

# Companion Apps for Long Arc TV Series: Supporting New Viewers in Complex Storyworlds with Tightly Synchronized Context-Sensitive Annotations

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## ABSTRACT

As television merges with digital technology, storytelling is becoming increasingly complex. Use of a second screen has become common, but academic research has focused on social applications and commercial applications have stressed community-building and trivia questions. Our survey of viewers reveals an unmet need for tightly synchronized second screen applications that can help them to enter and keep track of dramatic series with multiple recurring characters and multi-episode story arcs. We employed an iterative design process to create a second screen companion application for the critically acclaimed series *Justified* that was tightly synchronized, context-sensitive, and character-focused. Our usability testing indicated that use of the companion app enhanced comprehension for first-time viewers of a late season episode, and was especially effective in supporting understanding of character relationships, while also surfacing design considerations for future applications.

## Author Keywords

Agency; second screen companion design; narrative; interactive television.

## ACM Classification Keywords

H.5.2 [Information Interfaces And Presentation]: User Interfaces - User-centered design.

## INTRODUCTION

Television narrative is designed to capture viewers' attention and to preserve their interest through multiple

episodes and across seasons. The advent of digital recorders and streaming video sites has made producers more aware of viewers' demand for continuity and consistency across episodes. They have led to the creation of shows with a dozen or more frequently recurring characters and with story arcs that last over and across entire seasons, building toward a multi-year series finale [22]. Viewers are therefore rewarded for close attention and challenged to follow plot developments from episode to episode.

The TV series *Lost* was an important turning point, in which fans created their own online Lostpedia to keep track of characters and events. *Lost* fans included many who identified as “shippers,” i.e. viewers interested primarily in the relationships between characters rather than in the science fiction aspects of the story world [9]. The *Lost* writers responded to this interest by expanding the cast of characters, and increasing the possible structures of relationships by creating an alternate timeline. The intense interest in the characters can be seen as an illustration of the psychological theory that narrative is an adaptive cultural practice that allows us to produce mental simulations of human relationships [21, 27]. It is understandable therefore that viewers would be attracted to sustained fictional storyworlds with recurring characters in changing situations, while at the same time needing help in keeping in mind all the character and plot details.

Since the 1980s when television writers started to explore longer-form story arcs that did not resolve at the end of a single weekly episode, TV shows have addressed viewer confusion by starting each new episode with a retrospective montage, introduced by the voice-over words “Previously on....”. These recap sequences serve three purposes: to remind regular viewers of events from recent or long past episodes that are particularly relevant to the current episode, to update viewers who have missed some episodes, and to provide new viewers with important context about the show [16]. Our research began with the observation from our own viewing that the short (under 1 minute) recap montage was inadequate to help us follow, as new or regular viewers, an episode of a complex series such as *The Wire*, *the Sopranos*, or *Mad Men* – exactly the ones that

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were hailed as important cultural achievements. Through our research, we wanted to see if presenting viewers with context-sensitive streams of synchronized information could improve their understanding of long form narrative. We prototyped a companion second screen application for TV, which viewers could use as they watched a show. For this purpose, we chose the Peabody award winning American FX channel series *Justified* because it had a particularly strong extended story arc over its first season. We also conducted a separate survey about TV viewing habits, which helped us inform our design decisions as we created multiple iterations of the second screen application. In this paper, we document our design research process, and present the results of our survey and usability testing. We then use these results to suggest areas for further research and some tentative design guidelines for the evolving genre of second screen applications.

