

# ***Video Categorizer with AI*** **Case Study**

*Kira Hartlage*

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# Introduction

*Setting the stage*

1. Overview
2. Problem Definition
3. Users & Audience
4. Roles & Responsibilities
5. Scope & Constraints

# Overview

*Create an internal tool that allows a major TV network to tag and categorize their content.*

# Problem Definition

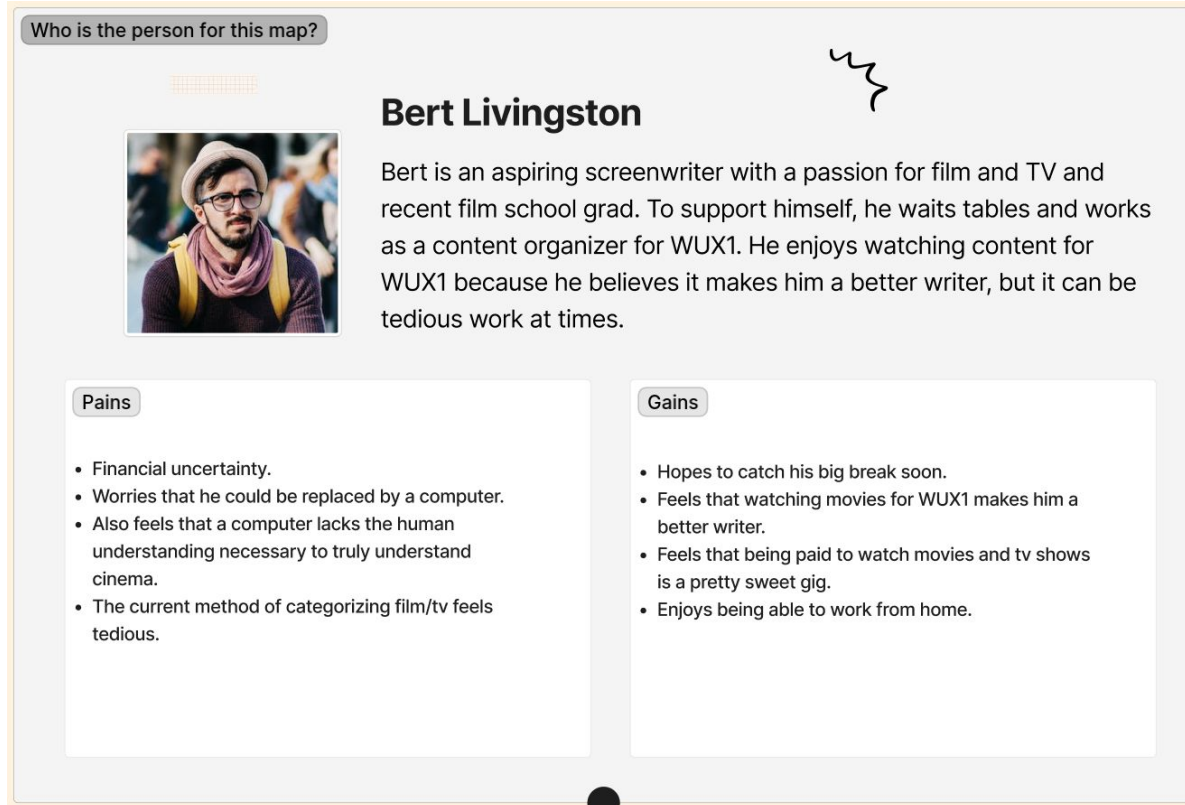
*WUX1, a national major TV network is struggling to get its digital platform off the ground. Currently, it has an app in the works, but it has so much content that it's hard to categorize.*

*Instead of spending 3 billion dollars to hire 50 workers dedicated to watching content and categorizing it, they want your team of UX experts to leverage AI to help them save some cash.*

# Users & Audience

- *Users*
  - *WUX1 employees*
  - *Freelance or contract employees*
- *Audience*
  - *WUX1 employees will use the tool*
  - *Viewers of WUX1 videos will benefit from the tool*

# Users - Empathy Mapping



# Bert Livingston

## Sees

What do they see around them? In the market? In the media?

Success stories of other directors and screenwriters his age.

