Consuming Video on Mobile Devices

Kenton O'Hara[1], April Slayden Mitchell[2], Alex Vorbau[2]

[1]Hewlett-Packard Labs
Filton Road
Bristol,
UK

[2] Hewlett-Packard Labs
1501 Page Mill Road
Palo Alto, CA
USA

ABSTRACT

Mobile video is now an everyday possibility with a wide array of commercially available devices, services and content. These technologies promise to transform the way that people can consume video media in their lives beyond the familiar behaviours associated with fixed TV and video technologies. Building upon earlier studies of mobile video, this paper reports on a study using diary techniques and ethnographic interviews to better understand how people are using commercially available mobile video technologies in their everyday lives. Drawing on reported episodes of mobile video behaviour, the study identifies the social motivations and values underpinning these behaviours that help characterise mobile video consumption beyond the simplistic notion of viewing TV to kill time wherever you may be. Implications for adoption and design of mobile video technologies and services are discussed.

Author Keywords

Mobile video, mobile TV, diary study, interviews, mobility.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Video consumption on handheld devices has been possible for some years now, but recently has been receiving renewed attention from parts of the technology and media sectors. Mobile phone operators, for example, are investing considerably in broadcast mobile TV with fully fledged services in various countries throughout Asia as well as other large scale trials around the world. The technology sector is also making important plays in this space, both in terms of device manufacture and content delivery. Numerous video-enabled media players are now available on the market today, most notably Apple's Video iPod and Sony's PSP. With forthcoming offerings from Microsoft, it is clear just how much interest is being generated in this area. The emergence of dedicated content delivery services is also an important feature of this emerging phenomenon. Again iTunes is the obvious example to point to here but perhaps more notable is the emergence of services such as Google Video and it's recognition of the value of mobile video in deciding to deliver iPod and PSP ready content. These and other such services are changing the landscape of video content delivery and pose an interesting challenge to the traditional broadcast companies. In response to this, we are also seeing plays from traditional broadcast companies, such as the BBC exploring the delivery of content to mobile devices through podcasting.

The shift from fixed to mobile usage does not simply result in a transfer of the same experience to a greater range of places. Rather, as we have seen with social studies of portable MP3 players and mobile phones, the mobile form factor profoundly changes the ways in which people orient towards these technologies and how these artefacts become integrated into people's everyday lives [5, 6, 7, 8, 14, 17]. One, of course, would expect similar shifts to happen in line with the growing possibilities for mobile video distribution and consumption. Our concern here, then, is to understand these shifts and explore how new mobile technologies and services are transforming how video can be integrated into people's everyday lives. Further, we want to understand the ways that such devices and services complement the existing ecology of TV and video technologies. Before turning attention to the study and to help establish context for our discussion, we first take a look at existing social studies both of TV/video viewing in general and, more specifically, mobile video. (While the study also draws on insights from the literature on social practices with mobile phones, space constraints prevent us from reviewing that here [but see 5, 8, 10, 14, 17, 24, 27].

PREVIOUS WORK

There are numerous social studies of television in the literature. Of these, perhaps the most extensive is Silverstone's study of television and everyday life [21]. While this offers some pointers to everyday behaviours with regards to TV, much of the analytic concern is above what is practical from a design perspective – being concerned more with societal significance of the TV. Of greater relevance to our concerns here are the more design-oriented social studies of TV/video consumption whose analytic concerns are more with the details of everyday practices and their relationships with particular TV/video technologies [2, 4, 11, 12, 13, 20, 25]. A number of important issues arise in these studies. For example, Taylor and Harper [25] in their ethnography of TV in the home highlight ways in which TV viewing at home gets structured and, in particular, how different modes of viewing relate to the wider social context in which TV gets consumed. Early parts of the evening, for

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example, are characterised by relatively passive and indiscriminate viewing behaviour – part of the ritual of coming home that allows people to "switch off" from the relative stresses and strains of the workday. Mid evening viewing, by contrast, is characterised by a more selective viewing with greater emphasis on social and communal viewing whereby the family sit down to watch TV to "be together". Late evening viewing is then done after doing household chores and children were in bed and is characterised by more individual content preferences.

The social organisation of the household and its relationship to TV is also an important theme in O'Brien et al's [13] ethnography of a set top box (STB) device in the home (TV, internet etc). A key insight of this study concerned the household as a distributed system. So while the TV/STB in the living room promoted some of the social functions of togetherness, the concentration of functionality into the set top box in the living room did not allow for a natural distribution of activities across different people and spaces in the house where appropriate. As we shall see later, this theme plays a part in the motivations underlying everyday practices with mobile video.

A further point to draw from these studies concerns methods for distributing content. The study by Brown and Barkhuus [4] is illustrative here in its look at practices and social motivations around video downloading relative to broadcast content. A critical point here is control over content choice. Control is not simply about what one wants to watch at a particular time but brings a host of other important social values associated with content ownership, such as the importance of content collection and the ability to share this with others. The study also highlights the need to consider the whole TV lifecycle; not just the viewing experience but the activities that happens around this, e.g. viewing program guide etc. These methods again have bearing on the different practices emerging around particular types of mobile video devices.

