliant learning units based on effective PowerPoint and Open Office authoring have been developed since 2003. The distribution of material is supported by a proprietary developed software application, which is able to transform presentations into SCORM packages. It uses a small set of attribute tags to parameterize the transformation for example with template addition and media asset integration. An online version of the 2006 transformer and documentation is available from MOCCA project [3].

## COMPONENT BASED STRUCTURES AND THE SHORT CLIP CONCEPT

In order to obtain well structured material technical, didactical and process-oriented points of view are needed.
To make the production for learning elements easier and more effective and to achieve easy access to the learning material it became more and more useful from all three considerations that the coursework could be divided into small parts of presentation. Therefore a »component based approach« which is oriented at a single slide size was designed. As a result a Learning module is segmented into 30 to 60 learning elements, which can be easily rearranged, replaced, reused or changed.
The pattern and length of media assets follows this granular structure. In the case of video assets the production of »Short clips« matches the »component based approach« nicely, so that

video objects of 1 to 3 minutes length are applicable to the concept. A number of advantages are associated with the »Short Clip Concept«:

- The production time for small units of video becomes very short
- Postproduction for the short video clips is easier and quicker then for long movies.
- The lay speakers in learning videos have to master a less complexity in rhetoric and cognition. Speaking on a video clip – especially with a teleprompter – is easier to learn with short self-contained scripts.
- An inexperienced production crew is easier to coach for short shots.
- Getting staff involved for short production sessions is a smaller problem than for longer ones.
- Updating or reproducing video content for a small part of the material is easy.
- The audience is directly accessible and more involved with short video clips. The material is usually more interesting for the consumer.
- Small content elements are more flexible than huge learning monoliths.
- Short and compact video presentations save bandwidth

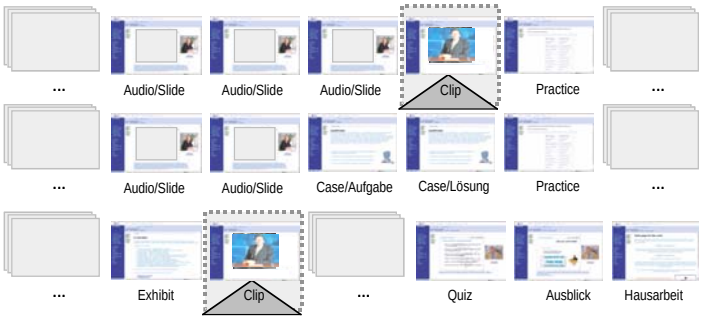


Figure 2: Scheme of a component based course structure

In most learning environments video based content is not a must. The visual representation of a lecturer on video usually gets no more attention after 3 minutes. At different surveys video offerings were rated very useful to achieve a personal involvement in the learning context and environment. Acceptable quality yields motivation. On the other hand audio based information was ranked as the most important channel within e-learning context. The conclusion is that short and compact video clips are not only easier to produce but effective in a didactic context as well. A balanced media mixture of Short video clips, audio- and still visual information was created for our referred online-courses at VGU. This strategy meets the needs of process design in the case of video production with the »Short clip concept«.

## VIDEO PRODUCTION SCENARIOS

For the video production process a low cost blue screen studio, based on inexpensive DV-technology, lighting technology and post production facilities was designed and established by our two Universities.
Three years of experience resulted in a simple and efficiency-driven set of six standardized shooting scenarios, process models, and supporting documents, such as checklists and forms. The processing concept ensures diversity while simultaneously enabling the management of repeatable, inexpensive, fast and hence efficient processes with high quality outputs:

- The Shooting Scenario »Desk Presenter« plays the part of a commentator who also takes on the role of a lecturing coach for the learner.
- The slightly more complex scenarios »Desk Interview« and »Exterior Interview« integrate external experts,
- The complex scenario »Meeting Interview« re-enacts a practical corporate situation (for example a consulting meeting), and finally
- The scenarios »Workplace Study« and »Screen Presenter« focus on the study of work tasks and the presentation of software applications.

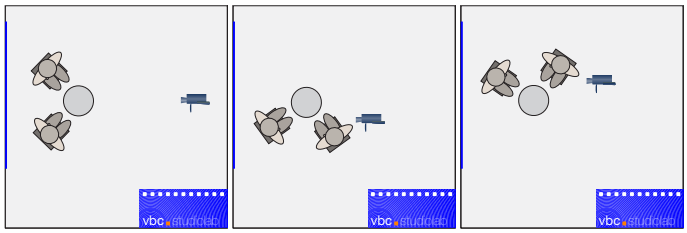

Figure 3: Layout of »Desk Interview« scenario

The visual representation of the video elements in learning environments is designed to meet the quality requirements and visual impression requirements of telecasts.
To develop a cost minimized production set the vbc.studiolab was equipped with readily available consumer technology. In 2005 a budget of 6.000 € was needed to configure a blue screen studio with chroma key color, camcorder, tripod, lightning, video monitor, teleprompter, stand, microphone, audio recorder, current supply, cable, and clapboard. A hardware list is available at [3].