### PREVIOUS WORK

The methods of consumption of television content have changed tremendously in the past ten years. In addition to broadcast and cable television channels and inputs from our DVRs, our televisions now provide us with computational capabilities while being able to host a series of internet-connected applications. Researchers have noted that TV interactivity offers the viewer rich opportunities to edit, share or control the playback compared to traditional, less viewer-active models of production, delivery and consumption [3]. Pablo Cesar and Dick Bulterman identify second screen interaction with TVs as having four major uses: to control, enrich, share, and transfer conventional television content [4]. Popular culture theorist Henry Jenkins also stresses enrichment and sharing, hailing a new age of “convergence media” and “transmedia” storytelling in which the experience of watching TV shows is unchanged, while the content becomes more “spreadable” across platforms, for deeper story development, and beyond corporate control for greater fan participation [13-15]. Similarly, the focus of much second screen research has been on the integration of social media services to accommodate affordances for communication with friends and family [8, 10-13, 20].

As increased bandwidth has made internet streaming more widely available, services like Netflix, Amazon Instant Video, Hulu Plus and Vudu have become popular alternative sources for episodic television content. Recently, Netflix usage accounted for 33% of peak downstream internet traffic [32, 36] in the United States. The proliferation of streaming has seen Smart TVs, and devices like Roku and AppleTV integrate many of these services to bring them from traditional interfaces that use a mouse, keyboard and web browser to the convenience of the 10-foot experience allowing users to browse and consume streaming content on their television. They also provide users with second screen applications on phones and tablets, but their functionality has been limited to social

features and the interaction modes of a traditional remote control – playback and content selection. One such popular application, IntoNow (now Yahoo SmartTV), allows users to sync with a current show and share personalized clips from the show with friends. It also provides them with stats for sports, and information about the cast in movies and TV shows [2, 7]. In addition to streaming content, these devices also allow viewers to use clients for web-hosted media, and interactive applications on their TVs, further blurring the boundaries beyond television-based and computer-based functionality.

But though research and commercial development has tended to focus on computer-based applications as communication devices for sharing or commenting on television content, our work has focused on the computation as a means for navigating complex narrative story structures[20, 23-25]. This is based on a theoretical position that sees the new digital medium as offering the possibility of enhanced human expression through more complex and interactive forms of storytelling [26]. Even before second screen applications for narrative became common, there was some empirical evidence that viewers were looking for greater functionality. For example, in a 2009 study of user practices, viewers asked about the features of DVRs and online streaming expressed a dislike for traditional electronic program guides, and showed interest in a television experience that is more focused on the content [1]. Other studies of television use in the home have suggested that by integrating digital technology with specific television content, designers can provide users with a more synchronized and immersive experience [29, 31].

Within the industry, discussions of interactive television have been characterized for over a decade by reference to the tension between “lean back” and “lean forward” experiences [33], a genre dispute that has mirrored digital media controversies over games versus narrative. A recent evaluation of game controllers and tablets revealed that users prefer TV interaction modes that do not require mastery, and are therefore less likely to result in user error [6]. Industry leaders have been drawn closer to interaction as they have seen it as a source of additional revenue and a means of demonstrating audience involvement to advertisers, and they have favored applications that require a single button click often based on multiple choice answers with immediate feedback. Network-affiliated application designers have used synchronized second screens to elicit the users’ input in trivia tests, guesses about future plot developments, or expressions of allegiance to one character or another [6, 28]. For example, the second screen application for the TV show *Leverage* from Turner Networks tests users’ knowledge of story details, such as where a particular went to school or what they are most afraid of, and provides quick polls with immediately tabulated results [38]. Another approach for synchronized content is to provide viewers with alerts that link to explanatory or production information about something just

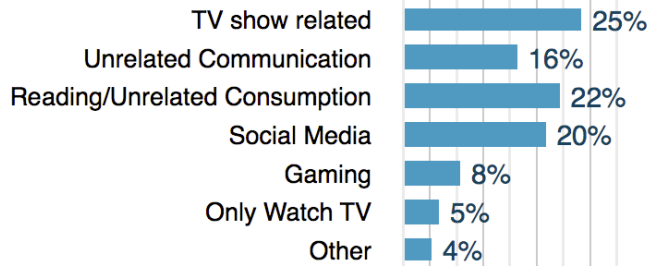


Fig 1.a. Second screen usage distribution.

