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Video in Design Processes: The Case of Bits & Pieces Video Documentation

Master Thesis (20 EAP)

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Author's Declaration

I declare that, apart from work whose authors are clearly acknowledged, this document is the result of my own work. This thesis has not been submitted anywhere for any other comparable academic degree.

Thesis was finished under supervision of PhD Tobias Ley

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*"How can users be effectively
involved in the design process,
particularly in the beginning
when there is nothing to show them?"*
(Ericson, 1995)

Introduction

Nowadays many design processes try to involve a number of stakeholders early in the process. It looks like videos are often used as a medium for this. However there are only very little guidelines of how to use video in that case. Obviously it depends on the stakeholder group, the purpose and the phase of design. Even though it seems a prefered choice it is not without its pitfalls.

An exploration of video in co-design processes concludes that video as a material is hard to produce and handle compared to still images (Tikkanen & Cabrera, 2008). Study of asynchronous video communication by Barksdale et al. seem to support this phenomenon by stating that "video takes more work than typing an email (Barksdale et al., 2012).

Furthermore, Communicating EU Research and Innovation guidance for project participants by European Commission aimed to assist applicants and beneficiaries for Horizon 2020 funding gives a suggestion to use video for dissemination of a project. However, the same document insists to avoid *"let's make a video to inform everyone"* attitudes concerning communication with video. It also contains various case descriptions of successful projects, which suggest involving a dedicated video team from the early stages of a project to foster project take-up by stakeholders and wider audience. (European Commission, 2014). This implies from one side the obligation to inform, engage and educate the academic community and interested laymen. However, from the other side, researchers in the projects mostly have no instructions and training in video production.

Therefore the purpose of this case study is to explore the role of the video in the design based research approach to derive recommendations for decision making upon the usage of video to communicate research findings among the stakeholders.

Why do we talk about video in the context of co-design?

Even if video is said to be a too detailed and cumbersome to use (Mackay et al.,2000) it certainly has been used in design processes. It has been used in design as an artifact throughout the design process (Mackay et al., 2000), The range of use varies from the legendary visionary videos as Starfire by Sun Microsystems (1994) and Knowledge Navigator by Apple (1987), to data source for design ethnography (Tikkanen & Cabrera), to designers clay (Buur & Ylirisku) to asynchronous communication mean (Barksdale et al.). Video enables to engage in large-scale discussions by presenting complicated phenomenons in highly accessible formats (Arnall & Martinussen).

It can be produced by many in terms of technological means. It also can be accessed by many in terms of reading the video information. It may save the time in terms of retrieving the information from the video.

What is co-design?

Co-Design "*The process of designing with people that will use or deliver a product or service*" (Design Council, UK).

Co-design is defined by Tikkanen & Cabrera as a collaborative design approach that requires strategies for active participation of various stakeholders.

Sanders & Stappers define co-design as referring to (...) "*the creativity of designers and people not trained in design working together in the design development process*" (Sanders & Stappers, 2008).

1 Literature Review

Current chapter gives an overview about the communicative role of the video in co-design processes.

Introduction

Co-design approach seen from the perspective of a designer is used to increase the involvement of a large number of stakeholders (Tikkanen Cabrera, 2008) to create widely accepted products and services e.g. Learning Layers involves stakeholders from health care sector and construction sector as the end users for their designed products.

Archetype of a designer using co-design approach could be seen already in Socratic maieutics as a "midwife" (Brunschwig & Lloyd, 2003) fetching the "truth" inside the user by questioning.

Whenever video is needed, it is usually that it is not video as such which is needed, but something has to be achieved through video. It could be the shyness of the participants on the meeting that has to be reduced by showing a video, which in co-design meetings would be usually something topic related so that gained courage would be still on topic thus goal driven. It could be a need to gather a large spectrum of different opinions about a phenomenon. Tikkanen and Cambrera call these videos the conversation starters (Tikkanen and Cabrera, 2008), Buur and Ylirisku call them a social glue (Buur & Ylirisku, 2007). Whatever the video is called it has potential in engaging people into the conversations.

1.1 Video in Co-design Processes

Overview of video in co-design processes is based on the article "Using Video to Support Co-Design of Information and Communication Technologies." by Ville Tikkanen and Andrea Botero Cabrera (2008).

Tikkanen and Cabrera investigated, how video could be used to support co-design of communication and information technologies.

Based on body of literature they introduced four approaches to video production used by research projects that follow the principle of user-centered and participatory design. Within the framework of these four approaches to video production, they analysed the use of video within co-design projects in Arki research group[1].

As a result of their analysis they proposed three potential video genres that would fit the needs of co-design projects. Video as a "conversation starter", video as a" throwaway video prototype" and "video documentation". First two of the genres were discussed as two main roles of video for design in more detail by Jacob Buur and Salu Ylirisku in "**Designing with Video**", refered as "social glue" and "designers clay" (Buur & Ylirisku, 2007). Nevertheless these genres offer good framework how one could think about the role of video for co-design projects.

Table 1 consists of 4 categories of approaches to video production and 5 characteristic categories that show how and when video could be applied (Tikkanen & Cabrera, 2008).

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[1] Arki Research Group, Media Lab, University of Art and Design Helsinki, Finland. Currently, Aalto University, URL https://medialab.aalto.fi/research/research-groups/arki-research-group/ (accessed 29.04.15)

	Video ethnography	Video recording of experiments	Design videography	Professional video production
Examples of artifacts	Observational videos from the design context	Instances of usability problems and issues, documentation of use situations	Video prototypes, sketches and scenarios, design fictions, contextual inquiry videos	Pitching videos, reportages, documentaries
Representation in the video material	"Hard" data from the potential design context	Ways how users use a product and how the product behaves in a controlled test setting	A use situation is constructed with a technology product or some features	Coherent and compact representations of technology and the context
Ways of using the video material	To influence and evaluate design implications and to identify and extract potential design drivers	As data to support usability analysis of products, as evidence to support claims in making feature decisions	To speculate and communicate design ideas, product features and practices	To convey a clear and unambiguous message across organizational and disciplinary boundaries
Production formats and genres	Raw video material from the design context	Recordings of test situations	Acted- and crafted-out videos, inspiration videos	Presentation videos, documentary videos
Disciplines involved	Anthropology, sociology, social psychology	Usability, ergonomics, cognitive science, experimental psychology	Industrial and product design, interaction design, computer science	Disciplines of professional video production, like directing, acting, writing and editing.

Table 1. An overview of four approaches of producing and applying video in design and research processes. Tikkanen & Cambrera, (2008)

Table 1 with general short descriptions created in 2008 is still sufficient, presenting the approaches to the video production.

Moreover, the table is relevant in nowadays due to highly accessible organization of its contents. It enables to start thinking about video production from the perspective of a specific artifact or a need e.g. data to support usability analysis, communication of design ideas or Observational video from the design context, design fiction.

1.1.1 Three Genres for Video in Co-design Projects

Video as a conversation starter gives suggestions using video for co-design sessions and collaborative interpretation sessions. Authors suggest that videos as a conversation starters are used to introduce complex topics, create focus for design conversations and pose a specific questions. (Tikkanen & Cambrera, 2008). They suggest that the target objects of the conversation should be kept ambiguous and other elements clear to provide a framework for the discussion. Ambiguous elements would create the gaps that would

facilitate the conversation. Moreover these gaps could be the very target for additional documentation as they will provide designers with the relevant comments.

Throwaway video prototype as their second genre based on Thomas Erickson's reasoning (1995) they suggest to avoid high-fidelity video prototypes in the early stages of a design process, instead use short videos of sketchy low-fidelity paper prototypes, because it encourages participants to be more critical. Although, the empirical study by Bojic et al. focusing on the fidelity questions of video prototypes did not support that argument. It confirmed that the visual refinement of the prototype had no effect on feedback the viewers gave (Bojic et al., 2011).

As there seems to be no difference in user's feedback about the product if the video prototype is low-fidelity or high-fidelity, but there is also not mentioned how users would behave encountering low-fidelity prototype outside the context of its use the third genre of video production would shed some light on fidelity-issues.

Video document could be summarized as a suggestion to treat video on equal grounds with other design project documents of possible public exposure to build a shared vision inside the project team and across project's boundaries. (Tikkanen and Cambrera, 2008). Video documents could be collected over a course of time, edited and re-edited into documents that would have several use areas e.g. Documentary explaining the course of the project, documentary explaining the evolution of the product. Short film explaining the design problem.

The difference of a video as a document from written document is that video file is much more explicit about its origins. Origins of written documents could be re-typed into the form that will not reveal the original thoughts. Retyping the video means re-recording it.

With the case study about co-designing the collaborative video-editing system authors demonstrated different phases for the video. Shortly described it demonstrates how ethnographic video, recorded by potential users themselves used as "hard data" by researches was accompanied by the material recorded by researches and re-edited several times thus becoming a dissemination video for the project.

When low fidelity video video is equally good with the high-fidelity video for designing the objects, more aestheticized video is needed when triggering the large-scale conversation. The following chapter will present the case study of how video could be used when the object of the design is the conversation itself.

1.1.2 Cinematic Practice

Sometimes the solemn purpose of a design project is to evoke a large-scale discussion. The large-scale discussion should pave the way for a massive and often compulsory take up of a novel technology.

Depth of Field: Discursive design research through film by Timo Arnall & Einar Sneve Martinussen (2010)

The article is discussing the role of video in discursive product design research and the use of video as a tool to explore and explain new technologies.

Discursive Design

Following is the best example of carefully crafted strategy for the video in a design project. Discursive design refers to creation of utilitarian objects, which would act as facilitators of the discussion on different levels in society to raise the awareness about technology.

It has to be clarified that instead of video, they used the term film, which is equally correct, by emphasizing their background in filmmaking, (namely Timo Arnall, who is currently a creative director at BERG and has been making films, designing products, and researching emerging technologies for 15 years). As for this master thesis the discussion whether filmmaker or videographer is in general irrelevant, however it could be assumed that film and video terminology clash was caused by the digital turn in film industry in the mid 2000s. Concerning the presented video material in their paper, it was produced, using imagery of digital photo camera and also video camera was used to document experiments. Therefore, film is merely a statement.

As they argue that film is a mode of production and display and video is a tool for documentation or analysis. Film has "(...) genre, narrative and cinematography, it is purposeful, constructed designed and directed (...)" (Arnall & Martinussen, 2010, pg. 101). Tikkanen and Cambrera seem to support their approach to video production as they state: "It is about representing the practices of the users (...) with the means cinematic storytelling." (Tikkanen & Cabrera, 2008, pg. 128). What authors suggest here is that film/video if used to communicate across the boundaries of a project has to be incorporated as a method in the project planning phase.

There are many research project, which develop technologies, however in the early phases of the project there seems to be nothing to show, yet that is the phase when design space is the widest and not constrained by the design process (Dennerlein et al., 2015). That is the phase where visionary videos could be used to engage stakeholders.

The research project called TOUCH, reported in the paper investigated Radio Frequency Identification (RFID) technology. Introducing RFID technologies inside London's Oyster card (or Tallinn's *Ühiskaart*) being invisible are met with suspicion by society.

Assuming that these stereotypical attitudes towards invisible could be reduced by revealing their qualities with the film.

Project TOUCH lasted three years. During the course of the project 7 short films were produced. The target group of the films was pointed out as: ourselves, research team, project collaborators, design research community, wider online audience.

First films about materiality of RFID were highly aestheticized products of photography, animation and compositing. (Arnall & Marinussen, 2010) Stop-motion was the method described as photography resulting in video, edited using compositing method and resulting in animation. Animation as described by community of practice as a good way to take a control over the details of the subject matter. It is used to either avoid the details that are destructive, but more importantly to visualize for instance value-chains, which are invisible in nature.

The second set of films took RFID technology out of the context and explored in domestic environment e.g. to control TV-set. These films were depictions of prototypes, whereas some of the functions, not working on real objects, were created with compositing method. Focus of those films was more on "describing" user experience and on creating emotional response among viewers. The focus was intentionally shifted from technical specifications and features to discuss technology through product design objects such as TV-controller or a toy pet.

