Using Concept Videos and Speculative Design with Privacy by Design

Richmond Wong

UC Berkeley

School of Information

Berkeley, CA 94720, USA

richmond@ischool.berkeley.edu

Deirdre Mulligan

UC Berkeley

School of Information

Berkeley, CA 94720, USA

dkm@ischool.berkeley.edu

Abstract

Privacy by Design suggests that those interested in evaluating how well privacy is protected should consider how it is attended to during the design of a product or service. We use the lens of speculative design to analyze three concept videos – videos depicting future technologies still in the development or design stage – to see how they implicate privacy concerns. We find concept videos useful for gaining insight into mental models, the sociotechnical environments in which new technologies may operate, and the broader conversations and discourses which new technologies are in conversation with.

Introduction

The Computer Community Consortium's Privacy Enabling Design report [3] discusses the need to better understand users' mental models, particularly with regard to how users build mental models for new types of technologies and interactions that they have not had experience with yet. The report further acknowledges that Privacy by Design requires designers to work more closely with non-designers to address privacy, but it is not known how this can be best accomplished.

We introduce the analysis of concept videos as a way to gain insight into how companies are conceptualizing privacy, what mental models they leveraging to convey
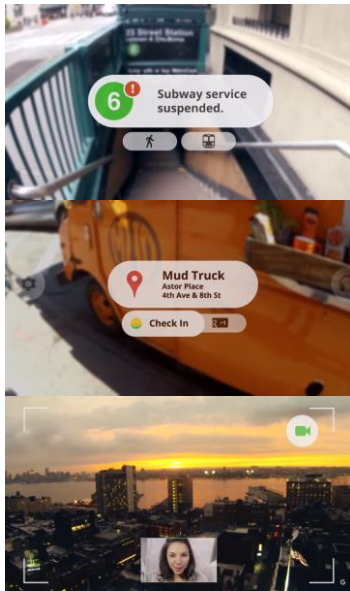
Figure 1: Screenshots from the Google Glass video. The video is completely shot in a first person point-of-view, never showing the physical device. The video takes place over the course of a day, seeming to constantly record across many types of contexts and interactions.

how the technology works, and moreover, surface social and legal implications of the future technologies companies envision. Concept videos can be used to externalize and share ideas and designs across communities of designers, engineers, business people, regulators, and other groups necessary to execute Privacy by Design.

Concept Videos and Speculative Design

We place concept videos as a type of speculative design, which focuses on using design to ask questions and surface social issues, providing us opportunities to discuss and better understand sociotechnical problems [5,7]. Speculative design focuses on creating conceptual designs that investigate possible sociotechnical alternatives to generate discussion and reflection on what people think may be a preferable future. To understand how design in the broadest sense—technical, operational, and organizational—protects privacy we must study sociotechnical systems, not de-contextualized technical artifacts. Speculative design's portrayal of alternative or future worlds, not just artifacts, allows us to do this.

Concept videos embody the qualities of speculative design and are also discursive. They respond to and influence conversations in the public discourse. Prior work by Dourish and Bell explores how cultural *representations* of technology, like science fiction, influence technical practice and design [4]. Other cultural representations of technology, such as advertisements, influence users' perceptions of products and affect users' ideas on the "proper" ways to use the technologies [9]. Concept videos, as a cultural representation of technology, similarly inform

technical practice and design, and influence users' perceptions of technology.

By analyzing concept videos as a type of speculative design, we can view concept videos as representing *possible futures*, rather than a demonstration of an actual service. This acknowledges that the product's design is not yet final, allowing critique, further inquiry, and discussion of privacy concerns among stakeholder groups before designs are finalized.

Analyzing Concept Videos

We analyzed three concept videos to understand how they frame or address privacy concerns when presenting a new technology or service. The videos portrayed Google Glass, Microsoft HoloLens, and Amazon Prime Air. All three videos were published well before the products they portrayed were available for public purchase. We followed Dyer's [6] method for investigating visual signs in advertisements by focusing on: physical appearance of people; people's behavior, emotions, and activities; props and physical objects; and settings. We also paid attention to the videos' camera and visual techniques, and any narration in the video. We iteratively watched and qualitatively coded the videos for the above categories. We analyzed the codes to see how mental models of existing technology were leveraged in presenting new technologies [14], how contexts and norms were portrayed [13], and to infer potential social and legal implications in the future worlds described by the videos.

