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Content-Enriched Communication – Supporting the Social Uses of TV

The technological difference between the broadcast and the telecommunications industries has imposed an artificial distinction between content distribution and interpersonal communication. As a result, content has to be distributed and consumed through broadband, unidirectional and inflexible TV channels, while interpersonal communication takes place over low-bandwidth bidirectional channels. The convergence of platforms offers many opportunities for integrated content and communication services, which we refer to as 'content-enriched communication'.

Introduction

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The anticipated take-up of interactive TV (iTV) has been supported by the nature of the medium, which is considered to be a familiar and trusted one and which is available in the majority of households in modern societies. Applications and services that have been developed for other digital platforms (e.g. Internet and mobile) can be offered through television and can enhance the viewing experience. At the same time, the opposite is also true; iTV content gradually finds its way through to Internet and mobile platforms. Therefore, besides the delivery of high-quality picture and sound, iTV promises to change the role of passive viewers by turning them into active participants of the television viewing experience, e.g. enhanced content navigation, user-generated content, interpersonal communication.

In this article, we define iTV as a user experience that involves at least one user and one, or more, audiovisual and networked devices. Previous definitions were focused on the technological aspects and ignored the fact that even traditional TV is potentially interactive. For example, viewers compete mentally with quiz show participants, or between collocated groups. Moreover, viewers react emotionally to TV content – they record and share TV content with friends and discuss shows either in real time, or afterwards. In this context, it is necessary to pay attention not only to usability issues, but also to sociability. In the rest of this article, we explore technological ways to support the social uses of TV.

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Related Work

This section explores the social dimension of TV and other related audiovisual media. In addition, we present an overview of technological support for iTV sociability. Although TV has been blamed for the reduction of social interaction within the family and the local community, there is a significant body of previous research that considers TV as a social medium, because it provides opportunities for shared experiences and group viewing. Applications that support sociability within the family or within distant groups might enhance the attractiveness of iTV as a leisure activity. This section draws on interdisciplinary literature and empirical research in order to raise the main research issues of interactive TV communications services.

Social aspects

Within media studies, television has received significant attention, although it has remained a controversial electronic medium. Some researchers have blamed television for a fall in civic engagement[1]. Alternatively, there are researchers[2] who argue that TV creates a shared and common experience that bonds together members in an extended society. Indeed as people lead more widely diverse lives and activities, TV and other mass media (radio, newspapers) can provide a common point or reference – a kind of 'social glue' that bonds strangers and acquaintances[3].

The use of audiovisual content as a placeholder for starting and sustaining relationships (e.g. discussions about yesterday's football match, or a popular TV series) is an everyday experience for the majority of TV users. Nevertheless, the pressures of daily life and the increase in the number of dispersed households make joint television viewing increasingly difficult. In this article, we consider a combined mass media and interpersonal communications framework, which we refer to as 'content-

enriched communication'. For this purpose, we are exploring iTV applications and services that support human connectedness[4] over a distance (e.g. synchronous communication about a TV programme between dispersed households), or that enhance the shared experience that comes with TV co-viewing (e.g. asynchronous communication about a TV programme).

Technological aspects

In the past, TV content in the living room has been provided either by broadcast, or optical discs. A basic iTV system includes a set-top box (STB) that decodes the signal and provides processing and storage capabilities that enable interactive applications. Nevertheless, the disagreement over a common open middleware platform has been an obstacle to the development of sophisticated interactive applications that are independent from the STB hardware. On the other hand, there is agreement about the specifications for digital video broadcasting (DVB-S/C/T/H specifications – satellite, cable, terrestrial, handheld/mobile). Furthermore, TV content can be efficiently distributed over peer-to-peer (P2P) networks. In this way, the variety of video content has been increasing with the support of new Internet technologies, which allow new ways of distributing video (e.g. broadband-connected TV boxes). Thus, iTV applications are neither limited to the traditional TV device and broadcast delivery, nor to the typical channels of satellite, cable, and digital terrestrial networks. Alternative and complementary devices and distribution methods should be considered, such as mobile phones (mobile digital TV (DTV)).

