Concept design for a collaborative digital learning tool for film post-production

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ABSTRACT

This paper considers how and in what form a collaborative digital learning tool can contribute to the training of trainees in the field of film post-production. A concept design for such a tool is presented. The concept design was the product of a series of collaborative investigations, and the initial findings of these investigations are reported. The initial findings suggest that such a digital learning tool has the potential to qualitatively improve how training is offered in the complex field of film post-production. The proposed digital learning tool seeks to combine the in-depth training associated with university-based training programmes, with access to a broad range of resources contributed by expert film practitioners, as well as enabling trainees to engage directly with such expert film practitioners. Post-production is not a routine practice that can be followed in a step-by-step manner. Experts in this field are characterised by their creativity and flexibility in being able to adapt the post-production process to the particular requirements of each film production. Such experts have an invaluable contribution to make to the training of the next generation of professional film practitioners. The concept for the collaborative digital learning tool presented in this paper was designed in close collaboration with such experienced film practitioners, in order that their knowledge and experience can be made directly accessible to trainees in the field. The paper identifies design challenges, discusses the applied participatory design methods, and illustrates how the design challenges identified were addressed through visualization and the design concept.

KEYWORDS

Post-production, Film, Collaboration, Digital tool, Learning

INTRODUCTION

Today even film experts have a hard time keeping pace with developments in digital film technology. This paper describes a concept for a digital learning tool for use in relation to film post-production, and how such a tool could provide detailed interactive visualizations of the digital production process, a range of digital learning resources, and the opportunity to engage directly with expert film practitioners.

The post-production process in digital film production involves a range of skills in which all practitioners need to be proficient. Trainees (novices and beginners) need to acquire, in addition, the flexibility to apply these skills to the particular requirements of each project. It is this ability, above all, that characterises the difference between experts and trainees in the field of film production. Trainees can gain an intrinsic understanding of the skills required through practice and collaboration with experienced, expert colleagues. However the time available to such experts to act as mentors, advisors and collaborator is limited, constrained by the demands of their professional careers and the budgets available within university film departments to fund their participation.

Task-related visualizations can compress extensive data and complicated information, which allows a range of processes to be made accessible to a wide range of practitioners. However, Tufte (1990, 2002) advocates the creation of high-density designs to allow viewers to select, narrate, recast and personalize data for their own use. Standard Gantt charts, for example, tend to be analytically thin and simple, thus lacking substantive detail (Tufte 2002). Visual clutter and confusion can be understood as failures of design. The collaborative capacity of social media tools, such as wikis, blogs and online forums, create the possibility for trainees and experts to participate in creating data-dense and more accurate visualizations of film production processes such as post-production.

Chen and Bryer (2013) argue that agenda-driven social networks can make a significant contribution to learner-centred learning, an approach that encourages the active participation of learners in their education. They suggest that open social media can provide students with access to a considerably greater range and quality of information and experience than can be made available within a closed teaching environment.

The current generation of film production trainees are the first generation to have grown up in a digitally connected environment that facilitates social learning. Social networking technologies (social media) have created learning environments, where experts can act as role models, facilitators of

effective collaboration, and mentors. This has led to the creation of learning networks that can boost the learning of generic skills that are necessary to a professional career.

In considering how digital tools and visualization can support training in film post-production, we addressed the following research questions:

- How can trainees, who are able and willing to participate in the creation of new film-related knowledge, be enabled to become proficient in film post-production through the use of digital tools and visualization?
- What kind of digital tools can promote collaborative and interactive learning by trainees?

The specific task was to design a concept for an internet-based interface and learning tool for use in the Film Department of Aalto University (ELO) in 2010–2011. This took place in the wider context of the research project *Visual innovations for inclusive projects with diverse participants* (VIPP; Raike 2010), which in turn followed the *CinemaSense* project (Raike 2006; Raike & Hakkarainen 2009).

The design team consisted of designers with backgrounds in programming, graphic design and media production (Keune, Lindholm and Muttilainen, co-authors of this paper, and the visual designer Martti Arvilommi). The team was joined by Jussi Lohijoki (a post-production workshop expert) and Anna Heiskanen (a film and television production lecturer). Lohijoki later acted as a 'design participant' and Keune as a 'design informant'.

