Effective use of video in design
Video in fast pace early design research

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ABSTRACT

Video is a powerful tool for design research. The last decade's fundamental changes in the accessibility and ease of use of video cameras and editing software have made video more relevant for designers. In this article an overview of video techniques relevant to early design research are explored. Their effectiveness is evaluated through a case with radon inspectors. This study suggests that The Engaging Camera, Situated Interviews and In-situ Acting are the most effective methods for designing for expert users in fast pace early design processes. The article also provides a map that describes how the video research techniques uncover different knowledge, and it suggests that the potential for using Participatory Video effectively has increased drastically with the introduction of smart phones with cameras and easy video sharing.

KEYWORDS: Video, User-Centered Design, Fuzzy Front End, Effective, Expert Users, Skilled Workers, Discover Design, Design Documentaries, Early Stage Design, Design Research.

1   INTRODUCTION

Video offers a vast amount of possibilities for use in design processes, however video is traditionally recognized as a time-consuming activity requiring additional expertise and expensive equipment[1-4]. The data is presented linearly and it can be time consuming to find the observations of interest and to meaningfully summarize them[2]. However, recent technological development has made simple video capturing and editing tools easily accessible. For instance you can record, edit and export a video using only your smartphone. Action cameras like GoPros have made it cheaper and easier to get access to previously inaccessible locations and interactions. This should make video a more relevant tool for designers.

There is literature on different ways to use video in the design process such as [4-15]. However, it has not been discussed what use of video is the most effective for different design processes. In order to discuss how effective the use of video can be, it is important to take into account the benefits and disadvantages of using video. The scope of this article is a literature review of the different video methods used in the early observation and analysis part of the design processes. The article will also investigate effective use of video related to a design project with skilled workers. How different video observation methods affect the outcome of the design process and how time and cost effective they are will be discussed. The goal is to identify the video methods with the most benefits in terms of time and cost effectiveness, with relevance for fast paced early observation and analysis processes.

1.1   Fast pace early design processes
The Design Council (UK) presented the double diamond model (Figure 1) as a simple visualization of the Design Process[16]. It shows the different stages in the design process as they diverge and converge[17, 18]. The Discover stage can briefly be described as an expanding stage where the

designers explore existing practice, ideas and gather knowledge. In the next stage, Define, the designers try to convert the findings and insights into problems that can be addressed with new products or services. The Develop stage is a divergent stage where different prototypes are refined and improved. The Develop stage ends in a specification of the product[19]. The final stage, Deliver, is where the final product is prepared and launched in the market.
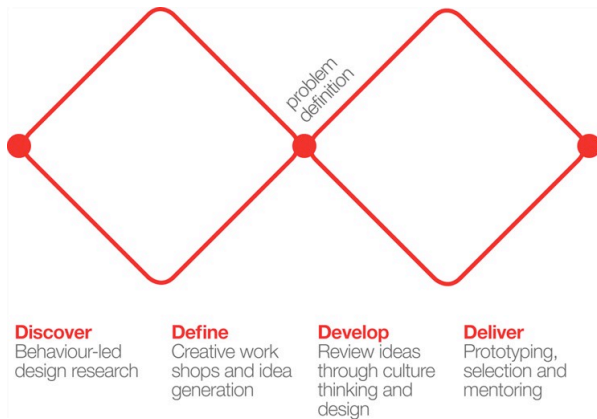

Figure 1: The double-diamond model[17]

This article will focus on the use of video in the Discover stage. In this stage it is crucial to arrive at a proper understanding of the context of the future design. Observations and interviews are often done to inform and push the process in the right direction. Raijmakers writes: "Discovery research … is most intensely called upon early in the process, to find information and inspiration in the world and with people."[14] Another characteristic of the early Discover stage is that it often has a more open approach to the problem. Ylirisku and Buur writes: "During the early phases, the focus is usually open and blurry but clarifies in the course of action through the engagement of various stakeholders in the iterative design events."[15] Buxton also expresses this well: "…at the early stages of design, the priority is generally exploring alternatives rather than refining any single approach."[20]

When conducting observations, interviews etc. the designers will have the same challenge as when making prototypes and mock-ups. In fast pace early

design processes learning has a high value, and creating refined prototypes and mock ups is not that important[19]. Tim Brown[21] argues: "Put as little time and effort into prototypes as you can and still 'generate useful feedback and drive an idea forward.' Early in the process, prototypes can be very basic – just enough to see if something is viable."