Content-enriched communication builds upon the convergence between different technological infrastructures, such as broadcasting, telecommunications, and the Internet. The convergence has been realised in different forms. On the one hand, Internet content may be accessed through television Web browsers, or linked to iTV programmes (e.g. interactive advertisements). Communications applications such as messaging, chatting, or voting during certain programmes (quizzes, contests, etc) strengthen viewer's loyalty to the specific programme. However, Internet access via television may disrupt current viewing patterns. Besides user interaction, at the network-level an Internet connection facilitates video transfer over P2P networks. Moreover, the distribution of TV content over IP-based platforms, known as IPTV (Internet protocol TV), provides additional opportunities for the delivery of a wide variety of TV programming. In addition, 3G mobile networks could be used to distribute and control TV content.

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There is a growing academic interest in content-enriched communication systems, which consist of technological solutions for integrated interpersonal communication and content distribution. There has been a significant body of computer supported co-operative work (CSCW) research on supporting interaction among geographically distributed co-workers, but there is limited investigation in the context of leisure activities, such as TV. Similarly, research on interpersonal communication in the human-computer interaction (HCI) field has regarded video-mediated communication at work[5]. In fact, there is not much information on designing applications for leisure or informal content-enriched communication. Although HCI and CSCW have considered some of the aspects of media consumption and interpersonal communication, they have not considered a closer integration between TV content and social communication.

We define a 'social TV' application to be part of an audio-video system which allows distant viewers to communicate with each other using several interpersonal communication modalities, such as open audio channel, instant messaging, emoticons, etc. One of the first approaches to social TV was the 'Inhabited TV' research effort[6], which developed a collaborative virtual environment, where viewers could interact with other viewers or virtual objects. In this case, viewers were watching TV within the virtual environment and not within physical space. Thus, TV experience was extended by enabling social interaction among participants and increased interaction with content. In an Inhabited TV application, the television becomes an actor and a part of a group interaction within a virtual on-line world.

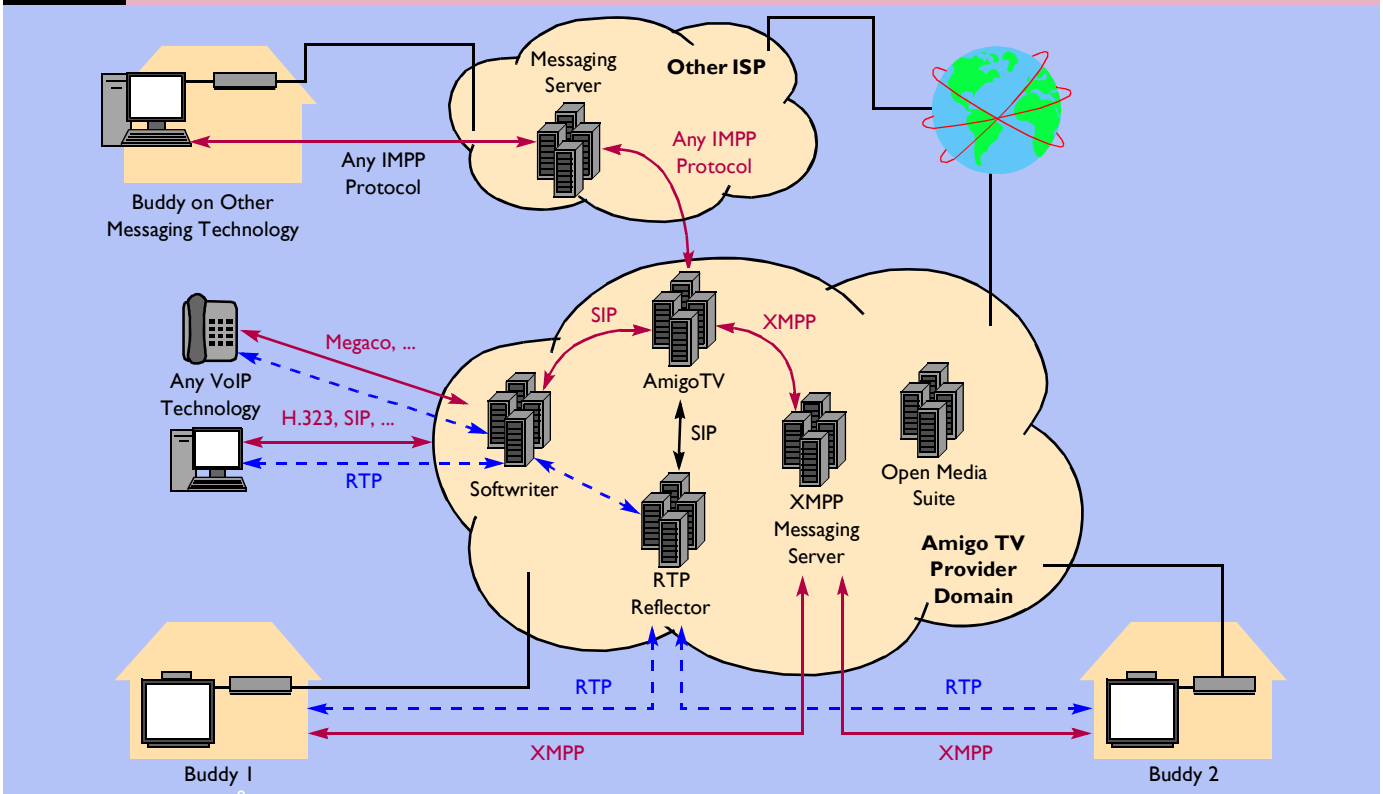
There is a wealth of research on instant messaging (IM), but with limited application to iTV. Moreover, there are many tools for on-line discussion, but computer-based IM and chat about a TV programme do not provide a bridge to the programme itself. The Media Centre Buddies system integrated TV technology into an instant messaging application[7], the main aim being to allow multiple users to log in to an instant messaging client that was running next to a TV channel. The 'Amigo TV' system provides a technological platform (see Figure 1) for integrating content delivery, communities, and interpersonal communication[8]. In addition, the content of the broadcasts can be personalised by sharing personal photos and home videos. Amigo TV supports on-line user meetings and buddy lists. Interpersonal communication is based on voice, text, and video formats, as well as animated avatars.

