Using Video to Support Co-Design of Information and Communication Technologies

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Abstract

In this text, we explore the possibilities video affords for co-design activities in the case of information and communication technologies. We present an overview of the current approaches and a categorization of the approaches of using video in design and research into four main strands: video ethnography, video recording of experiments, design videography and professional video production. Through case examples of videos done in our research group over the years, we discuss three potential video genres that suit the needs of co-design. After that suggest five considerations on what should be taken into account when using video in co-design. Finally we conclude by considering potential future directions for the use of video in design and research.

Introduction

Video is becoming an established tool and material in the research and design of interactive systems and ICTs. A large and diverse body of research is available, which accounts how video has been used to inform and support particularly design processes that follow the principles of user-centered and participatory design. The previous research shows that there is much potential in embracing audiovisual media as a way of conveying the lessons learned from contextual inquiry and user studies to developers and other stakeholders in the process, but also as a medium to construct and process design ideas not only inside the team but also with the other stakeholders of the process, including users. In this paper we extend these insights by examining the possibilities and challenges of using video as *part* of co-design activities.

By co-design, we understand a collaborative design approach that entails *strategies for active participation of various stakeholders* building on the tradition of participatory and user centered design approaches (Schuler Namioka 1993). Co-design strives not only to look at the position of users during the design process, but also the producers, designers and researchers (Botero et al. 2003). Second, co-design attempts to recognize *use situations as sites of design* in their own right (Fischer 2003). The products need to have co-designable qualities and their *designs* need to be aware of the systemic issues in the larger ICT ecosystem so that their collaborative evolution can continue further away from those first involved (Kommonen 1999, 2003).

1. Current Approaches in Using Video in Design and Research

We have categorized in a basic fashion, how video is most often used in design and research processes (Table 1.). The categorization of these approaches is based on the disciplines of the people involved in the video production and the different uses of the video artifacts and concerns that these disciplines bring to the process, because these reflect the ways how and when video is applied into the design process.

Table 1. An overview of four approaches of producing and applying video in design and research processes.

	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.

Video ethnography

Use of video ethnography is influenced by the research tradition of anthropology and ethnographic research methods. People who contribute to the creation of these videos are often educated in anthropology or some other tradition of social science. Ethnographic uses of video are about capturing evidence and observational videos from the site of the design context. These videos are then moved into the site of research and design, to the office or the research laboratory. Video ethnography treats video as hard data, which is undisputed evidence and as close to reality as possible (Buur et al. 2000a).

One of the first articulations of the ethnographic uses of video in relationship to the design of interactive technologies can be seen in the work of social scientists in the Interaction Analysis Laboratory at Xerox Parc at the end of the 80's (Suchman et.al 1991). The ways of working and methodologies were then developed

further with contributions from the Human Computer Interaction (HCI) research community (Tatar 1989) and Computer Supported Collaborative Work (CSCW) research community. Contemporary research reports, for example, Faulkner (2007) presents a clearly strategic approaches of using ethnographic video to present accountable, for example, to make clear and visible the difficulties people have in operating consumer technologies and personal computers.

Video recording of experiments

Using video to record test situations as part of usability studies or record real-world use situations for further task- or goal-analysis, is influenced heavily by the traditions of experimental and cognitive psychology. Central to these activities is that the recording situations are mostly constructed, controlled and planned in advance. The uses of video are not concentrated in reconstructing reality but more assuring correct and detailed documentation to support specific analysis and construction of usability claims (Jordan 1998). In professional design practice this might be the most common use for video material and production that exists.

Design videography

Design videography is by its definition practiced by the people inside the design organization during a design process. It includes the light-weight, pragmatic and resource effective creation of video prototypes, sketches, scenarios and design fictions. These are video artifacts which are created by individual designers or the whole design team to fuel the design process, to increase speculation on technology features and the possible forms the applications might take or the impact the technology might have on the life of the users. In design videography, video material and the production activities function not only as content which can be analyzed analyze but as design inspiration and evaluation (Buur 2000b), designers and users can create collaboratively video scenarios to create shared understanding (Ylirisku 2001) and through materializing the design possibilities and watching them repetitively, evaluate the designs (Mackay et al 2000; Binder 1999). In design videography, video is considered to be a full-fledged *design material.*

Professional video production

In some cases, design and research projects employ people who are specialists in communicating with audiovisual media. These people have a background and expertise in professional video production. The purpose of involving media professionals in this context is to be able to communicate something in a very compact and concise form. These videos construct new visions of technology in a high-end video scenario or a pitch video, which are created to communicate and 'sell' the idea of the product or the hypothetical

product, before any technology development has taken place. They are shown to audiences who typically are not part of the design and development process and thus don't necessarily have the expert knowledge to comprehensively understand the design choices made in the development of interactive technology products. Classic videos of this genre are the Apple Knowledge Navigator (Apple 1987) and StarFire (Tognazzini 1994) video scenarios, which were very influential in presenting technology visions and pitching potential product ideas to their viewers.

