Mobile & IoT Computing Systems
Project Paper
Tell-E

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Executive Summary

Our mobile application, Tell-E, aims to support the increasing number of media consumers disconnecting from cable television and relying on streaming services to provide a primary source of entertainment. With the cost of cable steadily rising close to 6% every month[1], cable companies themselves are the biggest threat to their industry. The majority of the "cable-cutters" are millennials, ages 18-34, believe that watching shows online have fewer advertisements and costs less than cable TV[2]--they are also more willing to watch programs 3-7 days after its has been aired. Where cable TV has an advantage over streaming services, however, is a single, aggregate source to browse multiple networks. Tell-E looks to meet this need for streaming services, acting as a remote for the streaming age.

After conducting research and executing surveys, some of the issues facing customers engaging in streaming services like Netflix and Hulu involve identifying where to find television programming across the various streaming site, keeping up with expiring content on these services, and being reminded of mid-season returning content. Additionally, the current applications or services that look to meet these needs are either incomplete, cluttered or lack the usability expected from this demographic of people. Since the time spent on mobile devices has increased to 40%[2], our solution would marry these two experience. Our main customer focus are not only cord-cutters, but in fact people who have both cable services and streaming, as we've found both have similar frustrations with the streaming side of their content intake.

While exploring this consumer market, we learned that the ability to set reminders similar to a DVR feature was not as much of missing feature when incorporating streamed programming. The major issues revolved around knowing when to log-in back into services before content expires, and easily identify which service would be the least cumbersome to watch programming. Sites like Hulu and ABC.com only offer customers the ablility to watch up to 5 episodes from the present. Although the average person can keep up with at least 2 shows [3]to make this deadline, other shows fall subject to sporadic viewership. Its also shown that even consumers new to a program will do some degree of research before entering a season--instead of relying on 3rd party review sites, we can offer a solution that connects you to where historic shows exist. You won't have to rely on sifting through a Google search which doesn't consider your streaming preferences--Tell-E will.

While Tell-E does a great job and providing a solution customers with these pain points, it also focuses on succeeding where other competitive apps fail. Other applications either emulate what a DVR would do with no additional incentive or graphics were overcompensated at the expense of usability. The unique features of Tell-E include bulk actions per shows (where a user doesn't have to mark each individual show complete for the app to add value), identify quickly where a show exists

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[1] http://www.bloomberg.com/news/articles/2015-01-07/why-your-cable-bill-is-going-up-again-in-2015-sports

[2] http://www.nytimes.com/interactive/2015/10/03/business/media/changing-media-consumption-millenials-cord-cutters.html

[3] http://www.wsj.com/articles/how-many-tv-series-can-your-brain-take-1434044239

(with preferences enabled to customize per user), smart lists (allowing a more intuitive creation of lists), and a simple recommendation network (social networking component which assist in reminding customers of shows they intend to watch)

Launching with a trial model will be the best way to gain traction on the consumer side. The most beneficial feature that would be an in-app purchase are smart lists. By only allowing the use of smart lists on a trial basis would allow users to see the benefit of this feature, incentivizing them to pay for the application. Additionally, we would want to use advertisements strategically to focus on media & entertainment. Since we are encouraging customers to return to content from these sites, we will also consider a partnership with Netflix or Hulu to allow us access to advertise their original program content and allow us access to private API services.

Market Research & Analysis

Initial hypothesis

At the start of the project, we hypothesised that customers would be most interested in our app would have similar qualities such as an active streaming content user with at least one streaming service account such as Netflix or Hulu. Additionally, we hypothesized that those with streaming services who also have cable TV would not be worried as missing any kind of programming.

Since we found many of our competitive applications top complaint was around separating movie search from television show search, we felt users would feel the same negativity around missing movies as they did missing television programming. After speaking to come folks in our convenience sample (undergraduate and graduate friends, family and local CMU staff members) we decided to deploy a survey to verify some of these hypotheses.

Survey Results

Goals

Some hypotheses we wanted to target to pinpoint some pain points of our target segments:

- People with streaming services struggle to find films/movies, with or without cable TV
- People with cable television and streaming services get frustrated when winter/mid-season breaks occur because they forget when TV show come back
- People with multiple streaming services are more frustrated when missing a TV show or movie
- Moviegoers who having streaming services come across movie trailers more often online than in the movie theatre

- People with any kind of streaming services do not have a clear method of setting reminders for watching television or movies
- People with any kind of streaming services are not satisfied with searching for programming online

Recipient Demographics

- Number of respondents: 39
- Age
    - Avg: 30.3
    - Min: 16
    - Max: 55
- Gender
    - Male: 66.7%
    - Female: 33.3%
- Have Local Cable TV: 49%
    - With streaming services: 98%
    - Without: 2%
- Use a mobile app for search/reminders
    - Yes: 10%
    - Examples: IMDB, Flixster

Survey Results

- Number of questions: 19
    - About TV shows: 7
    - About Movies: 3
    - General & Demographic: 9

High Level Findings

From this survey, we could only identify a strong number of cable TV users with streaming services, which focuses on the demographic that makes the most sense for us. We targeted our questions assuming that most people do miss TV programming--for this survey, over 90% of respondents did indicate they miss programs and over 95% of respondents reported missing programming after mid-season breaks, as we suspected.

We also wanted to validate some of our hypotheses around the behaviors of these potential consumers. We found that most people used a paid, online streaming service to catch up on programming--40% of the people that chose online streaming as their primary way had access to cable TV/DVR services, proving to us that more people are turning to online sites for their live and syndicated needs. Second,

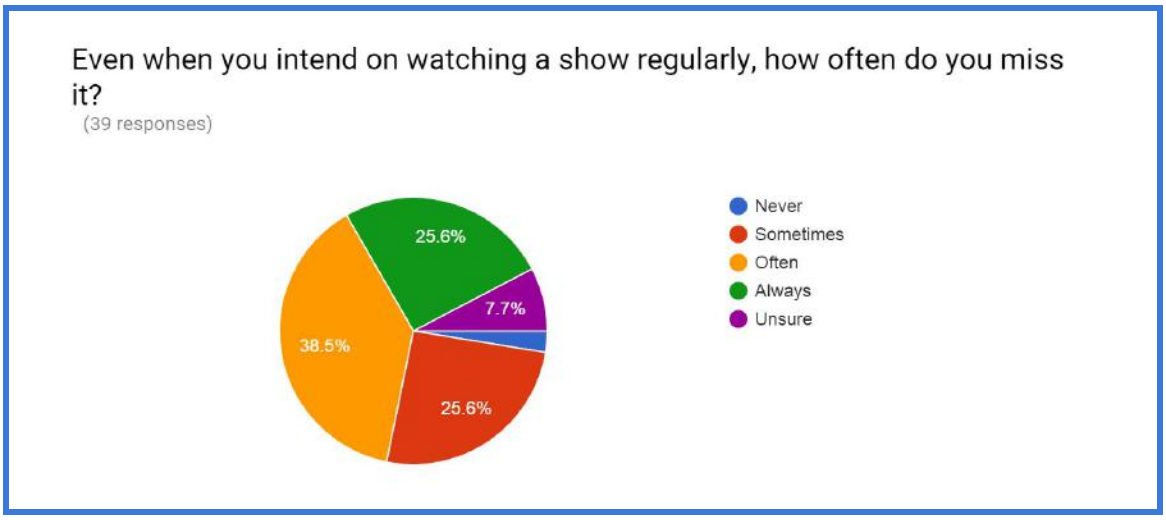
What was invalidated by our survey, was the pain point of remembering to watch a television programming. Most people were not as anxious about missing a TV show (a strong 63% noted “Not anxious or Neutral)--however when slicing the data, we found the more services respondents had access to, the more likely they are to be anxious about missing a show. This indicates to us that our key demographic of those that have to juggle many accounts are aged 25-34 with 35-44 coming in at a strong second. Additionally, it is more likely those 25-34 have cable TV than the older demographic of 35-44 which was counterintuitive to us.