Next film portrayed the Oyster card through the film following the idea of Rube Goldberg machine. That is the example of the very object of suspicion depicted within the context of narratives from popular culture.

These were the examples that were intended to broaden the discourse around RFID from (...) "industrial, and privacy issues towards playful aesthetic and reflective consideration on proximity interaction"(Arnall & Marinussen, 2008, pg.116).

The last example of the videos will be introduced with the image (Figure 2), because it summarizes the aesthetic and explanatory qualities of videos used in TOUCH project.
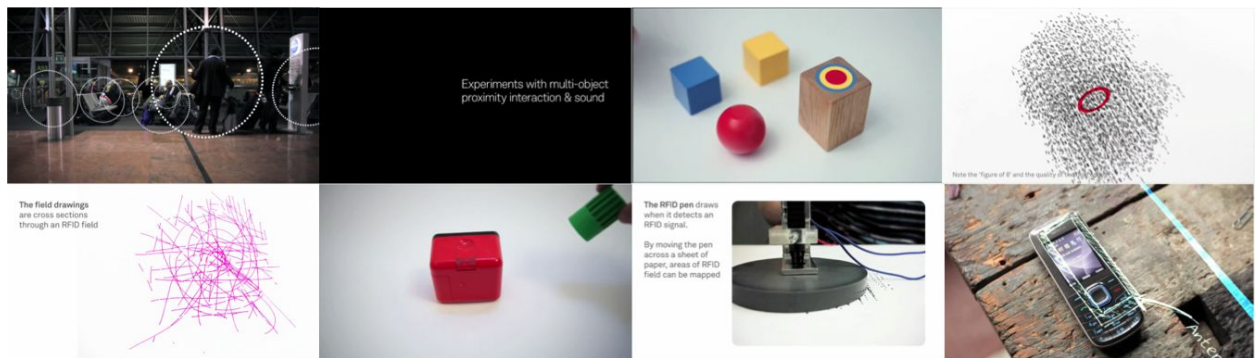
Figure 1: Frames from the video. (Arnall, 2009)

The last film in this series of examples of how video (film) has been used in design projects could be considered as the successful example of video document (Tikkanen & Cabrera, 2008) that is consistent of experiments with the technology in laboratory conditions intersected with fully experiential videos from domestic context. That is where the evolution of the concept and technology could be seen.

Although the aesthetic qualities of the videos expect knowledge about cinematic storytelling and advanced skills in video production the principle of visualizing invisible, de-contextualising and re-contextualising are good examples which could be achieved also without cinematic-storytelling centered approach to video production.

Let us assume that there is a sufficient video documentation created during the project. Some of the documents are created in the early phases of the project and others some time later. How can one, being involved in the project for some time, decide what

documents (videos) would be understood by the audience outside the project. To overcome the meaning gap one has to have tool at hand. Knowledge maturing model could be seen as offering that support.

1.2 Knowledge Maturing Process Model to Describe Video Artifacts

In this chapter knowledge maturing model is introduced through explanatory descriptions of its levels of interactions. Knowledge maturing process model is a model about learning. It has been applied to describe design process as a collective learning process (Schmidt & Kunzmann 2014). In the design process seen as the learning process video is seen as a medium/artifact that represents different phases of knowledge.

Knowledge maturing is defined as: "The goal-oriented development of collective knowledge, or better as goal-oriented learning on a collective level (...)". Learning is seen as (...)" interconnected series of activities of interacting individuals (...)" (knowledge-maturing, n.d.a).

Video as the artifact is described as an instrument to communicate about the knowledge and reflect the maturity of knowledge. Video as the knowledge artifact can be matured over the course of the project as the underlying knowledge is matured (Kaschig et al., 2011, pg. 49).
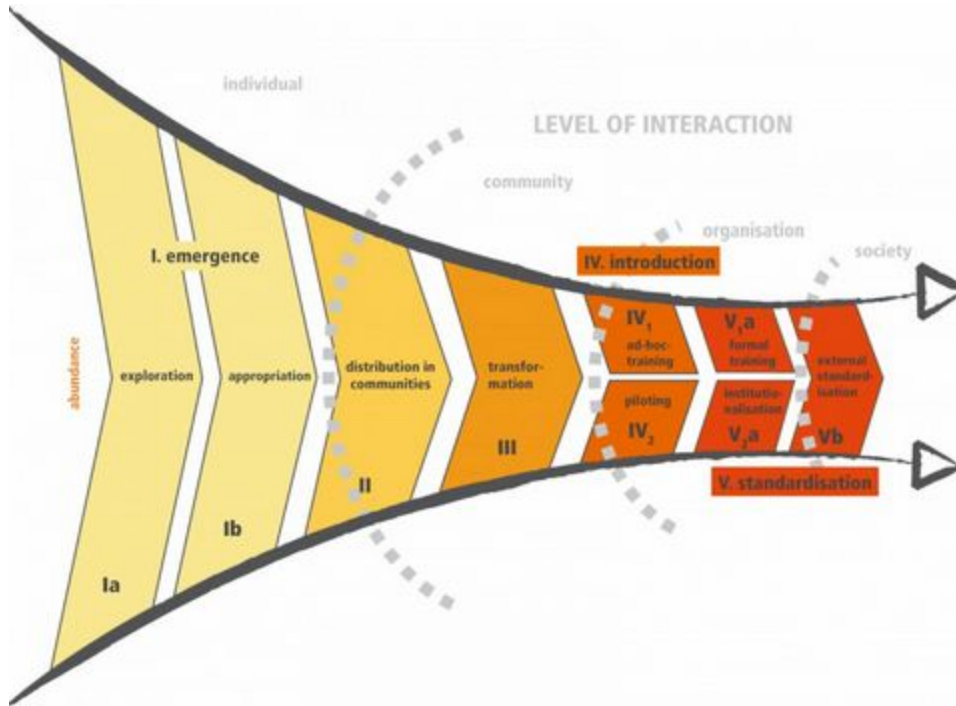
Figure 2.: Knowledge maturing phase model (Schmidt, 2011).

Knowledge maturing phase model describes how knowledge is matured. It visualizes 5 knowledge maturing phases: emergence, distribution in communities, transformation, introduction and standardization. It also indicates four levels of knowledge processing as the levels of interaction: individual, community, organizational, society. Maturing dimensions indicate the context of the knowledge in each phase.

Context indicates also the proportions of "information" to be added that would explain the context around the knowledge. In each phase knowledge artifacts worth sharing are "packaged" to enter the next phase (knowledge-maturing, n.d.b). Packaging could be seen as de-contextualising knowledge so it could be appropriated with the context of knowledge in the next phase.

Individual level
New ideas emerge either as the result of informal discussions, exploration of topics of interest. The knowledge is subjective and deeply embedded in the context of the

originator. The vocabulary used for communication could be vague and it is restricted to the person expressing the idea. (Kaschig et al., 2011, pg.55) The dimension of needed context is the widest. The driving factors are curiosity and creativity.

Individual level interaction with video artifacts is best described as processing video files within video editing software. That is structuring separate manifestations of knowledge that will increase the amount of context.

Community level

The knowledge is discussed between members of a social group. Vocabulary is synchronized and thus community based terminology is established. The knowledge inside the community could be seen a result of a merged personal contributions.

Video that is shared with whoever through shared file repositories is technically the artifact of the Distribution in Communities phase. Artifacts created on individual and community level are embedded in the context of community. Typical videos of the Distribution in communities level are ethnographic studies, video reports, recordings of the experiments.

Transformation phase is characterized by the artifacts that are prepared to communicate across the boundaries of originating community (knowledge-maturing, n.d.b). Typical videos here would be able to speculate and communicate design ideas in a more accessible format e.g. demonstration of the RFID technology through TV-controller or toy pet by Arnall & Martinussen.

Organizational level

Is best described as purpose driven training. The knowledge artifacts from the communities are evaluated on workshops and training sessions. The material is prepared in a "*pedagogically sound way*" (Kaschig et al., 2011, pg.56). The knowledge is arranged to cover broader subject area. Good practices as learning programs emerging from implementation and training are suitable for teaching novices. Knowledge becomes the object of certification (Kaschig et al., 2011).

Ad-hoc training phase would be characterized by array of "How to…" tutorials, which teach viewers to solve a specific problem with a specific tool.

Formal training videos in the context of Bits & Pieces knowledge would be a video that represents scientific evidence why a sensemaking is important at workplace learning and presents then the tool as one solution to understand that.

In Standardization phase it would be a curriculum composed of video lectures and not one video.

Knowledge maturing model helps to make the difference between knowledge and the artifacts (Schmidt & Kunzmann, 2014). The problem with the design processes that authors emphasise is that often artifacts that belonging to a more mature phases of knowledge get exposed to those, whose knowledge has not yet reached that phase. Thus, without shared understanding the design process with a design artifact of too mature phase could be seen "*even counter-productive*" (Schmidt & Kunzmann, 2014). Video documents being part of the co-design process could also be seen as knowledge artifacts representing specific knowledge phases.

Applying knowledge mature model to analyse the video gallery could give some hints about the state of that gallery by revealing what are the phases of the knowledge are represented by the artifacts.

1.3 Video Tools for Computer Supported Cooperative Work

Video as a tool in the CSCW context could potentially play a meaningful role by augmenting the aspects of the teamwork that are lost when realtime communication is not an option.

Firstly. What is CSCW? The term computer-supported cooperative work (CSCW) was coined by Irene Greif and Paul M. Cashman in 1984. The term gives (...) "*a shorthand way of referring to a set of concerns about supporting multiple individuals working together with computer systems.*" (Wilson, 1991.,pg.6).

The study "Comparing simple and advanced video tools as supports for complex collaborative design processes" by Zahn *et al.* divides video tools into video playback tools and video editing tools (Zahn et. al., 2010).

According to this division video playback tools are intended to watch video information that is prepared and structured thus guided by others. Video editing tools are intended for creating video information structures (Zahn et al., 2010).

1.3.1 Collaborative Video Editing in WebDiver

Zahn et al. examined how people learn during the design process. They found out that collaborative video editing tool in supporting collective knowledge creation is more efficient than video playback tool (Zahn et al., 2010).

Collaborative video editing tool WebDiver was developed and released in 2004. It allows segmenting, editing and annotating panoramic videos. (Zahn et al., 2010). Panoramic

video is recorded with several cameras at once, then recordings are stitched together (Zahn et al.,2010).

Figure 3: WebDiver action view. (Diver n.d. a).

The user can choose a point of interest on the panoramic video by adjusting a digital viewfinder to a desired region on the screen. The the point of interest is displayed as a separate video. Separated videos could be sequenced into yet another videos (Diver n.d. a). Separated videos act as conversation starters and design artifacts.

Remixing of a source video takes place inside the WebDiver service without the necessity of downloading the source file (Diver n.d. a).

The functions that allow users to select temporal segment or a precise spatio-temporal video regions, annotate their selections. And the functionalities around the selected segments and regions of the video are distinctive features of WebDiver service.

1.3.2 AchSo for Capturing the Video

Prerequisite for using full features of WebDiver service is a panoramic video. Creating the panoramic video is an advanced task. Annotating the captured video however could be something desirable for constructing shared understanding upon the captured video.
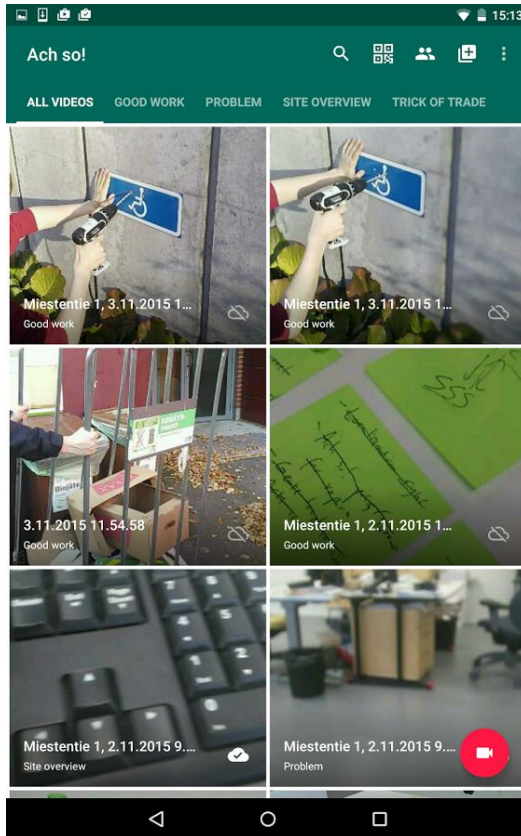
Figure 4: AchSo tool, Product image (n.d.a., Google Play).

