Introduction:

https://www.overleaf.com/project/66f6ccfe5b688b10e7e2ce39
^^^ Link to actual report document

- ~~Context~~
- ~~State the problem~~
- ~~Objective~~
- ~~Justification~~
    - https://www.statista.com/statistics/643099/physical-collectible-card-game-users-worldwide/
        - How many active users there are for physical card games
    - https://steamdb.info/charts/?tagid=1666
        - How many active users there are for virtual card games on steam
    - https://www.quora.com/What-is-the-appeal-of-playing-with-physical-cards-as-opposed-to-digital-cards
        - Question about feel of cards
        - ^ maybe use this, maybe

Background Review:

- What keywords did you use for your search and why?
    - **Leo**
        - Card game
        - Virtual reality
        - Immersion
        - Interest
        - Controller naturalness
    - **Andrew**
        - Tactile feeling
        - Card game immersion
        - Augmented reality
        - Tactile card game
- How many results did you find, how many did you discarded (briefly explain why some documents were excluded), and why you selected the ones being analyzed.
    - **Leo**
        - 6 results
        - Discarded 4 results because the abstract shown is going in a different direction than what I anticipated for this paper. For example, one of the discarded paper is aiming to find the influence of immersion on mobile games, we anticipated immersion with game controller and influence on

mobile game would be in a different direction then our main research purpose

- **Andrew**
  - 10 results
  - Discarded 4 because they were too vague to use, too similar to other resources, or they seemed like they would be good to use but upon further reading they went in a different direction than anticipated.

- **What is the problem the resource is trying to address and who benefits from it?**
- **How is the resource addressing the problem? This refers to the methods, instruments, and approaches used. *Focus on short descriptions.***
- **What was done to address the problem and how was it tested?**

- What were the results and what is your takeaway?
- What did you learn?

Results:

- ~~Task analysis:~~
  - Leo Use Case Before:
    - **Use Case 1:**
      - Playing a virtual card game
    - **Actor:** Player
    - **Basic Flow:**
      - Prepare a deck list
      - Start an online game
      - Draw a starting hand
      - Proceed game phases through touch screen/mouse
        - Standby phase
          - Move cursor to phase and click next phase
          - Confirm going to next phase
        - Main phase
          - Move cursor to phase and click next phase
          - Confirm going to next phase
        - Battle phase
          - Proceed battles between cards
          - Do damage calculation
          - Repeat previous 2 step until satisfied or out of attacks
          - Move cursor to phase and click next phase
          - Confirm going to next phase
        - Main phase

            - Move cursor to phase and click next phase
            - Confirm going to next phase
        - End phase
            - Move cursor to phase and click pass turn
            - Confirm going to pass turn
        -

