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Online Video and Interactive TV Experiences

Insights

→ Television still plays an important role in everyday life, but the way we consume and interact with TV content has changed dramatically.

→ Today's media production landscape is a distributed ecosystem of connected devices, people, and narratives.

→ Four key areas of research in interactive television are content, recommendations, device ecoysystems, and user feedback.

Media production and consumption are a central part of everyday life. People love to create, curate, and share media content using a variety of devices. It is no surprise, then, that leading device manufacturers, service providers, start-up innovators, and research groups are all vying to push the limits of these systems to create novel and compelling interactive experiences. As a result, media production and consumption have become a complex, highly interactive, personalized, and distributed ecosystem of connected devices, people, and narratives. Examples include the development of simultaneous and distributed multi-screen experiences and the interweaving of televisual content with social media and communication platforms.

Creating truly compelling multimodal and distributed media experiences is not an easy task. Key challenges range from storytelling and narrative development to building the technical expertise for capturing, annotating, editing, managing, and distributing content. More crucially, professional producers and broadcasters need to develop the skills to elicit, curate, and interweave contributions from amateur and pro-am producers, who make up the increasingly active audience and user community.
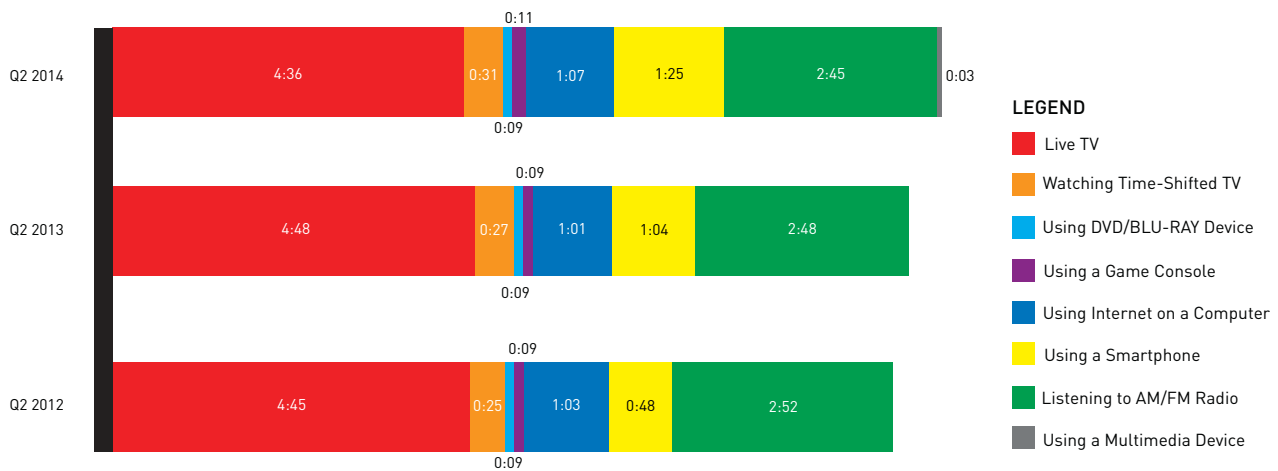
Figure 1. Shifts in viewing [1].

Legend:
- Live TV
- Watching Time-Shifted TV
- Using DVD/BLU-RAY Device
- Using a Game Console
- Using Internet on a Computer
- Using a Smartphone
- Listening to AM/FM Radio
- Using a Multimedia Device

Once the dominant channel for media consumption, television—both as a platform with highly controlled, non-editable broadcast offerings and as an audience experience—has changed dramatically as a result of these technical and social innovations in interactivity, content malleability, and multiple device and format capabilities.

TELEVISION IS (STILL) A POWERFUL MEDIUM

When discussing the current state of television, one often hears the claim that television is dead. While a shift in viewing and engagement habits is apparent, many people still watch traditional broadcast media through the TV (Figure 1). Television remains a powerful format for content production and consumption, embodying specific format guidelines.