The above studies offer important insights that can help understand aspects of mobile video consumption within a broader ecology of video consumption practices. But, they do not offer insights into the unique qualities of mobile video. Much of the work on mobile video has been largely technological in its focus, or focussed on particular aspects of usability such as video quality preferences or navigation issues [e.g. 9, 23]. While important in their own right, these studies do not address our concerns with everyday behaviours with mobile video, its integration into people's lives, and its relationship to the places people use it. A few key studies have attempted to do this. First, Södergård reports on an extensive study of a mobile TV prototype in Finland [22]. In this study, participants were given a prototype device (iPaq or Tablet PC), on which they could view content from three Finnish TV channels over WLAN. The study highlights the value of TV-anytime (being released from TV schedule) and anywhere for people. It also begins to highlight some interesting characteristics of people's mobile viewing behaviour; such as, the predominance of very short viewing periods (of the order of a few minutes), sometimes listening rather than viewing, and that favoured content was different from traditional TV. It also reports some of the different places where people viewed TV such as the home or at the bus stop. In terms of understanding mobile video, the study makes a good start but the analysis often stops a little short; describing behaviours but not really exploring the social context and motivations associated with the behaviour.

We get more sense of social motivations and relationship to place in the study of Repo and colleagues [18, 19]. In their week long study, they gave participants video-enabled mobile phones with access to a small amount of content streamed from a Finnish TV channel. Of interest in the study is their discussion about video viewing behaviour in public spaces. Drawing on Goffman's notion of "face" they highlight three strategies for managing face: averting disturbance by avoiding irritation to others around, adjusting to signalled disapproval, and purposeful aggressive behaviours to deliberately draw attention. In addition, the study starts to point out ways in which mobile video comes to be enjoyed as part of a shared experience rather than just alleviating boredom for an individual – a theme which we explore further in our study. This study, though, is only a starting point for our understanding. The authors indeed call for further research, acknowledging the limitations of their own study in terms of narrow focus on the mobile phone, small range of content type, limited period of use of the technology, and content delivery mechanism (namely steaming video).

Taken together, these studies begin to offer some insights. However, further research is necessary to really understand the social and contextual factors shaping practices as they are enacted and given meaning in everyday life. In this paper we address this through a study of what people are doing in everyday life with their own mobile video devices.

THE STUDY

Participants

Twenty-eight participants were recruited for the study, 13 from the UK and 15 from the US. The sample included 18 male and 10 female participants and covered a range of ages between 14 and 47 yrs of age. All participants were established users of mobile video on some form of mobile device. The devices included video iPods, Play Station Portables (PSP), Archos media players, iPaqs, and video-enabled mobile phones (including subscription based TV services). The aim here was not to create the basis for statistical comparisons across different types of users and devices (which would not be appropriate with such a sample size). Rather, in such an exploratory study, the aim was to provide opportunities for issues particular to different types of users and devices to be highlighted. Participants were given £50.00 in vouchers.

Method

The method used was a diary study augmented by in-depth interviews. Participants were given a small paper notebook and asked to keep a diary of all their mobile video related

behaviours over a three week period. Where possible, diary entries were to be made as soon as possible after the behaviour. Where there were pragmatic constraints, diary entries were to be made at the end of each day. The behaviours to be recorded were not limited to viewing of video content on mobile devices, but included the broader range of behaviours that enabled the viewing of mobile video. For example, participants were asked to record episodes of downloading content to view on the device, converting video material to suitable formats for viewing on the devices, searching for appropriate video media on the web, sending or receiving video to/from friends, connecting device for viewing on a larger monitor (e.g. TV), creating and editing content for viewing on a mobile device and deleting and organizing content. For each episode they were asked to record the time and place where it occurred, duration of the episode, content details, devices used, and reasons underlying the behaviours. Where practical, we also asked participants to take photos of the episode location to provide a sense of context for understanding the behaviour.

Interviews were carried out with participants before and after the three week period. Interviews prior to the trial period were used to introduce the participants to the study and establish background context about their work and family life, as well as gather general information about their TV/video technologies and habits. A longer interview (60-90 mins) was conducted at the end of the trial based around the recorded diary episodes. During this interview, we went discussed each recorded episode and elicited more details about the behaviour, the context surrounding it, and any underlying motivations. From the discussions we identified factors of the device, place, or person shaping the episodes.