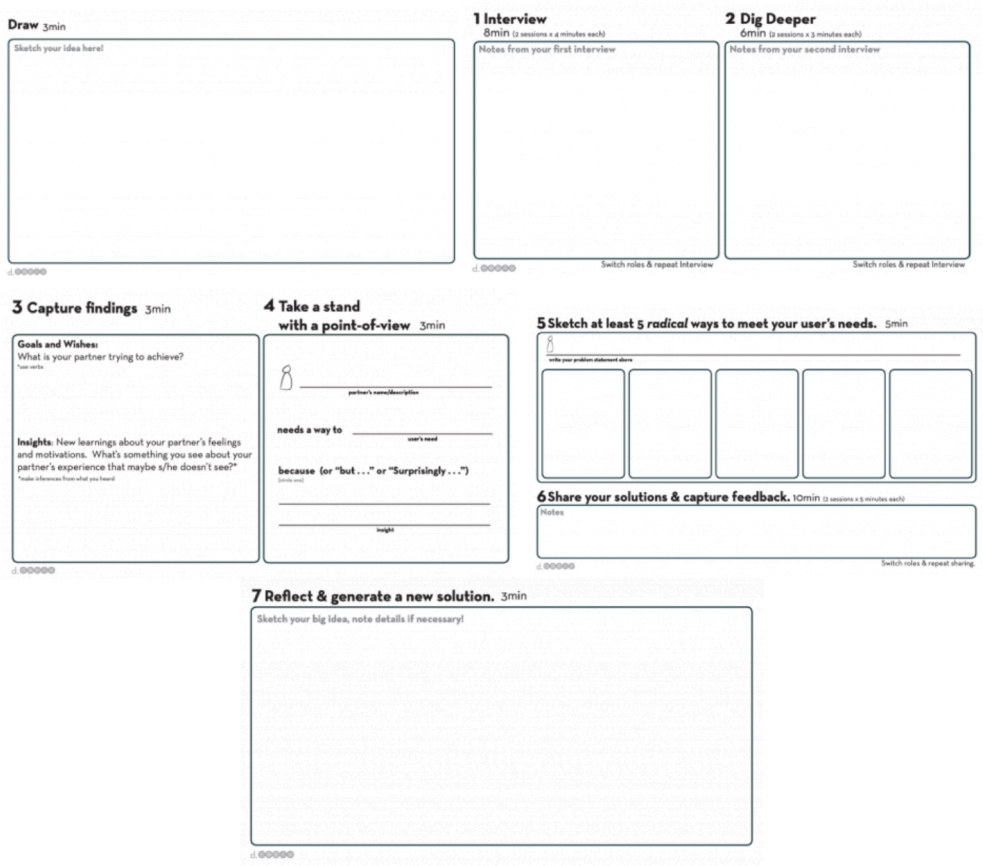
- Leo Use Case After:
    - **Use Case 1:**
        - Play virtual card game with our controller
    - **Actor:** Player
    - **Basic Flow:**
        - Prepare a deck list
        - Start an online game
        - Draw a starting hand
        - Proceed game phases through touch screen/mouse
            - Standby phase
                - Press next phase button
            - Main phase
                - Press next phase button
            - Battle phase
                - Proceed battles between cards
                - Do damage calculation
                - Repeat previous 2 step until satisfied or out of attacks
                    - Press next phase button
            - Main phase
                - Press next phase button
            - End phase
                - Press end phase button
        - Confirm going to pass turn

- Andrew Use Case Before;
    - **Use Case 1:** Get the same feeling of playing a physical card game in a virtual environment
    - **Actor:** Player
    - **Basic flow:**
        - Prepare a deck list
        - Set up a camera to capture your physical play area
        - Join the virtual environment that allows players to see each other's areas and cards

        - Proceed with game phases physically while monitoring other players camera feeds
            - Standby phase
                - Agree to move onto the next phase
            - Main phase
                - Physically interact with your cards if you need to
                - Agree to move onto the next phase
            - Battle phase
                - Battle with cards
                - Physically place down your cards
                - Physically remove any cards that need to be removed
                - Do damage calculations
            - Main phase
                - Physically interact with your cards if you need to
                - Agree to move onto the next phase
            - End phase
                - Show that you are going to pass your turn

- Use case after:
    - **Use case 1:** Get the same tactile feel of placing physical cards down that you would get in a physical card game while playing an online card game
    - **Actor:** Player
    - **Basic Flow:**
        - Set up controller and physical play area
        - Prepare a virtual deck list
        - Proceed with game phases virtually while interacting with the controller
            - Standby phase
                - Agree to move onto the next phase
            - Main phase
                - Use controller to interact with what you need to interact with
                - Agree to move onto the next phase
            - Battle phase
                - Battle with cards
                - Use controller to select move, use button to select options, and use pedestal to place cards
                - Remove card from pedestal, use controller buttons to remove any cards you need to from game
                - Do damage calculations
            - Main phase

        - Use controller buttons to interact with game and place cards if needed
        - Select option to move to next phase
    - End phase
        - Pass your turn
- Design Thinking Outcome
    - https://www.teachingentrepreneurship.org/design-thinking-101/
    - Interviews:
    - Leo
        - https://docs.google.com/document/d/13yKF8G65xqmV5Ab8TWLjNpR3luZEYq1YMGYRYlifN8g/edit?usp=sharing
        -
    - Andrew
        - https://docs.google.com/document/d/1twu_CfNT9n01nZC_wjbr_ceza-awzuQ3i0nJ5rLjHVs/edit?usp=sharing
        -