That said, more people are watching television content time-shifted, on other devices such as tablets and phones, and/or are using multiple screens when viewing content. The creation of interactive experiences that support or enhance the television-watching experience and innovations in broadcast format require technical and social research and experimentation.

We see four main areas of research where innovation and breakthroughs are possible for television and online video experiences [2] (Figure 2).

First, developing valued content is key, especially truly interactive and transmedia experiences that maximize the potential of growing consumer trends. Mixing broadcast content with Internet content is a promising new possibility, with emerging standards such as HbbTV (Hybrid Broadcast Broadband Television) providing frameworks that enable these links for producers. This creates exciting opportunities for not only enriching TV programs with content from the Web, but also creating completely new media experiences.

Second, understanding the media consumer is vital. A popular research topic in other domains, user recommendations is a prime area of research that raises specific challenges for broadcast viewing. Group recommendations can build on television as a social medium but need further research, as well as methods for gathering accurate data to feed recommendation algorithms. Here we can learn from advancements in data science, where we see surprising new developments in the fast-moving field of deep learning, as emphasized by Jeremy Howard in his recent TED talk [3]. Netflix already makes effective use of advancements in machine learning to provide its customers a better, more

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personalized viewing experience.

A third area of research focuses on the complex ecosystem of devices people use to consume and interact with media content. The wide range of devices available in many households is radically evolving. It is important to gain insight into which devices people are using while watching TV, and for which purposes, so this can be taken into account when creating programs and applications for TV or online video. We can also design new media experiences that take into account these multiple devices, thus creating more immersive [4] and novel multisensory experiences [5].

Finally, gathering audience feedback and insights on the impact of television and online video on consumers is vital. New technologies allow for more detailed and varied feedback (e.g., social media) from diverse audiences. However, measuring who is doing what and how consumption is occurring is still a big challenge in this area, given the complexities of multi-device and social viewing habits.

FUTURE TRENDS AND TOPICS

Research on online video and interactive TV experiences is a growing field of study subdivided into topics that include: content production, system design and architecture, implementation, application and evaluation of viewing experiences, and novel interaction concepts. As the lines between traditional television consumption and online video are blurring, the need for good storytelling through visual means remains strong. Research is addressing novel paradigms for the new media landscape such as transmedia storytelling; it is also highlighting the efforts around systems and infrastructures, describing the architecture and deployment of systems that support television and online video delivery, synchronization, and consumption.