The same kind of effective learning is found in Lean Startup when using Minimum Viable Products: An MVP is a "...version of a new product which allows a team to collect the maximum amount of validated learning about customers with the least effort."[22] Does the same principle apply to early observations with the use of video? Which approaches to video use are more effective for learning in the early discover stage?

1.2 Video in Human Centered Design

How video is used is heavily affected by the designers' research approach. Human centered design, especially User Centered Design, can be specifically characterized by a focus on observing, learning or cooperating with potential users[23]. Liz Sanders[24] introduced a two-axis mapping of different Design Research types (Figure 2). The y-axis distinguishes between a design-led and a research led process. The x-axis varies between the two extremes of looking at the user as an active co-creator in the process and looking on the user as a reactive informer. The map gives a good indication of how various design research types approach the use of video differently.
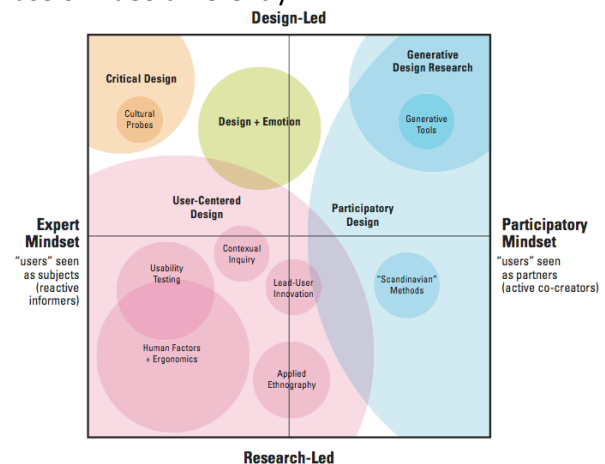

Figure 2: Map of Design Research — Research Types

2 VIDEO IN DESIGN OBSERVATION

2.1 The qualities of video

The tradition of using video in design observation has its roots in the use of video in research[3, 25]. Video offers a rich representation of the observations and it provides many possibilities that would be impossible in a real-time situation. Video can for instance be watched over and over, and the researchers or designers can analyze and discuss while pausing the film, they can play a sequence in slow motion etc. Other qualities of video involve the possibility to include more people in the analysis stage of the design process. Video is easy to share and it conveys the concrete richness and ambiguity of the situations captured[15].

At first glance video seems to be an objective representation of the situations observed. However, what is found in a research video is heavily influenced by the way the video camera is used[2, 26, 27] and the designers' perspectives prior to or during the video observations[10]. From the moment the camera is introduced people might act differently and withhold information they would have given if they were not filmed[15, 27]. However, some uses of video in design processes can still be characterized as more objective than others.

2.2 The role of video in design

There are different approaches to the use of video in the design processes. Ylirisku and Buur[15] suggest two metaphors to highlight the role of video in the design process. They propose to look at video either as designer clay or as social glue. The metaphor designer clay describes the ability video has to be changed and express different things. Designers can use video to communicate findings, ideas, problems or new solutions. Further, they suggest that the video created and the designers understanding increases during the shaping.

The other approach Ylirisku and Buur[15] suggest is to look at video as social glue. They highlight videos engaging capabilities and how video often becomes a lingua franca for the participants in the design process. Andersen and Veland[28] says: "…to support collaboration, a collaborative tools content should be easy to refer to." Video can be a material that it is easy to refer to in discussions and other group processes. Caglio and Buur[29] suggest that even old research videos can stimulate reflection, discussion and creativity in the social interaction between participants during and after seeing a video.

Other approaches to video can also be taken. For instance the approach taken in usability labs is more inspired by methods from research[15]. In this approach the video is recognized more as "hard data", which needs to be communicated in other ways.

2.3 Participatory Video

Participatory Video can be approached with different design research methods (Figure 2). In Participatory Design the users are recognized as experts[23]. Designers try to actively involve potential users in the design process to make sure that the product or service they develop will be beneficial for the users. Participatory Video is in these cases a good tool to bridge the gap between users and designers[2]. The users can more easily make their experiences or ideas visible to the designers, and preserve the context and some of the heat of the moment. An objection to Participatory Design is that it is not clear whether people are able to know or communicate their future opportunities.