Richard Oden

Only positive news from friends on social media. (no one shares their struggles, so it appears everyone is doing better than him.)

Richard Oden

News about an economic downswing and raising costs

Kira Hartlage

Increase in streaming services, cable packages, satellite, etc.

Kira Hartlage

Add text

Add text

## Hears

What are they hearing from others?

From his family, "When are you going to get a real job?"

Richard Oden

Hears that upper management is talking about using machine learning to improve their content organization.

Richard Oden

From friends, "Your job is too easy. How can they pay you to just watch videos?"

Kira Hartlage



# Bert Livingston

## Says & does

What do we imagine them seeing and doing?  
What is their current behavior?

Sitting in bed, wearing pajamas on a weekday morning, watching another copy of Law & Order SVU while making notes in an excel spreadsheet.

Richard Oden

Budgeting

Kira Hartlage

Going out with friends and comparing how far they've made it into the industry (or not)

Kira Hartlage

## Thinks & feels

What other things might they be feeling?

Feels like he's learning from the content he's watching.

Richard Oden

Worries he could be replaced by a machine.

Richard Oden

Thinks about how he can incorporate ideas from the content he watches into his own writing.

Richard Oden

# Users - Empathy Mapping

Who is the person for this map?



## Susan Fischer



Susan is in charge of the content organization effort at WUX1. Under pressure from higher ups to reduce costs and increase output, she wants to leverage ML to improve their productivity. As WUX1 is a pretty small company, she's forced to wear many hats. She needs to be able to quickly and easily assess how the project is going.

### Pains

- Super busy and stressed out
- Not that knowledgeable of ML.

### Gains

- Enjoys the diverse challenges of her job.
- Hopes that by achieving what's being requested by upper management, she'll be looked upon favorably come bonuses.

**Susan Fischer**

# Susan Fischer

## Thinks & feels

What other things might they be feeling?

Pressure to keep cost  
down, profits up

Brittany Bell

Confused about the  
technology options.

Kira Hartlage

Overwhelmed by the  
many available ML options  
that she could leverage.

Kira Hartlage

Imposter syndrome.  
Worried someone will find  
out she doesn't  
understand ML, especially  
when talking to ML  
services sales people.