There is increasing research interest in data science, large-scale exploration of user feedback, novel mechanisms for rating and assessing media-content consumption, and more personalized content delivery. In addition, social media has changed the game of viewing experiences, not only expanding the personal viewing space beyond the physical limits, but also creating the opportunity for new services for viewer
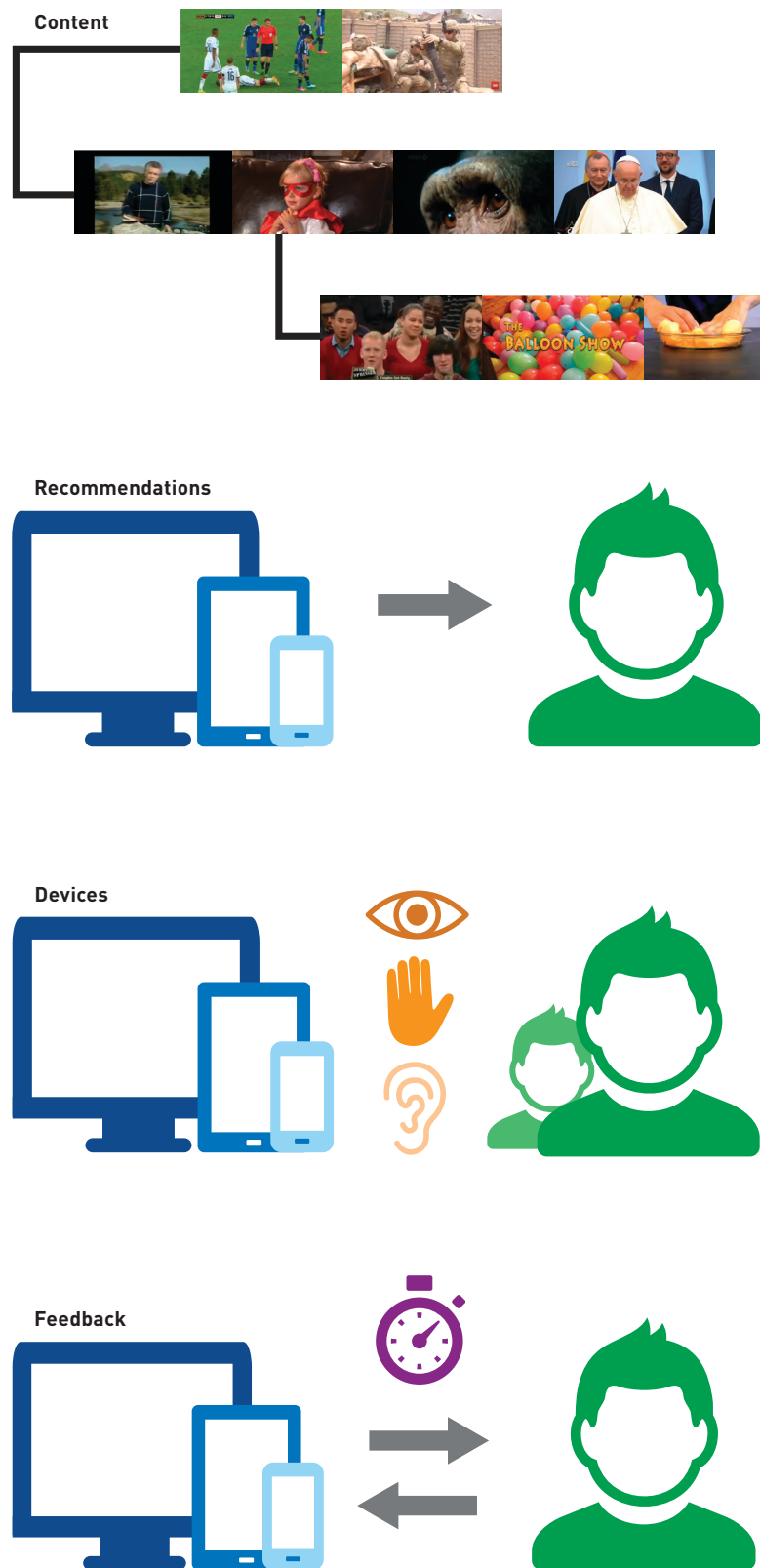

Figure 2. Four areas of research on interactive TV and online video.

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⌨ **More information:**
ACM TVX2015: http://tvx2015.com
Proceedings of ACM TVX2014: http://dl.acm.org/citation.cfm?id=2602299
ACM TVX Steering Committee: http://www.acmtvx.org
To join the ACM TVX Community: http://www.sigchi.org/communities/tvx

participation and engagement, such as through live tweeting.

Moreover, the question of who is in control of the TV is no longer a question of who is in control of the remote. This question rather depends on a much richer and more multifaceted ecosystem consisting of multiple screens, wide-ranging interactive content, temporal changes in viewing patterns, and diverse interaction concepts. Second screens have inspired research on changing viewing behavior and social patterns of media usage, opening up a whole range of new interactive experiences for individuals in social settings, such as channels showing additional information on personal screens.

This technological ecosystem enriched with a dynamic social environment has stimulated research on new input and control mechanisms and new interaction concepts. It has also energized opportunities to design for more social, collaborative viewing experiences. In addition, researchers increasingly emphasize the potential of designing more "empathic" systems that react to viewers' emotions and actions in front of the TV, supported by advancements in visual attention measures for multiple TV screens.