Another approach to Participatory Video is the one found in Critical Design. Sanders[24] writes: "Critical design evaluates the status quo and relies on design experts to make things that provoke our understanding of the current values people hold." Cultural Probes is an example of how designers try to challenge their understanding of the users. This is often done by giving the users different ambiguous artifacts, these stimulate responses that can inspire the design process[24]. Sanders writes: "Probes are intended to be a method for providing design inspiration rather than a tool to be used for understanding the experiences of others." Letting people record their reactions on video is an example of how video can be used in this approach.

Empathic Design offers another approach to Participatory Video. According to Marc Steen[23], Empathic Design is "researchers and designers attempt to empathize with other people's experiences." The designers' focus is on the users feeling towards a product or service, and Video Diaries is one way to capture these feelings. Raijmakers[13] expresses the advantage of video diaries well: "The video-diary is a good way to learn what people think; it may complement methods such as ethnographic observation that can reveal what people do." The strength of participatory video is that it can allow the users to record what they find interesting from their point of view without interference.

In terms of efficiency the use of Participatory Video depends heavily on the instructions given to the users[15]. On one hand the designers can end up with a lot of time-consuming irrelevant material to analyze. On the other hand by giving the users too limiting directions the designers can get videos with a too narrow scope from the users. Employed with awareness of these pitfalls, Participatory Video can be used in an effective way. New technology makes it easier to avoid making such errors today[30]. Almost everyone has a smart phone with a camera, and it is becoming simpler to share video. The video quality is better and the mobile data bandwidth has increased. It is easier to tag the videos with GPS-information and keywords on the go, and the designers can communicate via live video with people in their work setting. Altogether this makes Participatory video more effective and more open to two-way communication than before. It is possible to redirect the study in new ways during the research period.

2.4   In-situ Acting

A variation of In-situ Acting is that users and designers communicate through acting out existing or future situations relevant to the product or service investigated[15]. The various design methods approach In-situ Acting differently (Figure 2). Critical Design might use In-situ Acting to act out future scenarios to see how users respond to radically different approaches to products or

services. In Participating Design In-situ Acting offers a way for the designers and users to learn together, and a way for users to communicate and share their own ideas and thoughts. The camera can be used in different ways described in 2.7 The Surveying Camera, 2.8 The Engaging Camera and 2.9 The Composing Camera to capture this acting. By acting out instead of following users in all the relevant situations, the designer may quite rapidly gain an understanding of how the user works and make some early observations.

In-situ Acting can also be used to test what the users think about different ideas in an early stage. Designers can provide the user with simple mockups and see how they react and how they would use them. This can be a good way to initiate a dialogue on new ideas[15]. It can also be used in a Usability Testing tradition to validate or highlight important weaknesses and strengths of existing products or new product concepts.

2.5   Situated Interview

Ylirisku and Buur[15] define Situated Interview as an interview taking place where the participants have "…direct access to the details of the practice within the moment of the interview." This allows the users to express themselves bringing in the tools they know in a context they are familiar with. A lot of knowledge is embodied in the world of the user, and this approach helps reveal more of this. Situated Interviews can be used in for instance Empathic Design, as part of Ethnography Studies and in Participatory Design. In Participatory Design the interview can be focused on learning and creating something together with the user, while Empathic Design will focus more on learning how the user thinks.

Situated interviews can complement Shadowing, The Surveying Camera, In-Situ Acting, The Composing Camera and Participatory Video in good ways[15]. In early phase design processes, where the designers might have an open perspective, this can be a good way to get a broad understanding of the users concerns. Video calls are much more available today than they were some years ago, which allows the designer to do Situated Interviews

without spending time travelling. Ericsson[31] estimated that 50 percent of the world had 2G or 3G Internet coverage in 2012.

How effective this method is depends on how openly and freely the participant speaks. This method mostly focuses on explicit knowledge, so it should be combined with other methods to reveal tacit knowledge. Video calls will never give the same information as being present, however, it can be a very good tool for reaching more users and getting an overall understanding of for instance which problems the users experience with a product.

2.6   Shadowing

Ylirisku and Buur[15] describe shadowing as a method for observing people on the move. Shadowing can be a very good tool for investigating existing practice further. It is often combined with an ethnographic design approach[32]. Design ethnography has roots from sociology, anthropology and ethnomethodology[23]. In design ethnography the designers try to look at the relevant practice in a holistic approach from the members point of view. The designers take part in the users activities and daily routines. They observe and analyze how the product and the relevant actions are part of a social and cultural context. During shadowing the camera can take different roles. In the next three subchapters some of these are described further.