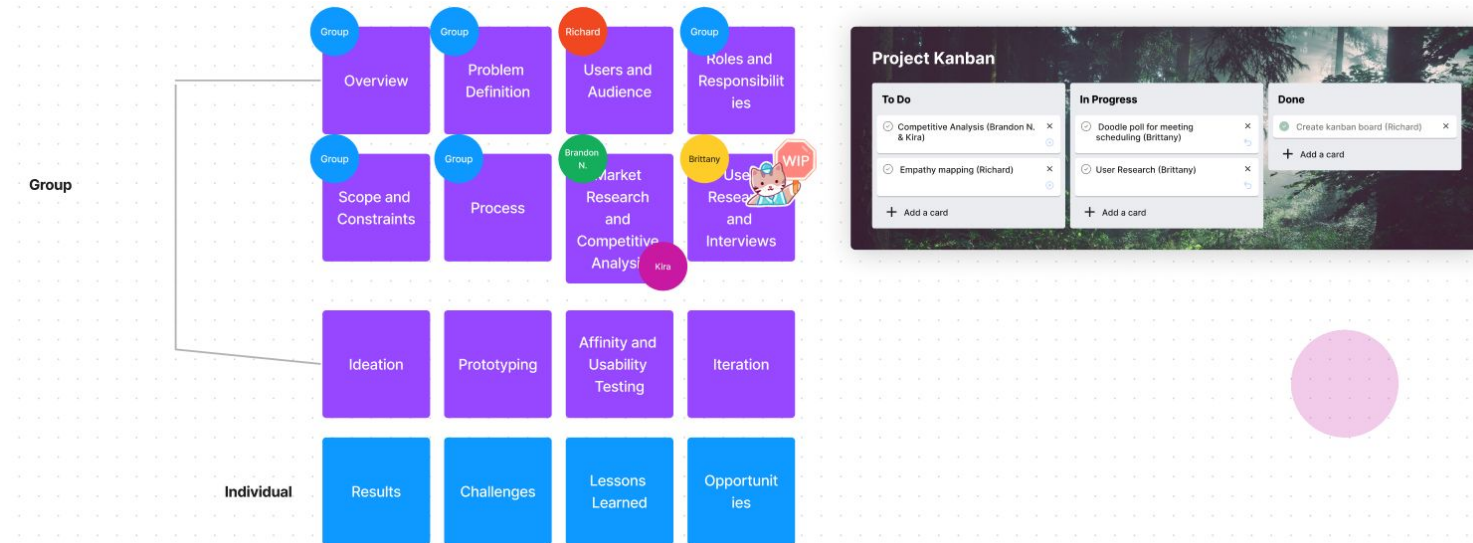
Kira Hartlage

Add text

Add text

# Roles & Responsibilities

- *Richard Oden took the lead of team meetings and user empathy mapping.*
- *Brittany Bell took the lead for user research.*
- *Brandon Norton researched how streaming services solve this problem of video categorization.*
- *I researched competitors in the AI tools and services space - focusing on image and video recognition.*
- *Together, we brainstormed ideas and ideated based on our research findings.*



# Scope & Constraints

- *Since we are working for fictional company, there are no internal users to interview or observe.*
  - *We interviewed people we know instead.*
- *We were given limited time to work on the project.*
  - *We were not assigned the project until 4 weeks before the end of class.*
- *We're amateurs at UX.*
- *Scheduling issues*
  - *Team members in different time zones.*
- *Problem statement includes a use of AI that we could not find evidence that it exists or is possible.*

# Process

What happened, and why

1. Market Research & Competitive Analysis
2. User Research & Interviews
3. Ideation
4. Prototyping
5. Affinity & Usability Testing
6. Iteration

# Market Research & Competitive Analysis

- *Who else has this problem?*
  - *Other TV networks with apps*
  - *Streaming services*
    - *Netflix, Hulu, Disney+, ESPN+, Prime Video, YouTube TV, Apple TV*
- *What other solutions are out there?*
  - *Paying people to watch videos and fill out Excel sheets with details, categories*
- *Who is using them?*
  - *TV critics*
  - *Employees*
  - *Regular people?*
- *How are they performing?*
  - *Netflix and microcategories!*
- *What are their flaws?*
  - *Takes manual effort of watching videos in real-time which is expensive and requires a lot of people*
- *Where are the opportunities for this solution?*
  - *Speeding up the categorization by not requiring individual people to watch them*
  - *Improve AI categorization by using human feedback*

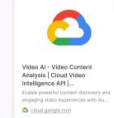


# Competitive Analysis

## Competitive Analysis

### Competitors

(AI Tools for Images and/or Video)



## SWOT Analysis

| Company/ Brand        | Strengths  | Weaknesses   | Opportunities   | Threats  |
|-----------------------|--|--|---|--|
| Superb AI             | <ul style="list-style-type: none"> <li>able to automate labeling at scale</li> <li>offers support when you need help</li> <li>manages data, models, and labelling (one complete package)</li> <li>they can create a custom solution for you</li> </ul>   | <ul style="list-style-type: none"> <li>can identify images within a video but I don't think it can categorize an entire video</li> <li>would probably need to pay at the enterprise level</li> </ul> | <ul style="list-style-type: none"> <li>be able to identify a category based on all of the images identified from within a video?</li> <li>doesn't work with audio</li> </ul>  | <ul style="list-style-type: none"> <li>human support would be nice, by creating an internal tool there's nowhere to turn for more expert help</li> </ul> |
| dotData               | <ul style="list-style-type: none"> <li>offers AI automation services</li> <li>used in existing industries</li> <li>goal is to make easy to use tools</li> </ul>  | <ul style="list-style-type: none"> <li>doesn't look like they've worked with media companies before</li> </ul>   | <ul style="list-style-type: none"> <li>can expand to more markets and industries as they focus on making easy to use generic AI tools</li> </ul>  |  |
| Google Cloud Video AI | <ul style="list-style-type: none"> <li>used by CBS interactive to generate video metadata</li> <li>has pre-trained ML models that recognize images in streaming videos</li> <li>"Gain insights from video in near real time using streaming video annotation and trigger events based on objects detected."</li> </ul> | <ul style="list-style-type: none"> <li>looks like mostly DIY with their tools, I don't know how much support they offer (there are training guides)</li> </ul>                                       | <ul style="list-style-type: none"> <li>they store the video while analyzing it?</li> <li>sounds costly</li> </ul>   | <ul style="list-style-type: none"> <li>this seems the closest to actual AI implementation that can generate information based on a video</li> </ul>      |
| Amazon Rekognition    | <ul style="list-style-type: none"> <li>can scale based on number of videos analyzed</li> <li>mentions they can analyze videos</li> <li>has some models available so you don't have to start from scratch</li> <li>can detect labels of objects and actions in an image</li> </ul>                                      | <ul style="list-style-type: none"> <li>not sure if it can categorize a video</li> </ul>  | <ul style="list-style-type: none"> <li>be able to identify a category based on all of the images identified from within a video?</li> </ul>   | <ul style="list-style-type: none"> <li>it can scale with the number of videos that we need analyzed</li> </ul>   |
| Azure Computer Vision | <ul style="list-style-type: none"> <li>can analyze videos in real time</li> <li>doesn't store the videos (deletes when finished)</li> </ul>  | <ul style="list-style-type: none"> <li>doesn't train on our data to enhance the underlying model</li> </ul>  | <ul style="list-style-type: none"> <li>"Pull from a rich ontology of more than 10,000 concepts and objects to generate value from your visual assets." 10,000 doesn't sound like enough</li> <li>if we used our own AI model, we could train and improve on it over time with our own data</li> </ul> |  |