Google Glass
Google published its concept video "Project Glass: One Day…" on YouTube on April 4, 2012 [8]. The video portrays a day in the life of a male Glass user, as he
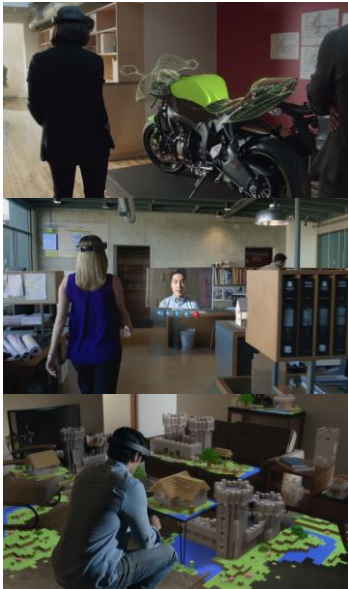
Figure 2: Screenshots from the HoloLens video, which mostly uses a third person point-of view. Top, a woman uses augmented reality to design a motorcycle part. Middle, a different woman uses HoloLens to conduct a Skype conversation in an office. Below, a man plays Minecraft in augmented reality.

makes his way around New York City (Figure 1). The context and places of use of Glass are presented as mobile and seamless. Notably, most of the scenarios shown in the video take place outdoors. The imagined user's activities evoke a smartphone metaphor and mental model, yet this is taken to a seamless and effortless extreme. Glass crosses multiple boundaries and contexts in the video, from home, to shopping, to seeing friends, to walking around. A continuous first-person viewpoint renders the physical device invisible to the viewer – in fact the physical Glass device is never seen. The video's day-long narrative suggests that the camera can continuously record and that Glass is always turned on.

This implication of continuous video recording across contexts suggests privacy violations by violating contextually appropriate information flows [13]. The seeming invisibility of the physical device and bystanders' inability to know if they are being recorded suggests surveillance concerns. Indeed, several journalists who viewed Google's video raised concerns about being surveilled by other users or the potential for Glass to integrate facial recognition technology [e.g. 10].

Microsoft HoloLens
Microsoft released its concept video for HoloLens, a pair of augmented reality goggles, on YouTube on January 21, 2015 [11]. The video shows HoloLens as a set of head worn goggles that projects holograms around the user (Figure 2). The perspective of the video utilizes a third-person point of view, allowing the viewer to see the physical design and form factor of the device which appears similar to a large pair of black ski goggles. Every use of HoloLens shown in the video takes place

indoors, either in an office or home. Furthermore, the video shows multiple users doing separate tasks: a woman uses HoloLens to design a motorcycle at work while a man uses it to play Minecraft at home. HoloLens is not used by one person for doing everything in multiple places, but rather it is used by many people for doing one thing in specific places. This evokes a traditional desktop metaphor and mental model of computing.

The imagined use cases largely protect privacy. Even though HoloLens is portrayed as having forward-cameras and other sensors, the desktop computing metaphor makes it seem like HoloLens is used for specific tasks in specific contexts, protecting contextual privacy. Journalists identified HoloLens as a device used for specific purposes like office tasks, not a device that crosses contextual boundaries [e.g. 12].

Amazon Prime Air
Amazon released its second concept video for Amazon Prime Air, a service delivering packages via autonomous drone, on November 29, 2015 [1]. The video clearly distinguishes between three stages of flight: vertical takeoff, horizontal flight, and vertical landing (Figure 3). This uses the mental model of a helicopter for the vertical phases and an airplane for the horizontal phase.

Privacy concerns raised by advocacy organizations about autonomous drones before the video was released centered on the potential for drones to trespass private property and take photos of people in their homes [e.g. 2]. Amazon's video addresses those concerns by using the airplane metaphor. Even though airplanes fly above private property, people on the

Figure 3: Screenshots from the Amazon Prime Air concept video, showing the actual drone (top). While the drone is in horizontal "plane" mode (middle), the video shows the drone's point-of-view by facing the camera horizontally, not identifying features of the houses it flies over. While in vertical landing mode (bottom), the camera faces vertically down, but only the package recipient's yard is in frame. The vertical-facing camera does not show any other person's property.

ground are generally not concerned that airplane passengers are violating their privacy by taking photos of them. This mental model is reinforced through a drone-view camera angle. In horizontal flight mode, the camera points horizontally, showing what one might see out an airplane window. In vertical flight mode, the camera points vertically downward, but only shows the property of the package recipient in frame. This suggests that cameras on Amazon's drones will not be looking down on bystanders or their property, thus protecting their privacy by not trespassing.