FINDINGS

Recorded diary episodes highlighted how mobile video was being consumed in a huge variety of places, including buses, cars, trains, airport lounges, work cafeterias, people's desks in the office, cafes, the gym, the hospital, on the walk to school, and the school playground. As we shall see, it also started to inhabit places where one expects to find other forms of fixed televisions and video consumption devices such as in the home and at friends' houses. Mobile video was consumed at different times during the day and for a range of durations. Earlier studies of mobile video prototypes had suggested that viewing episodes on mobile devices were typically short [e.g. 22]. There was some consistency here with some participants not watching mobile video for long periods of time because of the small screen size. However, a more accurate characterisation of behaviour was that viewing episodes were determined by the range of different content lengths available relative to standard broadcast TV, and perhaps more importantly, the practicalities of the particular circumstances where it came to be viewed. In this respect and in contrast to the earlier prototype-based studies, we saw how people watched a range of different content, both published and user created, from short 30 second clips and 5 minute podcasts through to 30 minute TV shows and movies. Mobile video allowed people to use different time periods for particular purposes.

How people were incorporating mobile video into their everyday lives and routines was of particular significance to us. For some of the participants it remained a novelty, but for many it became something that was routinely used. It was fitted into daily habits as individuals and as members of friends and family groups for particular social effect. In exploring this, we take a look first at some of the individual usage of mobile video, and then we move on to consider the social and collaborative aspects of its consumption.

Individual Viewing

Solitary viewing was the predominant form of consumption of mobile video. *"Passing time"* was unsurprisingly cited as one reason for this behaviour, but a deeper look at the episodes revealed important social factors underlying this seemingly solitary behaviour. Many of these viewing episodes took place in shared or public settings, such as the workplace or waiting spaces where other people were around. Over and above simply passing time, then, the consumption of mobile video in these setting was used as a way of managing relationships with others around.

Managing solitude

Consider, for example, the routine use of mobile video during lunch breaks at work by several participants. For these, lunch was spent alone rather than shared with other colleagues. Having lunch alone in the cafeteria was, socially speaking, mildly uncomfortable. Watching mobile video allowed people to appear purposeful rather than alone in these contexts. Alternatively, some participants avoided the cafeteria and lunched alone at their desks. However, it was still important for them to have a lunch break. Being immersed in the audio-visual experience of mobile video allowed them to claim back their own time and space, blocking out sights and sounds of a shared workspace.

Disengaging from others

Watching mobile video in shared settings was also used to avoid possibilities of social engagement. A good illustration of this can be seen in an episode recorded by one of the young male participants. For the school run each morning and evening, his parents carpooled with another family. This meant he shared the car's back seat with children from the other family. Because they were younger than he was, he found them a little irritating. Watching video on his PSP with headphones was his way of avoiding engagement with them in the close confines of the car. To a similar effect he also showed them the Simpson's to keep them quiet.

"I held it up and they were watching it and I thought 'oh blimey if it's like £200.00 to keep them quiet. I will pay it any day'. I just sat there and thought 'watch it please'. I held it so they could all see it. Best car journey home ever really."

Controlling the acoustic environment in these shared spaces was another motivation. For example, a young male participant described being driven to school by his dad. His dad played music in the car which our participant did not like, so he would watch mobile video with headphones to *avoid* listening to his dad's music.

In public transport situations, we saw mobile video usage for some similar kinds of reasons. As well as managing the boredom of these journeys, mobile video with headphones was used to create a private space and manage what Bull [6] calls the close proximity of unknown others within these public spaces. Of course people used other technologies and content to do this such as MP3 players. But video was particularly useful here since it demanded visual attention too, allowing further disengagement from unknown others.

Choosing to use mobile video in these spaces and circumstances (as opposed to adopting other strategies such as listening to music with headphones or reading) was contingent on several factors characterising these spaces. Unlike the Repo study [18, 19], the concerns here were not with disturbing people with sound since the devices were typically used with headphones in these spaces (indeed an important part of the privatising function of these devices). Rather, they related to the ability to be settled and undisturbed in these spaces. To illustrate some these factors, consider an example from a participant who regularly took the bus to and from work:

"Taking the bus [to work] takes between 45 minutes and an hour. In the morning I would come by bus sometimes or with a colleague – in the evening I would go back by bus – but that is when I was watching most of the content. There is less sunlight [in the evening] plus the bus is busier during the morning . If I was sharing the seat with someone – I don't know why – maybe you don't feel comfortable or something – you need more space to expand yourself. It's easier to listen to music – I have an MP3 player with me sometimes – probably just because I have the headphones already connected to it. At the bustop I sometimes watch things but if there are many people around I don't watch it because there is no where to sit."

As we see from this, the time of his journey was sufficient for him to "get into" a piece of content. This contrasted with other participants who routinely took journeys of 5-10 minutes and who didn't view video because the journeys were too short to justify the effort. At times when the bus was particularly busy, (e.g. on the morning commute) he avoided watching video because of the difficulty getting comfortable and settled with other people around. Sharing a bus seat with others made it awkward to get his iPaq out and hold it for viewing. At these times, it was more convenient to listen to music since the device could remain in his bag or pocket. At night, when the bus was less busy he could get sufficiently settled to watch video on his iPaq.

