
Understanding the Multi-Screen Household: An Interdisciplinary Approach

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Abstract

This position paper provides an overview of Understanding the Multi-Screen Household, an interdisciplinary project investigating how domestic media audiences use second screen technologies in relation to primary screen viewing. It describes the novel methods developed for this problem space by a diverse group of researchers and reflects on the practical, ethical and theoretical challenges attendant on those methods.

Author Keywords

Television; screen technologies; media industries; interdisciplinary; video; home network logging

ACM Classification Keywords

H.5.1. Multimedia Information Systems: Evaluation/Methodology

General Terms

Design; Human Factors; Theory

Introduction

Over the past decade computer and mobile based screen technologies have seen increased convergence

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with domestic screen technologies such as television and videogaming. This convergence has resulted in extensive changes in how domestic media audiences are able to access content. The television set has now been joined by smart TVs, laptops, internet connected games consoles, smartphones and tablet computers, meaning that viewers are increasingly engaging with multiple screens at once, and more generally make use of multiple devices and screens in their media consumption.

The media industries are simultaneously focusing on how to expand their content onto these screens: offering catch-up and on-demand services, and producing companion applications that provide viewers with additional information or the opportunity to play-along with programmes. Multi-platform, connected content is clearly becoming a vital part of the media industries' future growth. However, discussions with industry partners BT, Red Bee, Ofcom and Thinkbox indicate that the industry is struggling to understand how the technological changes they are themselves central to, are playing out within households.

As yet little is understood about how these technologies are being used and how that use intersects with more traditional television-viewing behaviour and the wider context of the household. Such questions have long been of central to the study of television as a cultural practice [1, 8, 9]. This tradition of media audience research needs to be extended to explore multi-screen viewing, necessitating methodological development. In this respect it can benefit from cross-disciplinary exchange and collaboration with HCI, with its established research interest in social aspects of technology use and technology change [2, 3].

Research context and methods

Understanding the Multi-Screen Household (UMH) is a one year interdisciplinary pilot project in progress at Horizon Digital Economy Research, an institute at the University of Nottingham in the United Kingdom. The focus of the pilot project is to explore the factors that prompt audience journeys across screens and content, the shift from primary screen to second screen that signals the start of a trajectory of user experience [4]. The intention is to develop and test methodologies and analytical techniques that could subsequently be employed in a larger-scale longitudinal study in order to follow complete journeys and track how behavior alters over time and how new services and platforms become integrated into household routines.

UMH is researching a small number of households in depth, seeking to collect rich data that captures nuances of behavior and details of context by employing a combination of methods.

Wi-Fi network URL logging

As part of developing a richer understanding of context we are employing URL logging, which captures HTTP requests made by devices connected to the home network. This is achieved through the deployment of an adapted router (<http://www.homenetworks.ac.uk>), which provides a different Wi-Fi access point for participants to connect to when taking part in the study. This router records a range of network data, including data flows, devices, and URLs. By deploying this router in the form of a laptop / netbook, participants as well as investigators can control this logging activity using a simple interface, as well as check on the status of the persistent URL records.

IP camera video observation

In conjunction with URL logging, we place Wi-Fi enabled cameras in the living room. These record video at set times agreed with the participants. One camera provides a record of when the primary screen was in use, and what was being watched, and a second camera records a view of those watching. As with the URL logging system, we are exploring designs that provide participants with awareness and control over the recording process in a suitable manner for studying the household. A further area for exploration is how particular types of events can be found in large quantities of video, by using the captured data to identify how the screen and network were in use at a given time.

Qualitative accounts

At times when internet logging and video recording is taking place, participants are also asked to keep media diaries, noting what content they consume and what devices they use. This allows for comparison between reported and observed behavior and provides insights into activities that will not be monitored by other means (e.g. because conducted over 3G networks or outside the communal area). Integrating the three forms of data – logs, video and diaries – in analysis makes it easier to identify moments of transition between screens. Instances in which the synthesized information is noteworthy, ambiguous or inadequate can be discursively explored with participants in household focus groups or individual interviews.

Research Challenges

There are interesting paradoxes inherent in the project's methodology. During sample periods (four hours per day, two days a week, for two months) the

aim is to collect observational data about 'natural' behavior in the households and so the technology for collecting that information is designed to be passive; activated remotely and requiring no direct input from the research participants. At the same time, the physical presence of the hardware (two IP cameras in the communal area and a laptop running the router and logging software) in the domestic space is obvious, and participants need to deliberately choose to log on to the research Wi-Fi rather than their usual home network.

Indeed, from an ethical perspective, it is crucial that the research participants understand the research process that they are contributing to, the nature of the data and methods of collection, and that they are free to withdraw at any point. Informed consent is obtained from each household member prior to the start of the study, but additional confirmation of that consent is also requested ahead of each sample period. An interface on the laptop indicates whether persistent logging is taking place and provides a button that participants can use to turn it off, just as they can switch off the IP cameras. The video and log data is stored locally on the devices themselves and not transmitted over a network, physically confined to the household until collected by the researchers.

The recording of video within the home environment for the purposes of research needs to be approached sensitively and negotiated in close consultation with the participants. As screen devices capable of capturing and uploading, as well as playing, video become increasingly prolific and mobile so the distinction between media content for personal consumption and for public display becomes increasingly blurred. While webcams are a familiar feature of domestic

environments, the technology also has connotations of covert surveillance when controlled remotely (IP cameras are designed for security purposes), which might be warranted in public spaces but is completely at odds with home privacy.

One of the objectives of UMH is to probe the limits of what information people are willing to share when it comes to their contextual footprint. It is an apposite time to be investigating this issue, given that Intel have announced that they will be launching a television product in 2013 that features a built in camera, prompting skepticism from commentators about consumer response [6]. The aim is to personalize user experience, but the question is whether this offers sufficient compensation for the camera's voyeurism. The fact that Xbox Kinect monitors activity in front of a screen is understood and accepted because it is integral to interaction with the technology for the purpose of playing a game. The value to users of a camera in their television set-top box is far less obvious.

Apart from up to £50 worth of vouchers for the inconvenience, the participants do not gain any clear benefit from being involved in the research. In some respects our methodology conforms to the model of a technology probe [5], in that it collects information about use and users of screen technologies in situ and tests simple tools for monitoring usage over time so that this can be reconstructed and analyzed. However, the design goal of inspiring new technology that responds to user needs and desires is subordinate in this case to the imperative of understanding current behavior, although it does remain implicit. The methodology is not designed to be inherently flexible

enough for participants to adapt it in creative and unexpected ways for their own purposes.

It is possible though that contributing to the study, keeping media diaries and discussing their behavior with researchers will encourage participants themselves to reflect on the role of media technologies in their everyday household routines. Indeed, it may highlight cultural practices they value even as these perhaps undergo transformation. Drawing on an idea in the writing of John Updike, television has been theorized as an 'electronic hearth' [10], an environment rather than a medium or a technology. A recent reality TV show, *Gogglebox*, in the UK has sought to convey this sense of television through its format of showing households gathered around a screen, interacting with the content and each other. An implication for design may be the need to translate the function of broadcast television as a site of ritual commune into a multiple device ecology.

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