Another case of employing media professionals, are those which deploy professional documentary film-makers to create more concise and edited video documentaries and reportages from the design context. These videos, as opposed to the pragmatic, quick and dirty solutions of of design videography, focus heavily on narrative conventions, cinematic language and techniques, careful planning of the shooting, story angles, efficiency of production, ability of thinking in genres, familiarity with conventions, ability to condense and summarize (Strickland 2000; Raijmakers et. al 2006). This way they can provide impressive video material which is less likely to be misunderstood than those created by designers or video ethnographers.

Summary of the four approaches

Video is a medium that captures and represents flexible, efficiently and tangibly activities in time and space. These qualities make it well suited to research the context and possible future constructions and designs of interactive technologies and media. From the examples and the disciplines involved, we can see that video as a medium, has the potential to connect many disciplines. Successfull videos are linear, structured presentations of some complex topic, which can be used to communicate across disciplinary and organizational boundaries and increase the participation of users.

When examining Table 1. and looking at the examples, the potential uses of video for the purpose of co-design cross over multiple categories. Buur (2000b) discusses Video Card game, an experimental media environment created to fuel design conversation and collaboration. It is a combination of video ethnography and the pragmatic needs of design to participate the users in a creative and engaged way. Video portraits created by Rachel Strickland (2000) are then again genre cross-overs between the ethnographic video and professional video production. They presented in a conscious and compact 5-minute format what people are carrying with them and they were used to inform and inspire the design processes of the early portable computers. Raijmakers et al. (2006) discuss 'design documentaries', which are light-weight video documentaries created from ethnographic research material into video personas, scenarios and other creative forms of audiovisual media. And the sketchy video prototypes by Bossen et al.

(2004) can be seen as audiovisual mockups of the high-end video prototype but done with the pragmatism of a designer.

In the light of this overview we argue, that the most interesting and potential directions for further inquiry are those which have the ability to scale the production to the resources and schedules of the design process, can maximize their impact to the audience, can enlarge the size of the audience by intentionally creating genre cross-overs, consciously attempt to communicate across disciplinary boundaries and those which submit the videos as a subject of inquiry in multi-disciplinary discussion and decision-making sessions, which are at the core of co-design activities.

2. Supporting Co-Design with Video: Case Studies

Since co-design is a strategic approach that attempts to increase the involvement of a large number of stakeholders and stretches in time from formal design activities to use situations, scaling the design process beyond disciplinary, organizational and time boundaries puts a special emphasis on how communication in the process all-in-all takes place (Kommonen 2003). *What is communicated? How that is understood? What impact does that communication have on the design and development activities?*

As presented earlier, video production activities and the resulted materials seem to support the creation of conditions, which are appropriate to facilitate the reflections and discussion of technologies through out their whole life-cycle. It seems that from a co-design perspective the issue of applying video is not so much of what kinds of videos are produced, but rather *how, where and when* they are applied into the process. What kinds of impacts the artifacts and production process are allowed to have? How these videos are used and re-used? What kinds of knowledge and understanding is produced when they are watched and discussed? And in design terms, what kinds of *materials* these videos are for the purposes design process? By presenting case studies of work done by members of our research group, we will try to present arguments of how video can be used in co-design.

Conversation starter

Co-design work usually includes the introduction of a complex topic to a variety of stakeholders with conflicting interests. It is useful to step as quickly as possible to discuss the concrete practices and wishes of people and not get lost into unfruitful argumentations about minor, irrelevant details. For the bigger context, we have used videos to create focus for design conversations. These *conversation starters* are videos that contain and represent a theme and pose a question to the viewer from that theme. This

question can then be answered in the discussion and collaborative design session succeeding the screening of the video.