# User Research & Interviews

## Research Goals



1. Understanding how the genre tags play into selecting what to watch on streaming services
2. Determine how accurate the classifications are
3. Are there any negatives to the genre tags (boxed in, overwhelmed with options, too specific, endless scrolling etc.)
4. Have they found the classifications to be accurate?

## Understanding genre recommendations and classifications on streaming platforms

RESEARCHER: BRITTANY BELL

### Summary

Understanding how genres influence what shows and movies we watch on streaming services

### Questions

- Q1.** Can you describe how you use your streaming platforms in your home?
- Q2.** What factors have the most influence on what you select to watch.
- Q3.** Have you ever noticed the genre tags on shows or movies on your streaming service? Did they influence what you chose to watch?
- Q4.** Do you find the genre tags to be accurate, why or why not?
- Q5.** What are the positives of having genre tags for digital content? What are the negatives?
- Q6.** If you could change one thing about how content is organized on streaming services, what would it be and why?
- Q7.** How do you think genres are applied to media on streaming services?



## TV Lover Alex

Married | American

Age: **32**  
Education: **M.Eng in Biomedical Engineering**  
Status: **Married**  
Occupation: **Engineering Management**  
Location: **Japan**  
Streaming platforms: **Netflix, Hulu, Amazon Prime, YouTube Premium, Spotify Premium**

### Background

Alex is from TN, but lived in KY for many years. Currently lives in Japan for work.

His hobbies: watching TV (Netflix and YouTube), video games, traveling with his wife, collecting KPOP albums

He mainly watches: video gamer streams, YouTube creators (Safiya Nygaard, Abroad in Japan), Netflix series (Stranger Things)

### Q1

"I mostly use a smart TV in my living room and my cell phone/iPad to watch digital content. I watch stuff at night for entertainment or during the day for background noise while working or doing tasks around the house."

### Q5

"Positives - if they were searchable, it would help filter down exactly what I am looking for."

"Negatives - If they tag turns off a viewer, when it's not super accurate, they could miss out on something they would have liked. Or the tag could be focused on only the major aspects, missing some nuance. No additional description of how applicable the tag is (what percent it matches)... which would be interesting and allow me to easily pick the perfect thing to watch."

### Q2

"Subject matter is the first and most important. I look for something different when watching with my wife. I mostly go for comedies. I will stop at something I've seen before that has a different picture, it catches my attention. If I see a general category that is what I'm in the mood for, I will stop and browse for a bit."

### Q6

"I think I would want whole categories able to be removed or minimized, so when scrolling if I see a category I'm not interested in, I could remove it from the view. It would make browsing easier. It would also improve the recommendations I get from the service. I wish I could turn off autoplay... I hate it so much because I can't read about the show without it starting to play."