DESIGN CHALLENGES IN FILM POST-PRODUCTION

Film post-production is a data dense process. The 'post-production' process of film production usually starts after the shooting of the film material. However, the planning of post-production often occurs during pre-production when, for example, the budget, as well as the resources and the equipment to be used during filming are specified. According to the design participant (Lohijoki, personal communication in November 2010), the post-production process progresses through five main phases: *Original material, Offline, Online, Grading* and *Distribution*. Understanding the differentiation that exists between these phases does in itself present a challenge during post-production training. The process does not necessarily progress linearly from one phase to the next, but may include project specific iterations that may be perceived initially as contradictory by trainees. Additional phases may occur simultaneously without a defined start or end, such as the creation of sound, music and visual effects. For trainees, this often poses time management challenges. Experts in post-

production are characterised by the ability to create an organized mental image of the flow of the post-production process, and the flexibility to adjust to project specific conditions. Such flexibility is particularly important, as the post-production process is not the same across the film industry.

The process by which experts convey their accumulated knowledge and experience to trainees may take different forms at each stage of the training programme. Experts are at each stage expected to provide guidance on how trainees can learn the skills associated with that particular stage, creating opportunities for, and encouraging trainees to, ask questions and explore their ideas. Experts are required to monitor and record the progress of trainees at each stage of their training, identifying at regular intervals the competencies that trainees have learned and those that remain still to be learned. It has to be recognised that expert tutors can only give a limited time to such training programmes. It therefore follows there can be no guarantee that each trainee will satisfactorily complete the training programme (Heiskanen, personal communication in 2010).

It is reported that trainees gain a feeling for, and knowledge of, information and communication strategies, information design, the process of envisioning information, best practices and teamwork, from practice and subsequent personal experience (Ehn & Badham 2002; Nelson & Stolterman 2003; Tufte 1990; Wenger 1998). In post-production, the topics addressed include information communication strategies, best data backup practices, and how to proceed when material is filmed with incompatible mixed media or under a number of different lighting conditions, causing parts of the film material to differ. Moreover, crucial decisions may have to be made during post-production that alter the flow and budget of the overall process, especially during the original material phase. Challenges such as these are likely to have been encountered and solved by experienced practitioners, such as alumni of the same film study program and other professional film practitioners. Trainees need to learn directly through collaborative work with such experienced practitioners, as well as through trial and error in undertaking independent projects. This dual approach creates excellent learning opportunities, and enables the trainees to develop flexibility as they progress, but is also a time consuming method of training, and does not usually occur to the extent that film educators would wish.

METHODS AND DESIGN ACTIVITIES

The design process followed a four-phase iterative and research-based design approach, which considers design to be a major outcome of research. (Leinonen & al. 2010): (i) *Contextual Inquiry*: the purpose of this first phase is to understand the context to be addressed by the research i.e. the context in which the application will be used; (ii) *Participatory Design*: this involves obtaining input from the potential users of the design (Ehn & Badham 2002); (iii) *Product Design*: the creation of prototypes that can mediate design ideas between the designers and the potential users; and (iv) *Software as Hypothesis*: the development of functional prototypes.

The main research activities undertaken to understand the context took place during a workshop attended by the designers and the collaborators. In the initial workshop, artefacts created by the collaborators, such as concept maps (later 'C-maps') of the post-production flow process, visual interface prototypes, and a draft version of a post-production manual, were used as a means to identify and clarify initial questions.

Four 2 to 3 hour long participatory paper prototyping sessions were held involving the designers and the design participants. As the design team was small, all designers participated in these sessions, which facilitated information sharing throughout the design process. During the sessions, the initial information was discussed, using the prints of the C-maps (Figure 2), the interface suggestions, and photographs of early whiteboard drawings as inspiration. The designers used coloured pencils and adhesive notes to map each stage of the post-production process on a large sheet of paper. At the last prototyping session further design recommendations were made. The sessions provided an in-depth contextual understanding of the post-production process and identified design challenges and opportunities to be addressed.

The artefacts that resulted from the paper prototyping sessions were used as the basis for the next design stage, which was conducted without informants. This included the visual design and programming of an interface prototype. During the visual design activities, the initial paper prototypes were analysed and redesigned through iterative visualizations. Based on this visual design, a HTML and CSS software prototype was developed, which allows basic interactions to be carried out, such as colour changes. The close collaboration established between the visual designers and programming designers during the earlier phases of the project facilitated communication during this crucial phase of the design process.