AchSo video capturing tool is developed since 2012 by one of the design teams of Learning Layers research project. AchSo tool is an Android application that (...) "*aims to support rapid recording of situations arising in the workplace*"(Ley et al., 2014). The application allows the recording and annotating short video clips. Based on the popularity of video sharing services such as Vine and Instagram AchSO is taking the step forward by allowing layering the video with graphical elements that guide the focus of the viewer. Unlike Vine and Instagram AchSo is a dedicated tool for workplace learning.

To enable rapid decision making upon sorting the captured video 4 categories are given by default. The categories are "Good work, Problem, Site overview and Trick of trade. These categories are guiding the recording or as suggested by Ley et al. (...) "*should help professionals to get used to short video clips for specific purposes*" (...) (Ley et al., 2014).

Even Though the tool was specifically designed for supporting the learning in construction domain, especially providing a support for working with various tools at the work site (Ley et al., 2014). Taking short video notes and being able to annotate and share them with the dedicated team could be a useful also for co-design teams. Especially those who are according Tikkanen & Cabrera (Figure 1.) engaged in video ethnography video recording of experiments or design videography.

1.3.3 YouTube as CSCW Tool

Being a contemporal for a WebDiver YouTube is a playback tool and an editing tool. In addition, YouTube seems often a logical choice as a shared file repository to support cooperative work with video files.

As YouTube was originally designed to facilitate asynchronous communication activities. It serves the project stakeholders as asynchronous communication platform for internal communication on one hand and on the other hand it serves as a dissemination platform for external communications.

As a playback tool it enables its users to search, watch and share the videos. The playback of the video is supported with the features of positive or negative response, comment section allows written and video correspondence.

As a video editing tool it has the features for online editing of the video files. It has features for collaborative editing of the video files. The playback of the video is supported with the features of positive or negative response, comment section allows writing responding with a video.

As shared file repository it provides its users with unlimited storage space for video files. (YouTube, n.d., a).

YouTube has been used as a source for "digital ethnography" to conduct the design research of the future networked cooking spaces (Paay, et al., 2013). Instead of engaging in video ethnographic activities observing cooking enthusiasts at their homes, researchers used 169 YouTube videos matching the specific keyword phrase.

YouTube may be the convenient choice as a file repository for a design team. Unlike Dropbox and Vimeo it does not limit the storage space and is charge free. However it is an environment for publishing the videos instead of keeping the videos unpublished. The goal of the video is to engage the viewers and tie them to the community. Therefore the suggestions of the videos that are similarly tagged or titled are displayed after video playback has stopped (Vines et al., 2013). Similarly tagged or titled videos entice the viewer to spend more time watching the videos so that advertising sales could be carried out.

Especially because of the viewer engagement there are simple postprocessing (e.g. color filters, free soundtracks, annotation tools for interlinking the videos) available on YouTube as the editing tool. Videos that are registered as under the license of Creative Commons could be reused by the users of the YouTube (YouTube n.d.a) .

As YouTube could be used for asynchronous video communication by stakeholders of a design project, the following chapter will give an overview about video messaging service concept.

1.3.3 Threaded Video Communication in Distributed Teams of Designers

Video Threads: Asynchronous Video Sharing for Temporally Distributed Teams (2012) explored the potential benefits of asynchronous video conversations for geographically distributed teams, which might experience large time-zone differences.

Large time-zone differences defined as eight-hours or greater seem to have motivated the investigation of the asynchronous communication tools to complement email, voicemail and shared repositories. Authors argue that the problem is the lack of visual presence of the differently located team members which withholds members from communicating effectively (Barksdale, et al., 2012). By effective communication it should be assumed that co-located teams would benefit from communicating face-to-face.

VideoThreads is a concept of a tool that supports asynchronous video messaging.
Besides the general functions such as video capturing, screen recording, message exchange, it allows to create a "conversation map" by threading the messages (Barksdale, et al., 2012).

Concerning the video production practice there are many software enabled options for using almost any computer for voice recording and screen recording with separate software applications. Merging the image and the voiceover takes yet another application to do so e.g. iMovie or Windows Movie Maker.

In addition to scattered software options there are also free and paid specialized software applications, which combine voice recording, screen recording and narrating e.g. X-Mirage, Jing by TechSmith, Demo Creator by Wondershare.

Therefore the most important contribution of VideoThreads study to asynchronous video conversations domain would be the juxtaposition of the written text and recorded video as communication means.

4 major topics were highlighted in the findings section of the study:

- Emotional and personal feel
- Communication efficiency

- Value of video as medium
- visualizing conversations

Emotional and personal feel. Participants felt more connected with other team members. Participants congratulated one another upon completing a milestone. The emotions, otherwise difficult to express through writing were expressed through the video (Barksdale, et al., 2012).

Communication efficiency. It was found both the benefit and the disadvantage
Explaining visually complex structures through the narrated screencast was perceived simpler and faster than through the written text. (Barksdale, et al., 2012) .

Composing a text enables writer to perform several alterations to the composed body of text, but video message should be recorded at once. The extent of manipulation of each element within production phase shows written text to be more flexible as a medium (Barksdale, et al., 2012).

Performing a search among the messages was perceived more efficient with the email (written text) than with the video (Barksdale, et al., 2012).

It was also mentioned that composing a video takes more time as one has to fire up the application, adjust the camera, make sure the intended message in terms of tonality or sound was captured (Barksdale, et al., 2012).

Value of the video as a medium. Video helped participants to explain complicated things e.g. use of an application, showing a drawing by pointing a camera at the whiteboard, using mouse cursor as a pointer to guide viewers attention.

People felt uncomfortable being seen on a video. For some language barrier was the reason for the shyness. As with the written text they would have taken some time for

proofreading and would have probably used speller to finalize the message (Barksdale, et al., 2012).

Visualizing conversations. It was mentioned that conversation map in form of visualized threads of messages was perceived as something useful to follow, whereas the general progression of the conversation wasn't easy to follow due to issues with switching between written text messages and video messages (Barksdale, et al., 2012).

Based on four categories authors gave three design recommendations, that could increase the efficiency of asynchronous video communication tools.

Integrate with existing communication tools. Provide threaded visualization of all messages related to a conversation. Ubiquitous access to the tool regardless of a device would be considered almost as a basic human right in nowadays software development (Barksdale, et al., 2012).

Enable searchability / Editability
Ways to search videos to find particular content or quickly browse content. More video editing features to personalize the messages (Barksdale, et al., 2012).

Provide Social Aids. Translation and transcription would help users, whose primary language is other than English. (Barksdale, et al., 2012).

Video has become a dynamic part of the asynchronous communication therefore the suggestion of integration with existing communication tools could be found in Gmail, where all media embedded in a message will appear equally with the text in a threaded view. Automated translation and transcription is still something desirable among video messaging tools i.e. YouTube or Vimeo.

Searchability of the video is also something that could be achieved through the transcription when video message inside the video is first written as a text and only then it is recorded. Speech to text feature would make the procedure even more efficient.

1.4 Summary of the literature review

The reason why many co-design projects tend to use video, is that they need a medium that would tangibly represent interactions with objects. Moreover, they need a medium that is capable of speaking with stakeholders with various backgrounds and interests. In other words they need a medium that is highly accessible.

Tikkanen & Cabrera (2008) used video throughout the design based research project as the artifact during the co-design sessions and re-structured their video collection over the course of the project to meet the needs of communicating about their research findings. To enable the broad range of uses video has to be treated on equal grounds with other design project documents of possible public exposure (Tikkanen & Cabrera, 2008).

Arnall & Martinussen (2010) explored the role of video in discursive product design research. They applied cinematic storytelling techniques to use videos as the tool to discuss and explore the novel technologies. They suggested to de-contextualise the knowledge to gather a wide spectrum of opinions.

Video is effective conversation starter as it was emphasised by both Tikkanen & Cabrera; Arnall & Martinussen.

Knowledge maturing model provides a framework for thinking about the videos as the knowledge artifacts that are representing specific knowledge phases (Kaschig et al., 2011).

Applying knowledge mature model to analyse the video gallery provides a framework for assessing the state of that gallery by revealing what are the phases of the knowledge are represented by the artifacts.

Barksdale et al. explored the potential benefits of asynchronous video conversations for geographically distributed teams of designers (Barksdale et al., 2012). The article was reviewed as nowadays many design teams are geographically distributed. The study revealed that video is effective in explaining visually complex structures (Barksdale et al., 2012). Video is ineffective by not revealing its contents without the playback as compared to text (Barksdale et al., 2012).

For gaining an overview of the state of the art tools for supporting the Co-design projects with the video I reviewed the AchSo tool for capturing, WebDiver for collaborative editing, YouTube for storing and VideoThreads for visual mapping of the video galleries. Each tool reflects the aspects to be considered while using video.

AchSo, WebDiver and YouTube enable graphical annotation of the videos for guiding the focus of the conversation. VideoThreads and YouTube enable interlinking of the videos so the conversations would be easier to follow (Barksdale, et al., 2012) or to provide more context that is crucial for communicating the knowledge across the boundaries of the community around the knowledge (knowledge-maturing, n.d.b).

2 Research

Case study research is a methodology that involves the study of an issue explored through one or more cases. A single Case study research is a qualitative approach in which an investigator explores a case progressively within a bounded system (Creswell, 2007, pg.73). In a single case study investigator focuses on as issue or concern and the selects one bounded case to illustrate this issue (Creswell, 2007, pg.74).

Case study approach is appropriate when the investigator seeks to provide an in depth understanding of the case (Creswell, 2007, pg.74). Setting the boundaries to the case investigator has to decide how it might be constrained in terms of time or events (Creswell, 2007, pg.76).

The data that is collected over the course of the research is analysed through descriptin of the case and themes of the case (Creswell, 2007, pg.79).

2.1 About Bits & Pieces

Learning Layers (LL) is a large-scale research project co-funded by the European Commission's 7th Framework Programme (Learning-Layers) Project duration is 4 years since November 2012. Project has 16 stakeholders from 6 countries. The goal of the project is to develop technologies for informal workplace learning. Design based research approach is used to reach that goal. The outcomes of the project are applicable in healthcare and construction domains. There are 4 design teams formed within Learning Layers project. PANDORA and Bits & Pieces are focusing on health care domain. CAPTUS and Sharing Turbine on construction domain (Ley et al., 2014). Each team is developing a tool to tackle the domain specific problem. Tools are co-designed together with the end users.

2.1.1 The Problem in the Healthcare Sector

Healthcare professionals in UK are required to present the evidence of their improving practice every three years, i.e. they have to submit a record of their informal learning experience (Dennerlein, et. al 2015). As General Practitioners (GP)s workload in the UK has increased, meaning that nowadays GPs consult more than 30 patients in 10 minute sessions for each on a typical day and also conduct home visits, therefore the time for reflecting is limited.

2.1.2 Why Bits & Pieces?

As one of four development teams of Learning-Layers project Bits & Pieces (B&P) is formed partially of the researchers from Center for Educational Technologies (CET) in Tallinn University. Therefore it was the logical choice to get the access to Bits & Pieces materials from their side. I decided to analyse how was video used on the basis of video materials produced by B&P team and limited the scope to the materials produced during first three years of the project.

YouTube.com is used by partners of Learning-Layers as a shared repository to store and share video documents. Vimeo.com is used by Learning Layer's finnish partner Aalto University and contains videos from Design Conference in March 2013, where 4 teams were formed and videos depicting activities of design team CAPTUS.