Managing transitions between spaces

Of particular importance about these transport experiences is that they are made up not just of single places but rather a system of places that people have to transition between. For example, people move from bus stop to the bus and back off again, or from train platform to the train and off onto the destination platform. At the airport, this was even more complicated as people moved from queues at the check-in through to the departure lounge (punctuated by trips to the shops or toilet) onto the gate and finally onto the plane. The transitions between these places both by participants themselves and people around them hindered their ability to be "settled", shaping these mobile video experiences and even decisions to watch video at all.

Consider the bus example again. At the bus stop, it was important to maintain attention on whether the bus was arriving or not. This demanded visual monitoring which competed for attention with the video viewing. Even on the bus, the experience was a little distracted in the sense that that people would look up from the screen to look around at people getting on and off and to monitor where the bus was.

"The content I was watching you are not always looking at the screen – you sometimes look around to see what is in your environment so you continue listening to it – the plot. It's the environment forces you – you are less into it than you would be at home. You are looking at people coming on to the bus or looking where you are – it's only maybe a glimpse but it's not like being at home in front of your TV."

This was not a problem per se, but it impacted the choice of content. They watched things they described as *"throw away"*, something that could be *"easily put down,"* or where continuity could be maintained through the audio.

Form factor also played a key role here, with smaller form factor devices allowing participants to better manage transitions between different spaces. For example, the PSP has a slightly larger form factor relative to the iPod or iPaq, and thus it would be carried in a bag rather than a pocket. Having to take a device out of the bag to watch then put away again to make a transition to a different space created a sufficient effort burden for people not to bother getting it out in places where they are waiting for only a short period of time such as a train platform. However, even with these smaller devices, watching video in itself was often much less conducive than listening to audio for dealing with the transitions between spaces because audio didn't require the same kind of stop-start behaviour that the visual attention of video demands. One could continue listening to music while moving from platform to train, or from bus stop onto the bus, or from departure lounge seat to the shops.

Coordinating mobile experiences with family life

Juggling commitments

While such mobile video episodes might be regarded as solitary experiences, it was significant these experiences were often intimately bound up with home life. This was evident in a number of ways. First, the opportunities to view video in alternative spaces allowed people to use time at home for other things and for family commitments. People were using it as a way to juggle commitments and other interests while still maintaining an interest in TV – shifting their video viewing to environments where fewer things available to compete with the attention required. This is illustrated by a participant who describes how his weekends are time for his family which conflicts with his desire to watch highlights of the football on Saturday night.

"I don't actually get to see the games at the weekends – Match of the Day late Saturday night – weekends is not always the times I get to look at the football – because it is social time with family whereas during the week if the kids have gone to bed and it's like Champions leagues football then I will watch that – but the

weekends I don't tend to – it's good to talk to your wife on Saturday isn't it. Match of the Day – it's on too late – we go to bed early because the kids get up early."

He goes on to describe his use of the mobile phone video service to download football highlights during a time which is not conflicting with these commitments.

"I pick up my daughter about 7.15 – she does Tap and Jazz at the club so I always end up having some time free and that's always the time I want to play with the phone and do some things – it's because I have 5 to 10 minutes –With the Premiership thing you can watch any of the goals – sometimes it is the Wednesday matches sometimes it is from the previous Saturday."

By allowing shifts of time and place of access, mobile video allowed him to manage priorities with respect to his family without giving up watching the football.

Coordinating content with family

Second, the choice of content viewed on a mobile device was influenced by the social viewing habits of partners and family at home. Participants referred to how certain shows or films were things they would sit down and watch together with partners or families. Consequently, viewing such content on a mobile video device would remove this opportunity for a shared experience. This is not simply the case that the participants in question were deferring viewing because they wanted to have the shared experience with their partners and families. Rather it was the social meaning communicated through these acts that was of significance. This is illustrated in the following example where one participant had been watching episodes of the TV program Lost on his PSP. His wife was also an avid watcher of the program and it was something they watched together. He had downloaded and converted new episodes of Lost and was particularly eager to see them. Rather than wait to view them together, he watched them first alone on his PSP. Later, they sat down together and watched the same episodes. Effectively he watched the same episodes twice due to the social meaning bound up in the act:

"I should say that I didn't tell her that I'd watched the episodes on the PSP before hand. "

Int: "Would she have been annoyed?"

"Annoyed? No - err I think she would have been more disappointed than annoyed – that's much worse isn't it – disappointed that perhaps I couldn't wait - you know to watch it with her I think. Because I think she would have turned round and said 'well there's no point in you watching this.' because you have already seen them – so I didn't let the cat out of the bag."

Conversely, this desire for togetherness and coordinated viewing meant there were not opportunities for viewing certain things at home. One participant said he had several DVDs that had been unwatched for months because they were not things his wife liked – they did not provide opportunity for shared experience. Only by converting them to PSP format to view on the train did he get to view them:

"I converted two more films from pre-recorded DVDs that I owned. I hadn't seen them before. So I bought them and put them in a cupboard and they've been collecting dust since. I just hadn't made time to watch them. Both of them are just under 2 hours. I had watched countless other DVDs since I bought those but just haven't watched them. We only have one TV at home. It just wasn't convenient to watch them…Action films, horror films – my wife has no interest at all in films like that – so I find myself putting that genre of film on the PSP to watch."