### Q3

"I've noticed them before, but they don't really influence what I pick to watch. I will use general categories, like "drama", to filter and browse."

### Q7

"Input of the creator of the media, like YouTube where the creator picks the tags. I don't know if there is an algorithm for any of this. A survey for viewers to assign tags after watching content would be cool but I don't know how much people would participate. Maybe if they give a discount for participation? I would do that."

### Q4

"Yes, because they are very specific. I think they are accurate because they try to force a certain number of tags onto content. Sometimes it seems like they are making up new ones, and they are super weird and specific."

## Insights

### Obstacles

- How do you account for personal taste?
- My interests change some times... I need my content to reflect that.
- Make genres "filterable" that would be so helpful!

### Neutral

- I'm always going to be overwhelmed with options, no matter what the genres are or how I can navigate through them. I like options but it can be a lot!

### Positive aspects

- Genre tags let me easily find things I might like but never thought about watching before.

## Feelings

### Negative

Frustrated

Critical

### Positive

Excited

Fascinated

Pensive

Stimulated



## Busy Mom Heather

Mom raising 1 boy | American

Age: **31**  
Education: **BA in English**  
Status: **Married**  
Occupation: **Human Resources**  
Location: **Kentucky**  
Children: **1 boy (7 years)**  
Streaming platforms: **Netflix, Disney+, Paramount+**

Heather is from KY and has lived there her entire life.

Her hobbies: reading and reviewing books, watching TV, hiking, attending concerts and thrifting.

She mainly watches: reality competition shows and comedies. She uses Netflix, Disney+ and Paramount+ for streaming.

Lives with her husband and son. They watch some content together but she also watches some alone.

### Q1

"I watch things in the evening in the living room or for background noise. I like watching things before bed on my phone, too."

### Q5

"Positive - gives you a quick idea of what it's about without having to read a long synopsis"

"Negative - can't think of any."

### Q2

"Time restraints and what I feel like watching at that time plays the biggest roles in what I pick. Seeing a familiar actor or actress would also grab my attention."

### Q6

"Disney+ organization is difficult to use and it's hard to find what you are looking for. It's not broken up into definable genres, maybe because they don't have as many. It doesn't specify into categories like "sci-fi" or anything like that. It has minimal filtering that isn't great or easy to find. You have to continually scroll to find anything."

### Q3

"Yes, they influence what I pick a lot! Certain genres, like romantic comedies, immediately grab my attention."

### Q7

"Content reviewers probably watch the content and tag it. Or maybe they use reference services like IMDB."

### Q4

"They've always seemed accurate to me."

## Insights

### Obstacles

- Not all streaming services use tags efficiently

### Neutral

- I wish I could filter based on the tags

### Positive aspects

- I can quickly find a movie to watch based on the tags

## Feelings

### Negative

Bashful

### Positive

Worthwhile









Satisfied

Aware

Thoughtful

# Ideation

## Brainwriting session as a group:

|   |   |  |   |
|---|---|--|---|
| Richard   | Kira  | BBell  | Brandon N   |
| Taggers should feel that they are valued for their cinema knowledge.  | Gamify tagger's input<br>  | Balance between objective and subjective   | There needs to be a way for tags to be manually added or removed<br> |
| Richard Oden  | Kira Hartlage   | Brittany Bell  | Brandon Norton  |
| Taggers should feel like the machine is aiding them, rather than replacing them.                                | Separate workflow for loading training data   | Sometimes genres get annoyingly in the weeds... I don't find it useful, only funny<br>   |   |
| Richard Oden  | Kira Hartlage   | Brittany Bell  |   |
| Managers should be able to quickly and easily view reports, see progress.                                       | Tagger should be able to recategorize videos whenever they disagree with the AI's decision and/or be able to see the ones with low confidence and help the model out by recategorizing<br> | Tagging system needs to balance speed and accuracy<br>  |   |
| Richard Oden  | Kira Hartlage   | Brittany Bell  |   |
| It should be easy to distinguish between AI and manually done work in the UI.                                   | Process for categorizing new videos should be fast and require little human interaction   | How long is a good amount of time to watch something to get an idea of what the genre is? Can you be misled? Can a user add more time to watch the clip if they can't come up with a genre?<br> |   |
| Richard Oden  | Kira Hartlage   | Brittany Bell  |   |
| To train model, we could start with a larger amount of temp workers, then taper down as we gain more knowledge. | Tool could send alerts if it's having a really tough time and needs tagger intervention<br>  | Skip pattern or decision tree? If you pick comedy, it wouldn't give an option for war epic?<br>   |   |
| Richard Oden  | Kira Hartlage   | Brittany Bell  |   |



Alternatively, we could try obtain a dataset of TV shows along with their genres, and train the model from that in the beginning.