2.2 Methodology

This master thesis could be described as applying Case study approach to derive guidelines for distributed teams who use video for co-design processes.

The material was collected through open-ended interviews with Tobias Ley, scientific coordinator of Learning-Layers project. The writeup of the design process of the B&P case is based on three articles.

1. Dennerlein, Sebastian, Vladimir Tomberg, Tamsin Treasure-Jones, Dieter Theiler, Elisabeth Lex, Stefanie Lindstaedt, and Tobias Ley. "A Sensemaking Tool for Healthcare Professionals' Informal Learning at Work : A Design-Based Research Study." *Computer Supported Cooperative Work* ? (?): ? (unpublished)

2. Tomberg, Vladimir, Mohammad Al-smadi, Tamsin Treasure-jones, and Tobias Ley. 2013. "A Sensemaking Interface for Doctors' Learning at Work: A Co-Design Study Using a Paper Prototype." *ECTEL Meets ECSCW 2013: Workshop on Collaborative Technologies for Working and Learning*: 54. http://ceur-ws.org/Vol-1047/ectel-meets-ecscw-2013-proceedings.pdf#page=61.

3. Ley, Tobias, John Cook, Sebastian Dennerlein, Milos Kravcik, Christine Kunzmann, Kai Pata, Jukka Purma, et al. 2014. "Scaling Informal Learning at the Workplace: A Model and Four Designs from a Large-Scale Design-Based Research Effort." *British Journal of Educational Technology* 45 (6): 1036–1048. doi:10.1111/bjet.12197.

Context and additional information about the events was found in Learning Layers wiki on the following URL: http://htk.tlu.ee/layers/MW

Videos were collected from Learning Layers channel on YouTube.com on the follwing URL: https://www.youtube.com/user/learninglayerseu and from Media Lab Helsinki channel on
Vimeo.com on following URL: https://vimeo.com/medialabhelsinki

Document analysis method was applied to analyse the videos in the case study. Document analysis is a systematic procedure for reviewing or evaluating documents (Bowen, 2009). Documents may contain text, images that have been recorded without the intervention of the investigator. Document analysis is especially applicable to qualitative case studies (Bowen, 2009).

When total amount of the videos for the analysis was collected I sorted the videos according to available metadata e.g. publishing platform, publishing date, publishing status, originating country. That would give me an overview of how video production is related to the general course of the project.

As a second step I skimmed through the contents of the videos to detect similar activities or patterns that would help to create groups.

2.3 Bits & Pieces videos

It was emphasised by the members of the Bits & Pieces design team that video is used in Bits & Pieces project as the communication mean not the tool for conducting the research. Even though majority of the videos are published on YouTube or Vimeo the intended use of video is limited to augmentation of asynchronous communication between stakeholders.

Media wiki for Learning Layers included the topic of "Video Content on YouTube" It contains the answers to following questions:

1. How to publish the videos that are only for LAYERS partners to see?
2. How to publish videos for LAYERS audiences?
3. How to embed the video in the Wiki?

The wiki did not cover expected topics of video or the guidelines of how and what for to use the video. The answers to 3 questions covered step-by-step instructions for performing the procedure. Therefore it was up to team members to decide how to use video and whether to publish it.

The YouTube channel of Learning Layers contains 68 videos. The first (oldest) video was published on 4th of March 2013 and the last (newest) newest was published on 4th of July 2014. Channel has 21 subscribes and 2911 views all together.

As the videos on Learning Layers YouTube channel are not grouped into specific playlists e.g. Bits & Pieces or AchSo, Living Documents or Help seeking, the exhaustive list of videos was gathered via email correspondence with Learning Layers scientific coordinator and resulting in 18 videos (see the complete list of videos Table nr. 2 in appendices) all together.

Total amount of videos: 18

Videos on YouTube: 11

First (oldest) video: March 2013

Last (newest) video: June 2014

Public videos: 9

Unlisted videos on YouTube: 3

Videos concerning B&P on Vimeo: 7

15 of 3 videos were publicly available through Learning Layers YouTube channel and Media Lab Helsinki Vimeo channel. 3 videos were stored on private accounts of Bits & Pieces team members.
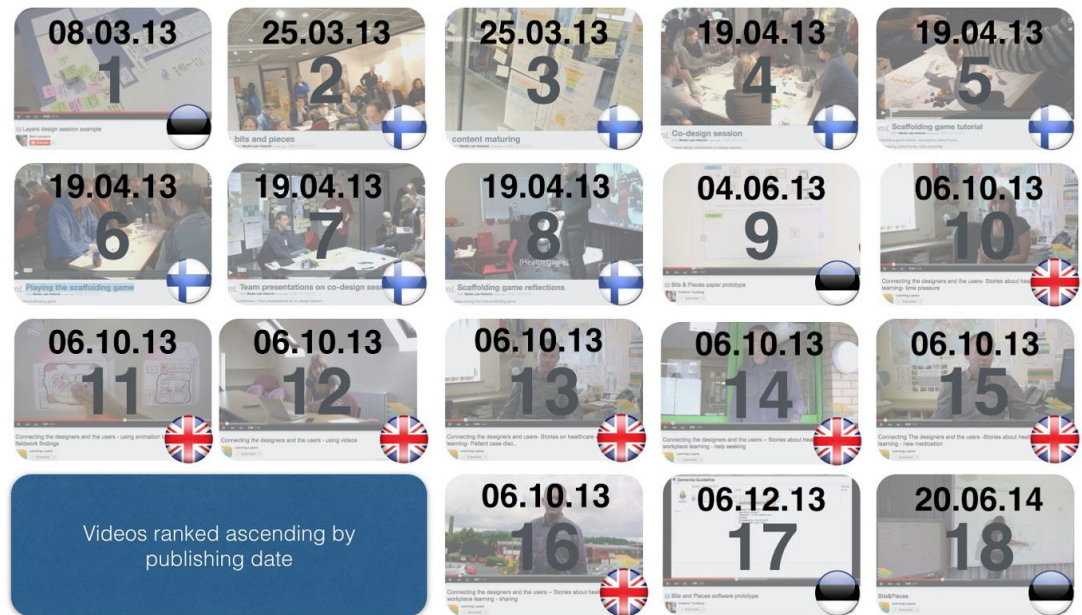
Figure 5: Videos ranked ascending by publishing date.

All the videos from YouTube and Vimeo are given numbers from 1-18. That is how the videos are referred throughout the analysis e.g. video (1) or videos (2; 8; 11). When it is suitable the title of the video is mentioned together with the number.

Data available on YouTube and Vimeo revealed that videos were uploaded on 6 occasions. Each video was located according to originator's country, which is indicated with the icon depicting the official flag of the country. According to which, videos were uploaded by Estonian, Finnish and British team members.

Videos (1; 9; 17) containing co-design session sample (1); paper prototype and paper prototyping session sample (9) and overview of software prototype (17) were uploaded as unlisted, therefore these videos were intended for the internal use among the team members and stakeholders.

Videos (2-8) stored on Media Lab Helsinki Vimeo channel were uploaded on 2 occasions. Videos were recorded on the Design Conference at Helsinki on 5th and 6th of March 2013.

As a next step I browsed through the contents of the videos to detect similar activities or patterns to create groups.

Videos, (5;6;8) "Scaffolding game tutorial", "Playing the scaffolding game" and "Scaffolding game reflections", document the cardboard game, which was designed by Jukka Purma and based on scenarios and was used to explore ideas related to problem solving at the workplaces (Layers wiki).

The author of the game Jukka Purma explained the game as following: "*What kind of problems you get on work and how you use other people and resources around you to solve these problems*". (Media Lab Helsinki, 2013) These three videos give an overview about the method; method in use; reflections about the method. Only person, whose name is given, is Jukka Purma.

Examples of fieldwork reporting (10-16) were published on 6th of October 2013 containing 5 videos of Bits & Pieces team members reporting "talking-head" style and one video with narrated report illustrated with live animation of paper-cut figures.

Videos are stored on Youtube, where each video is complemented with the identical descriptions that explains the purpose of the videos. The general purpose of the videos, as stated in the description, is to share early stories and observations from the fieldwork with the Learning Layers developers/researchers (Learning Layers, 2013) . These videos are the example of asynchronous video messaging. Video (11) "Connecting the designers and the users - using animation to present fieldwork findings" seems more advanced due to narrated paper-cut animation.
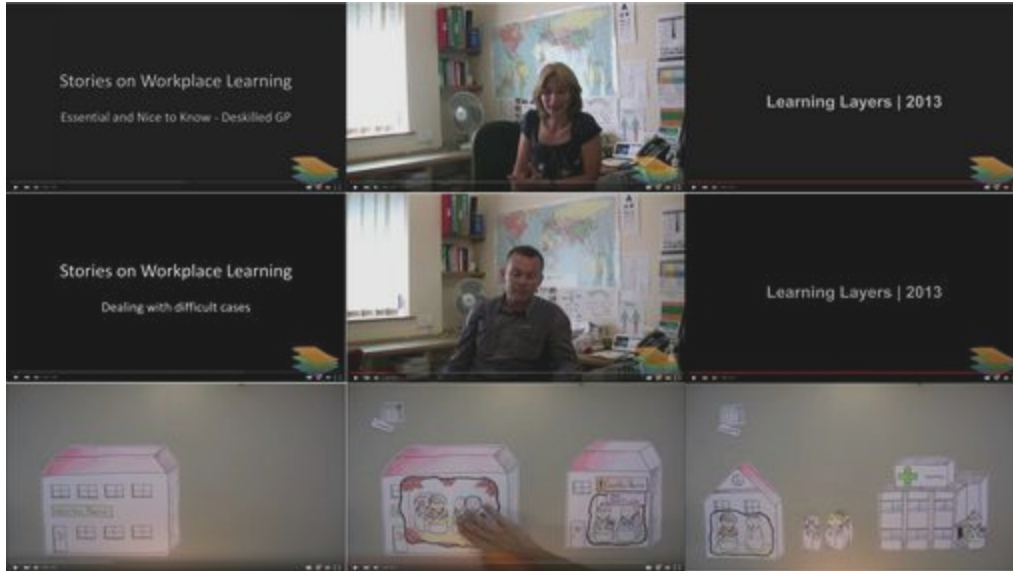
Figure 6: Screenshots from videos (10;13;11)

Figure 6 shows the visual progression of fieldwork reporting style. Screenshots from videos on first and second row contain Title, interview type of reporting and closing credits. Learning Layers logo watermark is used continuously throughout the video. Watermarking is conventionally used to protect the material from being used without permission.

Screenshots from the video in the third row depicting the animated version of reporting seems to have abandoned the title, watermark and closing credits. Nevertheless it employs visually more complex and dynamic ways to tell the story.

A Tool or a method is introduced - TUTORIAL

Co-design session results are presented - PRESENTATION

Participants of the event are enaged in activity - DOCUMENTARY

Fieldwork findings are presented with cut-out paper figures - ANIMATED REPORT

Fieldwork findings are presented in "talking head" style - FIELDWORK REPORT

Figure 7: Categorisation of the videos

Skimming through the videos to detect the patterns through activities visible in the videos could be summarized with the Figure7. These categories explain also the purpose of the video e.g. to introduce a tool (TUTORIAL), to present co-design session results (PRESENTATION) or to give an overview of the event (DOCUMENTARY).

Figure 8: 18 videos sorted into to 5 categories

According to 5 categories the largest group is Fieldwork report with 6 videos; Presentation with 5 videos; Tutorial with 4 videos; Documentary with 2 videos and Animation with 1 video. Two videos (5; 11) could be seen as genre crossing videos due to different production technique. Video (5), which is categorized as Tutorial and Presentation is in fact a presentation of how to play scaffolding game. It is recorded with one take as the presentation, but it contains similar knowledge to other 3 tutorials. Animation Fieldwork report (11) is narrated similarly to fieldwork reports, but instead of narrator it shows paper-cut imagery. The categories of presentation and documentary could also be merged, because they are recorded similarly on the venue co-design event, but category of presentation has specific focus on the presenter, whereas category of documentary is focused on the activity carried out by multiple individuals.