Consumeter video (1:10 min) presents what appears to be a typical shopping bag that is powered by a "consumeter". It is something that allows the bag to react to the products that are placed inside it (Ellonen, Westerholm 1999). The video presents a very stereotypical shopping situation where a woman is walking in a supermarket, placing consumer goods into a shopping bag. When she places one product into the bag and it blinks a green light, she keeps it, when another product is placed and it blinks a red light, she places the product back into the shelf. Finally, the video asks a question: "What would you like to know about your shopping?"

Fig. 1. Six still-frames from the Consumeter video (Ellonen Westerholm 1999).
First slide text: "It looks like your average bag, but it has Consumeter."
Last slide text: "What would you like to know about your shopping?"

According to our experience conversation starters present a theme, in similar way to how graphic illustrations work, in a slightly ambiguous in. Conversation starters encourage its audience to speculate the possibilities of the technologies presented, construct their own technology visions and bring forth relevant themes into the collaboration. The Consumeter story has certain elements that are very ambiguous, which

support multiple interpretations that are good ways to start a conversation that is follow by concrete design suggestions and negotiations. For example the video does not explain the inferring mechanism, which makes the bag blink in green or red. Nor does it tell what in reality, this thing called 'Consumeter' might be. The video only hints that the bag has some kind of embedded technology in it with functionality to support decision-making regarding shopping, and leaves the rest to the spectator.

Conversation starters like this are typically viewed in focus group interviews, exhibitions, presentations and design workshops. The video is always shown first and concept components introduced later. The Consumeter-video has been used many times for discussion starters in a design workshop situation, where everybody's focus and mindset is needed from the beginning to work on a shared theme. In the case of the Consumeter, the topic has been consumer choices and tools, shopping preferences and values tied to consumption, the experience of shopping and attempts to identify and map the stakeholders to the theme and project at hand. Despite being several years old, the video still manages to bring forth in the audience, for example, clear ideas about possible and desired mechanisms to create consumer profiles, alternative display options and suggestions for new stakeholders of everyday consumption.

Throwaway video prototype

For the communication to work, co-design requires a shared understanding among the team and other stakeholders, of what the form and function of the final outcome might be. In the early stages of a design and research project, there most often are no shared ideas between the stakeholders about the future of the project. Developing concepts and vocabulary requires continuous reframing and the assumptions for design should be questioned and they should be subject to change, especially in the beginning of the process. To present pre-conceptions of the design artefact with high-crafted things that looked very finished, don't prompt discussions, suggestions and critique (Erickson 1995). People simply believe that the changes are difficult or too expensive to make and that everything is too well thought out.

For this reason we have experimented with *throwaway video prototypes.* Influenced by paper-prototyping (Rettig 1994), the throwaway video prototypes are short videos that represent a use situation or a design scenario. The idea is that all the necessary placeholders for the technologies and other props are made using paper in a very short time (while brainstorming and designing) and then recorded in to the video and edited. Similar video has been also created by Bossen et al. (2004).

Fig. 2. Still-frames from a sketchy video prototype, which explored an aspect of context-aware technology and the issue of interruptions (Tikkanen & Botero 2006).

A video called Cooking Configurations (Fig. 2.) explores the notion of etiquette in human-technology configurations asking the basic question: when should phone calls take place and when not and could humans and technology together somehow take this into account? The video starts with a situation where a woman is cooking in the kitchen. She uses a "switchboard application" in her phone to configure her telephone so that no-one else but her mother's calls are connected through to her phone. When her boss tries to contact her, the switchboard application notifies him that she is baking and prompts him to leave a message. He leaves a voice message to the switchboard and the existence of this message with the information who has left it, is then displayed in the GUI of the woman's phone. But she doesn't react to it. When her mother calls the call is connected straight through and she answers the phone happily.

The paper props and background elements facilitated a short but playful and enjoyable production period for the video. The videos also experimented with pre-made speech bubbles that contained question marks and exclamations to represent different types of mundane chatter. This and a voiceover created in the post-production of the video, relieved the non-professional actors from the burden of performing and made the end result also a bit humorous and cartoon-like. This has resulted in a surprisingly well-received format, with minimal effort in producing it.