In regards to search, we found most people were slightly to completely satisfied with finding shows/movies to watch online however, when looking into the written responses asking them why there were unsatisfied, many people who claimed “Somewhat satisfied” had the same dissatisfaction like “too complicated,” “lack of availability,” or “disappointed with sudden expiration.”

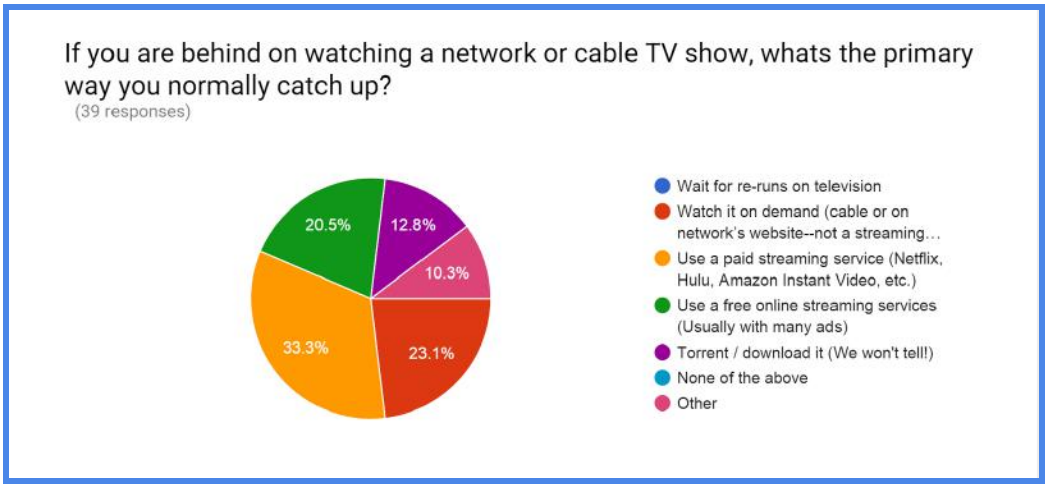
Lastly, while many people typically see movie trailers at movie theatres, a few people rely on a specific app (namely flixster) to bring trailers to them. Additionally, while most people will forget to watch a movie they intended on seeing, the disappointment isn’t as apparent with no one filling out the open-ended question regarding why. More people also indicated that they do not need to be reminded of when a movie is coming out. Because of this, we decided to limit the initial iteration of this application to just Television Shows.

Results

1. Majority of our respondents very often miss programs they intend to watch frequently



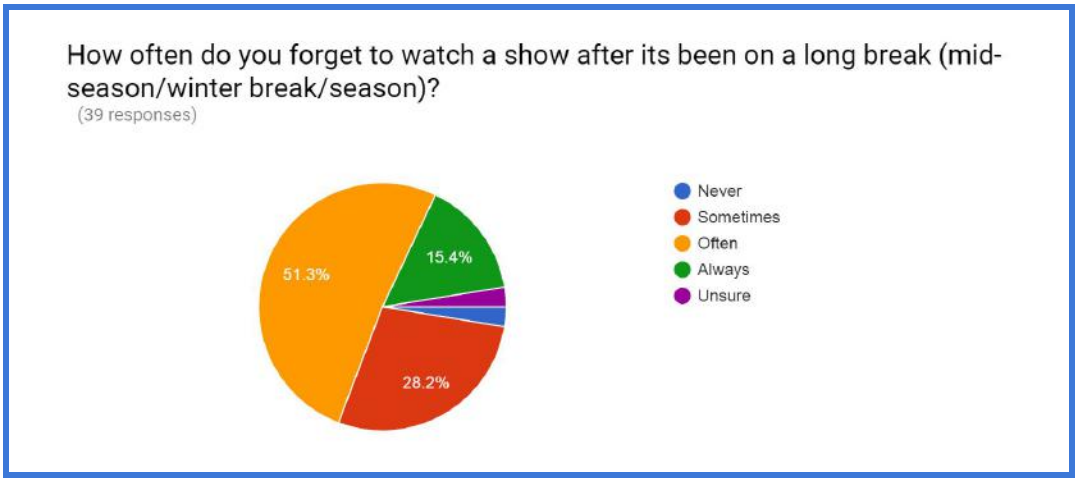
2. Majority of our respondents catch up TV shows via the internet, even when they have access to cable TV and/or DVR services



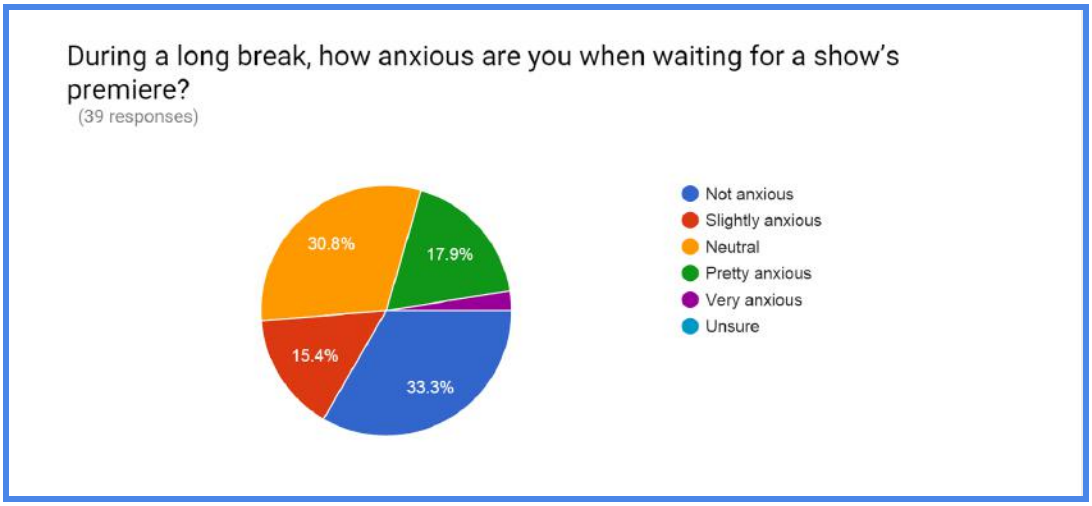
3. Secondary ways respondents catch up on television shows still lean towards online services (Multi-select question)

Answer Choice	# (%) respondents
Wait for re-runs on television	5 (12.8%)
Watch it on demand (cable or on network's website--not a streaming service like Hulu)	22 (66.7%)
Use a paid streaming service (Netflix, Hulu, Amazon Instant Video, etc.)	31 (79.5%)
Use a free online streaming services (Usually with many ads)	24 (61.5%)
Torrent/Download it	12 (30.8%)
Other (TiVo & DVR)	4 (10.3%)
None	0