Photo and music sharing

Many researchers have been interested in the use of personal photographs. In particular, there is a focus on sharing photos with others. The most elaborate study is the one made by Frohlich et al[9]. They observed the communication that surrounds photo sharing and concluded that photos are taken to 'communicate experiences with others'. In other words, they describe a need for content-enriched communication, where the content is one or more personal photos. From their examination of the discussion that occurs when photograph sharing takes place, they found that users share photographs with family and friends, who are either collocated, or by sending them via the post and discussing them over the phone. Frolich et al[9] suggested, in fact, that there is a need to develop technological support for 'image-based communication practices.' Furthermore, it was argued that the increasing use of mobile phones in leisure and the communication via digital photos is an important issue in the field of telecommunications.

Voida et al[10] investigated music consumption and sharing with the popular media player iTunes. They examined how the sharing of music facilitates the construction of an identity for the user, who shares the music. Indeed, they found that people would learn more about their co-workers and change previously held opinions after browsing their music collection. In addition, Agamanolis[4] has described the design of a music-sharing system that streams music wirelessly from nearby mobile media players as shown in Figure 2 (courtesy Agamanolis[4]). Motivated by the similarity of the findings in the above studies, Bentley et al[11] performed a cross-media content-enriched communication study. They argued that music and photos

Figure 1 Overview of a Social TV architecture



Courtesy Coppens et al[8]

Figure 2 Music sharing and social communication

are a fundamental aspect of how we communicate with each other. Moreover, they found that both personal (e.g. photos) and commercial content (e.g. music) are used to tell stories, and to support a sustainable communication and closer bonding with others.

Besides social communication about photo and music collections, a similar motivation has been explored in the digital libraries field[12]. In summary, all of these studies have demonstrated the importance of social communication through sharing photos, music, books and media experiences in general.

User-Centred Design

The design of content-enriched communication services should address the user requirements that have been identified in previous related research.

Preece[13] has presented a basic set of design principles and strategies, which are organised into two dimensions:

- designing for usability;
- supporting sociability.

The first design principle focuses on usability, because people need to perform tasks easily and effectively, while the second focuses on social interaction and the following three components of sociability:

- purpose;
- people and roles;
- policies related to governance, membership, codes of conduct, privacy, security, and copyright protection.

Preece[13] also examines software selection options and technology development approaches. Her principles draw from an HCI perspective of understanding individuals, groups and their environments in the design and development of information systems.

Girgensohn and Lee[14] have identified three basic requirements for the design of sociable Web sites:

- encouraging user participation;
- supporting social interaction components;
- promoting visibility of people and their activities.