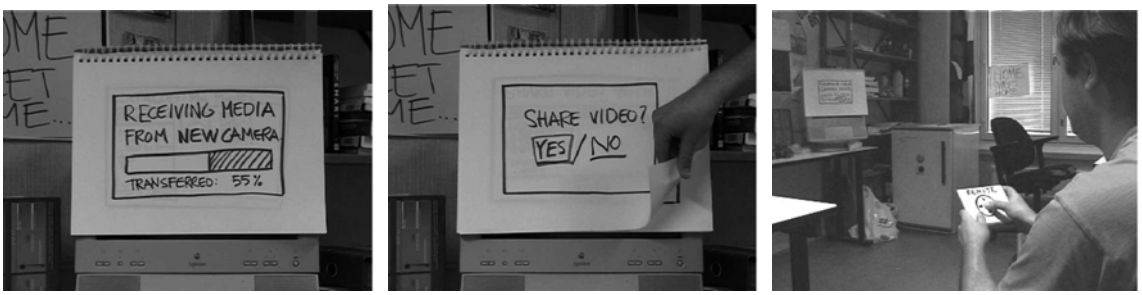

Fig. 3. Still-frames from a video prototype exploring media archiving (Tikkanen 2006)

The same technique was applied in a another project in six sketchy videos related to management and archiving of personal audiovisual media (Fig. 3., Tikkanen 2006). The videos were based on observations from the field research material of investigations into six personal video collections. This material was used as an inspiration in the stories which looked at potential change factors in the ways personal media collections are born and maintained. The videos had the devices and other props made from paper and cardboard. This time the interactions with the devices were slightly more complex, so the screens were done using a pad of paper and separate screens were drawn on each page. The feedback of users interacting with the devices, on the screen, were drawn using a red pen and the drawing was many times included into the editing. Also the turning of the pages was edited into the video. These "disillusioning techniques" were explained to the viewers before and they caused no problems in the interview situation: the content of the videos was what mattered to them.

These videos have been both used in conversational, small-scale settings to propose and sketch out potential directions for design and technology applications. These are straight-forward sketches from a situation where no clearer focus has yet to emerge and they focus on the user's practices and the relationship between the people and the technological artefact. This makes it easy for the people to relate to them. Also, the idea of these throwaway, sketchy videos is that they can be easily modified and adapted if they 'miss the target' and are not well-received. To be feasible in this way the end result must be very sketchy and the production of the videos must be fast and carried out with the basic assumption that the video prototypes and sketches are going to be thrown-away after they are used and remade if necessary (Löwgren 2004).

Video documentation

In co-design, transparency of the design and development activities and processes is important. Video documentation can be used to create shared understanding and comprehension about how the project functions as a whole. It can be used to represent the practices of the users, the research and observations made from these practices, how the design and development activity is influenced by this research and how the collaboration between the stakeholders works. It is about representing the practices of the users, the technology and media designers and developers and tying these activities together with the means of cinematic storytelling.

Fig. 4. Still-frames from video documentation of co-designing a collaborative video-editing application with snowboarders and skateboarders (Linkola 2006).

A project which dealt with co-designing a collaborative video-editing application in collaboration with snowboarders and skateboarders, was documented in the form of a video report (Fig. 4., Linkola 2006). In the video, the design researcher used video to support observation of young boys' snowboarding and parkour hobbies and the self-documentation videos as part of those hobbies. Three groups of boys, some younger and some older, were interviewed about their activities and a collaborative design session is presented in the video. The report also shows videos created by the boys.

In Table 2. We present the five different phases how video was part of the project. As co-design extends the design situation to be a part of the use, the self-documentation material made by the users was included in the process. The main raw material are the observational videos and interviews created by the design researcher then edited a 7 minute video report of the whole process. Later in the project another design researcher has created a compilation video of the former material to communicate the process to outsiders in a more efficient manner.

Table 2. Five phases of video use in the process of co-designing the collaborative video-editing system.

What is the content of the video?	Who produced the video?
Recording of the sport hobby activities	The skateboarders, snowboarders and parkourers
Editing the best parts together accompanied by a rock video	The skateboarder, snowboarder and parkourers
Capturing and observing the boys activities, interviews	Design researcher #1
Editing these into a video document, which contains a selection of material produced by the sport groups, observational clips from recording situations and interviews.	Design researcher #1
Editing the report into a short, dynamic summary with background music	Design researcher #2

Another more a thematically oriented video deasl with photo-sharing practices and their digital evolution (Rajanti et al. 2005). The EnComPAs project in which this video was made, worked in collaboration with an association of winter swimmers, people who swim in the icy waters of Finland's wintertime. In the project they mapped among others, the practices this particular winter swimmer community had regarding photo-sharing and developed tools to support that.