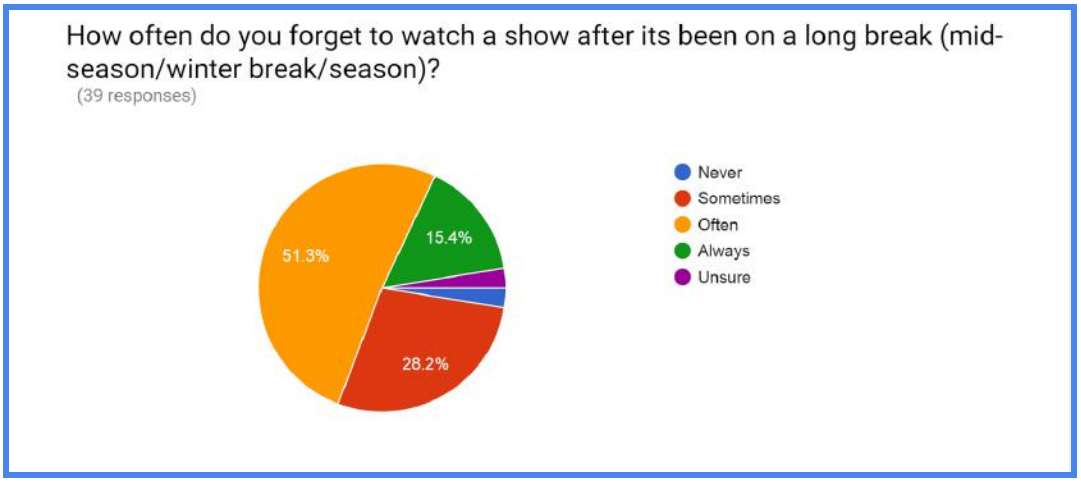
4. The frequency of missing a show after a mid-season break is quite high at 90%



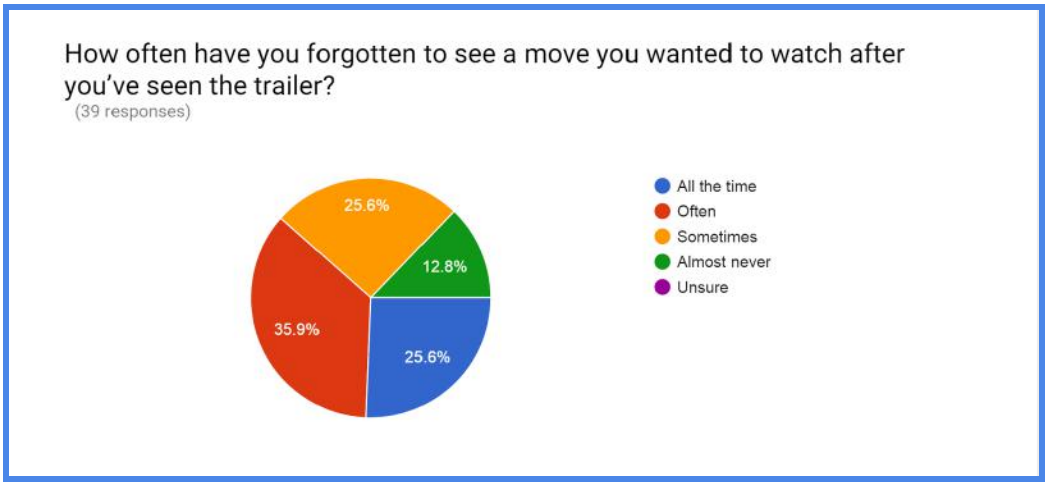
5. Even during long-breaks, there's always a worry about missing a TV show upon return at 66.7%



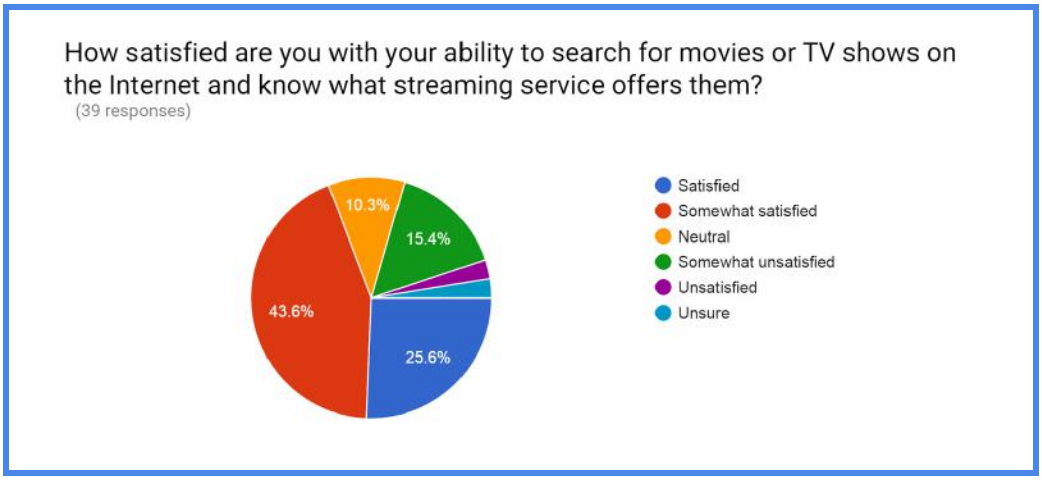
6. This is part because of the likelihood of forgetting to return to a show at 95%



7. Even for movies, most people have an issue with remember to watch a movie when they see trailers at the movies.



8. Although there a strong number of people who are satisfied at searching, the majority of people find a certain amount of dissatifaction with search for TVs and/or movies



9. What is your biggest frustration when looking for a service to watch a movie or show?

    a. *"Comparative streaming searches are too complicated."*
    b. *"A more extensive list of sources than what Google.com can provide"*
    c. *"That I have to look in many different places to figure it out. Also some look like they'll show it but then just show ads for a show or movie."*
    d. *"Many of the shows seem to be available only on DVD rental through Netflix."*
    e. *"Movie or show not available on the streaming services I use"*

Market Research Findings

The survey we deployed helps us identify where to focus our app's initial value proposition would be most effective and answer the most needs for our users. These pain points were not centered as much as reminders as it is updates to streaming sites about available programming, location of programs, and integration of the social reminders into our application.

User Personas & Scenarios

Additionally we were able to identify two particular personas of this application:

Sarah, 28 years old
Cable TV and Netflix user
Most important to Sarah:

- To find an application that will help keep track of the different types of shows she watches based on type of show: streaming, on-air, syndicated
- To find a solution that isn't cumbersome to update since she is at a different stage of viewership across multiple shows
- To keep up to date with as many socially accepted shows as possible to keep up to par with her co-workers

Paul, 34 years old
Cable TV user with TiVo, with access to Netflix, Hulu, and individual network service HBOGo.
Most important to Paul

- To keep track of all the shows he sees especially since he pays for so many outlets but only keeps basic TV for some sports
- Wants to continue to use smartlists as it saves him time from creating manual lists like other apps force him to do
- Prefers to keep recommendations for TV shows on the app, right where he looks for his own TV shows so he know he won't forget the recommendation

Based on these personas, user scenarios are as follows:

· Sarah is new to the Tell-E application and wants to add the top 5 shows that she is currently watching. Two of the programs are shows created by Netflix. For one show, she is currently in the middle of season 2 out of 3 seasons. The other show, she has caught up all 3 seasons and is patiently waiting for the 4th. Additionally, she has fallen behind on a prime time show and unfortunately, FOX network only allows you to catch up 5 shows from air date and she's already missed 6. Instead of mentally remembering to look out for when Netflix releases the complete season. A friend informs her that it a complete season is usually released the day after the new season is aired—but she is unsure if that is accurate for all network providers. Lastly, the two additional shows she watches is featured on HBO, and although she has access to the live viewing, they air late on Sundays and she ends up

watching it on her mobile device, the next morning as she is getting ready for work. Her coworkers often poke fun at her for being an “old person” if she hasn’t watched at least one of the shows—plus she doesn’t want to limit anyone on what they chat about during lunch.