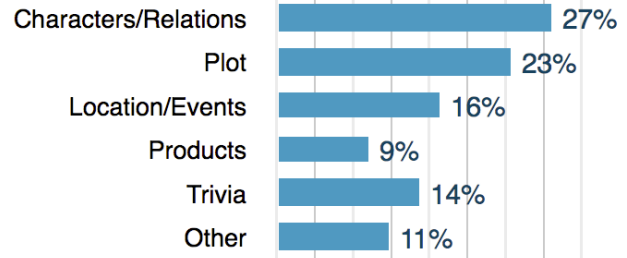


Fig 1.b. Categories of show-related searches.

seen. The HBO Go application [37], available on desktops and mobile devices for showing television content to subscribers across platforms, offers a card-like sidebar for longer annotations synchronized with streamed content. Viewers can pause an episode of *Game of Thrones*, to read a paragraph about one of main characters or view a short video about the production process for one of the intricate fantasy-medieval weapons. The HBO Go application also allows viewers to lean back and watch the show uninterrupted and then browse through the stack of annotations separately. Though these annotations are synchronized with the TV show, the character descriptions are general and not contextualized to the particular episode or dramatic moment, and the production information, like much of the trivia content common to second screen applications, often breaks the fourth wall by calling attention to the production process or the actors rather than focusing on the fictional world and the characters[5].

In short, companion applications for long-form television narratives offer a rich field for interaction design that is at an early stage of development, both commercially and as a focus of research. Existing conventions for synchronized content raise questions of immersion and agency, of what to provide and how to provide it, that go beyond the current landscape of social networking, trivia questions, and generic “enhancements.” One way to address these questions is by designing research prototypes that provide a finer granularity of narrative reference, and a more explicit recognition of the increasing complexity of television narrative than currently available. Building on the increasing convergence of television and computation but free of the limitations of any particular delivery platform or revenue model, academic design teams have the opportunity to focus on the intersection of narrative curiosity and interaction design.

#### TV VIEWING HABITS AND SECOND SCREEN USE

To be able to better understand what kinds of information viewers seek about shows they follow, we designed a web survey with 20 questions about television viewing habits. Members of the lab shared the survey over email, Facebook and Twitter. We captured the following information: demographics, the number of hours spent watching TV

content, content genres and categories, whether individuals used cable, DVRs or streaming services, the major use cases of second screens (smartphones, tablets or computers) with TV (see fig 1.), the nature of company and social interactions, habits of re-watching television, the kind of information viewers tried to seek online, and a wish list of what viewers felt they might want to find more easily.

We had 98 responses to our survey with 63% male and 37% female respondents, from a variety of age groups with 45% being between ages 17 and 30, 27% being between ages 31 and 40, 23% between ages 41 and 60 and 4% above the age of 60. We tried to gauge the frequency with which TV viewers used website resources to follow TV shows. We asked respondents about how they resumed watching a show after having missed previous episodes. 34% said that they tried to infer the story and characters from the context of the episode they had resumed watching the show from, 24% looked up resources on the web, 22% would simply watch previous episodes, 10% asked peers who followed the show for an explanation, and 10% stopped following the show. 66% of respondents said that they liked to watch TV episodes more than once. We asked them why they liked to watch episodes again: 40% said they did because their quality was predictable, 33% watched it to see important details they felt they had missed, 17% did to introduce the show to someone else and 10% used liked to keep their favorite shows on in the background as they did other work.

We also found out that 81% of our respondents were accustomed to using second screens in front of their televisions, and 86% used online resources for the specific purpose of getting more information about shows they followed, either during or after the show. Wikipedia, IMDB and other show-specific wikis were the primary sources for information about plots and characters. Half of all respondents wished they had an easier way to find character and plot information for specific episodes of TV shows they were watching. 65% of participants preferred to use on-demand content and online streaming over traditional cable network access. According to our survey, email and social media usage accounted for 20% of second screen interaction, and 25% of all second screen interaction

## Production: Producing Interactive Experiences



Fig 2.a. Story map of Justified Episode 11.

focused on communication or information retrieval specifically about the show.