Fig. 5. Still-frames from a video which presents ways of working and the Themes of the project regarding photo-sharing practice (Rajanti et al. 2005)

The video (Fig. 5.) presents the sauna and cabin of the winter swimmers and some of the winter swimmers going to swim in the icy water. During the whole video, an interview is made of three men regarding the changing practices of photo-sharing. The stories are then given rhythm by using illustrative still photos from the associations photo archives and in-between titles to make clear what the section is about. In the discussion they talk about the software prototype developed in collaboration. Even though the video doesn't show the application at all, all the practices and uses people have developed with it are very tangible. The material could be easily used to support designing such systems.

These two examples show how video can make visible the invisible work done by the users as of their practices and this way improve the understanding of those practices. Video can be also used to make the design process more understandable, to present connections between individual acts of design and the larger scale developments in the project. Because videos can use editing to condense material produced over a longer period of time, it is an ideal tool for creating these communication artifacts which support the building of shared vision inside the project team, of what is it that the project is aiming for or to communicate the process to people outside the process.

3. Lessons Learned

We have encountered a set of practices in video use that benefit co-design. These uses for video have been born when the incentives and aims of the different stakeholders in a process have been realized and observed correctly. By presenting the way video is used to support the creation of specific situations, we hope to promote the way in which video could be used as a design medium.

Strategic use of ambiguity and conflicting technology representation

As one of co-design's main characteristics is to empower the users and other stakeholders to design the future technologies together in collaboration, videos that successfully provoke opinions and function as conversation starters are considered more useful than those that silence people. Total technology visions and objective, neutral views on the possibilities of new technologies, tend to be like that. In the case of the Consumeter video, the video did not explain what the red and green light meant (Fig.1). This made it possible for the spectators to fill in these blanks and in a group discussion, share their own understanding about how "consumeter" would work for them. The discussions and especially the moments of observation that take place in the discussions after a video like this, should be analyzed very clearly. They can be powerful leads for inspiring and informing design activities. The technology's features presented in the videos can be ambiguous and even conflicting, but there has to be an awareness of that from the side of the designers and the sensitivity and sophistication to notice, what the collaborators and spectators make of those ambiguities and conflicts.

Make technology play a leading role in the story

In the case of the Consumeter video (Fig. 1) and the throwaway video prototypes (Fig. 2 & 3), technology plays an active role in the video. The intelligent shopping bag actively supports decision-making regarding shopping, providing information about the products of consumption. The personal switchboard provides means for smarter filtering of incoming telephone calls and the personal media archive enables its user to connect and share their own media and media consumption and this way share their everyday activities with the people they want to share it with. In these videos the technologies act as positive enablers of human activities central to our culture: consumption and keeping in touch with people. They *augment* human capabilities. When showing these videos to someone, they start either commenting on the credibility of the role the technology has or the ways in which the technology should work in their case and fit into their life, or not. There could be also videos that portray technology in a negative role. The key thing is to not portray the technology in a neutral role, or it will get unnoticed. These video-supported interventions

should have technologies that have *character* and the technologies should be dramatized and their meanings emphasized or even over-stated.

Support those appearing in the video

Performing in a video can be a burden for most people as video is relatively ruthless in presenting us how we look and sound. Amateur's acting should be made as fun and as easy as possible as every second someone is not enjoying herself in front of the video camera shows immediately. As video production is by its nature participatory activity involving often a larger production team, it should be done so that people have fun and enjoy themselves. If you don't have a movie production crew in the project, don't try to push the limit and try to make something which you don't have the skills and resources for. In the case of the throwaway video prototypes, we pushed these two limits to the other end of the spectrum: we gave people the possibility to use the speech bubbles (Fig. 2.) to perform a talking act. And we created the paper props to fuel their imagination and not make the situation painful for them: it was obvious that the situation was completely fictional and make-believe. This resulted in acting that was more play-acting and the design of the technology artifacts resembled more paper-crafting than actual user-interface design.

Craft the viewing situation

When a video is made, it is then shown to people in some particular occasion. It is not obvious, how this should be made. The viewing situation should be crafted to make the most out of the video. The viewing as such, is not interesting, but the impact of the video is: the discussions, the design proposals, debates, feature wishes and other activities sparked by the video are those which are aimed at. One must put special emphasis on what is being told about the video before and after it is shown, because that will direct how it is watched and comprehended. Another thing worthy of considering is, when the video is showed. Faulkner (2007) has used compilation videos created from ethnographic videos, in the beginnings of meetings to introduce some theme, similar to how the Consumeter video has been used in our research group's projects. To be able to craft the perfect viewing situation, one must know what the video is being applied into? What are the desired and potential outcomes of showing this video? When framed like this, the intentions of creating the video don't matter any more: one must only think about what needs to be gained from showing it.

