Understanding Social TV: a survey

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Abstract: **In recent years social networking and social interactions have challenged old conceptions in the television landscape. Web applications that offer video content, networked television sets and set-top boxes, and online TV widgets are – or, will be – radically transforming how people watch and interact around television content. Since the wealth of existing solutions and approaches might be daunting to newcomers, this paper surveys previous and current efforts in the area of social television. The contribution of this paper is a framework that categorizes the most salient features of existing applications. The resulting framework is a valuable contribution for better understanding the present, and a useful tool for evaluating and analyzing future developments in the field. The final goal is to provide a structured categorization that helps research, industry and entrepreneurs in analyzing the current shift on how people socialize around television content.**

Keywords: social media, TV, mass media, video, video sharing, videoconference

1 INTRODUCTION

Social Television constitutes a fundamental shift in how people interact and socialize around television content. Websites are starting to combine video streaming services with social networking sites such as Facebook and Twitter. Media software like Boxee allows users to recommend and share favourite television programs, and Motorola's Social TV [9] enables friends to remotely watch television together. Strategy reports* and a vast selection of new commercial services show the relevance of the current shift towards a more social-aware television experience. It reveals as well the commercial interest behind integrating successful social media and communication solutions with streaming video.

All these developments can be called social TV (see an example in Figure 1): allowing remote viewers to socially interact with each other via the television set, smart phones, tablets or the PC, where viewers might be separated in time and/or in space. This is not a new concept, as it has been explored since the start of this century in academic and industrial research labs by creating several prototypes. However, current products are making it a promising business proposition. Features in social TV include remote talking or chatting while watching a television program, content-aware buddy lists that show what your friends are watching, sharing and recommendation of video material based on social network statistics and trends, and easy accessible Twitter streams associated with one particular program.

Figure 1. Example of a Social TV service: the website of CNN that incorporates social features such as Facebook updates (http://edition.cnn.com/video/).

Some examples of social TV services include the integration of Twitter updates during a live video stream [11] and Facebook applications that allow commenting while watching video content (e.g., ClipSync). Several similar applications are recently being created for smart phones, which act as a secondary screen [1], so the commenting and communication do not occupy valuable space on the television set (e.g., TVChatter). In parallel to the integration of social networking into the television environment, there have been successful efforts in enabling domestic high-quality videoconferencing; providing a direct communication link between separate households watching television together. SkypeTV, Umi, and Kinect are pioneers in this direction.

Based on these examples, there is enough grounds to conclude that the market for social TV is growing, but is the behaviour of the users changing? Television has been traditionally associated with passive watching, but recent studies indicate that habits are changing. According to Yahoo! and the Nielsen Company, 86% of mobile Internet users (and 92% of 13-24s) are using their mobile devices simultaneously with TV† . Communicating with friends is the most common activity (SMS: 56% for mobile phones; email: 33% for mobile phones and 49% for PCs; IM: 19% for mobile phones and 22% for PCs), while updating/reading social networking sites is second in the list (40% for mobile phones and 53% for PCs).

The wealth of existing solutions and approaches might be daunting to newcomers, but it provides enough material

* http://www.futurescape.tv/report-social-tv.html

† http://advertising.yahoo.com/industry-knowledge/mobile-shopping-insight.html

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for surveying, analyzing, and classifying social TV. The intention of this paper is to summarize previous and current efforts, categorizing their most salient features. The resulting framework is a valuable contribution for better understanding the present. Moreover, it provides a tool for discussing future developments in the field.

2 METHODOLOGY

We performed a structured survey of past and current social TV applications, based on the following working definition: Social TV allows remote viewers to socially interact with each other via the television set, smart phones, tablets or the PC. Viewers might be separated in time and/or space. There are many systems that fit such definition, so the first decision was to focus on the most relevant ones based on the expertise of the authors. Relevance defined as market impact, research impact, and novelty. Balancing exhaustiveness and manageability, we surveyed a total of 35 social TV systems. Each of the systems was analyzed based on a number of aspects. The first and most important aspect was activity because it determines what the aim of the interaction is. With activity, we mean the general goal of the application and main tasks the users can perform with it. Other aspects taken into account included:

- *Device/network*: what is the device and network in use? Some solutions focus on the Web, while others target a television environment. Mobile devices and secondary screens are becoming very popular lately.
- *Modality*: how are the users interacting? The options include text, audio, and video.
- *Presence*: how are other users represented? Options include traditional buddy lists, ambient solutions, and more extended buddy lists as provided by popular social networking sites such as Facebook.
- *Synchronization*: Does the social interaction take place synchronously (while watching) or asynchronously?
- *Social reach*: what is the social reach of the activity? In some cases closed network reach is provided, usually including friends or family, while in other cases a more open reach is available and strangers are able to communicate with each other.