All these activities challenge the existing understanding of how people consume media. While the benefits from a sociotechnical perspective seem clear, there is still more to come. Inspiration can be found in media artworks and performances, new business and marketing strategies, and emerging digital technologies.

One area to look out for centers around the creation of immersive multisensory media experiences [5]. Designers of interactive TV and online video systems know how to design for depth and distance perception in visual user interfaces to augment people's experiences. However, vision is not always enough, for instance, when we would like to provide a tactile sensation of the objects shown in a movie (e.g., beyond three-dimensional viewing). Our sense of smell can also enhance media experiences by creating anticipation and building suspense, as is currently done through sound.

In the 20th century, a demand arose, especially from the film industry, for an organized way to describe colors. This spurred intense research on descriptions of colors and substantially contributed to advances in computer graphics, image processing, photography, and cinematography. Similarly, the 21st century demands an investigation of touch, taste, and smell as sensory interaction modalities, triggering a chain of questions about *which* multisensory experiences to design for and *how*. Inspiration can be found in the field of experimental psychology but also increasingly within human-computer interaction (e.g., at the annual ACM CHI conference; see, for example, [6]).

In sum, television and online video are an opportunity for researchers and practitioners from diverse backgrounds and fields to join forces and affect the way we will watch and experience media content in the future. This opportunity is taken up by an interdisciplinary and dedicated community: ACM TVX.

ACM TV AND ONLINE VIDEO COMMUNITY

In 2003, a small community of researchers initiated a special event on interactive television in Brighton, U.K. The event aimed to bring together researchers interested in the growing field of interactive applications for TV, interactivity beyond traditional concepts, and new opportunities for viewing TV. What started as the European Conference on Interactive

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Television (EuroITV) increasingly attracted the attention of an international audience of researchers, practitioners, and industrial representatives, who came together from around the world every year.

From its beginning, the conference brought together disciplines ranging from human-computer interaction and multimedia engineering/design to media studies, media psychology, and sociology. Ten years after the conference's inception, the steering committee of EuroITV took an important step forward: to stop EuroITV and to start a new journey. We successfully applied for a new conference to be fully sponsored by ACM. Acknowledging the interdisciplinary nature of the conference and the increasingly international make-up of participants, the ACM International Conference on Interactive Experiences for Television and Online Video, or ACM TVX, began. This transition to TVX was cemented where everything started: in the U.K., in Newcastle upon Tyne.

The conference provides a unique space for the discussion of interdisciplinary research around new and emerging media. From the generation of new knowledge, to developing an understanding of engagement with and experiences of media, to informing new ways of creation and consumption for a variety of devices and platforms, much new research is emerging. While some people have been at the core of the community for over a decade, the move to becoming ACM TVX has drawn more people to this arena of multidisciplinary perspectives, thereby making a step-change for future interactive media experiences (http://www.sigchi.org/communities/tvx).

There is increasing interest from industry and from academia in sharing and learning about the newest trends and directions for online video and TV experiences. Indeed, the second ACM TVX conference took place in Belgium last June. David Geerts, one of the longstanding members of the community, served as general co-chair of TVX 2015 along with Caroline Pauwels (iMinds/VUB) and Lieven Demarez (iMinds/UGent), and program chairs Frank Bentley (Yahoo Labs) and Christian Timmerer (Alpen-Adria-Universität Klagenfurt).

As the landscape of online video and television is rapidly changing, we expect the conference to grow as well. We are already making plans for the third TVX conference slated for June 22–24, 2016 in Chicago. ACM TVX 2016 will be hosted by the IIT Institute of Design at Illinois Institute of Technology, with Patrick Whitney (IIT Institute of Design), Janet Murray (Georgia Tech), and Santosh Basapur (IIT Institute of Design) serving as general co-chairs.

Television might be one of the traditional media, but the best is still to come.

ENDNOTES
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