### DESIGN OF SECOND SCREEN

The goal of our second-screen application was to provide useful information to viewers of a complex television drama in a synchronized second-screen experience that would not disrupt the viewing experience. We chose the show *Justified* (Season 1) [34] because it displayed a consistent story world with many recurring characters and a season-long story arc over a manageable 13-episode season. *Justified* was run by a head writer/producer Graham Yost whom we interviewed about his writing approach. Yost described the process as setting out a five act structure over the course of the season, with a turning point in the middle of the third act[35]. In interviews with us and with others he described his fidelity to the novelistic world of Elmore Leonard, whose crime novels were widely respected for their depiction of memorable characters in well-observed dialog. The lead character of *Justified*, Raylan Givens, appears in several of Leonard's works [17-19].

We began by prototyping a version of the application that included synchronized information to accompany the most exposition-heavy introductory scene of the first episode and the last action sequence of the last episode. For the early scene we demonstrated the helpfulness of displaying character images on the second screen to reflect who was in the scene and also who they referred to, together with spatial cues that indicated the relationship of the characters to one another. For the final scene we demonstrated the appropriateness of a recap of a crucial story-thread involving the hero, Raylan, and the anti-hero, Boyd, since

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Fig 2.b. Annotations of specific events in a scene.

the first season ends with a very meaningful and dramatic interaction between them, which would make a regular viewer want to go back and see some of the earlier scenes again. We demonstrated these functionalities to eTV researchers and industry visitors [23], and the response encouraged us to annotate a complete episode.

We focused on episode 11 since it focused on the longer story arc, and drew on considerable knowledge of previous episodes. As we annotated episode 11, we used a timeline spreadsheet to list all characters on screen or referred to in dialog as the episode progressed. As for our earlier prototype, we translated this chart into a story map, using photo thumbnails to represent characters, along with the combination of lines and iconography between two characters to describe their relationship (see figure 2.a.). A character was displayed on the iPad only if they were present or mentioned in the current scene of the episode. Tapping on a character on the second screen allowed viewers to see a short character description.

We conducted a pilot session with 4 participants. Each participant was a member of our lab, but had never watched *Justified* before. It was observed that participants were unable to follow the story despite having names and descriptions available for each character, and having them displayed in groups that separated the lawmen from the outlaws, with icons showing family relationships and who was fighting with whom.

We realized that we had to increase the depth and granularity of our annotation to support new viewers. For our second prototype of Episode 11 we added context-sensitive descriptions of the characters' situation that

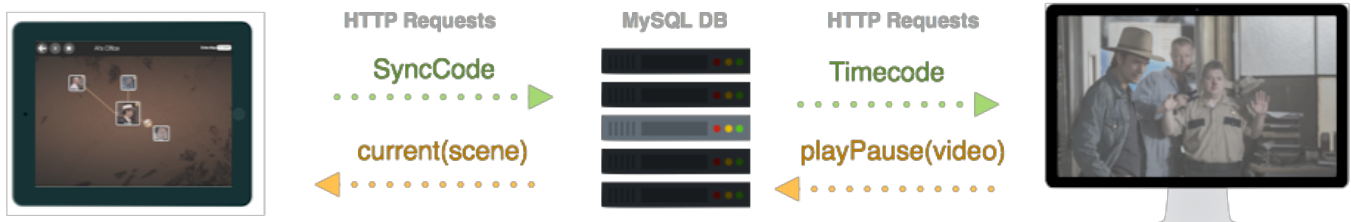


Figure 3. Communication between components used to build prototype of second screen experience.

changed as the episode progressed, as well as brief video montages that introduced the characters with key moments from earlier episodes. We also added annotations to explain confusing references in the dialog with either text or, when necessary, with more video montages. We limited these montages to three minutes, which had long been our own rule of thumb in the lab, and has recently been reported as the YouTube ideal as well [30].