2.7   The Surveying Camera

The Surveying Camera, also referred to as the Fly On The Wall, is an effort to record the events taking place with minimal influence on the users[32]. The Surveying Camera is most used in Usability Testing, Human Factors and Ergonomics (Figure 2), which are closer linked to a science tradition[24]. They are often trying to make design decisions based on analysis of observable behavior and quantified data. An example of this is how video sequences have been used in usability tests to highlight where users fail to understand the product[15].

Action cameras and micro cameras have become much cheaper and easier to use in the last few years. In addition products like Google glasses makes it possible for the designers to observe literally from the nose tip of the users. Tobii Glasses 2[33] is another example of a more sophisticated video tool that is becoming more available for designers. This product can record from the users point of view and also provide eye tracking. These products offer valuable information when evaluating products or services, whether it is a new alpine ski binding or a webpage interface.

Blauhut and Buur[32] are critical to how effective the Surveying Camera is: "…often the surveying camera that follows people at a respectful distance – the 'fly on the wall' – does not align with the close user collaboration opted for in user-centered design." When taking a purely observing role the designers do not have the chance to ask the relevant questions while the events take place. This makes the observations more realistic, but it also makes the learning process less efficient. The video is easy to discuss with the user later, but it can be more effective to ask the questions during the study.

2.8   The Engaging Camera

Buur and Blauhut[32] refers to the Engaging Camera as an actor. The Engaging Camera can be regarded as a counterpart to the Surveying Camera. In this approach the cameraman is an active participant, which engages the user to actively talk to the camera. The camera is a tool to document what people do and what they find important about their practice. The video is created in cooperation with the users and more in the spirit of Participatory Design (Figure 2). The designers and users explore the context or new ideas together. One weakness with this approach is that the designers can miss out important observations or new ideas because they get too focused on the interaction with the participant.

2.9   The Composing Camera

The Composing Camera can be characterized by a stronger focus on creating good, well-composed footage during the observations[32]. Dialog and actions are not mixed, and the camera tries to capture the context as well as the details. The

camera changes position and zoom during the filming to gather as much information and details as possible, with a focus on esthetically pleasing pictures. It is often combined with situated interviews where the participant is interviewed.

The Composing Camera can be very good for documenting and creating easily shareable field data that can be used later in the process. A possible positive effect of the better-composed video is that it can be easier to organize workshops or making inspirational movies from the material gathered. In the Composing Camera the cameraman is more a listener and observer, and it does not allow for the same degree of interaction with the user as for instance The Engaging Camera.

3 HOW THE VIDEO CAN BE USED IN ANALYSIS AND CREATIVE DESIGN

In order to evaluate the methods described in the previous chapter it is interesting to look at how the recorded video can be used in the discover and define stages. This chapter will briefly present some of the ways to reuse video from observations in analysis, creative work, presentations or workshops.

3.1 Video as raw data
Using video as raw data for further analysis is a well-established method from research[2, 26, 34]. Raijmakers[14] concludes in his study: "The idea that video is a good tool for taking notes of whatever situation is observed, intervened or created in the research, prevails." Video can be used as a personal virtual memory for designers to make sure they get as much as possible from the field study.

3.2 Highlight Videos
When using video in the observation the designers can end up with many hours of video material. In these cases a well-established method from usability labs is to cut smaller sequences showing highlights from the observations. Mackay et al[3] writes about highlight videos, "…they can be combined to show "typical" interactions, highlight

unusual or important events, or present collections of interesting observations."

The advantage of this method is that you can include experts and other people in the analysis, without requiring very much time from them. It can also be a good tool to provoke change[15], by showing the videos to key decision makers in the organization. A disadvantage is that it can be hard to say how much context film that is required for the different highlights to make sense[34]. A fundamental problem is that the situation filmed actually changes meaning when it is seen out of context.

3.3 Video Card Game
The video card game[9, 35] is one of several tools for creating workshops where multiple participants can discuss findings and insights. Before the session short highlight sequences are made. Each video sequence has a card with a picture and some notes made for it. During the workshop the participants discuss and organize the video cards in different ways to make sense of the content.