VISUALIZATION: DESIGN OPPORTUNITIES AND RESULTS

In addressing the design challenges, three main design tasks were identified: (i) visual representation of each phase and the key components that comprise each phase; (ii) visual cues for project specific information; and (iii) peer documentation of expert knowledge. These design tasks informed the design of the learning tool concept. Figure 1 illustrates the artefacts used in the creation of the prototype post-production tool.

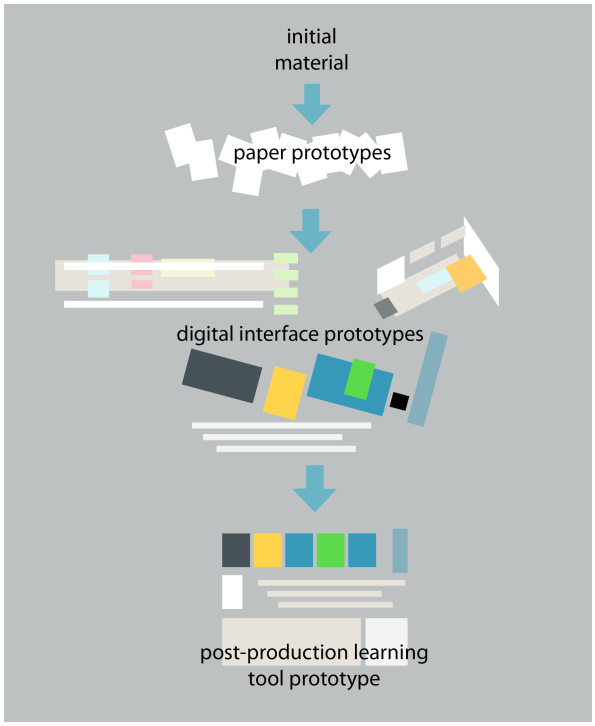

Figure 1: Illustration of the artefacts created during the design process by Jussi Muttilainen.

We recognized that the inclusion of a timeline would provide a useful means of visualising the post-production process. In the process of creating the paper prototypes we were able to identify the key steps that needed to be visually represented on the timeline. In designing more dynamic digital interface prototypes, we were able to identify and create visual cues for project specific information. The design of the prototype post-production learning tool enabled us to determine how we should document expert knowledge.

The visual representation of the phases and key steps

The visually rich material, in particular the C-maps created with the IHMC CmapTools software (Figure 2), that the expert collaborators provided, proved to be inspirational input during the design process. These artefacts enabled us to recognize that the timeline visualization of the main phases of the process would support the learning of the post-production process by

addressing difficulties experienced by trainees, in particular their conception of the overall post-production process.

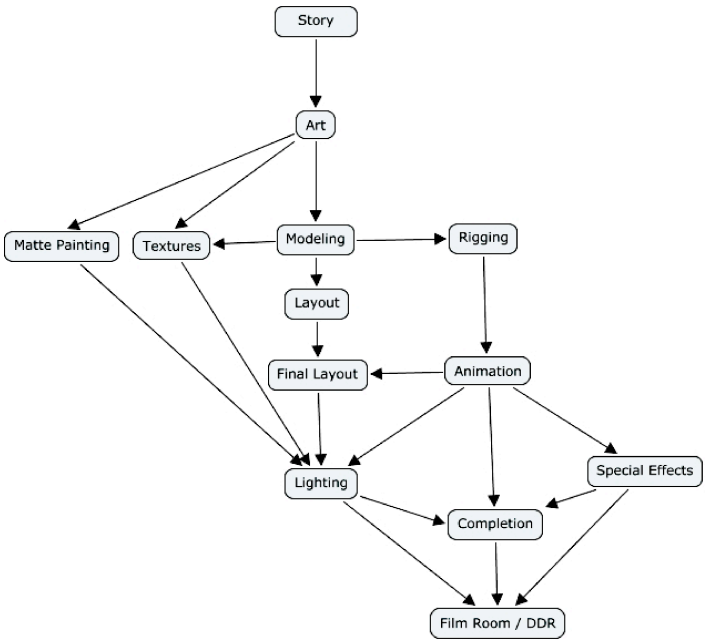

Figure 2: The expert concept map of the animation process by Deepa Agarwal.