One of our design goals while creating this application was to maintain agency – to provide viewers with useful information about the show through the companion application without trying to move their attention away from the show. In our second prototype, we focused on moments when the viewer would experience confusion or curiosity because of a specific story beat, such as a dramatic reference to an unsolved crime. For each such curiosity-inducing story beat, we used a speech callout icon quoting the key part of the dialog (see figure 2.b.). When the viewer tapped the callout, we provided them with information about the event to be able to continue watching the show. Viewers who chose to learn more about a particular character could tap on their image on the map to access the relevant video montage. The TV was paused automatically for the duration that the montage was played back on the iPad, and then automatically resumed.

#### TECHNICAL IMPLEMENTATION

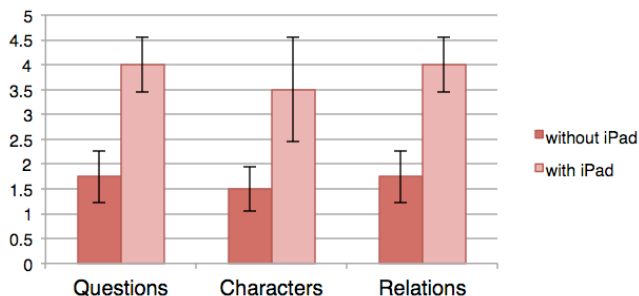
We used an Sony Smart TV with Android OS and an iPad to prototype our second screen design. The TV application and the iPad application were both developed using HTML5, CSS3 and JavaScript. We also developed a server application using MySQL and PHP which formed the data store to synchronize timing information between the TV and iPad applications. As the video played back on the TV, the HTML5 video player would send video time codes to the server(see figure 3). The iPad application queried the server and used these time codes to display information that was relevant to and in sync with the current state of the episode being played back.

The iPad application used a local database to retrieve information based on time codes from the episode being played back. One database table listed all the events mentioned in the show, the characters appearing or being mentioned in each episode as well as how the relationships

between these characters changed as the show progressed. A separate table was created in the database to describe events and related pieces of backstory, along with links to video montages created from previous episodes to provide viewers with more context about each event. The tables contained information about the characters on screen, as well as about the characters and events mentioned throughout the episode. Each table had a column, which provided a range of time codes between which corresponding information would be made available on the second screen. When information about a past event or backstory was mentioned in the show, a speech bubble appeared with a link which when tapped would display a short description as well as an optional short video clip about the event. If the viewer chose to watch the video clip, the iPad application requested that the TV application pause playback. After pausing playback, the video on the iPad would start playing back. During resumed playback, as new events were shown in callouts, previous descriptions and video about events were archived and available for access from the annotations menu. The annotations menu used the TV timecode to display information about events only if they had already occurred. This design decision was made consciously to prevent information about the show from being revealed prematurely. This information became available only after viewers saw relevant portions of the story unfold as the episode progressed.

#### PRELIMINARY USABILITY TESTING

We invited 8 participants who had never seen the show before to participate in our usability testing sessions. The participants were required to watch twenty minutes of *Justified, Season 1 Episode 11* with our application, and then to answer questions about the episode. To gauge the utility of the application, we invited 8 additional participants to watch the show as they normally would. All participants were students who frequently used another device while watching television. Participants were compensated with a \$5 Starbucks gift card for their time. The questionnaire included 17 questions about specific events in the episode, along with additional questions about specific user preferences while using the application. The group without the companion app did poorly in answering questions about the story segments they had just viewed, with an average of 4.9/17 correct answers. None of these participants chose to look up information online while watching the show. When we asked participants about this, they responded by saying, “...won’t want to break away from the show to find that...”, “...it takes too much time.”, and “...usually get more info during commercials...”. The group that used the companion app did much better (11.5/17 correct answers), and showed particularly good scores in identifying the relationships between the characters with 4/5 correct answers compared to 1.7/5 for those without the iPad (see figure 4).