In particular, they have distilled their research results into a set of four basic social interface components that can foster social interaction – common ground, awareness, interaction enablers and mechanisms, and place-making for building social interaction sites. They emphasise the concept of 'common ground', which refers to the need to have a shared interest or experience between the members of a group.

According to Oehlberg et al[15] social TV software should be designed to:

- support the proper timing of social interaction during group television viewing;
- minimise disruptions in the television programme's flow;
- isolate exchanges that are beneficial to the group from side conversations;
- allow viewers to move in and out of the audience smoothly;
- avoid drawing viewers' attention away from the television screen.

According to Coppens et al[8], to make the television experience like going to a football stadium together, three components are essential:

- audiovisual content;
- community support;
- rich verbal and non-verbal communication.

In the next sections, we describe a framework of usability and sociability requirements for content-enriched communication services with iTV.

Interpersonal communication

Social TV systems offer one or more computer-mediated communication features, which are closely integrated with the TV watching experience. Computer-mediated interpersonal communication over distance, or over time could employ various communication modalities such as:

- audio;
- text;
- video-photos;
- non-verbal cues (e.g. emoticons, avatars).

Content-enriched communication over a distance refers to two types of sociability:

- synchronous, when viewers get together and watch the same show at the same time (see Figure 3);
- asynchronous, when viewers interact after the show has already been seen by each one, independently and at different times.

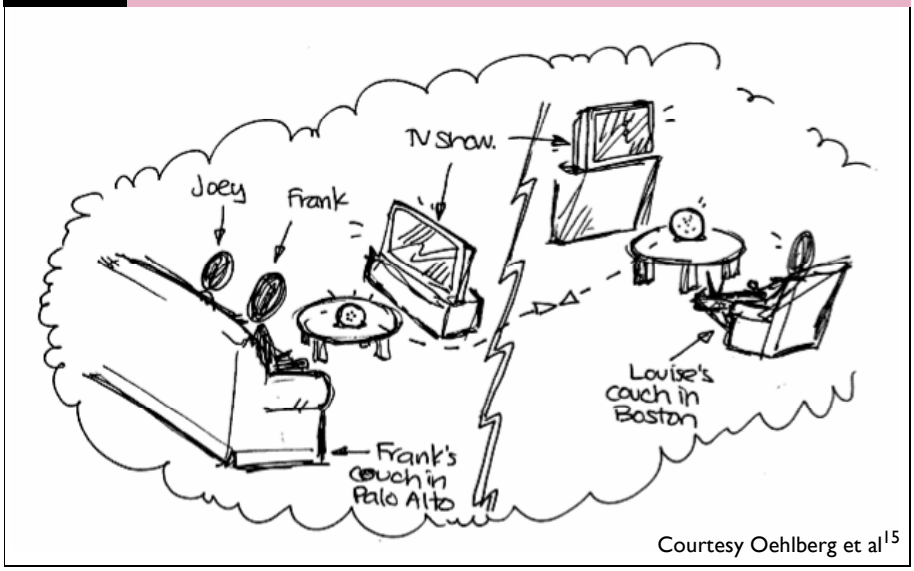
Communication between spectators is realised at two levels:

- direct communication, such as chat or instant messaging;
- indirect communication, such as co-operating in a team to win a quiz.

User-generated content

TV content production has been regarded as a one-way activity that begins with the professional TV producers and editors and ends with post-production at the broadcast station. As a matter of fact, television viewers have long been considered passive receivers of content, but a new generation of computer-literate TV viewers has been accustomed to make and share edits of video content on-line. Furthermore, the wide-availability of video capture (e.g. in mobile phones, photo cameras) and easy-to-use video editing software (available as standard in many desktop computer operating systems), opens up additional opportunities for wider distribution of home-made content (e.g. through peer-to-peer, portable video players). User-generated content and social communication about media content has been proposed by Resnick[16], who suggested that interactions could create productive resources, which he refers to as socio-technical capital. This capital may consist of artefacts created from the interactions or from the relationships and practices developed through repeated social interactions. Such capital can enable future social interactions.