Don't own the meaning of the video

People who have been involved in the production of the video, have a biased comprehension of what is the meaning of the video. This is hard, if the only thing worthy of concentrating in the viewing situation, is the

feedback. Spectators should be allowed to appropriate the video for their personal agendas, and project their own meanings to the video. The discussions and debates that result from watching the video are results of people trying to convince each others of the video's true meaning. The ultimate goal is to understand the diversity of people, but also the need to have consensus on some key ideas.

Conclusion

We have presented how video as a medium holds true possibility in engaging stakeholders over organizational and disciplinary boundaries into co-design activities. As the video production, authoring, storage and distribution technologies are becoming more and more accessible for a larger audience, new potential uses for video in design and research of information and communication technologies can also emerge.

Through case examples we have presented three potential *genres* of videos which suit the co-design process particularly well. These genres can help us as practitioners to think how their production could be organized and streamlined to make their production and use more efficient, and as researchers, what kinds of insights, values and meaning the particular genres have the possibility to convey. As design organizations are not media production organizations and design projects are not media production projects employing movie directors, actors and screenwriters, these three genres are to be understood as light-weight techniques that suit the purposes of pragmatic design research and co-design. It is important to scale the production right, so that is feasible to make the video and that the end result does the thing it is intended for. Video has been so far mostly used in the academic research context and the next steps should be transferring it to the industry and society, in general. Raijmakers et al. (2006) present successful, real-world cases of informing and inspiring the design processes of medical equipment. More of these documented cases regarding contemporary and future technologies and products are needed in order to fully start exploiting the possibilities video as a design medium has. Video as a material is still relatively hard to produce and handle, as opposed to still images: special expertise and maybe also novel tools and techniques are needed to apply video to the needs of design projects.

To create representations of users, their practices and the design context, is the privilege of those who develop technology. How about letting the users document themselves and construct their own identity on their terms? Ethnographic research has the history being supported by the colonialist: it has been used as an instrument of power by those who sought to understand the foreign cultures to benefit from them in an economic sense (Faulkner 2007). Later on, critical approaches to anthropology have tried to find ways in which to empower these people to create ethnographic research and films about themselves. This ethical

agenda creates a potential for also using video in design and research of interactive technologies: could people make audiovisual representations about themselves and represent themselves to those who develop the technology? Wouldn't this be a potential to get the main observations right, also? Empowering of users to take part like this requires skills and the right, efficient tools not only for creating the videos, but also to distribute and process them collectively. The more and more pervasive self-documentation of people's lives and this way their practices using (audiovisual) media might give people powerful tools to explain and justify what they do and why.

Because video is by its nature extremely portable - a direct result of more affordable equipment and the ever-increasing penetration of devices that can be used to record, author and display videos - we would like to consider a possibility of *mediating design activities with video*. The possibility to capture and represent time and space and transfer that representation to large number of stakeholders, is already here. The challenges are more organizational than technical. The example with the snowboarders (Fig 4., Linkola 2006) presents how video can be interrelated to videos created by other stakeholders of the process, to construct new meanings. Experimentations are already happening with the so-called open design platforms in the context of making physical things, but they don't include or use video that much and are concentrated on linear processes of creating objects. But they are the first step. Harrison et. al (1990) present a general, experimental technological solution, based on video conferencing technologies, that was created before the birth of the World Wide Web and diffusion of consumer broadband. The project shows the other end of using video for collaboration, to support intensive collaboration work.

As in today's society, there is an increasingly higher level of literacy in watching and creating audiovisual media, there are also increasing opportunities to benefit from that fact. High-bandwidth Internet access is an enabler for large scale co-design using video and video could be used as an instrument of civic participation in these kinds of activities.

Acknowledgments

The writing of this text has been supported by the Mediaspaces project with partners Nokia Design, Digita and Helsingin Sanomat Oy, the ADiK project with partners Nokia Design and Elisa and EnComPAs project. Mediaspaces and ADiK are projects that are funded by the Finnish National Technology Agency TEKES. EnComPAs is an Eureka project.

This document would not exist without the videos discussed in the case examples. The writers wish to express their gratitude to the authors of the videos and to all the numerous people who have been

contributing to discussion behind these videos in the past and present research projects of the Arki Research Group.

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