On asking participants to rate how helpful they found the iPad application on a scale of 1 to 10 (with 10 being the most helpful) responses averaged 5.2. Participants said that while they found the iPad extremely useful in being able to understand the context of the show, they found it less helpful because of the test environment, and they rated its distraction effect as 3.1 on a scale of 1 to 10, with 10 the most distracting. One participant said, “I find myself looking up characters all the time. Not holding it in my hand but having it ready by my side would make it very helpful. More so, than in this study.” Testers felt that in normal usage, they would not have been as conscious about the iPad application, and used it only when there was a moment of curiosity. It is important to note that while the group with the iPad rated the helpfulness of the second screen as 5.2/10, 7 out of 8 participants also used words like “very helpful” and “extremely useful” to describe the application. Participants acknowledged that they would normally seek this information during commercial breaks or after an episode had ended. For comparison, one participant described the ‘HBO Go’ application: “...it provides some information for Game of Thrones, but relationships are important...it does not describe them at all.”. Users found the synchronized relationships and event montages the most useful features in the application.

We asked participants for which shows they wanted such an experience to be made available. The top three responses were *Mad Men*, *Game of Thrones* and *ESPN*.

## DISCUSSION

The application proved most effective in increasing comprehension of the relationships between the characters. This is consistent with the theoretical position that fictional narratives allow us to create mental simulations of human relationships[22, 27]. It also is consistent with the “shipper” internet activity around *Lost*, and the responses of surveyed viewers who reported that characters were a major focus of their show-related second screen use.

It was also evident from the survey and the usability testing that in addition to getting additional information about key characters and their relationships over the course of the season, viewers wanted to be able to find specific plot details relevant to the present dramatic situation of the show. They wanted efficient summaries of previous events that contextualized the action they were watching without “spoilers” giving away plot developments they had not yet seen.

Summarizing the features of our application that users described as helpful:

**1. Annotations:** New viewers were able to instantly identify characters in the show, and to understand dialog allusions to previous events by calling up short text explanations. This feature was used spontaneously by all the testers, and helped provide context when there were references from previous episodes.

**2. Video montage for key events:** When short text descriptions were insufficient to provide context, users were able to call up a 3-minute clip that replayed important segments of previous episodes that provided background for the action. Users responded positively to the feature saying things like “...ah so that’s what they meant”, and “I had no idea about that murder before this”.

**3. Video montage for important characters:** For users who had never seen or read about the series, episode 11 presented a challenge because of the complex relationships among the characters, in a fictional world in which family members, lovers and friends were often on different sides of the law, and actively deceiving one another. The relationships were too complex to be summarized with the rapid clips of a typical “Previously on” review, the standard for non-interactive television. The Story Map home screen linked characters with expressive icons like a gun or a heart which led to relationship-focused video montages that offered key dramatic scenes between the two characters leading up to the current action. Viewers were particularly interested in understanding relationships, because they did not think that current websites and synchronized applications are sufficiently helpful: “ABC doesn’t explain anything, HBO does...but you have to keep searching...” and “...you can even see characters change through the season”.

**4. Expanded Map:** The application provided an option, which displayed the entire map of character relationships in that episode. New viewers were able to understand how certain characters were more important to the show than others by looking at the number of relationship lines fanning out from each character. While looking at the entire map, one user immediately described Raylan as a “...character who must be central to the show”. Another user appreciated the feature saying, “the visual overview tells me who plays a bigger role...whom to pay attention to”.