Figure 3 System set-up for distance content enriched communication



Courtesy Oehlberg et al[15]

An extension to the television-watching paradigm, proposed by Cesar et al (see Figure 4)[17], permits an end-user to enrich broadcast content. In this way, the viewer takes an active role with direct control over content consumption, creation and sharing. A key difference with the Web paradigm is that the iTV user remains a viewer who participates in an ongoing process of incremental content editing. They have coined the term 'authoring from the sofa' to define this paradigm. 'Authoring from the sofa' includes three activities:

- intra-programme selection (selection of the content to be enriched);
- enrichments authoring (the content enrichment process);
- sharing (post-enrichment distribution).

Presence, awareness and seamless social bonding

If TV watching takes place over a distance or even during different times, then the main requirement is to facilitate the communication of basic information that discloses status, preference and activity of the distant viewers. Indeed, an important functionality of a social TV system would be to create the impression of watching TV alongside a group of friends. For example, a social TV system could offer a real-time indicator or history trace of TV content that the rest of the viewers in a social circle have been watching. In this way, social TV provides a shared social context for conversations about the media that they have enjoyed, although not at the same time or place (see Figure 5 – courtesy Oehlberg et al[15]).

In the case of synchronous watching, users can remotely sense the presence of

Figure 4 'Authoring from the sofa' facilitates end-user editing

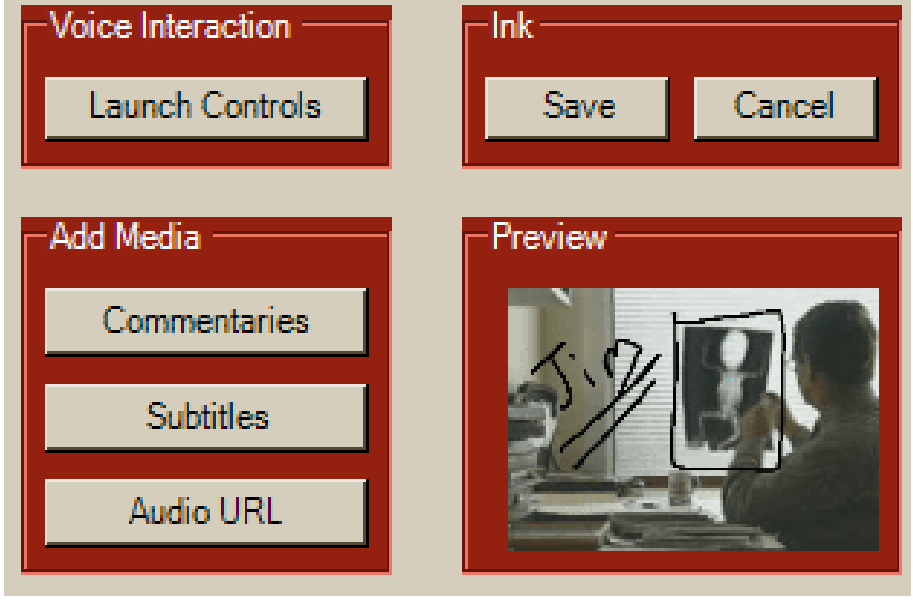
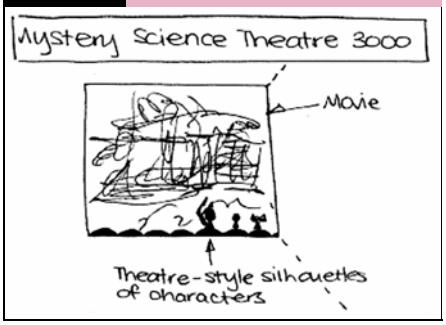


Figure 5 Seamless awareness of the presence of remote viewers



other viewers that watch the same or a different TV programme. A buddy-list on the TV could correspond to a 'friends' key on the remote control. The buddy list would be the first stage of an interface that would allow one to see what one's social circle is watching in real time – whether they be watching live television or something stored on their local storage. In addition, they should have the option to stream a particular programme directly from the STB of a friend, which would be very appealing when living in different countries. In this way, each STB becomes a sort of virtual TV channel[18] that broadcasts a particular TV programme to a social circle of viewers.

Interaction and visual design

When adding new functionality to TV programmes, there will be a respective visual interface added on to one screen. Then, there is a risk of having on-screen interactions interrupt the enjoyment of TV content. This is a major issue in the case of TV, because viewers have become familiar with an established set of audiovisual techniques that keeps the video area clean of other visual distractions. Most notably, the use of avatars and emoticons promotes a seamless and non-verbal communication among distant viewers (see Figure 6 – courtesy Coppens et al[8]). On the other hand, if the users wish to switch from a relaxed content-enriched communi-cation session to an intense audio or text chat, or even a videoconference session, a social TV system should be able to support it.