3.4 Video Active Wall
Buur et al[8] writes "The Video Action Wall is a technique of 'live post-its' on a (projected) computer screen." This method is similar to the Video Card Game and can be beneficial when designers need to structure and make sense of moving pictures.

3.5 Comic strip
Grabbing still pictures from a movie and making a storyboard, can be an effective way to present observations[20]. In cases where the findings must be presented on a poster or other static media, this can be a good way to use the video.

3.6 Drawing on Video
Drawing on video or still pictures from a video can be a good way to experiment with new ideas while preserving the context of use[20]. Designers can also highlight different findings by drawing and writing on top of the video or picture to communicate insights or ideas.

3.7 Design Documentaries

Raijmakers[13], Buur and Blauhut [32] argue for drawing knowledge from the long tradition of documentary film when making videos for design. Some of the ways documentary video can be used are to present video personas, video stories or video collages[1, 13-15, 32]. These can be used as material for a workshop, as an argument for a design decision, as inspiration for the design team or to communicate with people outside the design team.

4 EFFECTIVE USE OF VIDEO IN FAST PACE EARLY DESIGN RESEARCH WITH EXPERT USERS

4.1 Context

The value of video as a design research tool will be discussed in light of a case with Radon Inspectors. The fundamental question is: Is video more effective in design discovery processes than other tools? The project related to this article is to use video effectively in a fast pace design project for GEM Radon Detectors, a start-up in Norway. GEM Radon Detectors is developing an instrument for radon detection. Radon is a colorless, odorless and radioactive gas. The gas occurs naturally in soil and rocks and enters through cracks and pipes into our homes. The detector will be developed for professional radon inspectors. These are skilled workers with explicit and tacit knowledge on how to do radon mitigations. The new instrument involves technological innovations that can change the way radon inspectors work. There is a need to investigate further how they work today in order to understand how the new product can improve their future work practice.

4.2 The alternatives to video

Is video in itself more effective as a note tool in design research than writing, sketching, taking photos or using a Dictaphone? In terms of reproducing the richness of the situation video is superior, but notes, drawings and pictures are easier to skim through, and it is easier to pick out what is interesting during the observation. With video, the designers have to start recording before they know whether the event will be of interest.

This makes it hard to only record interesting events, as can be done with pen and paper. With video the designer can avoid unnecessary interruptions in the process, unlike when taking pictures, writing or sketching. Dictaphone has the same linearity problem as video, and it does not provide a visual reference. This can make it even harder to recover the parts of interest.

Another important question is: How easily accessible is the context and users? Is it an app that can be tested anytime with anyone, or is it specialist equipment as it is in the given case, where the users and locations are more than 6 hours drive away. In information rich situations where the designers need to observe and record a lot of information and observations, video is a very powerful tool.

4.3 Planning and participation

In the early discover stage design processes, the design team does not necessarily know which questions to ask and where to begin looking. It can be hard to use video efficiently in the Surveying Camera or Participatory Design, since clear questions and directions often are needed before conveying the study. Situated interviews, In-situ acting and the Engaging Camera are methods that have a more open approach and are more open for two-way communication. Observational studies with little interaction with potential expert users are harder to plan and direct in a good way, if the designers have little background knowledge.

It can be hard to find people for observational studies; in the case with the radon inspectors it was hard to find a time slot where it worked for both them and the designer. Several inspectors were called, and only a few of them were willing to participate and/or had an inspection job the designer could join during the project time. It can be hard to make people prioritize using time on something they will not see the benefits from in years. At the same time a lot of people are interested in helping out and think it is fun to play a role in a product development process. Participatory Design traditionally requires that designers use more time on planning and on

recruiting participants, but with mobile cameras and easy video sharing, it is much easier to use this method in user research. There is still a need to get people to prioritize it.

Participatory Video, the Composing Camera and the Surveying Camera can be harder to get participants for. Asking someone to be monitored in a Surveying Camera or Composing Camera approach can be quite hard, while asking if you can bring a camera while you follow the users in their daily routines is easier (The Engaging Camera). The Engaging Camera, In-situ Acting and Situated Interviews seem to be good places to start in the radon inspector case.