Leveraging Concept Videos for Privacy by Design

We note three implications of analyzing concept videos. First, analyzing concept videos shows how cultural representations can evoke and promote established mental models when presenting new technologies, similar to Orlikowski's findings of users leveraging mental models of old technologies to understand new ones [14]. These can assuage or heighten privacy concerns, particularly if we ask whether or not old mental models make sense in light of new technical affordances and different contexts of use.

Second, analyzing concept videos as speculative designs allows us to focus on how the videos present possible sociotechnical futures and ask what social and legal implications would arise in those futures. We can focus on the broader sociotechnical context in which these technologies we operate in, rather than a studying a single technology in isolation. It also opens the door for us to design, build, and present alternate sociotechnical visions of the future where privacy may be configured in new and different ways.

Third, concept videos are discursive; they are in conversation with other discourses, such as those of journalists or policymakers. Videos may be interpreted differently by various actors. For instance, a consumer, an engineer, and a regulator may come away from a video with different ideas about a technology. Our goal in analyzing concept videos is not to argue that our interpretation is the "correct" reading. Rather we present a method that allows viewers to surface ideas, questions, and reflections while watching concept videos, and to consider how the presentation of systems and artifacts relates and responds to public discourse around their introduction into society.

Further work can be done in two main areas in order to better understand how concept videos can inform privacy by design processes. First, further work can be done to study how users respond to concept videos. While we can analyze the types of mental models that the concept videos project, further work should be done to see how users might leverage concept videos' representations of technologies to formulate their own mental models. Second, further work can be done to study how concept videos can work as a communication tool and a tool of inquiry. We would like to know how different groups within and outside an organization can use concept videos to communicate and question ideas about technology and system design. Speculative design and design critique methods might be adopted as a way to ask questions about the privacy implications future technologies, or as a way to design alternative visions of future technologies.

References

1. Amazon. 2015. Amazon Prime Air. Video. (29 Nov 2015). Retrieved January 11, 2016 from https://www.youtube.com/watch?v=MXo_d6tNWuY

2. Center for Democracy and Technology. CDT Comments to NTIA on "Privacy, Transparency, and Accountability Regarding Commercial and Private Use of Unmanned Aircraft Systems". 2015. Retrieved January 11, 2016 from http://www.ntia.doc.gov/files/ntia/cdt_04202015.pdf

3. Computing Community Consortium. Privacy by Design-Privacy Enabling Design: Workshop 2 Report. 2015. Retrieved January 11, 2015 from http://cra.org/ccc/wp-content/uploads/sites/2/2015/05/PbD2-Report-v5.pdf

4. Paul Dourish and Genevieve Bell. 2014. "Resistance is futile": reading science fiction alongside ubiquitous computing. *Personal Ubiquitous Comput.* 18, 4 (April 2014), 769-778. http://dx.doi.org/10.1007/s00779-013-0678-7

5. Anthony Dunne and Fiona Raby. 2013. Speculative Everything: Design, Fiction, and Social Dreaming. MIT Press.

6. Gillian Dyer. 1982. *Advertising as Communication.* Routledge.

7. Bill Gaver and Heather Martin. 2000. Alternatives: exploring information appliances through conceptual design proposals. In *Proceedings of the SIGCHI conference on Human Factors in Computing Systems* (CHI '00), 209-216. http://doi.acm.org/10.1145/332040.332433

8. Google. 2012. Project Glass: One Day…. Video. (4 Apr 2012). Retrieved January 11, 2016 from https://www.youtube.com/watch?v=9c6W4CCU9M4

9. Ellie Harmon and Melissa Mazmanian. 2013. Stories of the Smartphone in everyday discourse: conflict, tension & instability. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '13), 1051-1060. http://dx.doi.org/10.1145/2470654.2466134

10. Kashmir Hill. 2012. Sergey Brin's Favorite Google Glass Feature. (11 Sep 2012). Retrieved July 1, 2015 from http://onforb.es/RIXia6

11. Microsoft. 2015. Microsoft HoloLens – Transform your world with holograms. Video. (21 Jan 2015). Retrieved January 11, 2016 from https://www.youtube.com/watch?v=aThCr0PsyuA

12. Patrick Moorhead. 2015. Microsoft Hololens Gets Face Wearables Right. (28 Jan 2015). Retrieved July 1, 2015 from http://onforb.es/1Hf8XgY

13. Helen Nissenbaum. 2009. Privacy in Context: Technology, Policy, and the Integrity of Social Life. Stanford University Press.

14. Wanda J. Orlikowski. 1992. Learning from Notes: organizational issues in groupware implementation. In *Proceedings of the 1992 ACM conference on Computer-supported cooperative work* (CSCW '92), 362-369. http://dx.doi.org/10.1145/143457.143549