TV watching in groups is governed by a set of cultural practices and interaction rules, which have evolved such that collocated viewers can enjoy each other's company. These rules should be reflected in the case of mediated sociability. Therefore, social TV should facilitate distributed, sociable television viewing by processing each user's activities and ensuring that they fit within the established interaction rules that exist when watching TV together in the same room. For example, there should be an option to choose which expresses that one's

TV watching in groups is governed by a set of cultural practices and interaction rules

full attention is on the running TV programme and audio or other modalities of communication by peer distant viewers are 'muted'. In the same way, there should be an option to express availability for intense social interaction. These types of status could be made apparent by the design of the instant messaging software.

Summary

There are some situations that could benefit from social TV systems. These are listed below in order of importance.

- Synchronous viewing over a distance
  This is probably the most interesting scenario, because the requirement it poses is to recreate the experience of collocated group viewing, when the viewers are located in two or more distant places. For example, distant viewers should be able to watch together popular social TV content, such as sports, quiz shows, series, reality shows. A good starting point is to consider ways to disclose presence and status of viewers, to continue with support for multiple interpersonal communication modalities (non-verbal most notably), and to summarise the social experience with automated highlight production, which could motivate further discussion and social bonding between the distant viewers.
- Asynchronous viewing over a distance
  This a feasible scenario if we consider that distance viewers might have very different time-schedules, patterns of daily life activities, or even live in distant time zones. Then, the probability of synchronous co-viewing is rather limited. In this case, a social TV system could record and share shows and viewing habits with the members of the social circle. In addition, a social TV system should allow annotation of content and recording of interactions, such as pausing, skipping, replaying and content browsing. In this way, each time a particular TV programme is accessed, a trace is kept, which is exploited at the next access, in order to personalise the content and most notably to provide a motivation for asynchronous communication. This could be rather subtle, such as visual annotation of the content highlights, or could be more explicit such as audio and text comments.
- Asynchronous viewing at the same place
  The main motivation for the development of social TV systems is based on the need to bridge the distance between social circles of people, but

Figure 6 Social communication over TV content as implemented in the AmigoTV system by Alcatel

there is also the case that collocated groups of people do not manage to meet as often as they wish for a social TV night. A subset of the functionality that was described in the previous case might be the most appropriate here.

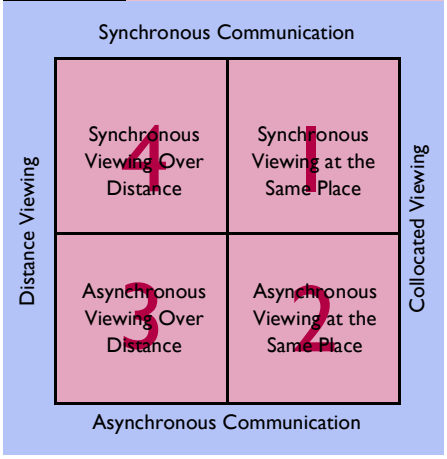
In addition to the above, social TV designers should consider the traditional TV watching scenario, where a group of viewers gather in the same place to enjoy a favourite TV programme. Although this is a case where content-enriched communication is least needed, there might be worthwhile benefits in employing a social TV system. In all cases, designers should consider extended functionality for user-generated content. For example, the ability to upload personal music, photos and videos might be used to achieve communication through content. In particular, the automated production of personal TV channels that keep track of individual life streams (e.g. music, photos, personal videos) could be multiplexed with broadcast TV watching behaviour. Indeed, Kubey and Csikszentmihalyi[19] have found that everyday life experience is correlated with TV watching behaviour. Thus, interpersonal communication could start with a screen displaying media use of each party during the past few days or hours. In practice, this scenario is fairly easy to implement, because the respective services have been very popular (e.g. YouTube, MySpace, Flickr).

In summary, there are two dimensions of the social aspects of TV (see Figure 7). The first dimension concerns the presence of the viewers:

- collocated viewing in groups;
- distance viewing.