4.4 Feelings and thoughts

Participatory Video, the Engaging Camera and Situated Interviews seem to be best at capturing subjective feelings and thoughts. All of them require that the users are confortable with being observed by the designers. Participatory Video is probably the best for getting a deep understanding in Empathic Design. Situated Interviews and the Engaging Camera allow the designer to ask questions and interact more freely with the subject. This can affect their feedback, but people are often more confortable talking to a real person that gives feedback than talking into a muted camera. In many cases the descriptions of our experiences occurs in the dialogue with people around us.

For the given case Participatory Video could be used to get an understanding of how the inspectors think and what their concerns are. Radon inspectors could be asked to share videos from their work to inspire the design process. The designers could send questions or topics to direct the participatory video from day to day or week to week. In the project an Ethnography Study with The Engaging Camera, In-Situ Acting, The Composing Camera and Situated Interviews were chosen. The Engaging Camera and Situated Interviews proved to give an effective indication of what the radon inspectors concerns were. However, how well these methods work is highly dependent on the person participating in the study.

4.5 Evaluating or generative

The Surveying Camera is most suited for evaluating or analyzing. It can be very efficient where the designers have clear hypothesis or ideas they want to test or evaluate. In these cases the designers can focus on certain aspects for closer analysis and use the video in an efficient way. In-situ Acting, Participatory Video, the Engaging Camera and Situated Interviews can allow the users and designers to explore the context and generate ideas together. For instance in Participatory Video the Radon Inspectors could be asked to make a movie about their dream work scenario. In the project with the radon Inspectors it was invaluable to get the ideas and input from the users, by using Situated Interviews and the Engaging Camera.

4.6 Efficient use of the footage

As described in chapter 3, video can be used in a variety of ways in the creative and analyzing phase in the discover design stage. To take video beyond hard data requires a certain quality of the video. It is beyond the scope of this article to find precisely where this point is, but it is evident that the different methods give material with different qualities and relevance. The Composing Camera often creates the footage with highest quality; best suited for presentations, while the Surveying Camera creates the footage that is most suited for deeper analysis.

In the project with the radon detectors it was very efficient to grab pictures from the video and add comments or quotes to how the inspectors worked. If a workshop was going to be prepared it could be more relevant to also make a design documentary to inspire the participants in a workshop.

4.7 Linearity

During later stages of the design process it can be valuable for the designers to go back to the captured video and check that their assumptions still are right. This was done in the later stages of the project to see the context in light of new designs, ideas or insights.

The linearity problem with video is easier to overcome today than earlier because it has become much easier to digitally browse quickly through video material. There is still a need for better annotation tools to make video a more effective tool. There is software that allows designers to combine the video capturing with real time logging, but they are expensive, complex and not particularly well suited for field studies[36]. However, a lot of researchers already do this by turning the camera at themselves and commenting on the go. There are many annotation tools that allow designers to browse through the video while they add notes, select highlights and mark important events in the video[37]. Products such as Remark[38], an online annotation tool, have made it easier for multiple designers and users to conduct interactive video analysis together. There seems to be a missing link between this software and a way to make digital interactive summaries of the videos in a format that is easy to generate and share.

4.8 Relation to the video material

With more effort from the designers in making visually pleasing footage it is easier for the designers to get more attached to the videos they make. In the same way as when making early mock-ups it is important to look at the models or the research video as part of a learning process and not as individual art projects. After conducting a field study with video it can be very time saving to throw away a lot of the material, and just use enough of the material to communicate or document the important findings. During the project with the radon inspectors hours of video material was produced. To use the video as an effective tool it seemed to be efficient to play the parts of particular interest and fast-forward through the rest of the material.

4.9 Designers focus during the field study

The video changes the designers' focus in two ways. On one hand it can help them pull their focus away from their notes and onto the conversations and interactions taking place. On the other hand it can change the designers focus away from the conversation and interaction to a focus on getting

visually pleasing footage (The Composing Camera). In the case with the expert users it is important to be focused on what they say, and to ask questions when the designer does not understand what is being done. Therefore the engaging camera seems more relevant, but when the designer feels he has established an understanding of what the user is doing he can supplement with other methods.