B&P design based research project and the videos

The goal of B&P team is to develop a tool to support informal learning in the healthcare domain.

Design based research carried out by Bits & Pieces started with consortium wide contextual inquiry, which is followed by 3 prototyping stages and one workplace integration phase.
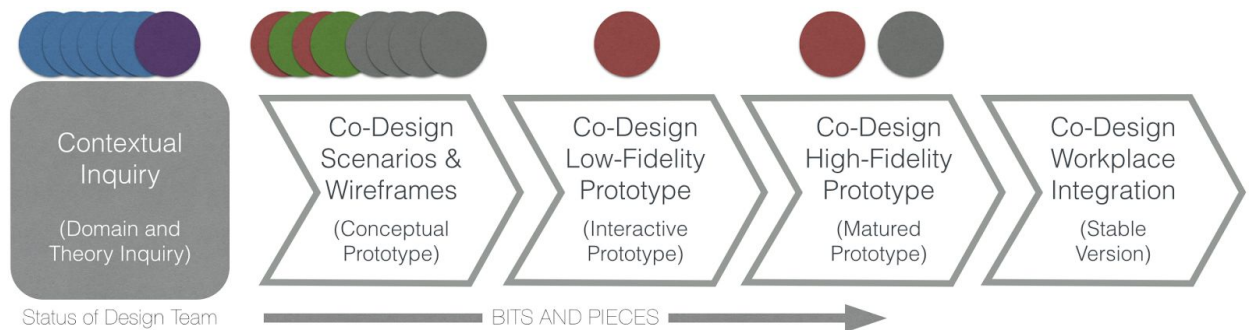
Figure 9: Videos attached to the phases of Design Based Research.

Figure 9 shows how videos are related to different phases of B&P project. It does not show in which order the videos were produced it merely connects the videos to the phases according to the topics that videos cover. The focus of the videos relating to different phases becomes more technology centered with each phase. Contextual Inquiry contains six videos containing fieldwork reports and one animated fieldwork report. Co-Design Scenarios and Wireframes phase contains two videos (tutorial) displaying a tool or a method that is presented, two documentaries about the co-design event and four presentations of the results from the co-design session. Co-Design Low-Fidelity Prototype phase contains only a presentation of a tool. Co-Design High-Fidelity Prototype contains one tutorial and one presentation.

It would have been interesting to see if the videos from Co-Design workplace Integration were again more fieldwork report and documentary type of videos so viewers could spectate the whole cycle of the B&P sensemaking tool development.

During the third cycle in analysing the videos I took the concepts from the literature review and organized the videos around them.

Video as the knowledge artifact

The following is an attempt to apply knowledge maturing model to look at the videos as the knowledge artifacts.
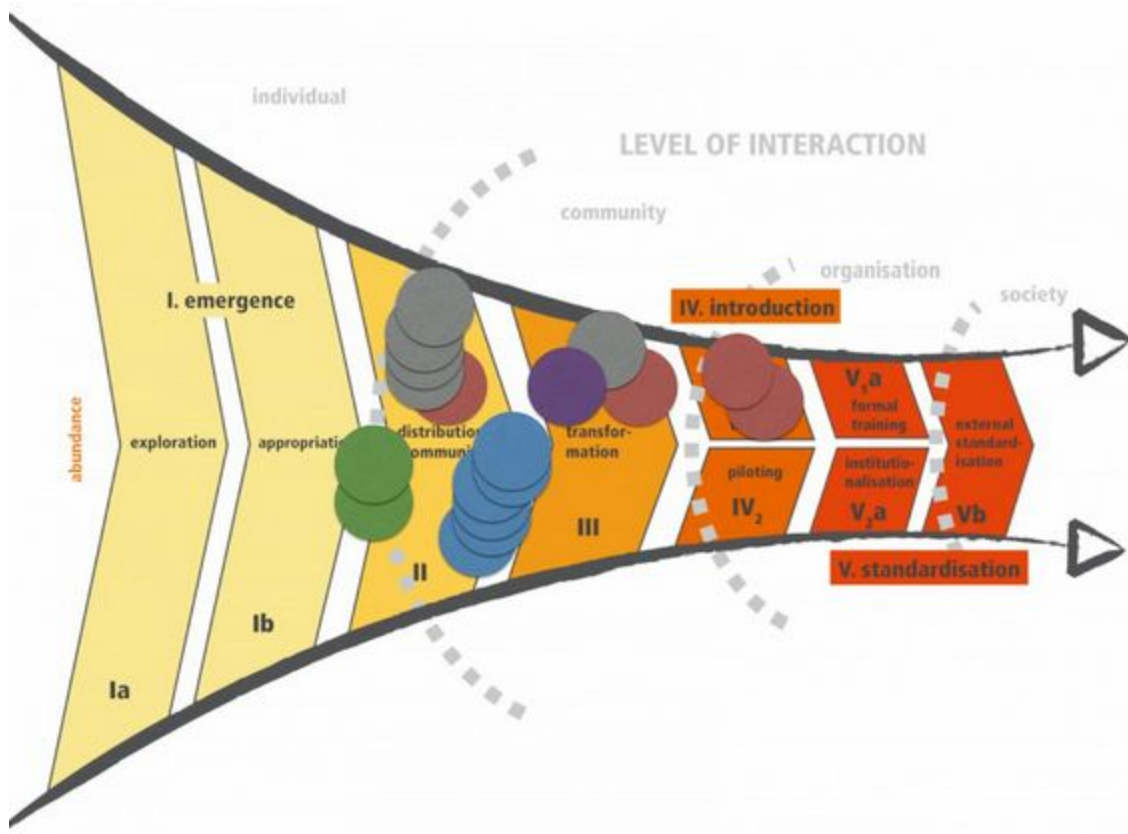

Figure 10: Video as knowledge artifact mapped on the knowledge maturing model.

The gallery of Bits & Pieces videos looked as knowledge artifacts cover the phases of Distribution in Communities, Transformation and Ad-hoc training. As the videos were published, therefore introduced within the community of Learning Layers, none of them

is the subject of individual level of interaction. However as the majority of videos were published within Learning Layers blog they fit the phase of distribution in communities.

Community level of interaction

The category of fieldwork report (videos 10;12;13;14;15;16) could be considered an innovative approach to present fieldwork findings therefore it is placed on the phase of Distributing in communities.

The category of Animation (video 11) although containing similar knowledge on narrated level with the fieldwork reports provides rich visual context due to orchestrated presentation of knowledge with paper-cut props therefore as the knowledge artifact it is placed on the phase of transformation. The phase of transformation contains one Presentation video (18), which gives a structured overview of Bits & Pieces design team progress with the presenter whose speech is supported by visual qualities of slideshow on the background. The lack of contextual support is the reason why the category of Presentation (videos 2;3;7;8) remains in the phase of Distribution in communities. It is placed even more towards the personal level of interaction compared to fieldwork reports due to insufficient titling and descriptions as compared to fieldwork reports.

Two documentaries (4;6) are the only videos that are placed between individual level of interaction and community level of interaction. Video (4) is divided into chapters therefore it seems that on personal level of the knowledge has been categorized corresponding to the titles of the teams that were formed on Design Conference in Helsinki. However the discussions that are depicted in the video represent only the context-dependent part of what was discussed in those teams. Video (6) is the documentation of the Scaffolding game "in action" First two minutes of the video depict the group that seems to be confused how to play the game and in 02:02 one of the players is leaving to seek some help. Minutes 02:05-10:06 depict the group, who is in the middle

of the discussion, however, due to sound quality of the video it can not be identified how the discussion that group is engaged in is related to the game. Therefore video (8) minutes (04:20 - 08:32) confirms that the first group from the video (6) had a chance to play the game and minutes (08:35 - 14:13) confirm that the second group, which topic of discussion remained unclear was in the middle of a post game-play discussion.

Ad-hoc training

Two tutorials are placed on Ad-hoc training phase. These are: "Layers Design Session Sample" (1), and "Bits & Pieces Paper Prototype" (9). Video (1) is answering the question, "How to organize co-design session with the end users", by demonstrating and explaining the procedure. Video (9) is demonstrating the paper prototype and the suggested format for co-design workshops with the end users. Videos (1;9) share similar format as in both, first the problem is indicated and then the solution to is provided through narrated demonstration of the tools and the procedure.

While videos (1&9) might have used the luxury of several attempts (takes) to produce the tutorial, video (5) is the tutorial that explains (in one take) the general principles of particular Scaffolding game for the audience of Design Conference in Helsinki. The aim of the video (5) was to capture the moment of presentation of the game, whereas the aim of the videos (1;9) was to create a reusable artifact, therefore video (5) is placed on the phase of distribution in communities.

Personal and anonymous communication

According to Barksdale et al. video message compared to written message is creating more emotional and personal feel so the viewers/team members would feel more connected with the presenter. In distributed teams it is the video that helps to connect names and the faces of the team members.

Figure 11: Screenshots from the B&P videos that indicate presenter's name.

Showing nameless presenters appears to be the throughout motive of the whole B&P video gallery with two exceptions - videos (5;18). Video (5) "Scaffolding game tutorial" makes it clear in the description area (see Figure 11, lower right area) and in the closing credits that the designer of the game and the presenter is Jukka Purma. Video (18) Bits & Pieces uses title layer on video that indicates the name of the presenter as Sebastian Dennerlein from Graz University of Technology.

For inner communication, adding a name to the video would perhaps be unnecessary. Videos (1; 9) were set as unlisted. Video (17) did not contain a audio track at all. However for the public videos (2; 3; 7; 8; 10-16) , not adding the name of the presenter, can be considered an artistic choice. Therefore the viewer from outside the project, seeing a nameless presenter would have no information about the presenter or presenter's connection to the project.

Graphical augmentations of the videos

Opening and closing credits provide the viewer with the necessary context to understand what the video is about.

Figure 12: Screenshots of opening credits used for public videos in 2013

The first image on the figure 12 provides clear information about the content viewer is about to see. Stories on Workplace Learning refers to the sequence of videos and "Essential and Nice to Know - Deskilled GP refers to the topic of the particular video. Second image on figure 12 is a title accessible only for those, who know what is Bits & Pieces. Third image on figure 13 tells what is happening and where.

Figure 13: Screenshot of opening credits sequence for public videos in 2014

In 2014 more sophisticated type of opening credits was attached to the videos published on YouTube. General opening sequence with the drawing hand followed by specific title, where it is indicated, which series the video belongs (Bits & Pieces) and what is the topic of particular video.
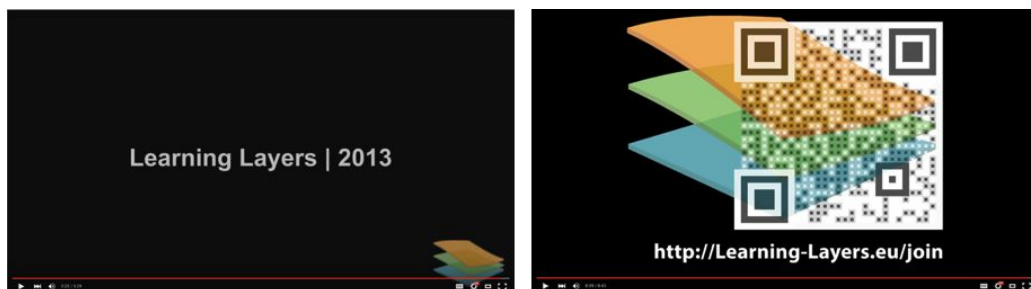

Figure 14. Screenshot of the closing credits for public videos in 2013 and 2014

Figure 14 is showing clearly how the closing credits gained complexity in 2014. The closing credits in 2013 indicate the title of the project and the year of production. In 2014 the year of production is not indicated, nevertheless the closing credits provide two options for navigating to the Learning Layers project website. Navigating through QR code takes the user to the main page of the project whereas typing in the URL as indicated with the text navigates to dedicated page for the stakeholders. Even without navigating through any of suggested options through the textual cues that URL is composed of it is clear for the viewer that Learning Layers is something EU based that could be joined.