The first participatory paper prototype workshop resulted in a note based paper prototype (Figure 3) that visualizes the main phases of the post-production process. The prototype was used to discuss, clarify and organize the main phases with the participant, using differently shaped and coloured paper notes. As a consequence of several design iterations of the paper prototype in collaboration with the participant, we removed excessively detailed descriptions of steps and optional software recommendations. Although the duration of different phases varies considerably (e.g. the online phase takes longer than choosing the production medium at the start of the process) the duration of each phase is represented equally. During the iterative paper prototyping, key steps and decision-making points were identified and included. Examples of these include checking the flawlessness of the metadata after the film has been digitized, and visual cues for budget management and for creating data backups. The backup reminders occur with important project milestones, which enables each phase to be clearly demarcated. Figure 3 shows the phases in the form of diamond shaped notes.

The creation of the paper prototype enabled the 'trainees' to gain an in-depth understanding of the project context. This suggested that the phase visualization could serve as an appropriate representation of the post-production process for the navigational interface of a digital learning tool. The phase visualization shows the most important phases and all concurrent steps in one representation.

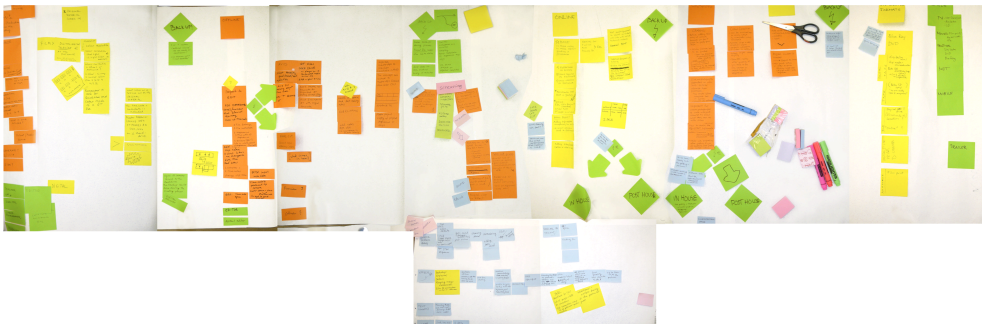

Figure 3: The paper prototype of the phases created by Matti Arvilommi.

Based on the paper prototype, digital interface prototypes were created by members of the design team (Figure 4). It was agreed that a) the learning tool should visually differentiate sequentially fixed post-production process phases from those that may shift and overlap and b) the tool should enable trainees to arrange the latter in accordance with particular project requirements. This personalized visualization capability was considered also to have the potential to support individual reflection by trainees, enhance communication, and facilitate collaboration with experts.

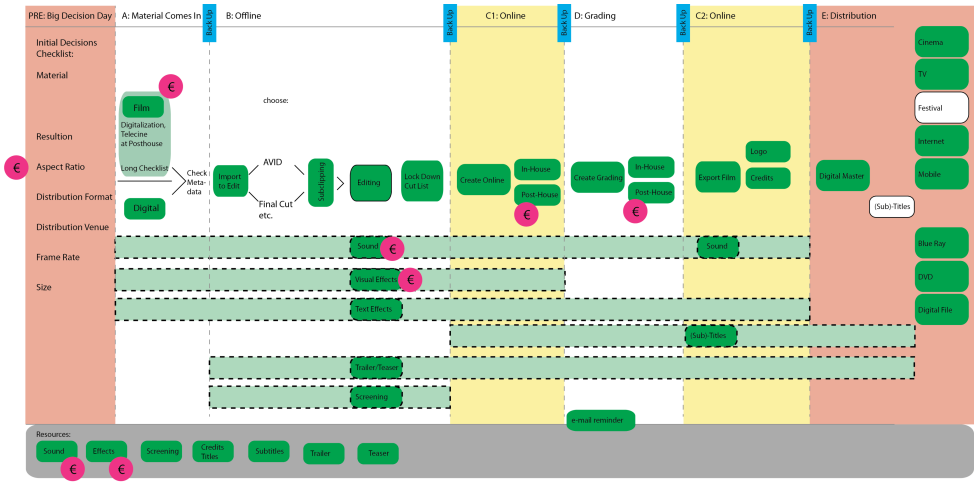

Figure 4: A prototype illustration of the digital interface by Matti Arvilommi, Anna Keune, Björn Lindholm and Jussi Muttilainen.

To support trainee's in developing good data backup practices, visual cues were included that remind trainees at important milestones to create backups. In relation to project budget planning, it was recognized that trainees need to be able to enter budget updates, change the budget in the interface, and receive immediate feedback on the budget implications of a path change. It was agreed with film production experts that budget related information should be transparent and accessible to all team members.