The second dimension concerns the type of communication between viewers:

Figure 7 Taxonomy of TV sociability



triple-play services have been introduced on the assumption that telecommunication, content and data services could be delivered over the same technological infrastructure

- synchronous communication that happens in real time;
- asynchronous communication that happens with a time-lag.

This matrix might be helpful in categorising available and emerging content enriched communication services with iTV. It might also be applicable to other types of media content, such as photos and music.

Implications

Research

The most significant implication of the content-enriched communication proposal is that it puts into doubt a major stream of research that focuses on personalisation of TV content.

The TV personalisation domain has been one of the most important research areas, applying and extending recommendation methods from other interactive media (e.g. Web). If content recommendation algorithms can be tuned to successfully discover new content at all times, or content that satisfies the particular tastes of each viewer, then there will be less opportunity for the social aspects of watching and discussing common content. Therefore, personalisation researchers should also consider the sociability dimension of content recommendation and tune their algorithms accordingly.

A very promising area is the application of recommendation methods within small networks of affiliated groups of TV viewers (e.g. friends and family), in order to enhance the shared experience of TV. For example, future electronic programme guide (EPG) systems should take account of the TV content that has been viewed by family members and close friends when making viewing suggestions. This approach is in complete contrast to the model of individualising the viewing experience for each TV viewer.

Practice

Content-enriched communication, and in particular social TV applications, could feasibly be offered through triple play infrastructures, which combine content delivery, voice, and data services. In this way, the network operator can provide interaction between the TV viewers on all TV channels using an interactive broadband link. Triple-play services have been introduced on the assumption that telecommunication, content and data services could be delivered over the same technological infrastructure thanks to the convergence of the respective technological platforms. Although this convergence of previously distinct platforms is a significant benefit both for consumers and for service providers, there are also additional benefits from a closer integration of platforms at the user level. Content providers could benefit from metered communication services, while telecom providers could benefit from content distribution. In both cases, the users could gain access to intuitive content-enriched communication.

In addition, mobile DTV infrastructure offers many opportunities for converged personal communication and content services. In particular, broadband wireless technology is very suitable for the delivery of content-enriched communication services (e.g. active content sharing, synchronous or asynchronous co-viewing over a distance, discussion about shared content). Wireless network operators have invested in broadband licences and infrastructures, but most of the services offered are only video communication, or video on demand. The introduction of content-enriched communication services is a worthwhile direction, because it offers an excellent balance between the basic need of users to communicate with a mobile device and the need of network providers for increased revenue by added value broadband services, such as mass media content distribution.

Conclusions

The present research opens up more research questions than the ones it has addressed, both for the design of content-enriched communication services and for related disciplines (telecommunication requirements, software engineering, usability, sociability, business models). In particular, further research should consider the obstacles that the iTV systems are facing, such as technical standards, consumer adoption, regulatory framework, and digital rights management. For example, the lack of commonly agreed technical

personalisation could become something that enhances social bonding, in addition to providing recommendations about new interesting content

standards, or the existence a single popular platform, prevents the wide adoption of advanced STBs, because application developers have to build and support multiple code-bases. The regulatory framework is also an obstacle, because outdated laws and rules, such as those controlling the number and the size of the time-slots for advertisement, or those controlling time-based pricing of voice services, govern the broadcasting and telecommunications industries.

An additional aspect of this work is that it poses an implicit argument against the personalisation of TV content. If TV content is such an important placeholder for discussion, as argued by many researchers in the past, then the traditional approaches to personalisation reduce the chances that two persons might have watched the same programme. On the other hand, this social aspect of TV viewing might also point towards new fruitful directions for personalisation, which are based on the behaviour of small social circles of affiliated people. Then, personalisation could become something that enhances social bonding, in addition to providing recommendations about new interesting content. This type of 'social' personalisation in combination with social communication tools could enhance the sociability of TV well beyond a single household. In conclusion, while counter-intuitive to many, watching television can be a very sociable activity. Therefore, the ultimate objective is to develop technological support for the social practices that surround TV viewing, while retaining the fundamental position of TV as a leisure pursuit.

Acknowledgements

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References

1 Putnam, R. Bowling Alone: The Collapse and Revival of American Community. Simon and Schuster, 2001.

2 Silverstone, R. Television and Everyday Life. Routledge, 1994.

3 Lee, B. and Lee, R. S. How and why people watch TV: Implications for the future of interactive television. *Journal of Advertising Research*, 1995, **35**(6), pp. 9–18.