Watching at home

Watching video at home on these mobile devices was common for many participants in the study. From the perspective of viewing experience, this seems a little odd given other devices in the home with larger displays offer a much better viewing experience. But these mobile video devices afforded some important behaviours in the home. To understand these we need to consider them within the social and moral order of the home - the relationships contained within the shared space of the home and the motivations for being together and not being together (cf themes seen in [13] and [25]. Consider the following example in which a teenage girl explains a mobile video viewing episode on returning home from school:

"When I got home I went to the living room and sat down to watch the Tiki Bar TV on my iPod."

Int: "Why do you do that rather than switch the TV on?"

"My brother normally has the TV anyway so I don't tend to watch that much TV. He has it more and I tend to have the computer more so it's kind of a fair deal. We don't tend to watch the same things – he is nearly 13… We have 4 TVs in the house – one in Mum and Dads bedroom, one in the front room, one in the conservatory and my brother has one. There was just nothing on – it's normally my brother watching cartoons – because like 2 TVs have Sky – they are both downstairs. We kind of stay separate from each other – it was just the first place where we had dropped. Mum was in the kitchen."

In this episode, several factors are playing out. In part we see Taylor and Harper's [25] "coming home ritual"; being downstairs in the *shared* part of the home with others around while waiting for her dinner is an important part of this. It was not simply a question of her going to view one of the other televisions in the home, as this would remove her completely from this important social context and part of home life. Also important in her explanation is reference to the moral order of control over the main TV - it is fairer to let her brother have control (in spite of the fact he has a TV in his bedroom). By viewing her iPod, she was able to distribute functionality and control across separate devices [cf. 13], allowing them both to share the space while maintaining a degree of separateness.

In other examples, we see an even greater sense of togetherness being played out with participants watching mobile video while their partners sat next to them or while their children watched the TV next to them.

"I enjoy sitting next to my wife in the living room but often times I may not enjoy the same shows she is watching so I watch my iPod. She is watching TV – she is very much into CSI and Law and Order - but they seem to have a formula and after a while I feel like they are not as interesting anymore - so sitting next to her I will be watching my video iPod."

"I ended up watching the music videos that I had watched before. It was on Sunday morning… Sunday is the wife's day to lie in…the boys [one is 3yrs and the other is 6yrs] were watching something on the TV so I thought I would pick that up and have a look…You can only take so much Dora the Explorer. But I think it's better to be in the room with them.And that type of watching is pretty early in the morning so there is not a lot else to do."

Watching a device with headphones on is often regarded as a socially excluding experience. But with close family in the familiar context of the home environment, this was not necessarily the case. Indeed togetherness here was not about talking together or watching content together. The experience of togetherness was about being in the same place - physically close and in sight. Traditional TV viewing with the family is similarly motivated by desire for togetherness but confounds sharing space with sharing content. What we see here is how mobile video devices were used to facilitate togetherness in circumstances where different content interests might have encouraged family members to move to other rooms.

There were other times, though, when family members wanted more solitary experiences in the home. Participants exploited the flexibility of mobile video devices to explicitly withdraw from the shared social spaces in the house to quiet places in the house where they could be alone.

"I was lying on the bed in the spare bedroom with headphones on – was watching Creature Comforts on the PSP. My wife was downstairs watching TV so it was just some quiet time where I could go away and immerse myself in the experience."

A key place for this kind of viewing was in the bedroom. For teenagers in particular, the bedroom was their own personal space. Watching mobile video for some participants became part of their ritual of going to bed.

"I watch my iPod in bed. I like to fall asleep while watching it."

Important here was that many participants who did this with mobile video actually had TVs in the bedroom. The form factor of the mobile device was giving them something different. Rather than having to adjust posture around the device (as was the case with other devices such as a laptop or bedroom TV), the device was small and portable enough to be positioned relative to the person's posture. This fitted better with their levels of tiredness and the desire to lie down in a relaxed horizontal position. As one girl said:

"I do [have a TV in my room] but I can't lay in bed and watch it. I put it [iPod] on the pillow and go like that [leans on her arm]…I'm too lazy."