Richard Oden



Have the (consumer) person watching the video answer questions after viewing the video to help the AI model

Kira Hartlage



Role to review others tags/AI assigned tags

Brittany Bell

Only categorize the most watched videos to save \$/time

Kira Hartlage

Typically, the user should only be shown things that the machine was not that confident about. The user's decisions in these cases would be used to train the model.

Richard Oden

Be able to add new categories

Kira Hartlage



Way to add an explanation/tag as to what led to the classification? Such as... explosion = action?

Brittany Bell

Team up with a streaming service to use what they use

Kira Hartlage

Taggers are typically not full-time and are not paid a whole lot, so they should feel gratified by their work.

Richard Oden

Tool could create a summary report of how confident it is overall and a breakdown of # of videos in each category

Kira Hartlage

Pop-up for consumers to rate accuracy of genre tags after watching the entire video

Brittany Bell

What if a video fits more than 1 category?

Kira Hartlage






# Lo-fi wireframe design iterations created individually and reviewed as a group

**WIP**

Video on the left taking up most of the screen, added navigation to move between videos, notepad at the bottom to add notes. Progress bar to show how many videos they have completed. Right column is where you would select the categories. Added the money to gameify the activity.

Brittany Bell

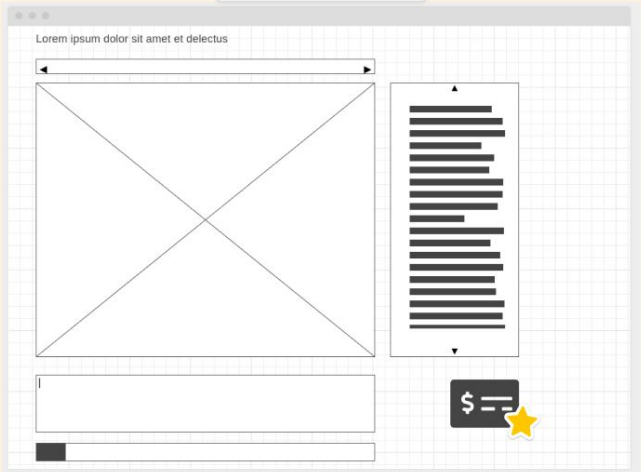


Wireframe.cc | The go-to wireframing tool.

A powerful, intuitive app for creating and sharing wireframes.

wireframe.cc

Lorem ipsum dolor sit amet et delectus




A wireframe of a video player interface on a grid background. It features a large video area with a diagonal cross, a progress bar at the top, a list of categories on the right, and a bottom section with a text input and a button labeled with a dollar sign and an equals sign.

draw.io

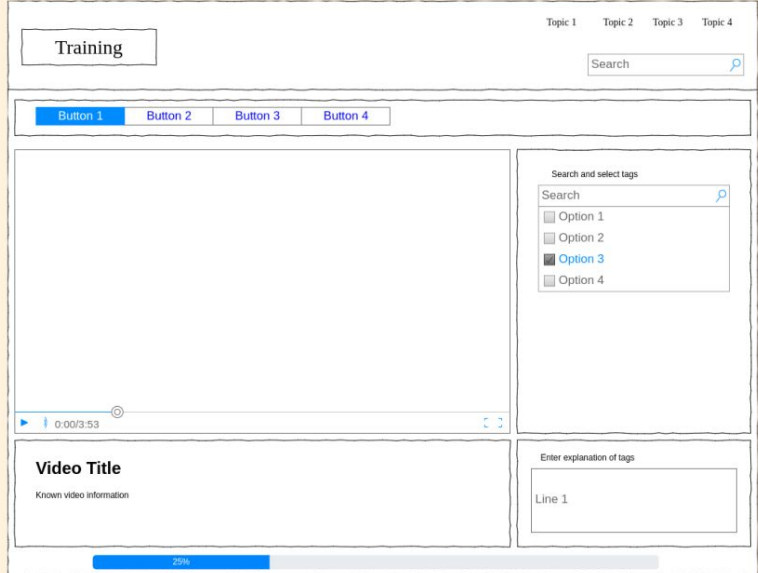
Video and progress bar again. You can search and select as many categories as you want.

