

## TV-centric triple play services: a requirements capture

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### Abstract

The UNIC project intends to address the digital divide by developing novel satellite-based technologies that will support the provision of TV-centric triple play services to rural areas. This paper presents the preliminary results from a requirements capture for these services. Interviews were conducted with 40 households in the UK and France. Participants were questioned about their use of television, other home entertainment technology (e.g. DVD, VCRs, radio, hifi, game consoles), computers and telephones. Our results show a demand for parallel services accessible through multiple interfaces including portable devices that would work throughout the home without the need for wiring.

### 1. Introduction

The provision of triple play services - TV, broadband internet and telephony - is currently a major growth area with satellite, telecommunications and cable companies competing to become sole providers of these three services to households within Europe (Richardson, 2007). Aside from offering consumers a single bill, triple play provides opportunities for converged information and communication applications. However, while the broadband networks that underpin triple play have extended to most urban centres within Western Europe, many rural populations and some urban centres in Europe still access the internet through slow dial-up lines. Thus, having put up with rudimentary use of internet based services the inhabitants of these areas now face exclusion from newly converged interactive and entertainment services.

The UNiversal home satellite Connection (UNIC) project is attempting to address this existing and potentially growing urban-rural digital divide by developing novel satellite-based technologies that will support the provision of triple play services to rural areas. At the same time, UNIC seeks to bridge the digital divide that arises from the lack of computer ownership and/or computer literacy by providing interactive services such as email and web browsing on standard TV sets.

This paper describes late-breaking results from a user requirements study for the proposed UNIC triple play system. Rather than focus on specific

services, the aim of the study was to take a broad perspective and obtain qualitative data on the ways in which television, internet, telephone and other entertainment technologies are currently being used within the home. In taking this focus and approach, the study falls within the tradition of ethnographically orientated research into domestic technology use that was pioneered by Venkatesh's research into home computer use e.g. (Venkatesh, 1996), (Venkatesh, 1985) and later by O'Brien's study of a set-top-box trial (O'Brien et al., 1999). As with the O'Brien study, the aim of the current research was to examine the social context of technology use within the home with a view to informing design by sensitizing designers and developers to the character of the "real-world" domestic environment (O'Brien et al., 1999). A particular focus of the current research was on the interplay of television, telephone and computer-based technologies; for example, when these technologies are used together and when they are used apart. In addition, we anticipated that new insights would be yielded by re-visiting the domestic environment after the arrival of wireless infrastructure and devices.

### 2. Related research

Within recent years, many researchers working within HCI and related fields have turned their attention to technologies designed for use within the domestic environment. Research into interactive television has focused on a number of specific services including electronic programme guides (Eronen & Vuorimaa, 2000), photo sharing on TV (Lindley & Monk, 2006) and interactive virtual channels (Chorianopoulos, 2004).

Other mostly ethnographically inspired research has taken a broader view focusing on the social context of use of technologies rather than on specific applications. One example of this type of research is an ethnographic study of a set-top-box trial carried out by O'Brien et al. (1999). Addressing technologies of all types, they found that technology use was interwoven within everyday routines, that certain spaces could be "owned" by individuals for technology-based activities at certain times and that there were often multiple demands upon single physical spaces. With respect to the set-top-box, they noted the central

importance of the aesthetic impact of the technology; they also noted the potential for disruption to family life given the high degree of functionality concentrated within a single “box”. Another strand of research concerned with domestic technologies has investigated home computing e.g. (Venkatesh, 1996) (Frohlich et al., 2001). Frohlich et al. found that the PC was located in only a few specific locations and that the choice of location was often influenced by two factors: the mood of a room with respect to its orientation towards work or play and the privacy of a room in terms of its orientation to personal or shared activities. Generally, the PC was placed in rooms that had a work-orientated mood and afforded privacy. However, they also found a great demand for relocation of some PC-based activities, including selective aspects of PC use for convenience and relaxation. Echoing O’Brien et al’s results, they found that individual household members often competed with each other for PC time and that parents were keen to monitor and control their children’s use of the PC.

The current research took a broad perspective and examined the use of a variety of technologies within the home, including telephone, television and internet-based activities on computer. By examining current use of these technologies in an exploratory fashion, we hoped to gain insights that would inform the design of a triple play system.