· Paul has been a Tell-E user for about a year now. He didn’t realize how many shows he watched until one of his smartlists alerted him to his trial expiration date—and he realize 7 shows had been added to the smartlist “Comic Book Origin.” He knows it wouldn’t be a difficult task to recreate the list but Tell-E’s smartlist had alerted him to another comic book show on AMC that he would have never known about. Plus, he’s enjoying being able to share his recommendations for specific shows with his other comic book enthusiastic friends. He works long hours and appreciates the reminders the Tell-E provides him on lazy Sunday afternoons for his streaming services. It reminds him of using the DVR feature when he used to have a full cable package.

Value Proposition

In order to provide value to the user, we zeroed in on what we believe is the single most important aspect for customers: Usability.

The purpose of this application is to provide customers with a reliable way to unplug but stay updated with the latest show and movie releases. Our application is focused on providing prospective users with a clean and intuitive interface that accomplishes the task, with no bells and whistles weighing them down.

We bring value to the customer by

- Providing the basic function of keeping the user updated with new releases. This is made easier for the user by providing “batch” add options for the initial setup. All interaction after that is initiated by the application itself when it sends notification to the user, instead of requiring the user to manually check in.
- Connecting the user with their friends and family in the context of this application, using social media services such as Facebook. We are banking on the survey results that indicate that users receive and give high priority to recommendations from their friends and family compared to other sources.
- Forwarding users to appropriate viewing services for the content directly, instead of them having to conduct a parallel search over the multiple streaming services present. This was one of the major pain points for the customers we found during the survey.

Due to time constraints, we were not able to gather customer feedback specifically regarding our value proposition using our high fidelity prototype.. However, during the project fair where we showcased the high fidelity prototype, many visitors, including the TA’s, acknowledged the usability aspect of our application interface. Other feedback we were able to gather showed that pointing out the streaming

services that provided a certain show or movie was another feature that potential customers appreciated.

Design Process & Analysis

When examining our value proposition and what would make us most distinguishable in a market, we also gave attention to the competition in this area. We wanted to make sure we did not make the same design and usability mistakes pointed out in these applications through brief contextual inquiries. While we were aware of a few native apps such as FanTV and iShows (iOS only), our survey brought to our attention some overlapping features coming from the IMDB app. We chose to inquire about two of these applications and begin working on paper prototypes with influences from their feedback.

Contextual Inquiries - Competitors

User Profiles

	User 1	**User 2**
iShows	iPhone 5 user, 25 years old Cable TV deluxe package owner, including sports packages, Netflix subscriber Mostly consumes programming on cable TV but often uses Netflix when travelling or visiting parents home--justifies having the account as a low-cost option and original programming	iPhone 6 user, 41 years old Cable TV, basic and some premium channels and Netflix Decides which medium to consume programming depending on the time frame and time of day. Weekends are reserved for binge watching on Netflix and weekdays are cable TV so not going to sleep late
iMDB	Android user (Samsung) 30 years old Basic cable TV, uses Netflix, Hulu, Amazon Prime and RedBox More often uses internet to stream because his computer is less noisy and intrusive when watches content at night while wife sleeps	iPhone 6 Plus, 27 years old No cable TV, shared Netflix, Amazon Prime and apple TV with roommates, and uses family member's login for HBO Go Often watches from a TV hooked up from an AppleTV, often with friends. Relies on one roommate to remind others to come home by a certain time to watch particular shows.

Tasks Asked for Contextual Inquiry

1. Add a new show to your general list of shows -- one that you are currently caught up with one, and one that you are not
2. Indicate how many shows you have completed on the app
3. Set a reminder for one hour before the show starts
4. Create a new list of shows for a category other than favorites
5. Share the latest episode of the Big Bang theory
6. Figure out which of your shows you can watch on netlfix.
7. Remove the show you are currently caught up with from your list

Below are some of the key takeaways from these inquiries across the three competitor apps:

Task #	iShows	iMDB
1	Icon inconsistency “the + sign took me to a page that didn’t look right, so closed and used the search bar instead”	User buy-in “THis is already downloaded into my phone without my permission, I shouldn’t have to log-in to an account--it should already know me.
2	Lack of help/instructions “I got to a page I thought would show me how to mark complete but it took me to an episode page. There’s nothing there for that and now I can’t get back” “well I’m probably only going to mark complete now because it’s kind of fun, but now I have to keep remembering to do that.	N/A
3	Effectiveness: “I can’t seem to get back to the page where I saw the complete checkmark” (The checkmark on this page actually meant someting else)	Helpfulness: After a few seconds of landing back at the homepage was disappointing because of the progression users felt it made
4	Navigation: “I think I added it but I don’t know where it went… or which icon to press to get it back”	Efficiency (User can only add to one ‘Watchlist’ and manual lists have to be created online/browser) “ Any additional lists cannot be done of the app but must be done online on a browser.
5	Ease of use/effectiveness? “I can just text someone from here or post to FB if I use that like that”	Effective: User knew exactly where we could post to -- social media or one-on-one communication.
6	Efficiency “I feel like I just did that by accident. I was just hitting buttons until something looked right”	No aggregate data available but efficiency: “The fact that a Netflix produced show has, as its first option, a button to play on Hulu when it doesn’t even know I pay for

		my carry-on.
7	Navigation “It was hard to know when I was on the “show” page versus on the “episode” page -- you can only remove from the “show” page. But the reminder is still set which is weird”	Efficiency “Easier to do but less easier to find from the front door of my office.