Brittany Bell

Training model



Brittany Bell



A wireframe of a 'Training' interface. It includes a title bar, a search bar, a row of four buttons (Button 1 to Button 4), a large video area with a progress bar, a 'Video Title' section, and a sidebar with 'Search and select tags' and 'Enter explanation of tags' sections.

Model predictions



Brittany Bell

The icon symbols are especially good. Summary table page.

Brittany Bell



"Theater Mode"

What the employee might see as they review and classify content.

Maybe mobile layout?

Brittany Bell

Model Results

Topic 1Topic 2Topic 3Topic 4

Search

Search

| Video  | Tag Method | Tags         | Updated              | Job #       | Status      | Confidence  | Modify      |
|--------|------------|--------------|----------------------|-------------|-------------|-------------|-------------|
| name 1 | model      | tag 1, tag 2 | 10 minutes ago #C301 | In Progress | <div></div> | <div></div> | <div></div> |
| name 2 | human      |              | 15 minutes ago #C350 | In Progress | <div></div> | <div></div> | <div></div> |
| name 3 |            |              | 5 minutes ago #C312  | Complete    | <div></div> | <div></div> | <div></div> |
| name 4 |            |              | 15 minutes ago #C347 | Complete    | <div></div> | <div></div> | <div></div> |
| name 5 |            |              | 19 minutes ago #C344 | Complete    | <div></div> | <div></div> | <div></div> |

Summary

Table

|   |         |
|---|---------|
| 1 | Value 1 |
| 2 | Value 2 |
| 3 | Value 3 |

←

Scroll through results

▶

Choose categories ▼

Submit

→

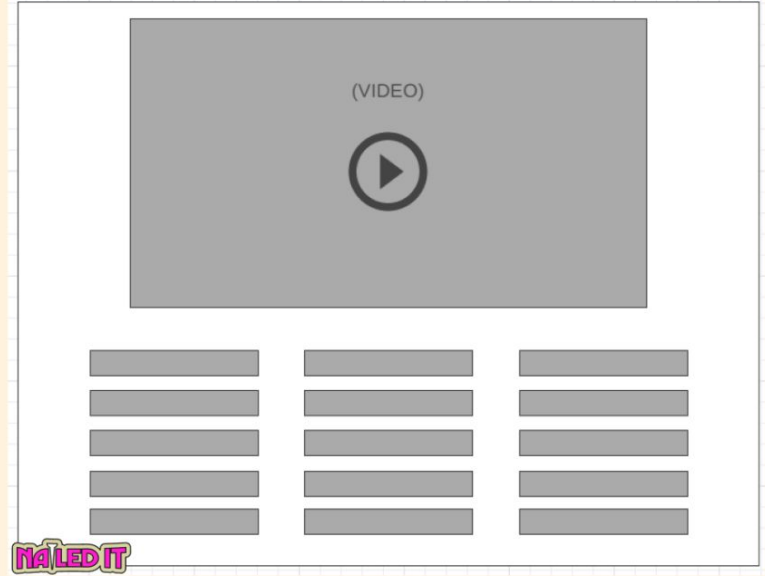
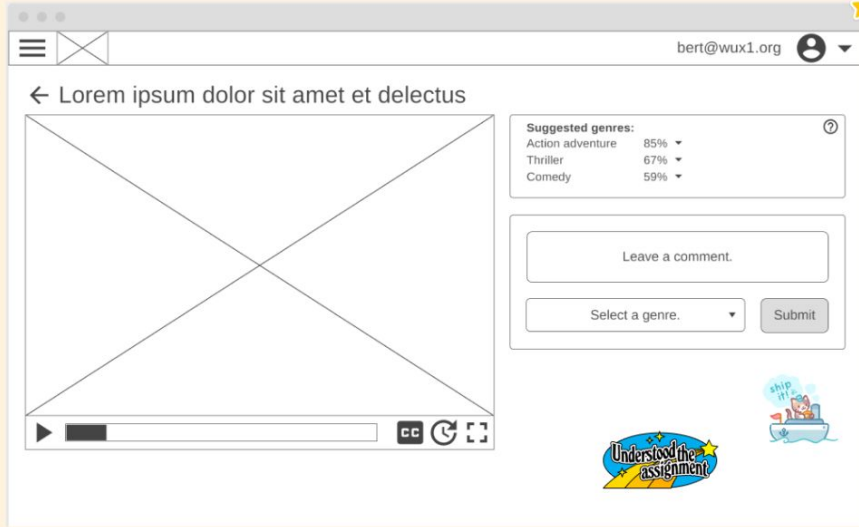
Inspired by video streaming services. Made the video smaller because it's less important. Progress bar and CC added.