4 Agamanolis, S. At the intersection of broadband and broadcasting: How ITV technologies can support Human Connectedness. Proceedings of the 4th European Interactive TV Conference, 2006.

5 Veinott, E. S., Olson, J., Olson, G. M. and Fu, X. Video helps remote work: speakers who need to negotiate common ground benefit from seeing each other. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '99), ACM Press, 1999, pp. 302–309.

6 Craven, M., Benford, S., Greenhalgh, C., Wyver, J., Brazier, C., Oldroyd, A. and Regan, T. Ages of avatar: community building for inhabited television. In Proceedings of the Third International Conference on Collaborative Virtual Environments (CVE '00), ACM Press, 2000, pp. 189–194.

7 Regan, T. and Todd, I. Media Center Buddies: Instant Messaging around a Media Center. In Proceedings of the Fourth Nordic Conference on Human-Computer Interaction, ACM Press, 2004, pp. 141–144.

8 Coppens, T., Vanparijs, F. and Handekyn, K. AmigoTV: A Social TV Experience Through Triple-Play Convergence. Alcatel, White Paper, 2005.

9 Frohlich, D., Kuchinsky, A., Pering, C., Don, A. and Ariss, S. Requirements for PhotoWare. In Proceedings of the ACM Conference on Computer Supported Cooperative Work, ACM Press, 2002.

10 Voida, A., Grinter, R. E., Ducheneaut, N., Edwards, W. K. and Newman, M. W. Listening in: Practices surrounding iTunes music sharing. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM Press, 2005, pp. 191–200.

11 Bentley, F., Metcalf, C. and Harboe, G. Personal versus commercial content: the similarities between consumer use of photos and music. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 2006, pp. 667–676.

12 Kaplan, N. and Chisik, Y. Reading alone together: creating sociable digital library books. In Proceeding of the 2005 Conference on Interaction Design and Children, 2005, pp. 88–94.

13 Preece, J. Online Communities: Designing Usability, Supporting Sociability. John Wiley & Sons Ltd, England, 2000.

14 Girgensohn, A. and Lee, A. Making Web sites be places for social interaction. In Proceedings of the ACM Conference on Computer Supported Cooperative Work, ACM Press, 2002.

15 Oehlberg, L., Ducheneaut, N., Thornton, J. D., Moore, R. J. and Nickell, E. Social TV: Designing for Distributed, Sociable Television Viewing. In Proceedings of the 4th European Interactive TV Conference, 2006.

16 Resnick, P. Beyond Bowling Together: SocioTechnical Capital. In Carroll, J. M. (Ed). Human-Computer Interaction in the New Millennium. Addison-Wesley, New York, 2001, pp. 647–672.

17 Cesar, P., Bulterman, D. C. A. and Jansen, A. J. An Architecture for End-User TV Content-Enrichment. *The Journal of Virtual Reality and Broadcasting*, 2006, **3**(1),Euro ITV Special Issue.

18 Chorianopoulos, K. Virtual Television Channels: Conceptual Model, User Interface Design and Affective Quality Evaluation. Unpublished PhD Thesis, Athens University of Economics and Business, 2004.

19 Kubey, R. and Csikszentmihalyi, M. Television and the Quality of Life: How Viewing Shapes Everyday Experiences. Lawrence Erlbaum, 1990.

Biography

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Konstantinos Chorianopoulos holds an MEng (Electronics and Computer Engineering, 1999) an MSc (Marketing and Communication, 2001), and a PhD (Human-Computer Interaction, 2004). Since 1997, he has been a member of four academic research labs in Europe (in Greece, England and Germany), which specialise in the areas of multimedia, eCommerce, intelligent systems and interaction design. He has participated in many European Commission research projects in the field of human-computer interaction for information, communication and entertainment applications in TV, mobile, and ubiquitous appliances. In 2002, he founded UITV.INFO (http://uitv.info), which is a newsletter and web portal for interactive television academic research resources (papers, theses), and industry news and events.

Currently, he is a Marie Curie fellow at the Bauhaus University of Weimar (Germany), where he is investigating the social uses of ambient intelligence and ubiquitous computing applications. He is also an adjunct lecturer at the Department of Product and System Design Engineering, at the University of the Aegean (Greece), where he teaches 'theory of communication' and 'interaction design'.

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