Peer documentation of expert knowledge

Based on conversations with the design participant, it was agreed that expert knowledge should be linked directly to the post-production phase that it addresses. The idea was to enable trainees to browse through expert commentary on issues relating to each specific phase.

The post-production phase visualization is complemented by a *wiki* space, for film practitioners to view, edit and add information or examples relevant to a particular phase (Figure 5). In order to encourage the participation of practitioners, the wiki can be edited by anyone. The use of HTML allows, for example, integrating open source project content, such as that to be found on *Wikipedia*. Combining the phase visualization with a wiki allows the editing of information in context. By moving the mouse above any of the post-production phases, a hovering window presents a short description of the phase and its requirements. Clicking the phases offers a more elaborate description and explanation. The wiki loads under the visualization without reloading the page.

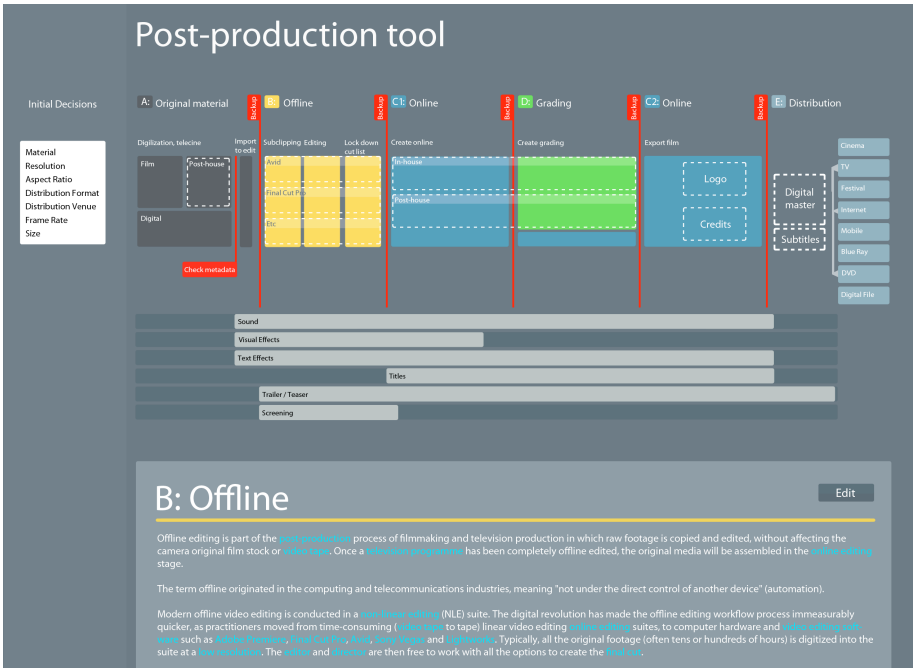

Figure 5: An interface concept illustrating an example project by Björn Lindholm and Jussi Muttilainen.

Although not functionally implemented, a visual mock-up of an administrator panel for the wiki was designed (Figure 6). It was considered important to include within the administrator panel the facility to edit information in context. Figure 6 also illustrates a second administrative tool, that of *Colour Utility*. *Colour Utility* is a simple colour selection and grouping tool, through which the colours of the interface can be changed.

This facility allows each phase, step, repetition and key step of the post-production process to be distinguished by a different colour.