### 3. Method

Technology use in the home has been studied in a variety of ways and with different scopes (see (Monk, 2000) for a review). Given time and resource constraints, we chose to carry out informal interviews. We felt that this method would yield useful insights most quickly and with minimal cost. We carried out forty interviews in total; twenty were conducted in the UK and twenty in France. Participants ranged in age from 19 to 78, and had a range of occupations. Our main aim in selecting interviewees was to maximize the range of household types; our eventual sample included families with children, retired couples, individuals living alone, professional shares, students living with their families and student sharers. Some of the interviews were carried out within participants’ households. The majority were conducted on the basis of photographs of technologies in the home which participants had taken prior to the interview. The interviews began with some structured questions about the type, number and location of devices within the household, and about usages of services associated with the devices. The remainder of the interview was unstructured with participants questioned about their use of television, other home entertainment technology (e.g. DVD, VCRs, radio,

hifi, game consoles), computers and telephones. The interviews lasted approximately one hour. They were recorded and later transcribed. Analysis was informed by Grounded Theory and supported by the Atlas.ti qualitative analysis software package.

## 4. Results

### 1.1. Location of computer-based activities

Almost all the households investigated in the current research had designated areas for computer based activities. Typically, this included a desk and any peripheral technology (e.g. headsets, webcams, and speakers). In some of the larger households, the designated area was located within a home office; in the smaller households, it tended to be located in a bedroom or else in the living room. In households that had one or more laptop computers and wireless internet connectivity, computer-based activities were less tied to specific locations. For example, one interviewee described how the household laptop computer was sometimes used in the living room and how, at other times, he would take it into the kitchen or a bedroom (see Figure 1).



**Figure 1: Laptop use in the bedroom**

### 1.2. Concurrent technology-based activities within the same room

Many interviewees described scenarios where computers and televisions were used at the same time within the same room, usually the living room (see Figure 2). A number of interviewees described how they would frequently use their laptop to surf the web, use email, or shop online whilst watching television. Often, concurrent use could involve more than one household member. For example, one interviewee described his partner would often watch television whilst surfing the web on a laptop while he worked at a desktop computer in the corner of the room. Another described how one of his children would sometimes chat with friends via IM on the family laptop while her brother used the television to play games. These scenarios suggest

that triple-play systems should be capable of providing multiple services at the same time.



**Figure 2: TV use in conjunction with a laptop**

### *1.3. Preference for multiple display panels*

One way to allow single or multiple users to access different services at the same time within the same room would be to use split-screen displays. This solution was generally not popular. Several interviewees said they could not imagine using email on television via a split-screen display if another household member was watching television; it would reduce the size of their display and could be distracting for them. Split screens were not popular even in individual use scenarios.

*“If you imagine if you had two things on a screen, it’s difficult to look at that without seeing what’s going on on the other half. If there’s a film on there and you’re reading a newspaper there, I don’t think it would work.”*

He noted that using services “at the same time” actually meant switching attention from one to the other rather than using them concurrently.

*“You’re not really doing two different things at the same time; you’re doing two things separately. One minute you’re reading the newspaper and then the next you stop with the newspaper and watch the TV, and then you watch the TV for a little while and then you go back to reading the newspaper.”*

In summary, there was a preference for accessing different services on different display panels rather than “overloading” one shared display panel. Asked whether these additional displays should be fixed or mobile, interviewees favoured mobile displays. With mobile displays, different household members could be more flexible with regard to how they situated their activities in a room (e.g. see Figure 3). Some interviewees believed that mobile displays would afford greater privacy.

### *1.4. Spatially distributed access*

One strong theme emerging from the interviews was a desire for access to entertainment and

communication technologies in different parts of the household. This was reflected by the spatial distribution of existing devices. Most households, particularly the larger ones, owned multiple television sets, radios, music players and telephones. These were typically positioned around the home e.g. in the living room, the kitchen, the bedrooms and, occasionally, in other rooms (e.g. study, bathroom).

Devices were distributed partly so that household members could access television, music or radio while they were engaged in activities that were tied to particular areas of the household. Thus, for example, in some households, a TV set was located in the kitchen so that household members could watch television while cooking. The distribution of devices also allowed multiple household members to use different services at the same time without the risk of audio interference.

Compared with other devices, the spatial distribution of digital television tended to be much more limited. The majority of households had just one set-top box. Some interviewees described incidents where one or more household members were unable to access live or recorded content because the set-top box was being used by someone else. Several households had attempted to distribute access to their set-top box by wiring it to additional TV sets. However, this only provided access to the set-top box in multiple rooms; it did not allow different individuals to watch different television programmes at the same time. Also, it required coordination of household members that were in different rooms.



