The challenge of integrating open-source and proprietary applications as part of a European-funded pilot project

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Abstract

This paper discusses the integration of open-source and proprietary software in the framework of a European-funded pilot project. It simultaneously describes the topic of the project, the development of an integrated solution enabling to easily produce audiovisual content for Vocational Education and Training, the benefits the end-users enjoy thanks to the proposed solution, and the internal working procedures of the consortium, including the pros and cons of the selected groupware and the means to take users' opinions into account during an iterative prototyping process.

Keywords: integration, open-source, proprietary, groupware, consortium, end-user, training, lifelong learning, communication, knowledge transfer, public relations

1 Introduction

1.1 Context

In 2004, six European organizations, five universities and one SME, involved in Vocational Education and Training (VET), linked their strength to design, implement, validate and disseminate a versatile, user-friendly, ICT-based framework for their initial and lifelong learning activities. They had identified the need for the easy production of VET content distributed online, but were not satisfied with existing tools. Tests had revealed several weaknesses:

- The existing tools were not easy to use by the average user,
- Their outcome required much post-production work,
- The licence fee model (one licence per trainer) could quickly become unbearable if the tool was used by many trainers in the organization.

The consortium partners were dreaming of a tool requiring almost no post production handling and that could be widely distributed among the training workforce. This dream led to the launch of the Leonardo-funded V3 pilot project [V3] in October 2005.

1.2 Project description

How to integrate distance education with traditional educational models and approaches, with help of technology, has been a worrying problem for about ten years [Calder, 1998] [Gasskov, 2000] [Moran, 2004]. As an operational and recent contribution to this topic, the *V3* project ambitions to design and implement a training framework requiring a limited investment from the trainer to achieve a performing competence building process by his/her trainees. More precisely, the project describes how an audiovisual file can be generated and indexed, so that it can be exploited afterwards in Learning Management Systems (LMS) like Anaxagora [Anaxagora], Claroline [Claroline], .LRN [DotLRN], Dokeos [Dokeos] or Moodle [Moodle].

Specifically, seminars presented by the trainer on his/her own computer are recorded with the help of an open-source software merging screen and voice activities. Versatility of the content is achieved through the capture of screen shots, enabling to embed not only slideshows, but also software demonstrations, snapshots of webpages, screen annotations, etc. Indexing metadata are simultaneously collected, and joined to the resulting audiovisual file, in order to enable keyword search through a collection of recordings and to facilitate navigation within each of them on a chapter basis. To be compliant with public encoding and indexing standards like AVI and LOM, indexed audiovisual files are

available for play and download through the LMS platform of the trainer's organization. On this LMS, a personalised learning process can be organised, by drawing a pathway across the available recordings, taking into account both formal and informal skills of the trainees.

1.3 Existing solutions

Such a two-year project could obviously not start from scratch. From the discussions during the project groundwork, the consortium identified the open-source recording software CamStudio [CamStudio] as the keystone of *V3*. However, it is suffering from several problems:

- It only runs on MS Windows. It is not portable. Users which do not use Windows operating system (OS) cannot record their lectures ;
- The AVIfile Application Programming Interface (API) is obsolete (issued in 1992);
- There are synchronization problems between audio and video (up to half a minute per recorded hour);
- It is not possible to use it in order to stream the captured content live on the Internet.

Moreover, the daily use of CamStudio has revealed a need for additional features:

- Pop-up of an error window when audio input is lost (i.e., when the battery of the microphone is exhausted);
- A more user-friendly Human-Machine Interface (HMI);
- Indexing of recordings ;
- Pop-up of a waiting message/screen while the recording is being compressed at the end of the talk.

There is therefore a clear need for an alternate solution, which would additionally favourably compare with existing commercial products like Camtasia Studio [Camtasia Studio] and Captivate^{1, 2} [Captivate].

Camtasia Studio [Park, 2007] is a software which enables the user to easily record screen, voice and webcam video to create video tutorials for web and CD-rom delivery. It is an expensive (185€ per licence key for government and non-profit organisations) and closed-source software. The recording tool and the player of CamStudio and Camtasia are identical. So the complaints about the HMI on CamStudio apply to Camtasia, as well the difficulties met by trainers when using CamStudio. A major difference between both programs is that Camtasia includes a

¹ Captivate is the evolution of RoboDemo [RoboDemo], the recording software based on CamStudio released by eHelp after eHelp acquired RenderSoft, the company that originally started CamStudio's development. eHelp was later bought by Macromedia, which rebranded RoboDemo as Captivate. Nowadays, Macromedia is a subsidiary of Adobe.

² Connect Professional [Connect Professional] (formerly Breeze) is not listed here, as aiming at teleconferencing rather than e-learning.

video editing application. It is an interesting feature if the recording has to be edited but this feature may appear too difficult for a novice. A codec called TSCC [TSCC] has also been developed for Camtasia and is claimed to be better than other codecs. Finally, it is a program which only runs under Windows. Again, people using other OSs cannot use it.