Suggested genres box with confidence, drop down box would explain how the model identified that.

Leave a comment and select a genre boxes. The submit button should auto load the next video. The back button would take you to a list of the videos you need to review.

Maybe adding selecting multiple genres on the drop down?

Brilliant! Well



### Features we loved:

- Video taking up most of the screen
- Having a full-screen video mode (mobile layout?) and a smaller video model
- CC and speed controls for videos
- Progress bar to show how many videos have been tagged
- Be able to navigate from video to video
- Be able to navigate back to list of videos
- Gamification - showing points or \$ that represent videos tagged
- Search for videos
- Search for tags when selecting them
- Select as many tags as you want to
- Separate screens for tagging a video vs. seeing summary of all videos and their tags
- Icon symbols to represent ML tag confidence levels
- Include explanation on why ML chose the tags it did
- Have space for the tagger to leave notes
- Include current login info on top right

### Features we need to address or add:

- Show suggested tags next to video while tagger is watching (could this introduce bias?)
- Auto-load next video when a video is tagged (is that a clear process flow?)
- Use a multi-select drop down (is it obvious that you can select multiple tags?)
- Show all tags on one page under the video (depends if there are too many tags or not, otherwise it might take up too much space; also might be hard to find the tag you're looking for)

# Prototyping

- *How did you approach making your prototype?*
- *Did you make wireframes or sketches?*
- *What were the requirements for the prototype?*
- *What challenges did you face while making it?*

*Add photos and screenshots of your prototype*

# Affinity & Usability Testing

- *How did testing your prototype go?*
- *Where were the pain points?*
- *What was successful?*
- *What did you learn?*



*Add photos and screenshots of your affinity or usability testing*

# Iteration

- *What did you change?*
- *How did you approach making changes?*
- *Why did you change those things?*
- *What were the results of changing them?*

*Add photos and screenshots that show how your solution has changed in response to research insights*

# Conclusion

Where things ended

1. Results
2. Challenges
3. Lessons Learned
4. Opportunities

# Results

- *What were the ultimate results of your solution?*
- *Was it successful? Did it fail?*
- *Why?*
- *Remember - it's okay to create a solution that fails.*
- *What's important is what you learned.*

# Challenges

- *What challenges did you face while creating and testing this solution?*
- *What part was hardest?*
- *How did you overcome it?*

# Lessons Learned

- *What did you learn?*
- *What takeaways would you share with others?*
- *What will you apply in the future?*

# Opportunities

- *What opportunities are still left in this solution?*
- *What would you do differently, if given the chance?*
- *If you were moving forward with another iteration, what direction would you take?*



# Q&A

# Research Links

<https://www.theatlantic.com/technology/archive/2014/01/how-netflix-reverse-engineered-hollywood/282679/>

<https://help.netflix.com/en/node/100639#:~:text=We%20estimate%20the%20likelihood%20that,preferences%20on%20our%20service%2C%20and>

<https://www.latimes.com/entertainment/movies/la-xpm-2012-sep-03-la-fi-0903-ct-netflix-taggers-20120903-story.html>

<https://uxstudioteam.com/ux-blog/ai-ux/>

<https://towardsdatascience.com/introduction-to-video-classification-6c6acbc57356>

# FigJam

<https://www.figma.com/file/N1K5yed46fnPfjYKpYFROP/Brainstorming?node-id=0%3A1>