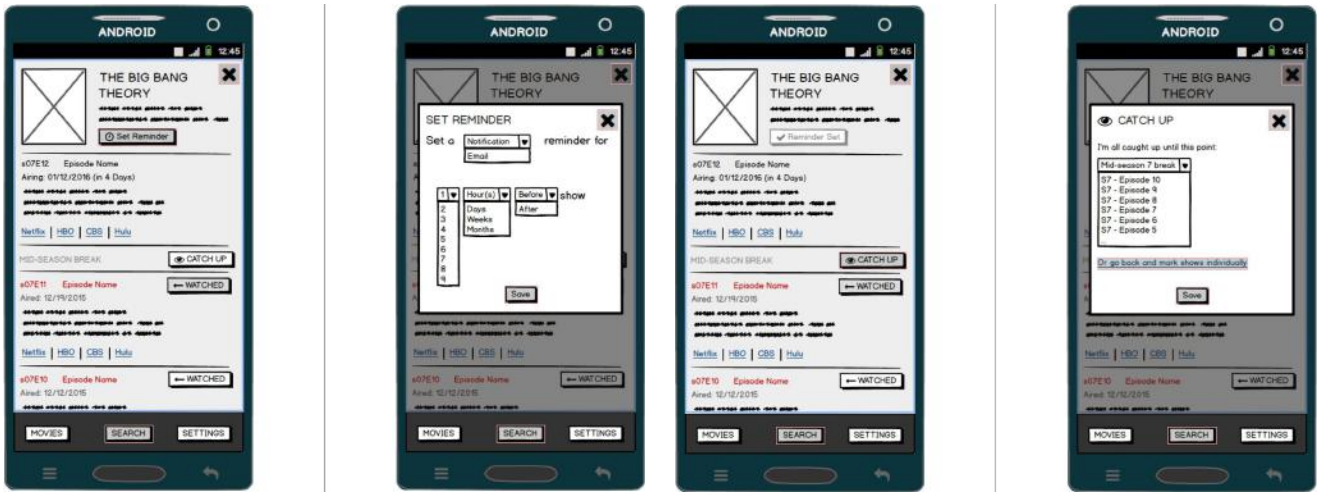
Prototypes

Paper prototypes

Based off of the feedback we received, we developed a paper prototype to address some of the pain points we discovered and provide a basis for functionality.

Opening screens with preview of show for quick functionalities

Each preview with link to a detailed screen

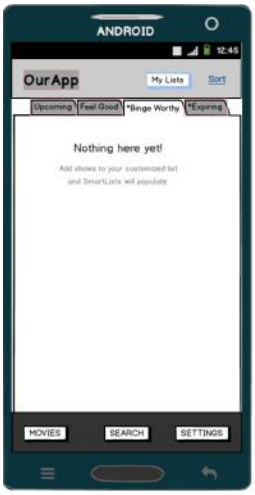


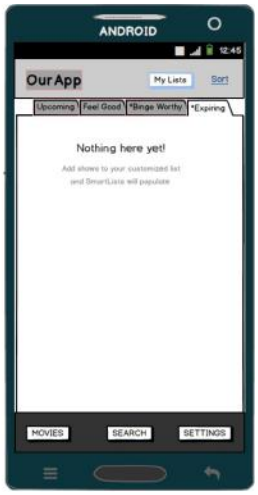
It should be clear when a show has a reminder set or shows are marked complete

Should also be clear how to perform a bulk action of “mark as complete”

There should also be a clear way to access My Lists

Lists should be as accessible as possible--these tabs will be scrollable





Each list with an asterisk indicates a smart list and should be made clear that they cannot be added to manually

Sorting will enable displaying the right shows on top -- should be set up in preferences the right default sorting

The search functionality is focused on one show called DareDevil -- sorting will

Streaming shows will also have a section for seasons since shows get released per season not per episode. Additionally, it should be simple to add to a list and clear what smart lists this show will be added to

Should also be clear when a show is added to a list

Lists should populate properly and be accessible accordingly

User Studies - Contextual Inquiry on our Prototypes

Profile of users to perform an contextual inquiry:

User 1 iPhone 5S, 32 years old, Student Non-cable user, but has access to brother's cable streaming account (AMC, HBOGo); Also consumes programming mostly on weekends and catches up on shows. Only has Hulu for access to ABC, since their streaming service isn't covered by this brother's log-in	User 2 User's iPhone 6S for work, Android for personal, 40 years old, professional Has cable TV package with HBO & Showtime, access to Netflix and Apple TV; Rarely catches content live except for one show on Thursdays. Uses a Google calendar shared by friends to keep up with shows but often hides it because it can interfere with her work calendar.
User 3, Student Android user (Samsung) 26 years old Basic cable TV, uses Netflix, Amazon Prime and XBoxLive Relies on roommates to let him know when shows are on, otherwise would consume without direction. It's been a good way to find new shows to watch but ends up missing shows he's really interested in.	User 4 iPhone 5S user, 28 years old,professional Access to basic cable TV, and uses HBONow instead of paying for premium. Also uses Netflix and Hulu. Often catches show live but enjoys repeating episodes. Additionally, allows her family to use her Netflix account on the weekend therefore only feels "safe" using her account on weekdays.

Tasks Asked for Contextual Inquiry

1. Figure out which show you are behind on and which you are caught up on
2. Update the Big Bang Theory to say that you watched up to the last episode
3. Set a reminder for one hour before the show starts
4. Create a new list of shows for a category other than favorites
5. Add a new show called "Daredevil" to your ""Feed Good" list
6. Figure out which of your shows you can watch on Netflix.

Below are some of the key takeaways from these inquiries across four users:

Task 1: Reading lists/opening screen

- Instead of focusing on homescreen, users went to MyLists instead
- Expected that clicking on the red "3 behind" icon would take them somewhere (perhaps open the preview screen)
- Expected the "Added" button, even though it is inactive would take them to lists to edit or add
- "Tonight" link was also pressed to take users to information about the upcoming episode

Task 2: Update the Big Bang Theory to say that you watched up to the last episode

- Wasn't immediately clear that the first episode was upcoming and not a past episode, even though (in 4 days) was there. Expected more of a header to indicate it was "upcoming"
- Wished there were more of a descriptive list in catching up such as air date or name of episode

Task 3: Set a reminder for one hour before the show starts

- User didn't see why there was an email option, but was concerned about getting too many individual notifications per show -- gave example of Instagram direct messages giving a pop-up notification per message not aggregate
- Another user wanted a way to set a reminder per episode rather than just the entire who. Some episodes are more important such as season finales.

Task 4: Create a new list of shows for a category other than favorites

- Didn't immediately see that the asterisk indicates a different type of list and wondered if a help button would be helpful -- assumed there would be a "set up" guide in the real app so wasn't too worried about it
- Thought that long pressing a tab name would cause it to change the name of the list
- Tab listing would be hard to expand -- what if [user] wanted multiple lists? they would have to keep scrolling horizontally which is not ideal
- Would prefer shows on this list go directly to the details page, not a preview page

Task 5: Add a new show called "Daredevil" to your ""Feed Good" list

- If searching from a show from the "List" page, expected to go directly into the "Add List" screen and not have to press the "Add to List" button again
- Wanted to see which lists it is added onto from the show details page such as "Added to: Feel Good"

Task 6: Figure out how to access Big Bang Theory on Netflix

- Most users did accomplish this quickly
- A few users expected this to see in the preview section from the home screen

High fidelity prototype

Drawing conclusions from paper prototypes as well as analyzing faults and successes of competitor apps, we designed a few high fidelity prototypes to accurately reflect the tasks one would complete when using the app. Simplicity in the user interface and icon designs, intuitive controls and navigation for the user experience and use of imagery and edge-to-edge designs were a key factor in developing these prototypes.

The main app screens are either the Movies screen or Shows screen, both of which are designed to be quickly identifiable by their different layout styles

Quickly viewing title, release date, episode name and episode number is as easy as tapping on its image. Simple buttons for further actions are also shown, such as marking as watched, “options” or more info

When a user chooses to view more information on a show or movie, it starts with this full-screen showcard

Swiping down or tapping the arrow from the showcard brings the user to the “more info” page, highlighting various information. Users can also mark episodes or movies as watched from here. The highlighted episode shows more info.

From the information page, users can learn more about specific episodes or cast members by tapping on them

Predetermined organizational lists and user-created lists can be accessible by dragging the list of shows down, revealing the options. User-created lists all share the same ✳ icon.