Figure 4: »Desk presenter« szenario at vbc.studiolab

## PRODUCTION PROCESS

The embedded process part of short clip video production in the environment of e-learning production is shown at figure 5.
The context for every video sequence results from a storyboard of the E-Learning application. The most important part of the screenplay is the text script, which can be developed from regular learning material like PowerPoint slides, textbooks or suitable pictures. The text script has to be prepared for speaking from the teleprompter application (Figure 6). Because of standardization of the shooting scenarios the assembly of the studio, props, background, lighting, audio- and video-equipment is quite efficient. For an ideal preparation a 180

point checklist, an installation plan and a process documentation were created.

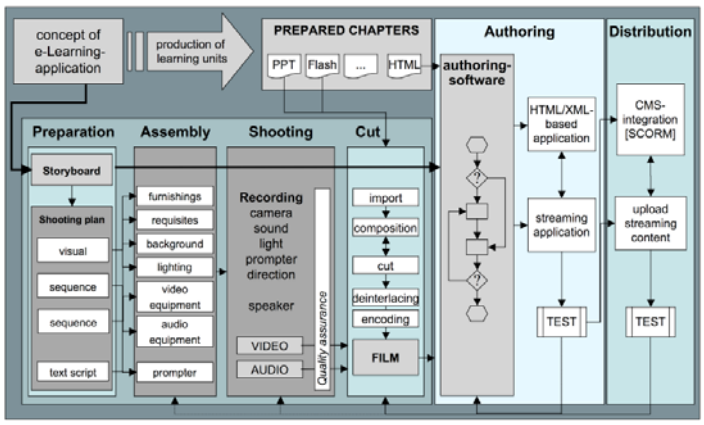

Figure 5: Video production as a part of e-learning material production process

The shooting efficiency mostly depends most on the experience of the speaker. Usually a camera training of at least two hours is necessary to prepare a lecturer for speaking in a Desk Presenter scenario with the help of a teleprompter under studio conditions to obtain satisfying output. To process the shooting a checklist helps to work with less experienced team members. To get the best performance for the whole production process a shooting protocol is needed. All required information such as media information, time codes, quality of each take of a scene, etc. can be filled into this form for a quick Cut. The director of shooting is responsible for having enough material with sufficient quality stored in appropriate media after each session.

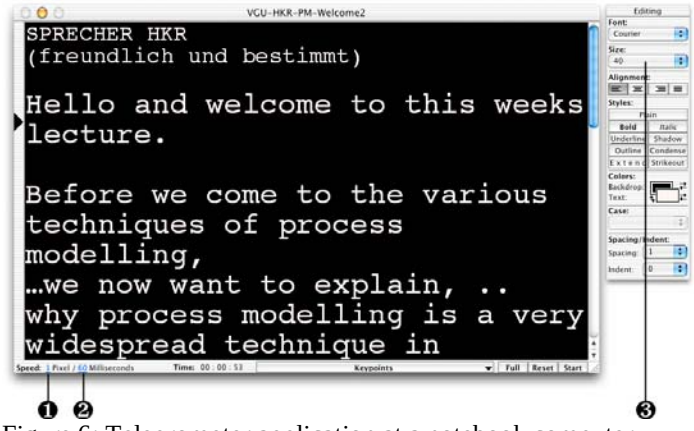

Figure 6: Teleprompter application at a notebook computer

The combining of the recorded material with other media elements like backgrounds, pictures, texts, graphics and other recorded scenes, the production of different video versions depending on device specification, delivery codes and bandwidth of the consumer are the main subjects of the cutting process. It especially has to consider the demands of specific mobile presentation environments. Thus different versions of layout – for better text readability – and coding are created if the mobile channels are required.
If the material was produced for TV broadcast the immediate next step will be the distribution. In other cases the material has to be integrated into accompanying media context like HTML, Flash or DVD. A specific Multimedia Authoring Application is used for this integration purpose and for adding functionality like navigation, computation, user feedback and so on.
Testing is an essential working step before and again after distribution of the final learning product. Because of the complexity and the involvement of different persons in the production process it is not unusual to repeat some steps depending on technical mishaps or quality problems. For the whole part of post processing a working time from 2 to 5 times of shooting time was measured. In extremely elaborate scenarios like »Meeting Interview« the time expended rises to a factor of 20 times. Process documentations, checklists, shooting protocols, media protocol templates, a lot of pointers and examples are available at [4].