The table (Table 1) by Tikkanen and Cambrera will be used as the framework for organizing videos into categories. Some comments about the framework that I will apply to categorize the videos. Concerning the section of the table describing the Disciplines involved, while being useful for a video production for co-design in general it is irrelevant in analysing videos.

Video ethnography suggests that material should represent "Hard" data from the potential design context. Video as "Hard data" refers to recorded evidence that should be as close to reality as possible (Buur et al., 2000).

The potential design context for the sensemaking tool of B&P is the hospital or GP practice (Dennerlein et al., 2015). Therefore to fulfill the prerequisites of the Video ethnography genre videos should depict potential users engaged in their daily activities on the premises of a typical GP practice.

3 videos (10;13;15) seem to have been recorded on the premises of a GP practice. It could be assumed due to generic images (anatomic image of a body, table for eye test for adults) that could be conventionally associated with the GPs office.

Video (14) seems to have been recorded in front of the hospital or a GP practice due to a sign of Waiting Room on the background of a presenter. However that could be assumed only using common knowledge about Hospitals and GP practices, which usually have Waiting Rooms.

As video ethnography lays stress on the context we should look at the context of those 18 videos to detect whether there were unintended examples of the genre.

All 18 videos could be used as a subject for video ethnography, but in the context other then B&P case study. For example 2 (2;3) videos from co-design meetings used experimental method for capturing the image. Namely camera was mounted to the head of the presenter creating rapidly changing imagery from the perspective of a presenter. The result of that novel technique used to capture the image could inform the community developing head-mounted cameras. As there was no explanation provided the reason remained implicit.

Video recordings of experiments suggests that material should represent ways how users interact with a product and how the product behaves in a controlled test setting. Video could be used as data to support usability analysis of products. (Tikkanen & Cabrera, 2008).

2 videos (2;3) from co-design meetings with head mounted camera would fit the category by producing artifacts about issues with readability of material due to skewed horizon, recorded by a first-time user. One could also notice that the audience seems to be tired. Taking that into account one could assume that the material would be used by those, who attended the event to recap with the material.

Figure 15: Screenshot of the video (2) demonstrating the presentation with the head-mounted camera, (Media Lab Helsinki, 2013)

Video demoing B&P software prototype (17) could be an example, but as the description is missing, it is not clear if it is an experiment, . As this video's privacy status is "unlisted" only those who have been provided with the link are able to view it.

Design videography represents a constructed use situation with a technology to communicate design ideas through video prototypes, sketches, contextual inquiry videos. These are the matter of social glue (Buur & Ylirisku, 2007). Design videography is intended to build a common ground for designers and stakeholders to evaluate the designs (Tikkanen & Cabrera, 2008).

Although all 18 videos could be assigned one or other way to be representatives of Design videography approach, some of them (9;17) fit the genre best. due to more technology centered focus than the others.

Figure 16. Bits & Pieces paper prototype (9), (Tomberg, 2013)

Bits & Pieces paper prototype video (9) contains the following topics:

1. Overview of the affordances (frames 1-6)
2. Introduction of a setup for the organizers of the design sessions (frames 7;8)

As the length of the video is 13:57 and it contains 2 topics, it could have been useful for the viewers, if the the videos was organized into chapters. The chapters could have been indicated either with the graphic annotations or with timecode indicators inside the description section.

First the video was used as a conversation starter on co-design meetings, where it was introduced to potential end users from GP practices. Secondly the paper prototype itself was used on co-design meetings.

The reason for making the video was explained in the status paper as following: (...) *"to sketch the procedure of the paper prototyping session and to arrive at a common understanding together with the application partner coordinators"* (...) (Dennerlein et al., 2015). The goal of the paper prototyping session was to evaluate and reveal affordances of the tool in the workplace context. The imagined context of a GP practice was based on the experiences of the end users.

As a result of the showing the video on co-design meetings followed by interaction exercise with the paper prototype, the affordance of map and layers (frame 3) was suggested by the end users of having no value for them and therefore the development of these affordances was dropped and the development of those affordances the potential users were most satisfied with was continued (Dennerlein et al.,2015).

Professional video production approach is needed, when clear and unambiguous message across organizational and disciplinary boundaries through pitching videos,

reportages and documentaries has to foster project take-up by stakeholders and wider audience (Tikkanen & Cabrera, 2008). That is the approach that has to create usable "sales tools". It is usually that in the final phase of the project "dissemination video" or call it a "sales tool" is needed.

Every public video of the project could be considered a sales tool. 15 of 18 videos were publicly available through YouTube and Vimeo. As Bits & Pieces project is still in its matured prototype phase there are still videos to be produced that would in above described manner communicate the project to the stakeholders.

Tikkanen and Cabrera suggest that technology should play a central role in the story (Tikkanen & Cabrera, 2008). That would trigger the conversation about the technology and not about something else being seen in the center of the story.

Discussion

The purpose of this master thesis was to explore the role of the video in the design based research approach to derive recommendations for decision making upon the usage of video to communicate research findings among the stakeholders.

Discussion is organized into two parts. First part deals with the discussion of the Literature review. Second part summarizes the findings of the Bits & Pieces case study.

Discussion of the literature review

Video as a medium

As it was stated in the introduction chapter of the thesis that video is not an effortless activity. It is hard to produce (Tikkanen & Cabrera, 2008) and it is not as mouldable as text (Barksdale et al., 2012). It is too detailed (Mackay et al., 2000). Despite the "warning signs" it is used. There are some qualities about the video that seem to justify its use:

- Creates enough emotion to start a conversation
- Effective for sketching (out the low fidelity prototypes during the co design sessions)
- Can visualize otherwise invisible (if composed of animated images)
- Effective in explaining visually complex structures.

Emotion seems to be one of the keywords that is attributed to the video by Tikkanen and Cabrera; Barksdale et al. Arnall & Martinussen suggest to de-contextualize the video and

use elements from popular culture so it would address wider audience and trigger the conversation about the technology especially in the early phases of the design. Effectiveness for sketching is perhaps challenged by intuitive software based prototyping services e.g. Invisionapp.com. An animated video could be a prefered solution when there are aspects that cannot be filmed but still are valuable to build the shared understanding upon e.g. RFID technology. Effective in explaining visually complex structures (Barksdale et al., 2012). That is perhaps the most important quality of the video as the medium that was supported also by Tikkanen and Cabrera by suggesting that video could be used to explain the evolution of the product or illustration of a design problem.

There are the qualities about the video that form the counterweight necessary for decisionmaking upon using it for the project.

- The content of the video file is not searchable
- Should be recorded at once
- Uncomfortable being seen on a video

These qualities were brought out by Barksdale et al. as compared to written text. Videos that are narrated could be turned into searchable pieces by transcription of the narration. Should be recorded at once and Uncomfortable being seen on a video are related qualities. When composing a text one has time to alter the text whereas altering the text during the recording usually means to start the new recording and would usually give the feeling of disappointment for those who are the subject of recording. Despite the bitter feelings about re-recording one's presentation it usually helps to refine the text if it is too complicated to remember and thereby present. That could also be used as an indicator of how the message is received. If the message is too complicated to remember then it is also too complicated to remember by the viewers.

Video as a document

Video is no different than other documents created over the course of the project. Video as a document on equal grounds with written documents could be considered a good way of thinking generally about the role of video within the project.

From one side It opens up the medium for the projects by promising the potential of the use in almost all the project phases, including treating context dependent video as a note that could be thrown away. From the other side it gives a notice to establish rules similar to those concerning writing, so video documents if not thrown away should maintain the potential of being published.

Even if the professional video production team is not included from the very outset of the project the perspective of outsourcing the service for dissemination of the results in the later phases of the project is usually there. To do so with the least effort the following suggestions would help:

- Discuss the project with the video professional already in the planning phase.
- Develop the principles for publishing the video, make it available for those involved in video production for the project.
- Create the registry of the video files.

Discuss the project will help to make sure that the quality of the produced video would fit the requirements of being later restructured into a coherent video presentation, documentary or pitching video. The suggestion of including the video professional could be seen as a suggestion of thinking and planning carefully about using the medium from the very outset of the project. Professional would help to set the requirements for using certain technologies and recording techniques to maintain the "moldability" of the medium.

Create video registry would help to avoid piling up similar information i.e. accounts of people sitting around the table during co-design sessions, whereas there might be a lack of video information that would illustrate hours and hours of work going into coding for example.

Video Tools for supporting Co-design projects

For gaining an overview of the state of the art tools for supporting the Co-design projects with the video I reviewed the AchSo tool for capturing, WebDiver for collaborative editing, YouTube for storing and VideoThreads for visual mapping of the video galleries. Each tool reflect the aspects to be considered while using video.

- Create genre presets for capturing the video
- Enable collaborative editing
- Connect the stored video files

Create presets. Even though the presets in AchSo were given by default the overview of captured genres would balance the collection with the videos representing for example good or bad practices. That supports the exploration of different aspects of the same phenomenon.

Enable collaborative editing could be seen as a tool supported opportunity for collective knowledge creation (knowledge-maturing, n.d.a). Video editing for that matter is seen as the effective method (Zahn et al., 2010). The collaborative editing and connecting the stored video are the activities enabled in YouTube. Connecting separate videos through interlinking would add complementary information that is increasing the context. Increased contextual support makes the knowledge accessible from the outside of the originating community(knowledge-maturing, n.d.b).

For example videos depicting the co-design meeting in Helsinki could have benefited from being connected to the tutorial that explains how to conduct a design session. Carefully narrated paper prototyping video would have added the necessary context to the silent software prototype video by showing how the product has been evolved.

Discussion of the Bits & Pieces case study

As it was indicated on Figure 9, which displayed videos attached to the phases of design based research, the majority of the videos were produced during the Contextual inquiry and Co-design & Wireframes phase. Thus the the case study did not cover the whole project.

Video was used in Bits & Pieces project as the communication mean and its was limited to augmentation of asynchronous communication between stakeholders.

The Asynchronous Video Messaging

As the design team of B&P used video for delivering video messages mentioned as "talking head" style reporting the following suggestions would help to improve the practice:

- As in a written message indicate the sender if the intention is not to send an anonymous message.
- Transcribe and add subtitles so the viewer would receive it no matter the quality of the sound or language skills.
- If possible use the text of the message as the voiceover and act it out with the props

Indicating a sender would contribute to the creation of the personal feel of the message. Transcribing and subtitling would help the viewer to receive the intended message

despite the quality of the recorded sound. It is especially relevant if recording takes place outside and the noise (of the wind) is interfering with the spoken text. Act it out with the props helps to keep the focus on the topic and augment it with the relevant imagery.

Based on the analysis of the videos from the case study of Bits & Pieces the suggestions for decision making upon using the video for communicating research findings among the stakeholders could be the following:

- Use one file repository for storing the video files.
- Create chapter indicators for topics covered within the video.
- Group videos containing similar topics.

Use one file repository. Videos relevant for communicating the research findings were divided between two video hosting services (Vimeo and YouTube). If using two file repositories for some reason i.e. Vimeo allows to download the video files and therefore it is relatively easy to replicate them on YouTube.

Create chapter indicators. It could have been stated more ambiguously by suggesting to add chapter indicators to longer videos. However the length of the video does not necessarily contain different topics. Chapter indicators would support searchability of the videos (Barksdale et al.,2012). Unlike text documents videos reveal their contents only during the playback.

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Kokkuvõte

Käesolev magistritöö andis ülevaate video kasutusalast kaasavas disainiprotsessis. Tänapäeval püüavad disainiprotsessid kaasata sidusrühmi juba varajastest faasidest alates, et kindlustada loodavate toodete või teenuste võimalikult laia kasutuselevõttu. Video näib olevat vahend, mida sageli kaasamiseks kasutatakse.

Ehkki on olemas kirjandust video kasutamise kohta kaasavas disaini protsessi kontekstis ei ole piisavalt juhiseid kuidas seda teha hajutatud meeskonna tingimustes ja millega tuleb sellisel juhul arvestada.