Captivate [Huettner, 2005] enables the user to record screen and audio but the main interface is designed for video editing. The program is difficult to use for a novice. Captivate is closed-source too, and costs \$199 (education price).

	CamStudio	Camtasia Studio	Captivate
Operating	Windows only, all	Windows 2000	Windows 200
systems	versions	and XP only	and XP only
System	400 MHz CPU	2.5 GHz CPU	600 MHz CPU
requirements	64 MB RAM	1 GB RAM	256 MB RAM
(recommended)			
Issues	Obsolete API		
	Desynchronization		
	No streaming	No streaming	No streaming
Missing features	Intuitive HMI	Intuitive HMI	
-	Warning pop-up	Warning pop-up when loss of audio	
	when loss of audio	(at least not mentioned in features	
		list)	
	Indexing	Indexing (at least not mentioned in	
		features list)	
Bonus		TSCC codec	
Price	Free	185€/licence key	\$199/copy

Moreover, both Camtasia Studio and Captivate are limited to audio and video capture and do not implement any indexing technique.

Table 1 – Comparison of CamStudio against commercial products

V3 hence aimed at improving CamStudio's applicability to its pedagogical objectives. As a first step, the recording settings were optimised in order to minimize the size of the resulting audiovisual files. This optimisation relies on XviD codec and GSM speech compression, achieving an average file size of 30 MB/recorded hour. Next, the collection of metadata during a seminar has been implemented so as to automatically index the audiovisual file, and offer the resulting indexed, audiovisual file as course material on their LMSs. The choice for automatic indexing was motivated by the wish to relieve trainers from any post-production task. Indeed, one cannot expect a trainer having just recorded one hour of lecture to spend another hour watching the recording for the sole purpose of indexing it by hand!

Another product, Apreso Classroom [Apreso], could be compared to the proposed solution. An earlier version, called Apreso for PowerPoint, seemed to be a first step

in the direction of the proposed work, but the product soon needed complementary features, such as capture of more than just PowerPoint and multi-platform playback, which were proposed separately by an online desk (Apreso online) till June 2006; these features have now been integrated in the current version of the product, Apreso Classroom, which advertising slogan is: *"Capture the classroom experience and publish it online"*. As described on [Apreso], Apreso Classroom is actually an automated lecture capture and Web publishing system that produces online versions of classroom sessions for on-demand student review. The application can be scheduled to start and stop automatically. It captures and synchronizes the trainer's voice with visual aids, and posts an indexed Web-based version of the lecture to university websites or LMSs.

Despite its merits, the current release of Apreso Classroom would not be as rich as the proposed solution, according to some user accounts, particularly because its indexing technique is image-based, not textual. And it is not to mention the cost of the equipment of media-enhanced lecture rooms and licence fees (starting at \$2,500 for a single licence) [Brumfield, 2006].

1.4 Challenge

Although the original objective of the project was to address the user-friendly production of VET content by promoting fully open-source solutions, it quickly appeared that technical limitations, budget constraints and market pressure would not allow the project to achieve that initial goal. As a back-up solution, the consortium decided to integrate the open-source recording software CamStudio with the proprietary presentation software Microsoft PowerPoint, and to offer the recordings for play and download through a web service triggered by the various LMSs exploited by *V3* partners.

The remainder of this paper addresses the development process of that integrated solution, first looking into the consortium procedures, then focusing on the involvement of end-users in the proposed solution.

2 Consortium procedures

Sharing common pedagogical goals, the partners of the consortium have nevertheless faced the major challenge of reaching a true consortium-minded working. Despite the problem seemed well described in the preparatory documents of the project, it took some time until the partners could define commonly agreed use cases. These common use cases resulted from the confrontation of the different understandings of the project aims on the one hand, and from the various daily practises at each organisation of the other hand.

Despite the fact that, as early as the kick-off meeting, the consortium decided to promote online collaborative work by relying on a groupware, it appeared that

face-to-face meetings and a global brainstorming session was needed to reach a detailed consensus on the basic scenarios to focus on. Obviously, despite its technical merits, the traditional collaborative tools offered by the selected groupware *GroupWare*³, namely point-to-point (private mailing, chat) and point-to-multipoint (mailing lists, broadcasts, forums) communications, file repository, etc., did not enable the partners to skip that stage of the consensus building process.

In addition, despite being centered on an open-source tool, budget issues were definitely not out of the question. It put an additional constraint on the achievement of the goals of the project, as technical options had to be ruled out, not because they were not sounded, but because the resource was missing to fully investigate them.

These budget constraints, combined to technical limitations with respect to the design of a true multi-platform, open-source audiovisual recording software, lead the project to narrow down its scope, so as to manage to reach a point where the consortium would be able to present concrete outcomes. It was therefore decided to record and index Microsoft PowerPoint slideshows with the help of CamStudio (Fig. 1). Technical solutions already exist to perform independently the audiovisual recording (CamStudio) and the metadata collection (CarpePPT PowerPoint macro). The challenge of V3 is to synchronize both features in a mixed open-source/proprietary code context. This topic is often got onto at technical conferences, for instance O'Reilly Open Source Convention (OSCON) [OSCON, 2007].