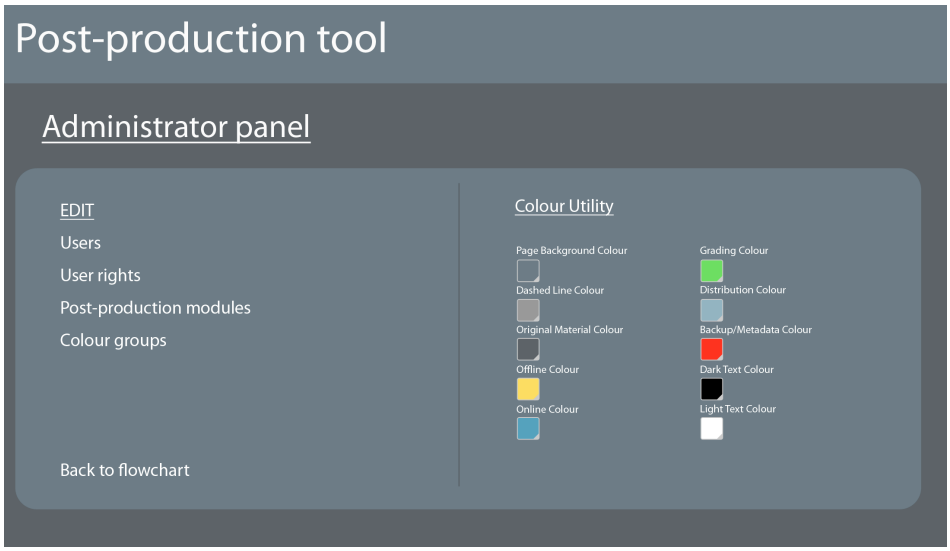

Figure 6: The visual mock-up of the administrator panel created by Björn Lindholm and Jussi Muttilainen.

This categorization by colour coding allows interrelationship to be made visually evident e.g. the steps involved in a particular phase, repetitions, and distinguishing between an actual activity and additional information about that activity. Administrators can change the colours of any group. *Colour Utility* was developed with jQuery, a JavaScript library, to allow instant feedback on selected colour changes upon refreshing the page. A colour swatch grid with a limited selection of colour choices opens upon selection. Additional colours can be added with standard hexadecimal codes. *Colour Utility* was designed as a separate module that can be bound with HTML pages that use standard Cascading Style Sheets (CSS) for colour definition. At this time not all functions of the *Colour Utility* tool are fully developed, and work is on going on the prototype.

DISCUSSION

We recognized the clear need for other project specific information, such as progress, dependencies, and deadlines. In order to support collaboration between learners, a function that generates a pathway through the interface, highlighting the stages and possible dependencies, and allowing the updating of project progression, was conceptualized (Figure 7).

Through such a personal project pathway, the effects of early process decisions could be visualized; enabling trainees to compare how changing particular variables could affect outcome media, the project budget and the project completion schedule. In order for the project path to appear, the

distribution channel, film material, resolution, aspect ratio and tools to be used, have to be selected. It was conceptualized that, as the project progresses, learners would be able to update the state and schedule of specific, simultaneous and flexible phases of the project by horizontally moving the phases that are illustrated as blocks under the main production diagram (Figure 7). The use of the visualization facility allows film team members with different roles to recognize if a phase of the project requires their involvement.

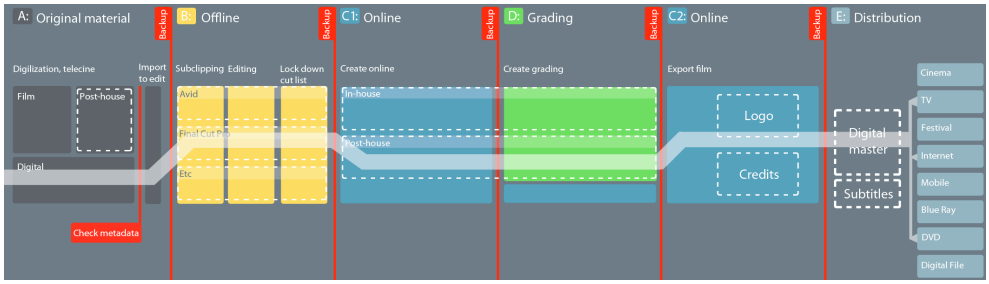

Figure 7: Clipping of post-production interface with conceptual project pathway by Björn Lindholm and Jussi Muttilainen.

The design participant proposed that the repository of the collective knowledge should be accessible to anyone who is interested. This would, in the view of the design participant, encourage more experts to participate (Lohijoki, personal communication in August 2011).

CONCLUSION

The design team, and Aalto University's Film Department with whom the team closely collaborated, view the post-production learning tool prototype as a potential free and open public repository, for use in particular by academic and industry based film practitioners. Aalto University Film Department have suggested that the collaborative building of the knowledge repository could present opportunities for strengthening ties between the Department's staff and students, and that alumni of the Department could continue to be beneficiaries of the repository long after their graduation.

The design concept presented here could add considerable value to university based film post-production training, if further developed into a functioning prototype. The design participant, the design informant and Aalto University Film Department collaborators share this view. We therefore encourage anyone who shares our interest to build on the concept design and ideas presented in this paper, to develop a functional tool that addresses the challenges involved in enabling trainees to become qualified professionals in the field of digital film post-production.

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