4.10 Explicit and tacit knowledge

The different methods used with video focus on tacit and explicit knowledge differently. In Figure 3 the methods are presented in a two-dimensional map according to what extent the resulting knowledge is tacit or explicit (x-axis), and to what extent the designers focus on interaction with the subject or the camera (y-axis).
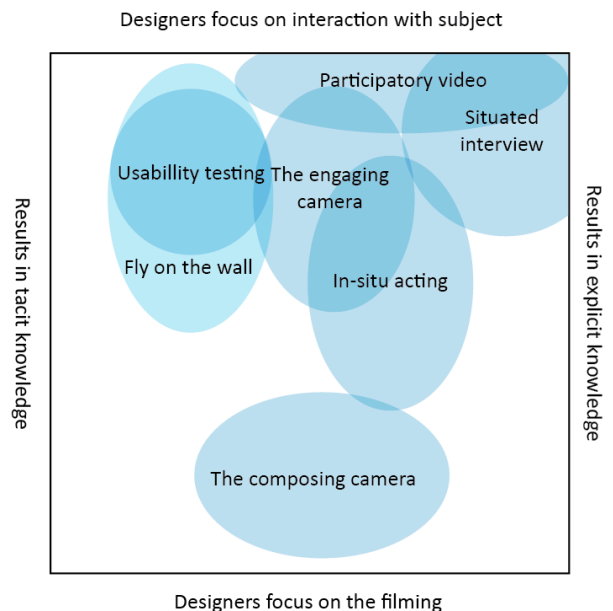

Figure 3: Video research methods mapped by the designers focus during the research and the resulting knowledge.

Tacit knowledge can be very hard to access. Some tacit knowledge requires decades of practice to achieve and understand. Other knowledge is distributed among collaborators, and it can be very hard to understand the big picture of how things are connected. Hutchins[39] introduced the term distributed cognition to describe the knowledge that can not be found in each individual but in the individuals' social and physical environment. A lot of tacit knowledge lies beyond the scope of what a

fast design process can cover. The different video methods have different access to tacit knowledge. A situated interview will only focus on the explicit knowledge the interviewed person can express, while The Surveying Camera has much more access to tacit knowledge on how products are used without interference from the observer. Combined with video reviews of the practice with the users the tacit knowledge can become more visible.

What is the most effective method depends on the case investigated. In the case with the radon inspectors a combination of tacit and explicit knowledge is needed, hence it could be most effective to start with the Engaging Camera and In-situ acting, to get a good overview. Situated interviews are also a good place to start, since the Radon Inspectors will have their instruments and tools easily accessible and this can also be a good starting point to get an overview of the explicit knowledge before moving over to the tacit knowledge. When a good overall understanding is established, it might be beneficial to investigate further with more focus on tacit knowledge. This can be done with the Surveying Camera.

4.11 All-round

The project with the radon inspectors showed that the Engaging Camera, Situated Interviews and In-situ Acting were good methods in the early phase of the project. They gave an effective introduction to how the radon inspectors' workday is. Being part of the work process itself proved of most value, but being able to document and communicate these findings with video and stills were very useful. Grabbing frames from the video was an efficient way to document the learning. In-situ Acting had several advantages in the project as well. The inspectors' practical and theoretical requirements to the product became a natural part of the conversation when acting out. After joining a couple of inspections the video method was changed to The Composing Camera to supplement the video already gathered. This produced better images that were more suited for documentation.

5 CONCLUSION

The Engaging Camera, Situated Interviews and In-situ Acting seem to be the most preferable video techniques for early stage design processes. In light of a case with skilled radon inspectors they have proven to be beneficial to start the early design research process with. During an early design process it can be valuable to supplement with other methods to highlight other important aspects.

As a result of the analysis a map (Figure 3) was developed. It shows how the various methods cover tacit and explicit knowledge differently and where the designers' focus is. What method is effective is highly dependent on the case investigated, and the map can be used as a decision support tool in design research planning.

Newer video technologies and products have shown the ability to make, especially Participatory Video, a much more effective video method than earlier. Smart phones with video capturing and sharing capabilities is one of the most important contributors to this method. It can make the collaboration between designers and users much more close and dynamic.

Action cameras, mini cameras and eye tracking glasses can offer a detailed analysis. However, in fast pace early design processes they slow the process down if introduced at an early stage. They are more efficiently used when the designers have clear hypotheses or questions that need to be tested or answered.

The linearity of video has become a less prominent problem with increased data storage capacity, easier video editing and faster browsing of the video material, but it is still a problem. There seems to be a need for a better, faster and more user-friendly logging and annotation tool for video design research. In addition there is no simple way to share the material which both preserves the rich features of video and the easy browsing of a book or webpage.

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