Kirjanduse ülevaate tulemusel joonistusid välja video kui meediumi kvaliteedid, mida tasub arvesse võtta video kommunikatsiooni kavandades:

- Video on efektiivne keeruliste visuaalsete struktuuride selgitamisel
- Aitab nähtavaks muuta tehnoloogia tehnoloogia nähtamatuid aspekte
- tõhus arutelu ergutaja

Kui vaadelda Disainiprotsessi õpiprotsessina võimaldab Teadmuse küpsusmudel hinnata video või terve video galerii kommunikeerimispotensiaali.

Juhtumiuuringu käigus rakendasin video galerii analüüsimiseks dokumendi analüüsi meetodit ja kirjanduse ülevaate põhjal loodud teadmusprotsessimis mudelit.

Appendices

Appendix 1 - Registry of 18 videos

Video messages

Date: 08.03.13
Title "Layers design session sample"
Description: *Tobias recorded a demo video to illustrate the recommended format for participatory design session based on four design ideas from Helsinki conference.*
Link: https://www.youtube.com/watch?v=O8hltt1dGuw
Channel: Mart Laanpere, accessed 15.04.15
status: unlisted
presenter: unspecified (Timo Tobias Ley, Layers scientific coordinator)
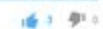Institution: Tallinn University
Country: Estonia

"The conceptual prototyping method via the scenarios and initial wireframes was depicted in a video to achieve a shared understanding on it and share it with the

application partner coordinators as they administered the respective meetings [...]" (Dennerlein et al., 2015)

Date: 19.04.2013
Title: bits and pieces
Description: not added
Link: https://vimeo.com/62612711
Channel: Media Lab Helsinki
status: public
presenter: not specified
Institution: Aalto University
Country: Finland

Date: 19.04.2013
Title: content maturing
Description: not added
Link: https://vimeo.com/62604353#t=214s
Channel: Media Lab Helsinki
status: public
presenter: not specified
Institution: Aalto University
Country: Finland

Date: 19.04.2013
Title: Co-design session
Description: Learning Layers design conference co-design session
Captus: 00:10
Pandora: 10:50
Sharing turbine: 15:50
Bits & pieces: 28:40
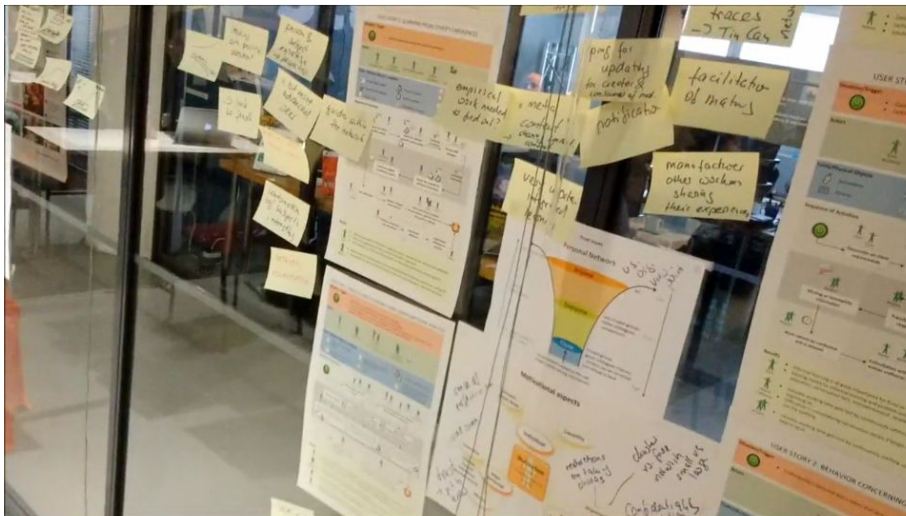Link: https://vimeo.com/64382615#t=1722s
Channel: Media Lab Helsinki
status: public
presenter: not specified
Institution: Aalto University
Country: Finland

Co-design session
from **Media Lab Helsinki** 2 years ago / NOT YET RATED

Learning Layers design conference co-design session

Date: 19.04.2013
Title: Scaffolding game tutorial
Description: Scaffolding game tutorial - narrated by Jukka Purma. Designed by Jukka Purma, Aalto University

Link: https://vimeo.com/64378912
Channel: Media Lab Helsinki
status: public
presenter: Jukka Purma
Institution: Aalto University
Country: Finland

Date: 19.04.2013
Title: Scaffolding game reflections
Description: Design ideas arising from the scaffolding game
Link: https://vimeo.com/64377484#t=854s
Channel: Media Lab Helsinki
status: public
presenter: not specified
Institution: Aalto University
Country: Finland

Date: 19.04.2013
Title: Team presentations on co-design sessions
Description: Design conference - Team presentations on co-design session
Link: https://vimeo.com/64384000
Channel: Media Lab Helsinki
status: public
presenter: not specified
Institution: Aalto University
Country: Finland

mL **Team presentations on co-design session**
from **Media Lab Helsinki** 2 years ago / NOT YET RATED

Design conference - Team presentations on co-design session

Date: 19.04.2013
Title: Playing the scaffolding game
Description: Playing the scaffolding game
Link: https://vimeo.com/64384000
Channel: Media Lab Helsinki
status: public
presenter: not specified
Institution: Aalto University
Country: Finland

Playing the scaffolding game
from **Media Lab Helsinki** 2 years ago / NOT YET RATED

Playing the scaffolding game

Date: 04.06.13
Title: "Bits & Pieces paper prototype"
Description: *Presentation of Bits & Pieces paper prototype for workshops with end-users.*
Link: https://www.youtube.com/watch?v=IrnpNE3JCzo
Channel: Vladimir Tomberg,
Status: unlisted
Presenter: unspecified (Timo Tobias Ley, Layers scientific coordinator)
Institution: unspecified (Tallinn University)
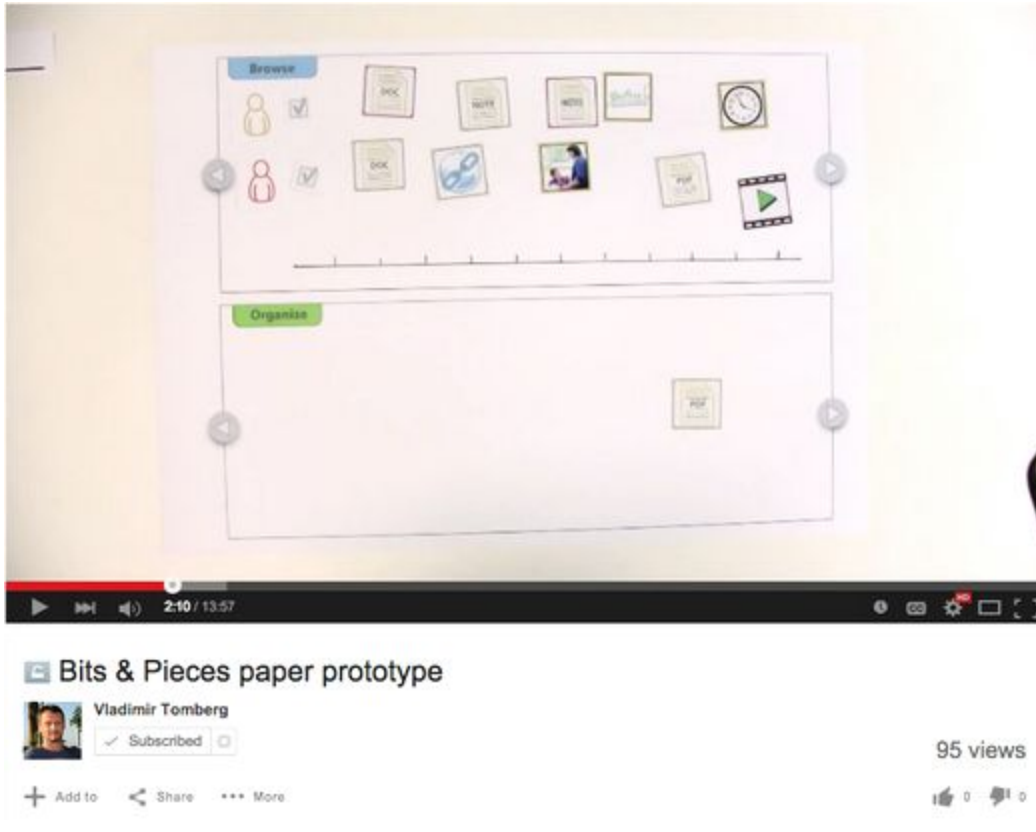Country: Estonia

Figure 4. Screenshot of video demonstrating a paper prototype

"Then we produced a video, where usage of Bits and Pieces was demonstrated on the paper prototype to sketch the procedure of the paper prototyping session and to arrive at a common understanding together with the application partner coordinators [...]" . (Dennerlein et al, 2015)

Date: 06.10.13

Title: Connecting the designers and the users- Stories about healthcare workplace learning- time pressure

Description: *http://Learning-Layers.eu - This video is an example of how Layers is using technology to share initial reports from the fieldwork with the developers and researchers in the design teams. Leeds is undertaking explorative studies with 3 GP practices in the UK, spending time with their staff to understand how they currently learn at work. These videos were made to share early stories and observations from the fieldwork with the Layers developers/researchers to help them to get a richer feel for the healthcare working and learning context. Pseudonyms have been used in these stories; none of the GP practice staff or GP practice names referred to are real. In many cases the stories do not refer to one individual's story, but to a pattern that the researchers have observed in several situations. This particular story describes some issues connected to cascading of learning within teams and also identifies how time pressures lead healthcare staff to focus solely on the essential learning and personal interests or less critical learning is squeezed out.*

Link: https://youtu.be/SM4QMJDb8OI,

Channel: LearningLayers status: public

Presenter: unspecified (Tamsin Treasure-Jones)

Institution: unspecified (Leeds Institute of Medical Education, University of Leeds)

Country: UK

Connecting the designers and the users- Stories about healthcare workplace learning- time pressure

Learning Layers
✓ Subscribed ⚙

48 views

+ Add to   ⟨ Share   ••• More   👍 1   👎 0

Date: 06.10.13

Title "Connecting the designers and the users - using animation to present fieldwork findings"

Description: *http://Learning-Layers.eu - This animation is an example of how Layers is using technology to share initial reports from the fieldwork with the developers and researchers in the design teams. Leeds is undertaking explorative studies with 3 GP practices in the UK, spending time with their staff to understand how they currently learn at work. This animation was created and shared with developers/researchers to illustrate the different working patterns of staff involved in the diabetic clinics based in GP practices.*

Link: https://youtu.be/_kOCzBomlUg

Channel: LearningLayers

Status: public

presenter: unknown

Institution: unknown, Leeds?
Country: UK

Connecting the designers and the users - using animation to present fieldwork findings

What could have been the reason to publish fieldwork findings after the paper prototype of the software has been introduced? Fieldwork findings were utilized already during the workshop in Helsinki in March.

Date: 06.10.13
Title: Connecting the designers and the users - using videos
Description: *http://Learning-Layers.eu* - *This video is an example of how Layers is using technology to share initial reports from the fieldwork with the developers and researchers in the design teams. Leeds is undertaking explorative studies with 3 GP practices in the UK, spending time with their staff to understand how they currently learn at work. This video was made to briefly set out to developers/researchers GP practices some issues around technology use within the GP practices.*
Link: https://youtu.be/yEWBJlW5_ts
Channel: LearningLayers
Status: public
Presenter: unspecified (Tamsin Treasure-Jones)
Institution: unspecified (Leeds Institute of Medical Education, University of Leeds)
Country: UK

Connecting the designers and the users - using videos

Learning Layers
✓ Subscribed ⚙

25 views

👍 1 👎 0

➕ Add to   ⏷ Share   ••• More

Date: 06.10.13

Title: Connecting the designers and users- Stories on health care workplace learning-
Patient case disc...