Some examples of the systems under study included: web applications that provide social interaction around video (e.g., Justin.tv); broadcaster's new social offerings (e.g., CurrentTV); mobile applications that allows for micro-blogging (e.g., Miso); synchronous communication applications for people at different locations (e.g., Social TV from Motorola [9]) and TV content sharing (e.g., the Ambulant Annotator [2]).

3 FRAMEWORK FOR SOCIAL TV

Based on the structured survey of 35 applications, we clustered the applications based on their dominant aspect. Four main clusters were identified: content selection and sharing, direct communication, community building, and status updates. This section will further analyze each of the categories providing relevant examples.

Table 1 provides an overview, as a quick reference guide, of the framework of social TV applications contributed by this article. The main categories are:

1. Content selection and sharing: information by other peers is used for making appropriate decisions on what to watch. The user might also want to send to his/her peers full programs or edited versions of the programs.
2. Communication: direct communication via chat, audio, or video with other peers while watching television content.
3. Community building: commenting about a television program with a large community of viewers.
4. Status update: making available to others what you are currently watching.

We believe this framework is, while approachable, complete enough for describing past and present social TV solutions. Moreover, it is consistent with previous efforts in categorizing social TV [7]. Nevertheless, our framework is more functional and it provides a structured mechanism for categorizing applications. Other categorizations and definitions include Coppens et al. [3] and Ducheneaut et al. [4], that focus their analysis on our direct communication category, but do not take into account current new directions in the field.

In general, previous efforts in categorizing social TV have been very valuable for our work, but they did not consider the broadness and complexity of current developments. We believe in this paper we provide a functional and simple, yet complete, framework. The next step is to better understand how the categorization applies for the systems under study. In the next subsections, we will describe each of the categories in more detail, giving examples of specific systems and applications representative of that category.

3.1 Content selection and sharing

Due to the wide range of alternatives, content selection has been considered as a cornerstone of interactive television systems. Since the first commercial interactive television solutions, the Electronic Program Guide (EPG) helps viewers decide what to watch, sometimes providing video recording capabilities. The EPG is a table-based application showing the schedule of different channels, mimicking traditional TV listings in magazines and newspapers. On the other hand, one can find on the Web a variety of playback video streaming services such as BBC's iPlayer (Figure 2), Netflix, Apple TV, and Hulu. Such systems tend to provide more efficient and open mechanisms for content selection, since old broadcast thinking models do not need to be followed. In this direction, the recently announced Google TV is raising expectations as a convergence environment between the Web and the television world. While the previous examples mostly concentrate on time-shifted content, real-time broadcasting services (e.g., Facebook Live, Justin.tv) are becoming an alternative.

Application	Description	Content Selection and Sharing	Communication	Community Building	Status update
Hulu	Video streaming service. It allows users to navigate and search for content. It allows sharing (edited) video clips.	++			
iPlayer	BBC shifted-time streaming video solution.	++			
Netflix	Real-time video streaming service; and video rental service. It allows to navigating and searching content.	++			
Boxee	Application that allows viewers to watch movies, television shows, and clips on your television set.	++	+		
ConnectTV	Research project from TNO. It allows users to follow the same programs as their friends, and to send recommendations.	++	+		
YouTube	Web video sharing application that changed the online video world.	++	+		
Facebook Live	Facebook application that allows people for real-time broadcast. It includes text chatting and watching content together.	++	++		
Joost	P2P player that allows people in different locations to watch a show together. It allows content rating and recommendations.	++	++		
Justin.tv	Real-time video broadcast service. Users can create rooms, where they stream content. It allows text chatting.	++	++		
AmigoTV	Research project from Alcatel-Lucent. It connects households through their television set, allowing users to talk.	+	++		
CollaboraTV	Research project from AT&T that aims at asynchronous watching of content. Users can leave messages for friends during the show.	+	++		
Starling.tv	Online service for watching content together (synchronized). It allows to chatting about the content, and to commenting on the show.	+	++		
SocialTV	Research project from Motorola. It connects households through their television set, allowing users to talk, chat, and see presence updates.	+	++		
Wachitoo	Online application that allows to sharing video with friends. It allows video, audio, and text chatting when watching a show together.	+	++		
Zync!	Plugin for Yahoo! Messenger that allows sharing videos when chatting	+	++		
Current TV	Online TV station that encourages user participation. They have incorporated twitter activity in certain programs.	++		+	
Fiber Optics TV	Verizon's social television platform that allows users to launch applications. (e.g., users can watch a twitter stream of a program).	++		+	
GoogleTV	It allows users to navigate and search content. It allows users to launch applications, such as a Twitter stream to be overlaid in the screen.	++		+	
NBC Website	TV channels are incorporating social features in their online offerings. Twitter, Facebook, Ustream are some common ones.			++	
Real Time Fantasy	NBA fantasy-style game that allows you to compete against other friends and fans in real time during every NBA game.			++	
TVChatter	Mobile application that provides real-time the Twitter comments about a specific television program.			++	
IntoNow	Similar to Shazam, this mobile application automatically identifies the show and episode, you are watching; making it available to others.			+	++
Miso	Mobile application that allows you to 'check into' programs, shares what you're watching, and lets you earn badges for watching shows.			+	++
TunerFish	Users can tell their friends what they're watching, see what's trending among other users, and earn rewards.			+	++