Another teenage boy described:

"I was in my bed and I didn't want to get up to the couch to watch TV so I watched South Park [on his iPod] and then my batteries ran out and that kind of sucked. [There is a TV in the bedroom] but you can't see it from the bed so…"

Sharing the experience

Watching together

While much of mobile video viewing behaviour was characterised as solitary viewing (albeit often in the presence of other people in public and shared spaces), an important feature of people's behaviours with mobile video concerned shared viewing episodes. On a purely practical level, there were certain pragmatic difficulties with shared viewing of these devices and typically it was limited to small groups of two or three people. Sharing the audio on some devices was also difficult. For example, with the iPod there is no internal loudspeaker available, so people would use one headphone earbud each or cup the earbuds in their hands to try and amplify it or simply not bother with the sound at all. With other devices such as PSP and mobile phones, the built-in loudspeaker was used (though in certain noisier environments of public spaces this too was sometimes a poor experience). While identifying these practical limitations lends itself to potential design opportunities, also of significance is why such behaviours happen in spite of the practical difficulties. There is value in such behaviours that needs understanding.

Looking more closely at these episodes we see that mobile video creates interesting new opportunities for social occasioning. Important here is how the devices allow specific pieces of content to be carried into new social contexts. It is within particular social contexts that the content on these mobile video devices could be made meaningful. In one episode, a group of four boys were at school and used a PSP in order to watch the film "Shaun of the Dead". The film was their collective favourite; something they had *"all seen about ten times before"* and something that they wouldn't be allowed to watch in adult company. The group had retreated to the graphics room because "*not many teachers go in there"* and gathered round the PSP. What was notable about their viewing was that they didn't watch the film continuously. Rather, they fast forwarded to the *"funny bits"* in the film in order to watch those. They would each call out different scenes to forward to, have discussions together about which were the good bits, and comment as the scenes played. This behaviour was more than simply passing the time. Rather, they were enacting their friendship through suggestions, agreements, and disagreements about scenes and expressing something about their tastes as individuals and as group members. The device mobility allowed this to play out away from the presence of inhibiting authority figures they would find at home and in more public parts of the school.

In another episode, we see how sharing specific types of content was part of belonging to a group or community based around a specific interest. The participant in question belonged to a gang of skateboarders. The gang would congregate in a particular part of the city where others skated. At the end of one particular day, they went to a local coffee shop to continue *"hanging out"*. While there, three of the group gathered round a video iPod to watch professional skateboarding videos together. Again we see here how these particular pieces of content were being made meaningful within a particular social context. Watching the videos was a resource for expressing their identity as skateboarders to the others in the group. They also used the videos to discuss good places to go and skateboard. Of significance here is

that this group was organised around the particular location and vicinity where they all skated. This is not something that would take place in each others' homes because their homes were not the places where they interacted as a group. It was the mobility of the device and content that created the opportunity for being part of this social context.

Some participants also used mobile video to spend time with their children. We noted earlier how parents sometimes gave their device to their children to watch, but there were also examples of watching mobile video together with their children. This kind of shared experience was a more active form of viewing than the passive experience of simply handing the device over. It was a way of brokering conversation and spending time together. As one participant noted:

"He asks questions as we are watching Felix the Cat or Dora the Explorer and I'll answer them."

On other occasions, sharing mobile video was used as a resource for shared decision making and planning about social occasions. For instance, one couple while waiting for their children to finish playing at a local leisure centre decided to think about what to do on an upcoming evening when they had a babysitter. They downloaded to their phone several trailers of currently showing movies and watched them together in order to discuss whether there was anything worth them going to see.

"The kids were running round and playing and very happy and my wife and I were talking about going to the cinema on Wednesday night because we had a babysitter to look after the children. We didn't know what was on at the cinema so thought why don't we just look on the myview.com website and see what films were on. We downloaded some film previews – the Weather Man and Walk the Line and a couple of. We were able to play them and see the different scenes but it was so loud in there with all the kids and things that we couldn't actually hear the volume. So we ended up ignoring the volume – and we were talking over it – oh this looks funny or this looks good. We concluded we didn't want to see the Weather man."

Showing video to others

Sharing mobile video was not just about watching things together but also about *showing* things to other people for particular purposes [e.g. cf. 27]. There were several episodes where participants showed personal content such as family videos using their mobile devices

"This is the type of file [video of the family on PSP] that I want to be able to have with me – it's more family, It's not… for me. I'm sure there is a market out there for people who want to download the next CSI but…"

An important feature of this behaviour was that people were putting and keeping certain pieces of content on their mobile devices specifically for this purpose. It is not just that the content happens to be on the device and then comes to be appropriated for these collaborative practices. For example, one participant described keeping his holiday videos on his phone (as opposed to just downloading them to his PC) for a certain time period after the holiday because he knew that people would ask him how the holiday went.

"It stays on there for a while during the period when people are still asking me whether I had a good holiday – I can then show them the videos when they ask."

Similar behaviour was also seen with published content. One couple kept documentaries recorded from the TV on their mobile device. The point of keeping the content was not to watch it themselves but rather to show particular bits to friends whenever they visited their friends' homes. The content would form the basis for discussion between them – part of the ongoing socialising of a visit to a friend's house. Another female participant kept certain content on her device after watching it in order to show her friends who would be interested. Through the act of showing chosen content, she demonstrates her own interests and understanding of what her friends find cool.