Hitting the ⋮ icon allows users to quickly add and remove shows and movies from lists. Tapping the search button on any screen pulls up the search screen, where you can add both movies and shows at the same time

On the search screen, tapping a movie or show brings up the details page, but long-pressing on its image brings up the “add” menu, where you can choose to add it directly to the predetermined lists. For shows, you can mark where you are in a show you are currently watching (not shown)

Learning lessons for future development

As we were designing the icons and layout for the app, we realized how difficult it was to intuitively add multiple functions to a limited number of buttons, so we included some features that are accessible

through certain finger actions, such as long presses or swiping down from the top of the page to reveal the lists at the top. Learning from these experiences, we may provide a quick and simple tutorial at the first launch of the app (something no more than one page of easy to read text and arrows highlighting actions), and perhaps restate the different features in the settings page. However, all the features should be quite intuitive and natural, as other apps also use long-pressing for “more options” and dragging from top of list to reveal sub-menus or options.

Business Model

We are allowing our application to be free to use for all users, but require a user to register before use. Revenue will be achieved by placing targeted advertisements in strategic locations, such as the “more info” page for movies or shows, or on a search page. New users will be able to search for movies and shows, add them, mark them as watched or not (by episode if it is a show), organize them by predetermined lists (“watched”, “to watch”, “watching” for shows, and “favorites”) and view information on episodes, movies, cast members and franchises.

Advertisement Plan

Advertisements will be based on the types of genres the user mainly enjoys watching, which will be acquired from the list of movies and shows the user has added to their account. This list of genres, with no other PII information included, will be distributed to third party advertising platforms for them to put targeted advertisements onto the specific locations for ads we will implement in the app. For example, if User enjoys watching fantasy and adventure movies and shows, “Game of Thrones” might be advertised by HBO on the search page when User begins the process of looking for a new show or movie to watch.

Application Framework

Libraries and APIs

Library/API	**Usage**
Django	We are developing the app using Django to be a webapp. This ensures the app is accessible by all devices, whether they are Android, iOS or other. Using a web app also skips the process of installing a native app, and can easily be bookmarked or saved to homepage (if the OS allows this feature) for quick access. https://www.djangoproject.com/

Trakt.tv API	The API for trakt.tv seems to be updated more frequently and the API access is free and unlimited, and despite this we have not noticed any slow performance or throttling. This is our primary source of content related data. http://docs.trakt.apiary.io/
Heroku	We are using Heroku as our temporary web-app hosting platform. In the future we plan to upgrade to a paid service which will allow us to have our own domain name, possibly faster server speeds and no server sleep times. https://www.heroku.com/

We found that other streaming services (Netflix and Hulu) do not provide API's to access their content. However, given that we do not need to access their content per se, but instead just scan their content library allows us to scrape the required information of the web, either directly from their websites, or from other services such as http://www.canistream.it. Our application can then extract the services that provide specific content, and use URL Schemes to launch into the appropriate applications.

Resource Usage

Resource	Usage
Memory and Storage	Users preferences, custom lists and all saved media are stored in our (currently) Heroku-based server. Some HTML based assets are retrieved from our server as well while others, as well as images, are pulled from the web. All of these assets including images can be saved using caching on the local device, but the amount and time stored depends entirely on the user's browser app's settings.
Network/Data	Because our app is a webapp, internet connection is required for it to function. We have implemented a number of data-saving techniques in addition to local caching, which includes the use of plugins (such as SmoothState.js) that only require loading assets once even when visiting different web pages on our app site. We found the typical image to be about 50 Kilobytes in size, so retrieval over WiFi or 4g, and even 3g connections should be fast at less than 100 ms per image.
Battery Usage	The application uses WiFi or data connections for all information retrieval so the battery usage may be high. Notifications by our app are handled through email, so battery usage for fetching email is dependant on the user's settings for their device's email client.

Security & Privacy

In order to keep our application safe and prevent any privacy issues, we double encrypt all data servers-side. Django has its own encryption and we will implement our own extra-encryption as well. All sharing is done on the websites of the social networks themselves, so our app has no access or knowledge of the user's login credentials or username, etc. Only post content is given to the social networking platform.

Data requested for usage scenarios

Scenario	Data	User choice
User adds a show to be tracked by the app	• Search term entered by the user	Required for basic functionality
User shares a show on a social network	• Post content	User initiated option. Uses the share button supplied by social network companies. So no need for separate authentication if your account is already connected signed in within the browser.
User attempts to find a viewing service	• List of services the user has access to	Optional information. If not provided by the user, the application will display all the results without filtration, so there is a loss in usability, but not in functionality.

Information shared with 3rd Parties

3rd Party	Information	Justification
Trakt.tv API	• User search term	Since our server handles API calls to process and relay them back to the user, the user's IP address and preferences are not sent to the API service. Only the search term is used.

User data consent and removal

The application does not require, retain or share any data entered into the application without the user's consent. None of the user data is accessible by third parties. The user may remove all their data known to the application by simply deleting their account through the settings page, and potentially creating a new one immediately afterwards.

Application Implementation

The application is designed for visual simplicity, quick and efficient usage for gathering information, and a flawless management and alert system. There are many functions and features within the app, each intended to be as easy to use as possible while providing powerful and dynamic capabilities that can adapt to various user scenarios or intentions.

SHOWS

A user can view any show that has information available from our API sources. This includes shows that are currently airing, will start in the future, or that have been off the air / finished in production. To view the list of shows a user has added, simply tap the show icon.

MOVIES

A user can view any movie that has information available from our API sources. This includes films of many nationalities/languages, films that have been released in the past, are currently in theaters and will be released in the future. Short films and collections may show up in search results if the API sources have them. To view the list of movies a user has added, simply tap the movies icon.

SEARCHING

A user can search for movies and shows to add from any screen accessible by the search button. Results should be filtered in real time as the user types in the search bar. A user can return to the previous screen by tapping the search icon again, or by hitting the movie or show icons.

ADDING

One function of the app is adding media to lists in the app, sorted by type (movie or show) and organized within sub-lists as described below.

***TO WATCH* LIST**

By default, movies and shows are generally added to the “To Watch” list under the assumption that the user wishes to watch it in the future. Any movie marked as “watched” and any show whose episodes have all been marked as “watched” will automatically be moved out of the “To Watch” list into the “Watched” list (below).

***WATCHING* LIST**

By default, shows that are currently being watched by the user are added to the “watching” list. Movies are not able to be added to this list, and this list is not visible from the movies page. A user is considered “watching” a show if they have at least one episode marked as watched. If they have all episodes marked as watched but the show’s status is still “on-air” (future episodes are yet to come), the show will remain in the “watching” list.

***WATCHED* LIST**

A user can choose to add a movie or show directly into this list if they wish to manage or keep track of the shows and movies they saw in the

past. Any movie or episode in a show that is marked as “unwatched” will result in that movie or show to be moved out of this list into the “To Watch” list (above).

FAVS LIST

A user can “favorite” shows or movies by adding them to this list.