**Figure 3: Watching videos on a laptop**

### *1.5. Reluctance to install wiring*

One factor that may limit the distribution of digital television is reluctance to install new internal wiring. While internal wiring existed in many

households (most typically, with multiple telephone handsets wired to the same landline), it had often been installed by previous occupants or, as in two cases, during renovation projects. A number of interviewees indicated reluctance to install new wiring. One interviewee had allowed a spare set-top-box to fall into disuse rather than go to the trouble of installing wiring from his living room to the kitchen, despite wanting to have the additional channels and PVR service in his kitchen. These data point to a need for alternative mechanisms to distribute services e.g. high bandwidth wireless connectivity or networking via the household power circuit.

#### *1.6. Frustrations with DRM*

Several interviewees noted frustrations caused by digital rights management (DRM). DRM in the iTunes/iPod system prevented one interviewee from changing which computer he used to download music. He had originally downloaded music using his desktop computer in his office. After obtaining a laptop computer, he tried setting up a new partnership between the laptop and the iPod but found that this cleared the hard drive of the iPod. He did not want to have two separate stores of music and so he continued to use his desktop computer albeit with a good deal of frustration. Another interviewee described how the DRM prevented him from sharing music with his partner. They were forced to maintain two separate stores.

#### *1.7. Incompatibility of devices and formats*

While some households listened to just one type of music format (i.e. either CDs or computer-based formats), the majority used a mixture of formats. Individuals within these households sometimes found that they did not have the right format for a particular player in a particular room. Generally, this limitation was overcome by uploading music stored on CD onto a computer or else by writing it onto CD. Thus, many households maintained two stores of music so that they were able to access all their music on any device. Some interviewees used their iPod/iTunes system to achieve the same goal by linking the iPod to their living room stereo. By doing this, they were able to access the same store available on their computer.

#### *1.8. Limiting access*

A recurrent theme in the interviews was the desire to restrict access to services within certain areas of the home. For example, one interviewee said that she would not want a TV anywhere apart from her living room because she wanted certain areas of the home to be quiet areas. She felt that if she had TV in these areas it would always be on. Another said he would not want a TV in his kitchen because it

was for socializing. One interviewee said his children did not have TVs or computers in their rooms because he and his wife wanted to have some control over what they watched on TV or viewed on the internet. These data suggest that users would like to restrict access to certain services within certain rooms e.g. systems should provide a central management facility that allow users to specify what services are available on each display.

#### *1.9. Envisaging services on TV*

Interviewees were asked about their current use of internet-based services on computer; they were then asked to envisage using these services on their TV set in the living room. Some interviewees were very resistant to the idea of using certain services in the living room because they associated these services with work.

*"I have a work space and leisure space and I keep the two separate*

*Interviewer: So you wouldn't want to use your TV for banking?*

*No absolutely not*

*Interviewer: Internet browsing or anything like emailing?*

*No absolutely not*

*Interviewer: All those things would be classed as work?*

*That's work and that happens down the other end. The view I take is that when I'm here I'm relaxed, when I'm down there I'm working."*

Others felt that their living room TV sets could be a useful additional gateway for activities such as email, instant messaging and web surfing but felt that, given the option, they would prefer to access these services on a computer because it afforded greater privacy, freedom from distraction and did not stop other people using the TV set to watch television.

The services that interviewees favoured on the living room TV set were ones that would make use of the social nature of the space and the affordance of the typically larger screen. These included photo sharing and video phone.

One interviewee explained how he was dissatisfied with existing ways of presenting photographs. When he wished to show photographs to friends or family, he had to take people upstairs into his home office or else spend time printing the photographs. He liked the idea of being able to view or share photographs on his living room TV set and felt that the larger screen would be an additional benefit. One household was already using the living TV set to share photographs. The father of the family used his computer to edit and download the photographs onto a DVD. These photographs would then be presented to other family members.

Video phone was another popular service for the living room television set. A number of interviewees described how they were currently using video in conjunction with VoIP services through their computer. In almost all cases, video was used in communications with family and close friends who were seen infrequently in person. Often, there were multiple users at one or both ends. As with photo sharing, interviewees explained their preference for the TV set by citing the size of the screen and the social nature of the space surrounding the TV set.

### 5. Summary

This paper presents some preliminary results from an on-going service assessment effort within the UNIC project. We have highlighted some of the dominant themes to emerge from an analysis of 40 interviews carried out within the UK and France and have attempted to draw out some implications of these themes for the design of TV-centric triple play services.

### Acknowledgments

This work was supported by the IST-2005-27034 universal Satellite Home Connection (UNIC) project. It forms part of the service and user requirements assessment effort within the UNIC project.

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