Opportunities for humour were another motivation for showing mobile video content. A good example of this was a particpant's use of the mobile phone to show highlights from the football. He would show the clips to his friend at work in order to wind the friend up about how badly his friend's team had done at the weekend. The issue here was not really one about quality of viewing experience. Indeed for both parties the content was not new as they had seen it before. The content was a pointer and the act of showing was sufficient to generate the humour.

Owning and exchanging content

The motivations for having mobile video content on these devices extend beyond notions of having stuff available to watch. Apparent from our interviews was the value of simply *having* content on the device, in particular for the younger participants. As seen in research on music, content collections are an important way of representing aspects of identity or provide clues about the identity of others whose collections you are viewing [cf. 3, 15, 26]. Video content collections on these mobile devices had similar properties. Several younger participants spoke of how they would just browse through friends' devices to see what was on there.

"People just look through your videos just to see what you have got. When we are just sat somewhere people will look through your videos to see what you have got – just anywhere when you are sat around bored – have a look at the phone."

The social motivations here are intimately bound up with the methods of content distribution to the device. Keeping content on the device that has been specifically chosen by the user (as with download models of distribution) has different social consequences relative to content distribution based on streaming TV services. Downloading afforded a sense of ownership bringing different social values.

Indeed within the context of these social motivations, certain content was seen to acquire high status. This helps explain the quite considerable lengths that certain individuals would go to in order to get exclusive content on the device because of the kudos associated with having it.

"This was in school. I watched the rest of Shaun of the Dead. Everybody loves this film – It's one of the best films ever – so they were all like 'do you reckon you can get Shaun of the Dead on

there - so I was like ah 'I'll see what I can do'. So I transferred it over from the site I got it from and then put it in there. It takes ages about 3 hours but then once you've done it – and then you have to convert it which is another couple of hours so the next day I took it in and they were all like 'ahh no way'."

That content had value in this way and is part of an emerging market for the exchange of video material among peers. Peer-to-peer transfer of short video clips on mobile phones was common practice among school children:

"Pretty much they go 'ah I got this funny video the other day' – 'ah lets see then' and you'll laugh and go 'ah send it to me' and then the next day you go out and send it to about 10 other people - so it takes one person and then 2 days on the whole school has it. It spreads around so easily."

As with other forms of exchange, particular social motivations, rules, and consequences underpinned these behaviours, e.g. reciprocity, exclusivity, and trust [cf. 24].

"It's sort of like exchanging them. If they see any they want you send it to them. If you see something you like they send it to you"

As one of our participants describes, some people in his school were happy to give content so long as they got accredited for it. There was enough value in being the initial source of the video content. The participant also said how some people would not exchange particular content to retain exclusive rights over and make them feel important.

"Some people are like well I had that first and they send it and you just tell people they had it first…Most people aren't like I want to be the only person with it – they go just take it. But there are some people who are like I want to be the only one with it and you have to gather around their phone to make them look good – but that's a bit silly really."

Interestingly, the concerns here were never really with the legalities or illegalities of such behaviour but rather with the particular social consequences. The social importance of ownership and exchange, then, was an important driver for people to obtain new content – having something to give has value over and above just having something to watch.

This peer-to-peer exchange of content was not possible on the other devices, such as the iPod or PSP. However, exchange of content formatted for iPod and PSP was still important here. High-school kids made an art of finding content on Google Video and file sharing networks, then exchanging via CD or USB sticks as a form of currency. However, they wanted to do this directly between devices.

"Or like having a little connector cable so instead of having to go through the computer I can just send something to Dillon [gestures with his iPod to signal device to device sharing] even like wireless or something."

Getting content onto the devices

Buying content was actually relatively rare among our participants. One participant bought episodes of "Commander in Chief" for her iPod because she rarely had the opportunity to watch TV at home. Some of the younger participants occasionally bought music videos. Other purchased content included UMD disks for the PSP but these had typically been purchased as gifts *for* the participants by others. Part of this was attributed to limited content available for purchase at the time of the study. Some participants hinted they would have bought content if something interesting had been available. However, a large part concerned the relationship of purchased content to the viewing opportunities within the broader ecology of viewing devices and situations such as watching TV at home with the family. That is, there was some reluctance to pay for content such as films or TV episodes that would only be suitable or capable of being viewed on these portable devices. In paying for content to keep, participants wanted the flexibility to use it on other devices.

"It's not just about buying content for the mobile device – when you buy content at full price you want to be able to use it on TV, projectors, etc – you want the flexibility to use it in different formats…I think I would feel a bit cheated just to have a small version of it and you've paid probably the same price… watching it at home sometimes on the PSP isn't very good and if the whole family want to watch it it's not very good – which means you will end up buying it twice – it's silly."

With this is mind, participants adopted strategies for getting free content onto their mobile devices. One such strategy was to look for free content on the Internet. Particularly popular sites were those where the free content was already formatted for iPod or PSP, e.g. Google Video. This search behaviour was both a source of frustration and fun. Some of the younger participants really enjoyed the search for and discovery of new content, spending significant amounts of time doing so. For them it was an integral part of the mobile video consumption experience.