Description: *http://Learning-Layers.eu* - *[Story: Patient case discussions] This video is an example of how Layers is using technology to share initial reports from the fieldwork with the developers and researchers in the design teams. Leeds is undertaking explorative studies with 3 GP practices in the UK, spending time with their staff to understand how they currently learn at work. These videos were made to share early stories and observations from the fieldwork with the Layers developers/researchers to help them to get a richer feel for the healthcare working and learning context. Pseudonyms have been used in these stories; none of the GP practice staff or GP practice names referred to are real. In many cases the stories do not refer to one individual's story, but to a pattern that the researchers have observed in several situations. This particular story focuses on how a difficult case is shared and discussed with colleagues.*
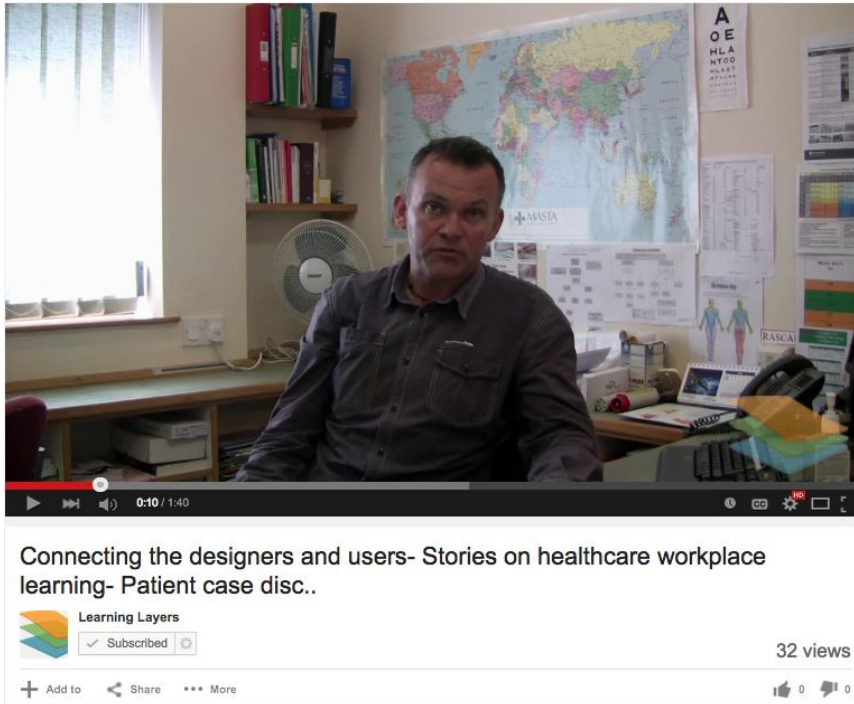
Link: https://youtu.be/y2urjOEA7YY

Channel: LearningLayers

Status: public

Presenter: unspecified

Institution: unspecified, Leeds?

Country: UK

Date: 06.10.13

Title: Connecting The designers and the users -Stories about healthcare workplace learning - new medication

Description: *http://Learning-Layers.eu - This video is an example of how Layers is using technology to share initial reports from the fieldwork with the developers and researchers in the design teams. Leeds is undertaking explorative studies with 3 GP practices in the UK, spending time with their staff to understand how they currently learn at work. These videos were made to share early stories and observations from the fieldwork with the Layers developers/researchers to help them to get a richer feel for the healthcare working and learning context. Pseudonyms have been used in these stories; none of the GP practice staff or GP practice names referred to are real. In many cases the stories do not refer to one individual's story, but to a pattern that the researchers have observed in several situations. This particular story focuses on learning prompted by the introduction of a new medication.*

Link: https://youtu.be/nNdUPzRrfrA

Channel: LearningLayers

Status: public

Presenter: unspecified

Institution: unspecified, Leeds?

Country: UK

Connecting The designers and the users -Stories about healthcare workplace
learning - new medication

Learning Layers
✓ Subscribed ⚙

15 views

➕ Add to   ◁ Share   ••• More

👍 0   👎 0

Date: 06.10.13

Title: Connecting the designers and the users -- Stories about healthcare workplace learning - help seeking

Description: *http://Learning-Layers.eu - This video is an example of how Layers is using technology to share initial reports from the fieldwork with the developers and researchers in the design teams. Leeds is undertaking explorative studies with 3 GP practices in the UK, spending time with their staff to understand how they currently learn at work. These videos were made to share early stories and observations from the fieldwork with the Layers developers/researchers to help them to get a richer feel for the healthcare working and learning context. Pseudonyms have been used in these stories; none of the GP practice staff or GP practice names referred to are real. In many cases the stories do not refer to one individual's story, but to a pattern that the researchers have observed in several situations. This particular story focuses on help seeking beyond your own practice/organisation.*
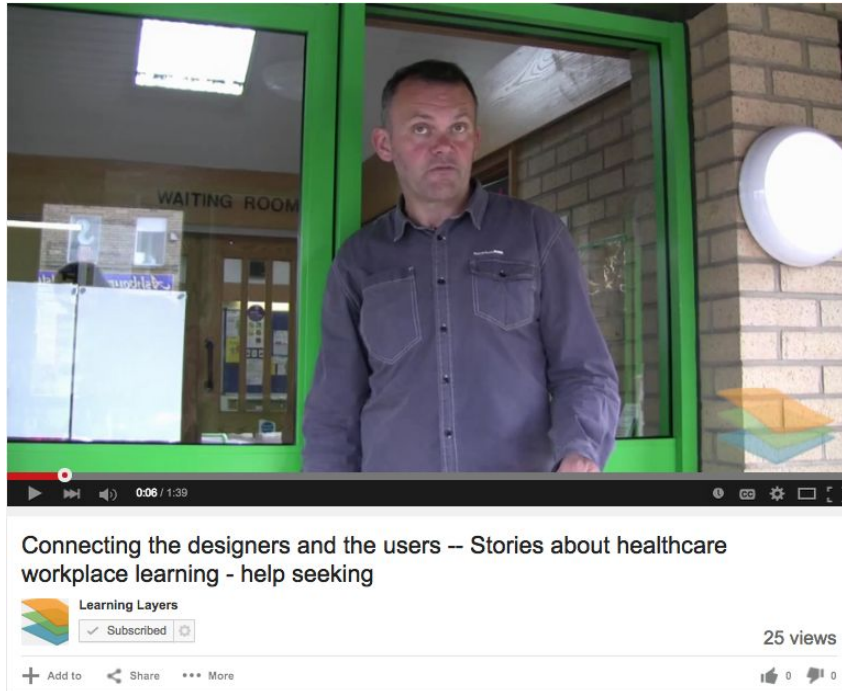
Link: https://youtu.be/TpZKKaanVWs

Channel: LearningLayers

Status: public

Presenter: unspecified

Institution: unspecified, Leeds?

Country: UK

Date: 06.10.13

Title: Connecting the designers and the users -- Stories about healthcare workplace learning - sharing

Description: *http://Learning-Layers.eu - This video is an example of how Layers is using technology to share initial reports from the fieldwork with the developers and researchers in the design teams. Leeds is undertaking explorative studies with 3 GP practices in the UK, spending time with their staff to understand how they currently learn at work. These videos were made to share early stories and observations from the fieldwork with the Layers developers/researchers to help them to get a richer feel for the healthcare working and learning context. Pseudonyms have been used in these stories; none of the GP practice staff or GP practice names referred to are real. In many cases the stories do not refer to one individual's story, but to a pattern that the researchers have observed in several situations. This particular story focuses on individual learning then being shared with colleagues.*

Link: https://youtu.be/OS5PxYRi5Ck

Channel: LearningLayers

Status: public

Presenter: unspecified

Institution: unspecified, Leeds?

Country: UK

Date: 06.12.13

Title: Bits & Pieces software prototype

Description: *Version 1, December 2013*

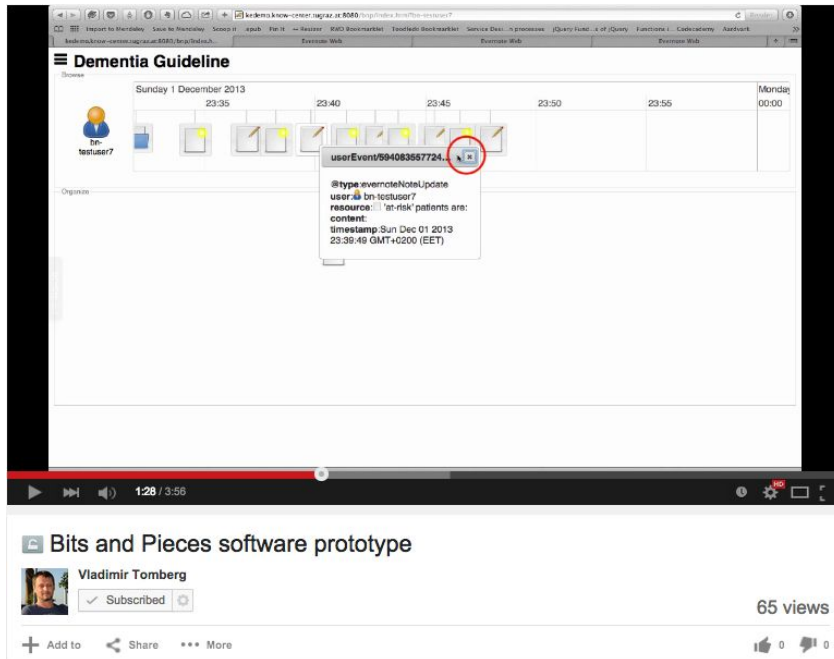Link: https://www.youtube.com/watch?v=emPt_fFJZPg

Channel: Vladimir Tomberg

Status: unlisted

Presenter: unspecified (Timo Tobias Ley, Layers scientific coordinator)

Institution: unspecified (Tallinn University)

Country: Estonia

Date: 20.06.2014

Title: Bits & Pieces (status update)

Description: http://Learning-Layers.eu -

Link: https://www.youtube.com/watch?v=-Ynv6wtPrJQ

Channel: Learning Layers

status: public

presenter: not specified (Sebastian Dennerlein)

Institution: Technical University of Graz

Country: AU

Order	Date	Title of the video	Location	Link
1	08.03.13	Layers design session sample	EST	https://youtu.be/O8hltt1dGuw
2	25.03.13	bits and pieces	FIN	https://vimeo.com/62612711
3	25.03.13	content maturing	FIN	https://vimeo.com/62604353#t=214s
4	19.04.13	Co-design session	FIN	https://vimeo.com/64382615#t=1722s
5	19.04.13	Scaffolding game tutorial	FIN	https://vimeo.com/64378912
6	19.04.13	Playing the scaffolding game	FIN	https://vimeo.com/64379395
7	19.04.13	Team presentations on co-design sessions	FIN	https://vimeo.com/64384000
8	19.04.13	Scaffolding game reflections	FIN	https://vimeo.com/64377484#t=854s
9	04.06.13	Bits & Pieces paper prototype	EST	https://youtu.be/IrnpNE3JCzo
10	06.10.13	Connecting the designers and the users- Stories about healthcare workplace learning- time pressure	UK	https://youtu.be/SM4QMJDb8OI
11	06.10.13	Connecting the designers and the users - using animation to present fieldwork findings	UK	https://youtu.be/_kOCzBomlUg
12	06.10.13	Connecting the designers and the users - using videos	UK	https://youtu.be/yEWBJlW5_ts
13	06.10.13	Connecting the designers and users- Stories on health care workplace learning- Patient case disc...	UK	https://youtu.be/y2urjOEA7YY
14	06.10.13	Connecting the designers and the users -- Stories about healthcare workplace learning - help seeking	UK	https://youtu.be/nNdUPzRrfrA
15	06.10.13	Connecting The designers and the users -Stories about healthcare workplace learning - new medication	UK	https://youtu.be/TpZKKaanVWs

16	06.10.13	Connecting the designers and the users -- Stories about healthcare workplace learning - sharing	UK	https://youtu.be/OS5PxYRi5Ck
17	06.12.13	Bits & Pieces software prototype	EST	https://youtu.be/emPt_fFJZPg
18	20.06.14	Bits & Pieces (status update)	AU	https://www.youtube.com/watch?v=-Ynv6wtPrJQ

Table nr.2: The registry of video messages used by the B&P design team