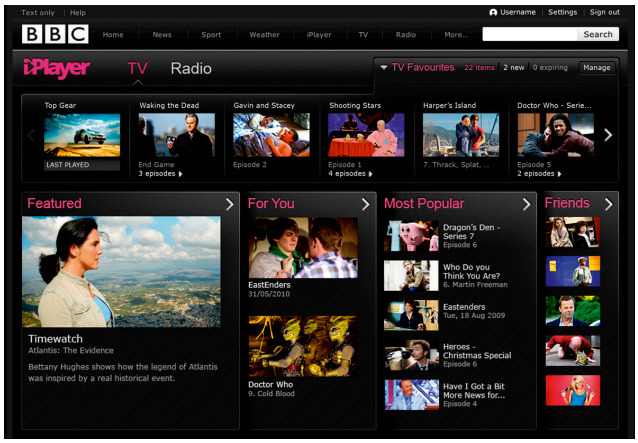

Figure 2. Example of Content Selection and Sharing: BBC's iPlayer (http://www.bbc.co.uk/iplayer/)

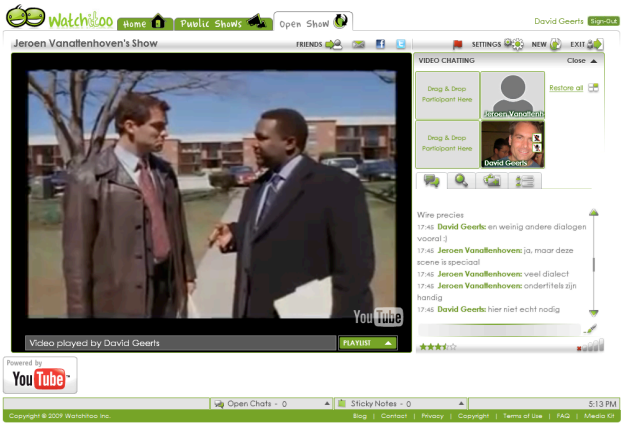

Figure 3. Example of Direct Communication: Wachitoo web application (http://watchitoo.com/)

Unfortunately, most of the content selection and streaming solutions lack social features – Hulu, iPlayer, Facebook, and Justin.tv being exceptions. Social-aware selection systems use information by other people in order to help in deciding what to watch. As demonstrated by social media research, useful information includes ratings, comments, recommendations, and insights from the social network that can be directly used by the viewer or by a recommender system.

Some of these systems, such as Hulu, allow social interaction in the form of content sharing. In this case the video – or a link to the video – is the communication means between people. Boxee and iPlayer provide content sharing functionality, acknowledging that direct recommendations are more effective and personal than computed recommendations. In most cases, the user can also recommend only the interesting parts of the video. Ambulant Annotator [2] provides extensions to the model that allow viewers to enrich television content while watching, and to share the results with targeted groups.

For content selection and sharing, the network and device in use are not salient features. Services within this category are available on the Web, in the television environment, and on mobile phones. Presence information is not key, since there is no synchronous communication between the users. Content sharing is an asynchronous activity that tends to reach social networks beyond the close ties. Nevertheless, direct recommendations that involve content editing such as clipping is restricted to close ties, due to the effort and intimacy of such action. The most salient feature of this category is the interaction means: the actual video or a link to it.