Additionally, from an organisational point of view, the project allocated the recording and the indexing to two different work packages. People involved in them have to collaborate while tackling the same issue from different perspectives. This can only be achieved by technically skilled staff members who succeed in efficiently communicating on a daily basis. Both work packages contributed to a joint document describing the technical issue to address, and agreed on means to solve it. They implemented a prototype that was deployed among partners' training workforce as a matter of validation stage, to collect their comments, bug reports and suggestions for improvement.

Coming back to *GroupWare*, it is worth mentioning that its usage is not limited to technically related tasks of the project and to consortium animation. As *GroupWare* has been designed for European-funded projects, it offers a budget tracking feature potentially very helpful at the time of the production of the interim and final reports requested by the funding authority. Actually, the design of the tool is so smart that any consortium activity can be logged in the groupware databases, such that both technical and accounting parts of the above mentioned

³ To avoid any dispute with the groupware provider, the name of the product is not mentioned in the present paper, and replaced by *GroupWare*.

reports could eventually be automatically generated. However, the consortium has not achieved a fully satisfactory experience with *GroupWare*, since the large amount of features combined to the lack of detailed and user-friendly documentation has impaired novice users from mastering its complexity and exploiting its potentialities to a full extend.



Figure 1 – Trainer HMI: CamStudio + PowerPoint

3 End-user perspective

The training framework designed by V3 has two different kinds of end-users. On the one hand, a trainer would use the solution to generate an indexed recording of his/her PowerPoint slideshow. On the other hand, a trainee would like to browse through recordings to find out either the recording of a given course or the moment in a recording when the trainer has been addressing a given topic (Fig. 2).

3.1 Prototyping

As to achieve a satisfactory user experience, the consortium has been iterating on its solution. Each version of the prototype has been proposed to a group of beta test trainers, who fed back comments after using it. Their suggestions have been collected through an online form on the public part of the website established as part of *GroupWare*. The questions are compliant with ISO/IEC standards 9126 and 19796 on the assessment of e-learning activities. This feed-back has enabled the consortium to set up a prioritised To-Do List towards the next release. With no

surprise, trainers mostly reported weaknesses impairing a user-friendly experience. Another online form is planned to be submitted to trainees currently following some test courses recorded with the help of the project's prototype. If time permits, their comments will also help to enhance the framework, or will shape a follow-up project.



Figure 2 – Website for trainees: access to indexed recordings for play and download (Screenshot from V3 Resource Center - <u>http://v3.zmml.uni-bremen.de/v3rc/index.cgi</u>)

3.2 Exploitation

Notwithstanding the development of interactive and remote training solutions, the ex cathedra lecture remains a privileged mode of communication and training. However, recording such seminars proves generally prohibitive, considering the importance of the fixed costs (building facilities, dedicated equipment, etc.) and variable costs (involvement of technicians, cameramen, etc). That is particularly true for organisations with limited means like SMEs or non-profit organizations.

V3 is offering them a versatile, user-friendly and unexpensive solution for recording and indexing training sessions based on the presentation of digital media (slideshows, software demonstrations, snapshots of webpages, etc).

This solution meets market needs, for VET as well as for internal communication and public relations (thematic professional events, R&D dissemination, etc.).

According to an investigation by the Agence Wallonne des Télécommunications (AWT), 45% of Walloon SMEs acknowledge the pressing need for keeping

competences and skills of their staff up-to-date [AWT, 2006]. The recording solution presented by V3 fits in the portfolio of the exploitable tools for staff training, either for recording a training given by an external consultant or for knowledge transfer within the organization.

Moreover, the proposed solution meets an obvious need of training organizations involved in initial as well as lifelong learning [IVETA], as ten years of experience with adult evening classes of one consortium partner show it. These mature trainees appreciate the availability of indexed recordings, enabling them to face an unexpected absence or to get back to the thread of the arguments. In addition, *V3* solution is not limited to the "classroom experience" use case. During the validation phase, it has been used to record separate, ad-hoc prepared learning assets having a popular form of "screencasts" [Udell] covering a certain on-demand topic. The relatively short resulting assets (10-15 minutes) have been appraised by the trainees. They stressed the importance of having short, high-quality, reusable set of supportive learning assets.

4 Conclusion

The present paper addresses the development process of an integrated VET solution combining the open-source recording software CamStudio with the proprietary presentation software Microsoft PowerPoint as part of a European-funded pilot project. The proposed solution has been presented ; the consortium procedures have been discussed, as well as the pros and cons of the groupware selected by the consortium. The involvement of end-users for shaping the proposed solution as well as the benefits offered by the solution have been addressed in a second step. It results from this example that integrating open-source and proprietary applications is a true technical challenge, that can appear as a rather difficult experience in the context of a European-funded project, due to the need for consensus building within the time and budget constraints of the project.

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