CUSTOM LIST

A user can create a custom list by giving it a title and adding shows or movies to the list. There is no limit to number of custom lists if the user has the unlocked version of the app (described in the Business Model section)

SMART LIST

Similar to custom lists, a user can create a smart list by giving it a title as well. However smart lists act like Smart Playlists in iTunes, where a user can add rules from a predetermined list of rules, which will automatically be applied to shows and movies in other lists. For example, any film after the year 2005 can be added to a smart list automatically if a date rule has been added to it. There is no limit to number of smart lists if the user has the unlocked version of the app (described in the Business Model section)

REMINDERS

The app will send a notification via email and in-app notifications every time an episode is about to be aired or a movie is about to be released. By default, episode alerts will be sent 15 minutes before and movie alerts will be 1 day before the release. Reminder settings can be customized in the app settings.

SHARING

Users can share the current page they are on (i.e. an episode details page, or an actor’s bio page) by tapping on the share icon. This will open a list of compatible social networks, such as Facebook, and supply a premade message such as “I found this episode really interesting! Check it out: [link]” that the social network can use to post on the user’s account (handled out-of-app by the social network, and posts are not posted automatically. User confirmation is required).

DISCOVERY

This feature is currently under planning and development, but minimally speaking it will provide a user suggestions for movies or shows to add based on their popularity or, if we have time, the user’s preferences. At minimum this can be achieved by analyzing show and movie genres in the user’s lists. This may be paired with advertisements displayed.

INFORMATION

More information can be found on each movie, show, episode, and cast member by tapping on their image or description. Links to iMDb or streaming sites like Netflix or Hulu are also provided, where applicable.

EPISODE MANAGEMENT

Users can manage shows episode-by-episode. On the main episodes page, users can find information on when the next episode is airing if it is currently running, or how many episodes are left to go if they are catching up on a show. While they are adding a show to a list, they

have the option to mark the episode they are currently on and the app will automatically mark all previous episodes as watched. A user can also activate this feature on shows that are already in their lists, by going to the episode list and tapping on any episode.

SETTINGS

Ideally, sorting shows and movies, app color themes, alert times/rules, adding/deleting lists and other functions will be included in the settings.

Application Development

Development of the app was done using Django webapp language and deployed on heroku. You can use our app by visiting http://telle-mobile.herokuapp.com/ . There were many design choices that had to be made because of the different development environment from the original Swift/iOS native app plans. These include but are not limited to changes and design choices in data transfer and network usage, security and privacy, user interface functions and experience, visual design and integration with multiple browser platforms.

Data Transfer, Network Usage and Efficiency

Because the app is being developed as a webapp capable of being accessed by any modern mobile browser, internet connectivity is required for even accessing the app. This raises many concerns about the speed at which pages are loaded and the amount of data being transferred any time a user visits a new “page” in the app, or every time the user launches the app. To tackle these issues, many plugins and old-fashioned javascript tricks were implemented to create not just a fast experience and efficient data transfer, but to also change the way the “website” acts to look and feel like a native app.

smoothState.js This javascript plugin is one of the biggest data-saving techniques used by our app. Originally the plugin is just meant to create smooth transitions from page to page, but the process in which it does so is actually a great data-saving technique. It allows you to define which assets are reloaded upon clicking a new link or visiting a new page, and define which assets should not be loaded and be reused when visiting new pages. Effectively, this feature allows us to only load large javascript libraries, such as JQuery, as well as the many other plugins used on our site only once, on the first launching of the app. SmoothState.js also allows caching of previously visited pages as well as preloading sites as the user taps a link. It takes the average user 300ms to tap a link, and smoothState.js begins loading at the first touch (0ms). This improves page load speed and makes it seem like a native app. Visit https://github.com/miguel-perez/smoothState.js for more information.

lazyload Lazyload allows images to be fetched/loaded only when they are visible in the viewport/screen. This way, a user can theoretically have hundreds of movies in their list but when the page is loaded, only the ones you can physically see on the screen will be fetched. This also allows the

page to finish loading quicker of slow internet speeds, and even if the images on the page take forever to load, the page will display a temporary movie symbol with the title of the movie, allowing the user to perform their usual tasks without needing an actual loaded image of a movie poster. This technique is used site-wide so it does not just apply to images of posters, it also works for cast/crew images and other situations. When an image finishes loading, it pleasantly fades in. Visit http://www.appelsiini.net/projects/lazyload for more information.

caching Caching is handled by the client browser, and the time/storage amount is dependant on the client's settings. Caching will help keep loaded images and other assets from being loaded again between page switching and revisiting.

User Interface and Experience

The feel of the webapp was an important factor in designing the site. An ordinary website needed to feel like a native app, and there are many different defining features for a native app that sets it apart from regular website designs.

- Implementing smoothState.js allowed for using custom enter/exit CSS animations as a form of transitioning from page to page, which allowed gave the illusion that you were merely going from one screen to another in a native app rather than actually switching web pages. Some elements such as the menu bar remained fixed while the main page moves in and out. The direction was also important- tapping the search icon "pulls up" the search page while tapping the movie/show icons move the page side to side in a sort of infinite horizontal scroll.
- Following the rules of Lund's Maxims, when a user taps anything that would change a page or perform a possibly time-consuming action, such as searching or switching to detailed info page, a loading symbol is applied to the button or related buttons. For example, tapping the movie icon from the show page replaces the movie icon tapped with a loading symbol, which transitions to a shows icon once the page is finished loading/switching.
- To create a sense of efficiency for AJAX-controlled server-based actions, such as marking a movie as watched/unwatched by tapping the check icon, when tapped the icon changes state immediately instead of waiting for a server response, and changes back if the server returns an error (an alert is also performed, so the user knows the reason of the error).
- Adding/removing from lists uses the browser's native "Select" options, however normally these are a form element that requires form submission (such as with a "submit" button). But a regular, native app generally doesn't have an "apply" or "submit" button, they usually save the settings/changes instantly as the user performs the action. So we have a javascript event listener that detects any changes done to lists for movies, and applies them in the background, allowing the user to pull up the menu, change the lists and close the menu without any additional steps. Settings acts in a similar way, changes are "submitted" once the user taps any of the menu buttons to go elsewhere.
- Pulling up the list of custom/default lists to switch to is as simple as swiping right, which is a common touch-based action for mobile apps, particularly to pull up menus.

- Doing a long-press or “taphold” on a movie or show brings up the delete icon, which requires a confirmation before actually deleting it from the user’s list. The confirmation negates the need to implement an undo action
- Specifically on the movie/show info pages, scrolling was a particular effect that was meticulously designed to feel just right. You cannot scroll on the “opening page” (full-screen poster), you must swipe up for a quick automatic scroll down to the information, or press the arrow button. Once in the info section, you can freely scroll, but if you scroll up to the opening page, it will snap to the closest section start position (either the info section or the opening page). This creates the effect that it is a native app that restricts scrolling on certain areas/pages.
- Horizontal scrolling of cast/crew members and related movies/shows (or for a person, movies/shows they are known for) is also something rarely done for a regular website but feels natural for a mobile app. It is also more space efficient, as often there can be dozens or even hundreds of cast/crew members which would be quite annoying to scroll past if you are trying to reach the bottom of the page.