3.2 Direct Communication

A number of social TV applications support direct communication between its users. Early TV-based research systems like Alcatel-Lucent's AmigoTV or Motorola's Social TV allow users to talk with each other using voice. Similarly, the first commercial social webTV applications Joost and Lycos Cinema enabled users to text chat with each other while watching online TV or movies. While Instant Messaging solutions allowed users to share videos while chatting (e.g., Windows Messenger and Zync [12] from Yahoo!), more recently, the web-based applications Watchitoo (Figure 3) and YouTube Social also enable talking and videoconferencing while watching the same content. Most of these applications support only synchronous communication, although CollaboraTV also included asynchronous communication by letting users leave comments at specific moments during a television show. In all cases, presence features such as a buddy list is available so users can see who is available, and if they are watching the same show or not.

Most of the existing social TV applications that offer direct communication possibilities are limited to a (smaller) group of friends. The rationale behind this is probably that these people do not have the option to physically watch TV together (anymore), and social TV allows them to (re)create a social co-watching experience.

Nevertheless, some applications offer strangers the option to communicate directly. Joost e.g. offered a 'channel chat' allowing strangers to interact on a channel where the content was not synchronized. The non-synchronized content made it however difficult to find common ground with strangers to talk about the same things while watching, so it is doubtful if this combination would lead to successful communication.

These and other applications embody a category of social TV applications where directly communicating with each other is the core social feature. While other social features are usually supported as well, such as sharing which program someone is watching, it is the synchronous communication that characterizes these applications the most. As a consequence, social TV in this respect should optimally support the communication process, e.g. by providing different levels of communicating like emoticons, text chat and voice chat [6].

3.3 Community Building

Community building refers to the activity of sharing thoughts, comments, and impressions about television programs with a large community. Followers of a specific show normally comprise such community, who before the

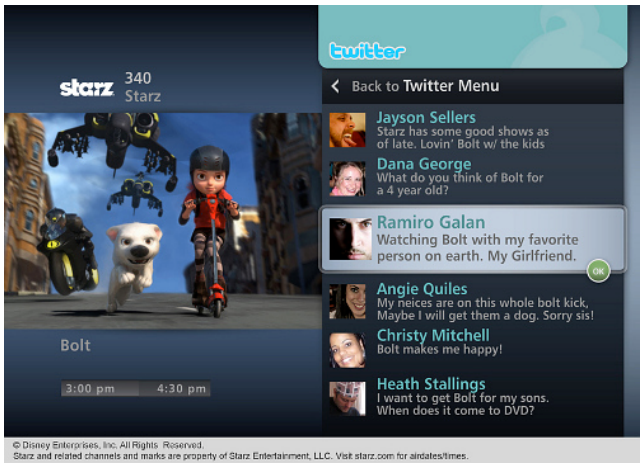

Figure 4. Example of Community Building: Verizon's Fiber Optic (www.verizon.com/FIOS)

advent of social television mainly gathered on web based forums for sharing their passion.

In some cases, games (e.g., NBA Real Time Fantasy) and other immersive activities are provided by the television channel or by individual followers of the show. In the past, successful approaches included the use of telephone calls for deciding the outcome of a show – Big Brother or the Eurovision song contest are good examples – but lately many television channels are providing specific Web pages with Facebook and Twitter updates.

TV Chatter and Starling TV are two recent examples of the community building category, where comments related to a television program are gathered and aggregated. While TV Chatter renders the Twitter stream in an external device – mobile phone - GoogleTV and Verizon's Fiber Optic Television (Figure 4) offer the possibility of overlaying the comments alongside the television content. In most of the cases such aggregation is done via an external channel, with no effect on the program. Some exceptions exists like NM2 [13], where comments of the viewers were used for interactively affecting the storyline of a drama series and Current TV's "Hack the Debate" that showed Tweets onscreen during the televised debates of the last USA presidential election.

The mobile phone and laptop are the most commonly used devices, since it is more convenient to use than a television remote control as some typing is usually required. A salient feature of this category is the network reach, where large audiences of strangers congregate around a television program. Text tends to be the most common communication modality. Even though the comments are synchronized with the show, synchronization is not a key feature because time-shifting is common and people might add/read comments whenever they want.