"I do a lot of browsing. I could do that for like 3 hours at a time. I like checking out the new videos. Lately iTunes has been really good adding a lot of new things that I can check out."

For others it was a source of frustration because of the time involved; especially if searching for particular content as opposed to more non-specific browsing. Converting video was another strategy to get free content onto devices. Some of this was published content that had been downloaded from web sites and peer-to-peer sites and some was personally created content. Primarily, though, it involved the conversion of DVDs which the participants already owned. While there are subtle legalities at stake which actually prohibit such behaviour with DVDs, participants who adopted this behaviour generally felt it was morally acceptable to do so because they had already paid for the DVD. The conversion process though proved to be a significant area of frustration for participants and one of the key barriers to more frequent usage of mobile video. Not only was it too time consuming, it was also somewhat of a black art in terms of knowing how to decrypt DVDs and the relevant parameters for formatting the files.

Preparing and putting content on the devices followed a number of different strategies. In one strategy people would prepare content on demand, putting it on their device in preparation for a specific purpose - a known upcoming opportunity for use, such as a specific trip. Others though would search for and load content onto the devices on a

regular schedule in order to have content on there for non-specific opportunities. So while this required advanced planning, it was planning for opportunistic use [cf 16].

DISCUSSION

What we see in the findings presented is how mobile video consumption is more than just watching TV anytime and anywhere to pass time. It is also more than content "snacking" with a range of different viewing behaviours according to circumstances, some of which are quite time consuming. By looking at people's everyday practices with different mobile video technologies, we have highlighted a range of motivations and values underlying usage of mobile video in a variety of settings and circumstances. In addition, we have pointed to issues related to form factor (e.g. device size) and context that affect its use.

As an immersive solitary activity, mobile video was used as a privatising technology - a way of claiming back their own time and space in shared spaces (urban environments, on public transport, in cars, the workplace, and even in the home) at times when people actively wanted to be alone. Much of this solitary activity, though, had additional social underpinnings, allowing people to more effectively manage video content consumption in the context of other social activities such as spending time with family. That is, people were able to shift certain viewing activities to times and places where it didn't compete with other activities in the home, and they coordinated content watched on the mobile with shared TV/DVD experiences at home. Further, by not confounding sharing of space with sharing content (as with traditional TV viewing), mobile video facilitated togetherness in the home allowing people to watch their own content while being in proximity to family.

Shared viewing experiences were also an important feature of mobile video consumption practices. People could bring content into social situations and places to create meaning and value in ways not possible with the traditional fixed TV. As well as viewing together, actively showing content to others in support of conversation was a key motivator for having and keeping content on the device over and above being viewed by the owner. We also saw the social importance of content ownership and exchange with others.

These experiences all have significant implications for technology both at the device level and in terms of content distribution methods. For example, we can amplify the values and behaviours highlighted in the study through better integration of these mobile devices with TV/DVD viewing experiences in the home. Conceptualising these devices as mobile PVRs (as in the Archos) that link to broadcast content on normal TV would be one way to do this. This would combine the new social behaviours afforded by these mobile devices with the extensive social capital that gets built up around traditional broadcast content. Broadcasters and TV networks should further increase their efforts to distribute content over the Internet that is ready formatted for mobile devices. Furthermore there should be an exploration of licensing arrangements that better fit with people's everyday understanding of content ownership. Separate arrangements for mobile vs. DVD content, for example, only make sense to the industry and not to the consumer. Different licensing arrangements could allow DVDs to be shipped with mobile ready content, avoiding need for cumbersome conversion processes.

With regards to shared viewing experiences, the findings suggest additional consideration is given for including integrated speaker technology into such devices. One might also consider new forms of docking solutions with larger displays to support a wider range of sharing experiences. In terms of exchanging content between devices, there are arguments for integrating WiFi or Bluetooth technology into these mobile devices, and we are indeed beginning to see this in emerging media player solutions such as those from Microsoft. Such technology will also facilitate other social aspects of content ownership and collecting. For example, it could allow people to browse and even consume video content collections of coproximate others in the same ways that we have seen with music (e.g. tunA [1]). Content ownership and collecting also relate importantly to content distribution methods. Broadcast and streaming models may support some of the "killing time" aspects of mobile video consumption but only the download and store model supports the value associated with ownership and exchange. Related to this model are design considerations regarding storage methods and capacity. Storage capacity on a device must depend on the range of social reasons people keep content on the device which is more than simply having content available during a particular piece of downtime.

In summary, we have started to characterise how mobile video is being integrated into people's lives and social interactions. We have illustrated ways in which these findings might inform the design space of these technologies and surrounding services. Such findings can also inform judgments about emerging adoption patterns and behavioural practices surrounding mobile video consumption and its relationship to a broader ecology of video and TV consumption technology.

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