What Is Completed So Far

Unfortunately, the app is not ready for deployment. The features/implementations we have finished (including a good amount of debugging/edge-case testing) include:

- Movie/Show pages
- Ability to view/switch to default lists and custom lists
- Ability to create custom lists
- Ability to search for movies, shows and people
- Ability to add movies
- Ability to mark movies as watched/to-watch and add them to custom lists
- Complete information page for movies and people
    - Shows poster and fanart for movies
    - Shows title for movies/ name for people
    - Has ability to view more information by tapping the “i” button, which brings the user to iMDb or themoviedb.org (iMDb has priority if available)
    - Ability to mark movie as watched/to-watch or add movie if it is not added yet
    - Links to share the current page on facebook, twitter, google plus or via email
    - If a movie, link to check for theater ticket availabilty on Fandango.com
    - Movie information includes description, release date, runtime, genres, rating, list of cast and list of crew members
    - Person information includes birthday, death date, born location, biography and shows/movies most known for (either as cast or crew)
- Mostly functional settings page where the working functions include setting movie/show/search page view modes, default list views and sorting (for movies and shows only). Show sorting is not functional yet because shows cannot be added yet. You can also delete custom lists, and set default homepage between movies and shows, and deleting your account.

Privacy Policy

This privacy policy governs your use of the software application Tell-E ("Application") for mobile devices that was created by Hizal Celik. The Application is useful for tracking shows and movies, managing watch history and setting notification alerts for release dates of episodes and movies.

What information does the Application obtain and how is it used?

The Application stores information on a server, which includes (a) your settings and preferences, (b) your movies, shows, and watch history and (c) your lists. All of this information can only be accessible by you and is not shared with any third parties. In addition to this information, genres of movies and shows added by you are collected for advertisement purposes, but are handled anonymously and no information about movies or shows are collected aside from a list of genres.

User Provided Information

The Application obtains the information you provide when you download and register the Application. Registration with us is mandatory in order to be able to use the basic features of the Application.

When you register with us and use the Application, you generally provide (a) your name or username, email and password; (b) transaction-related information, such as when you make purchases, respond to any offers, or download or use applications from us; and (c) information you provide us when you contact us for help.

We may also use the information you provided us to contact you from time to time to provide you with important information, required notices and marketing promotions.

Automatically Collected Information and Advertisement

The Application does not collect information regarding third party sources used for features such as ticketing and theater information, services that use geo-location, or social media/email platforms for sharing. All information is handled outside of the app, by the parties, features or services themselves, either by the local OS or by third party companies on their websites.

In addition, the Application may collect certain information automatically, including, but not limited to, the type of mobile device you use, your mobile operating system, the type of mobile Internet browsers you use, and information about the way you use the Application. This information is used for debugging and improving the experience, design and functionality of the Application.

Does the Application collect precise real time location information of the device?

This Application does not collect information about the location of your mobile device.

Do third parties see and/or have access to information obtained by the Application?

The only information that is sent to third parties are the genres that you are most interested in, accumulated from your watch history. All information is anonymous and does not include actual show or movie information aside from genres. We will share your information with third parties only in the ways that are described in this privacy statement.

We may disclose User Provided and Automatically Collected Information:

- as required by law, such as to comply with a subpoena, or similar legal process;
- when we believe in good faith that disclosure is necessary to protect our rights, protect your safety or the safety of others, investigate fraud, or respond to a government request;
- with our trusted services providers who work on our behalf, do not have an independent use of the information we disclose to them, and have agreed to adhere to the rules set forth in this privacy statement.
- if Hizal Celik is involved in a merger, acquisition, or sale of all or a portion of its assets, you will be notified via email and/or a prominent notice on our Web site of any change in ownership or uses of this information, as well as any choices you may have regarding this information.

What are my opt-out rights?

You can stop all collection of information by the Application easily by deleting your account from the settings page and/or uninstalling the Application. You may use the standard uninstall processes as may be available as part of your mobile device or via the mobile application marketplace or network. You can delete all existing information on your account by deleting your account from the settings page.

Data Retention Policy, Managing Your Information

We will retain User Provided data for as long as you use the Application and for a reasonable time thereafter unless information is cleared by you as outlined above. We will retain Automatically Collected information for up to 24 months and thereafter may store it in aggregate. If you'd like us to delete User Provided Data that you have provided via the Application, please delete your account or contact us and we will respond in a reasonable time. Please note that some or all of the User Provided Data may be required in order for the Application to function properly while your account is still active.

Children

We do not use the Application to knowingly solicit data from or market to children under the age of 13. If a parent or guardian becomes aware that his or her child has provided us with information without their consent, he or she should contact us. We will delete such information from our files within a reasonable time.

Security

We are concerned about safeguarding the confidentiality of your information. We provide physical, electronic, and procedural safeguards to protect information we process and maintain. For example, we limit access to this information to authorized employees and contractors who need to know that information in order to operate, develop or improve our Application. Please be aware that, although we endeavor provide reasonable security for information we process and maintain, no security system can prevent all potential security breaches.

Changes

This Privacy Policy may be updated from time to time for any reason. We will notify you of any changes to our Privacy Policy by updating the current Privacy Policy on this page and informing you via email. You are advised to consult this Privacy Policy regularly for any changes, as continued use is deemed approval of all changes.

Your Consent

By using the Application, you are consenting to our processing of your information as set forth in this Privacy Policy now and as amended by us. "Processing," means using cookies on a computer/handheld device or using or touching information in any way, including, but not limited to, collecting, storing, deleting, using, combining and disclosing information, all of which activities will take place in the United States. If you reside outside the United States your information will be transferred, processed and stored there under United States privacy standards.

Future Plans

For the app to be ready for deployment, the main features that still need to be implemented includes ability to add shows, marking episodes as watched, smart lists, a functional email-based reminder system (Heroku is giving issues with scheduled coding and requires a credit card) and code to check for updated information for movies and shows in the database (this checks for changed images, updated episodes or release dates, etc). Smaller tasks include adding related movies/shows to the info page, implementing advertisements, including a “where can i view this?” section for movies/shows (uses canistreamit.com) and creating an episode info page, implementing a back button so users don’t have to use browser back buttons, and finishing settings features (such as changing email/nickname).

Usability Testing

I performed 5 usability tests with 5 different subjects. I gave them a list of tasks to perform and had them tell me what they were doing, what they thought and how to improve the app. Some of the tasks they had to perform were adding movies, finding certain information about movies, adding/using custom lists and sharing information on social media. These are some of the feedback/suggestions I received:

- Highlight selected movies in grid view (hard to tell the fewer the movies there are)
- Give some sort of feedback when a movie has been added (more than just the icon being filled with color)
- Add auto-suggestions while typing in search bar, and movie suggestions if a search query was made that had no results
- Make list-add button clearer
- Make settings icon more like a settings icon and less like a pirateship steering wheel
- The app is severely laggy/glitchy on the only Android test, which was on a Samsung Note 4 using Google Chrome. Issues included inability to view popup list management menu and very laggy animations/experience
- Implement a swipe-to-go-back feature that acts like a browser
- Sometimes searching hangs and requires researching same query
- Possibly add a tutorial page or add more to “no movies” page to learn how to search for movies (there is currently a little thing on “no movies” page that teaches the user how to swipe to view lists, but now they want one for searching for movies)

Some things we noticed during tests were that almost everyone, upon registering, read the how-to-swipe blurb and immediately started swiping to test that feature out. So adding a how-to-search blurb will also help get people started right away. Otherwise many users liked the animated feel of the site and thoroughly enjoyed discovering new movies especially when looking through the “known for” section for actors. Specifically, one of our tasks was to view the movies and shows Mark Hamill was in, and everyone was quite surprised and entertained while looking through his large list of works.