## SOFTWARE SUPPORTED TRANSFORMATION

In order to foster asset integration into the creating process with the target of a simultaneous production and distribution of Learning Objects, Podcast-, Vodcast-, and other content formats the Multimedia Content Transformation Project MOCCA is working on a variety of plug-ins for enhancing the transformation of e-learning material. The MOCCA transformer will be enabled to rapidly shorten the process of SCORM development. The first release for the e- and m-learning domain is still under construction and will be finalized at the end of 2006.
The first idea in developing tools for this process improvement was to use PowerPoint or Open Office for authoring the complete online content with the addition of supplementary information on Meta Tags in the commentary field of each slide for instance, to reference templates and time-based media components. At one working step the XML transformation pipeline converts the material into the required presentation format, for instance a SCORM Package. This idea was realized first with the vbc.content.transformer application described at [1] in 2003. Since April 2005 a new online content transformer was released as a public transformation web service [5]. It converts Open Office presentations into SCORM packages while obtaining vector representation of graphical content in SVG frames. Before using the transformer with PowerPoint files, a simple import and save procedure with Open Office is required. Because of the Microsoft commitment to support the Open Document Format until 2007 [6] the use of our current Online Transformer without the Open Office application also becomes possible.

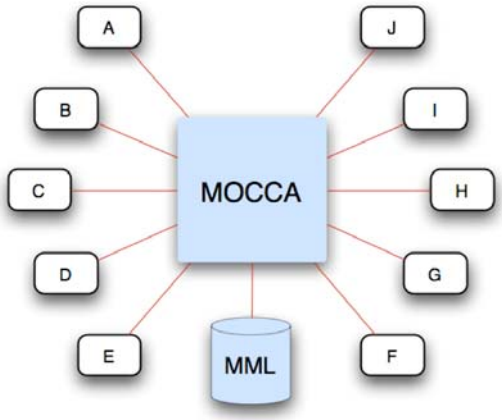

Figure 7: Generic content transformation with MOCCA

The current working package is the integration of Open Office and PowerPoint handling into the MOCCA java framework to realize a one-step-transformation process in a desktop application. Another objective is to integrate more time based media functions into the framework to support the production of RSS Podcast as a distribution channel for Mobile Learning Content. The idea is to encourage a lecturer to produce and publish learning material from his favourite presenter

application and then distribute into different channels with minimal effort. That could be HTML, PDF, Podcast, Vodcast and Flash content. Podcast production is described at the following chapter below about the case study.
The integration of e-learning content into the MOCCA framework has a lot of advantages exceeding the domain of e-learning production. Following the principles of Generic Content Transformation (GCT) authored learning content is transformed into a format independent XML representation, which is supported at MOCCA for a wide variety of authored project data from very different multimedia authoring domains. The collection of these different sources into one standard format at unique repositories opens a new quality of data transparency at the enterprise level. It helps to manage the lifecycle of authored multimedia content which is today usually stored in proprietary file formats at different archives and is dead closed information for most staff members at a company or institution. The way of integrating different connected media types enables synergistic effects in the fields of archiving and information retrieval, persistence and compliance, shared production, parallel media distribution, mining old media content, change management, user empowerment, and process optimization. The described concept of GCT was first implemented with a transforming and authoring solution for interactive TV content (MHP) and is now continued in the field of e- and m-learning.

## CASE STUDY PODCAST LEARNING

As an example how these results could also encourage the support of innovative and novel content output formats, Mobile Learning Media production has been examined. The objective is to establish a simple production process to complement a physical academic lecture with a mobile podcast distribution. The latest survey about »Podcasting as a distribution channel for M-Learning« [7] from October 2005 to February 2006 at the University of Applied Sciences FHTW Berlin confirmed that significant value can be added by the presentation of lectures with audio and slide pictures in this way. However, the current production process requires still too much manual work, especially when teachers produce it themselves. The survey identified that a wide variety of students use different MP3 players and applications at their computers. For a maximum of acceptance it will be necessary to distribute at least two variants of podcasts: a segmented MP3 file with the linked slides collected with an RSS XML file and a version of M4A, where the slides and the audio elements are connected in an MPEG4 container.

Figure 8: M-learning Vodcast lecture at iPod

The support of podcasts with video elements (Vodcasts) added from the video production process can be easily realized with MP4 Files. With the integration of audio, video and slides in the MOCCA framework and the addition of a podcast export, it should be possible to decrease production time by 30 to 50 percent.

## ACKNOWLEDGEMENTS

This work was supported by German Federation of Industrial Cooperative Research Associations »Otto von Guericke« (AiF) within the IKAROS project. The program is funded by the federal Ministry of Education and Research. We'd like to thank our colleagues from Berlin, Dortmund and Görlitz for the fruitful discussions. In particular, we'd like to thank our graduates Daniel Möller, Johannes Stein, Roman Frohn and our student worker Andreas Hohendorf.

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