Among the problems that we are correcting in future designs are:

1. Viewers who paused the show to view the video montages and found them valuable wanted to gain the information more quickly. Some of the responses we received for the character montages were “helpful in understanding a character’s motivations”, “that explains why Boyd behaves like that”. When asked about the length of the montages, a common suggestion was to limit them to “less than 30 seconds”. The longest continuous interaction with the iPad in the TV show’s paused state was 48 seconds. These requests suggest that their model is the “Previously on” television convention. On the other hand, craft practice would suggest longer intervals of 2.5 to 3 minutes for on-demand video such as

YouTube segments [30]. We see this as an area for further research.

2. Viewers wanted control of when the TV video stopped and started, rather than having it stop automatically when they clicked on a video on the iPad. They were concerned that stopping the main video would be too disruptive if they were watching it with someone else. Users liked the option of a pause button on the application, which could be used while interacting with the iPad. They wanted a control that allowed them to enable or disable automatic pause/playback. They said the decision to use this feature would also depend on whether or not they were watching TV alone. When they had others watching TV with them, they said they would prefer to turn automatic pausing off, so that they do not disrupt the experience for other viewers. This result is consistent with the design goal of maximizing user agency. We had considered a bookmarking feature but disabled it for this round of testing. The testers' responses point to the importance of supporting story comprehension in viewers watching in groups with varying familiarity. Future research will examine various strategies for meeting this need including bookmarking, and more efficient and perhaps silent montage strategies.

When users resumed playback of content, they wanted to be able to move back the play head, so that they are able to hear any important dialog that they paused midway. In addition to being able to rewind the video, they wanted the ability to jump to specific scenes in the episode. Users did not want to use an additional remote to access playback, rewind and fast-forward options. While it makes sense that a commercial implementation of the system would include this expected functionality, this request raises further design issues about the future hardware/software configurations.

## CONCLUSION

Our prototyping and testing confirmed the survey results that users would welcome second screen applications that helped them to enter long-form TV narratives mid-season or to follow them from the beginning with the close attention of the habitual viewer. We are optimistic that with further research and refinement of design, the kinds of aids tested here can provide viewers with contextualized information on a second screen that directly reflects the events, characters, and relationships enacted or referred to at the synchronized moment in a non-distracting manner with viewers free to pursue greater depths of information as needed.

Data from our survey reinforced the observations we made in testing this system, which we present as a tentative set of guidelines for the design of tightly synchronized companion applications:

1. **Opt-in interruptions:** While designing second screen interactions, it is important to give users complete control over playback to minimize disruption during a

shared TV viewing experience. This includes providing the user with an option to choose whether or not to automatically pause the show while interacting with the second screen for extended periods of time.

2. **Companion experience synchronized with present context.** Presenting users with an opt-in companion that aids viewers during moments of curiosity is helpful in maintaining agency. Additionally, the companion should “listen” to the show, and display information relevant to the events and characters in the current episode’s context to minimize time spent in navigation and search by the user.
3. **Emphasis on characters (like many online aids now provide) and relationships between characters (which our application added):** In order to do this effectively, with the right level of context-sensitive detail and without spoilers, it is important to have a framework that updates with each episode and even with scenes within an episode. This is becoming more challenging but also more needed by viewers as television series expand the casts of significant continuing characters.
4. **Events:** Provide concise descriptions of events that have taken place in the past if they are explicitly referred to in dialog.
5. **Social Context:** Take into account the situation in which multiple simultaneous co-located viewers have different knowledge levels, and no one can stop the playing of the current episode without impacting the experience of the others.

The last two areas offer rich possibilities for future research focused on the widely available and often used second screens of current television viewers. Other more general areas that are promising for further design research are the differences in narrative mental models between new viewers, habitual viewers, and committed fans re-viewing a familiar episode; overview strategies for representing relationships with readable spatial arrangements and iconography; strategies for navigating discrete story threads within a multi-threaded story world; and integration of social television applications with narrative-focused applications. In addition the strategies that we are researching could be investigated in the framework of non-fictional television forms such as news or historical documentaries, and from the vantage point of the creators of long-form episodic story worlds, who, like their viewers, are increasingly challenged by the complexity of twenty-first century storytelling.

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