3.4 Status Update

While early social TV systems usually offered status sharing (e.g. "I'm watching Breaking News on CNN") as one of its social features, more recently many applications have been launched which offer status sharing as its core feature. Applications like Miso, Tunerfish, and PhiloTV allow users to indicate the TV program they are watching by 'checking in' to that program, much like checking in to locations with location-based applications such as Foursquare and Gowalla. Users that frequently check into a specific TV program earn badges. Apart from indicating the TV program a user is watching, these applications also provide the option to write a short, twitter-like, status update. Similar to Twitter, users can follow other users, so they receive the status updates and other information from these users. The programs users are currently watching, the associated status update and the badges earned are broadcast to these friends and 'followers', creating a sense of competition. Recently, a new application has been launched: IntoNow. This application is similar to Shazam, but for television programs. Based on the audio of the television program currently playing, it automatically identifies the show and episode the user is watching and broadcasts it to others, simplifying the process of checking into a certain program, as the user does not have to take any action anymore.

Many of these applications are web based and have a mobile counterpart, making it easy to change status while watching TV. However, it is also possible to have a TV widget on a connected TV with the same functionality. The main communication modality for this category of applications is text based. Although the network reach includes friends, especially when linked to Facebook, the Twitter-like structure of followers makes it easy to include strangers in the network as well. What these applications are usually lacking is a presence feature. As communication is not a core function, it is not really necessary to know if other users are online or not. The interaction is therefore also mainly asynchronous, as there are no direct communication possibilities other than short status updates.

Although direct communication is not possible with these applications, they allow users to communicate with short status updates. Similar to the previously discussed category, however, it is the sharing of what one is watching which is the core feature of these applications. So instead of seeing direct communication as the main social TV component, social TV in this respect is about creating a sense of commonality in what you're watching, much like when you knew the whole neighborhood was watching the same television show, and the next day at school or at work people would talk about the show. By showing off the badges earned, users also present themselves as avid fans of specific shows.

4 DISCUSSION

Based on the framework provided above, this section discusses future possibilities for Social TV.

4.1 Mash-Up and Connected TV

Convergence of domains such as IPTV, the Web, and the mobile world is still in its infancy. Even though some prototype solutions have demonstrated the benefits [10], there has not been much deployment. In the future, we can expect domain convergence that provides shared

experiences independently of the location and the network. In this direction, we can foresee as well just-in-time compilation of television programs, by assembling content based on the social graph and user preferences, and on other people's edited versions. Some preliminary research in this latter direction can be found elsewhere [8]. We believe that further development on social networking will act as a bridge between currently fragmented environments. We expect that in the future the boundaries between the television, the Web, and the mobile world will be minimized allowing people for content selection and sharing independently of the domain.

4.2 Other Activities

This paper has focused on social interaction around television content. Even though television is considered to be one essential social activity, there are other alternatives such as gaming, learning, and even dancing. Current developments of communications technology are starting to make home video conferencing a realistic alternative, where homes are actively incorporating newer technology and communication means. We believe there is a full research path in home-to-home immersive experiences, still to be explored. Recent results show that a number of activities such as playing informal games between families are attractive, where the television set in the living room is used as the interaction device [14]. We expect that in the future, direct communication between households will not be restricted to Skype calls, but more immersive social experiences will emerge.

4.3 Social TV Content Formats

Many current social TV applications are generic systems, which can be used for a range of different programs. Already some applications (e.g. Sofanatics) target a specific genre such as sports, and are tailored to support social interactions around that specific kind of content. Future social TV applications could take a step further and be tailored to one specific program. Popular programs like ABC's Lost have gathered a community of avid fans who discuss the contents or actors at great length in online discussion boards. More recently, the Fox show Glee links fans of the show ('Gleeks') via Facebook, Twitter, and a dedicated smart phone application, allowing viewers to sing along with the show's songs and to share this with others. We think it is possible to also apply other aspects of our framework to these programs. Ideally, program formats are even created which inherently include social features. Television shows can implement these social features to match the content of the show as closely as possible. An added benefit of program specific social TV applications is that they easily can take into account the properties of the genre [5] e.g. by focusing on synchronized interactions for social genres such as quiz shows or soap operas, and synchronized interactions for less social genres as movies and documentaries [6].

5 CONCLUSION

This paper provides a structured framework for better understanding an emergent field, social TV. Where social networking and mass media seamless integrate, leveraging social interactions between viewers separated in time and/or space. By surveying a number of applications, we have identified four key aspects that define social TV: content selection and sharing, direct communication, community building, and status updates. Such categorization is helpful not only for classifying current solutions, but for paving further innovations. In the future, we can expect convergent environments where TV, the Web, and social networks fluidly interoperate; domestic video conferencing that nurtures closed relationships; and novel social-aware TV formats.

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