Leo:

Rory McGloin,Kirstie Farrar &Marina Krcmar paper titled *Video Games, Immersion, and Cognitive Aggression: Does the Controller Matter?* and *Kevin D. Williams' paper* titled *The effects of dissociation, game controllers, and 3D versus 2D on presence and enjoyment* addressed the problem, does realism of game controllers increase player's immersion and enjoyment of the game? The two scientific papers discover how immersion of a controller brings higher cognition Players within the card game community and researcher would benefit from this as it provides ideas and reasons in making stronger realism in controllers.

Besides just focusing on controller realism, card game companies like Konami have different approaches like add in as many features a real life yugioh card game would have into the game as possible. One of their digital card games, Yu-Gi-Oh! Master Duel contains zone placements that is relatively the same as the in person card game organizations. For example as shown on the Yu-Gi-Oh! Master Duel tutorial section, the field contains main deck, graveyard, and banishment is on the right side and extra deck is on the left(Yu-Gi-Oh!, tutorial). Another approach Konami took is to introduce the game into virtual reality, which virtual reality itself has been known for the immersive gameplay experience. Within VR, the first thing being noticed is how the game simulates the draw action and it would be great to have a draw slider on our controllers(Rhymestyle). Placing buttons or controls on familiar spots like in real life would give a better immersion experience to users.

Both papers address the problem through comparing results of participants under different conditions. *Rory McGloin,Kirstie Farrar &Marina Krcmar* paper compare players' cognition of the game through four different conditions, a combination between high/low realism and high/low controller naturalness(Rory, Methods), and the result shows a higher realistic controller creates greater immersion for the player(Rory, Results). *Kevin D. Williams'* paper compares the enjoyment of the game through different types of controller, like steering wheels vs normal controllers(Williams, Method), and the results indicate that participants would have a higher enjoyment with steering wheels in a racing game compared to normal controllers(Williams, Results). The takeaway is that in order for users to enjoy the game more, a controller with higher realism and providing an immersive experience is an excellent approach.

2 scientific papers:
https://www-tandfonline-com.uproxy.library.dc-uoit.ca/doi/full/10.1080/15213269.2012.752428#d1e255
In the paper "Video Games, Immersion, and Cognitive Aggression: Does the Controller Matter?" addressed the problem that realism of the game increases the immersion and performance for players. This benefits players as a more immersive and realistic environment gives players better cognition and understanding the context of the game. The paper is addressing the problem through comparing different participant's cognition of one of the four different conditions(table 1). The result indicates that a more realistic controller wouldn't create a really significant difference in performance but does create greater immersion for the player.

low realism and high controller naturalness	low realism and low controller naturalness
high realism and low controller naturalness	high realism and high controller naturalness

(table 1)
https://www-sciencedirect-com.uproxy.library.dc-uoit.ca/science/article/pii/S0747563214003264
Within the paper “The effects of dissociation, game controllers, and 3D versus 2D on presence and enjoyment” addressed how the effects of game controllers would affect the player’s enjoyment. This benefits researchers as it provides evidence and test results of controller realism would increase enjoyment. It is addressed through testing 146 participants under conditions of steering wheels compared to normal controllers. The results indicate that participants would have a higher enjoyment with steering wheels in a racing game compared to normal controllers, the takeaway is that a controller that provides higher immersion could give players higher enjoyment.

1 commercial devices/patents:
https://www.konami.com/yugioh/masterduel/eu/en/

The game yugioh master duel addresses the problem of creating an immersive feeling playing a digital version of a physical trading card game. The game does this through setting up the zones in specific areas exactly like what real life yugioh organized. This helps players originated from the physical yugioh card game community to better transmit onto an online version of the game. The takeaway of this would be the importance of button placement as a similar placement related to physical card game would create better immersion for players.

1 solutions reported and discussed on websites (e.g., YouTube, Reddit, others):
https://www.youtube.com/watch?v=bfCeuE9tE6A

In this youtube video introducing virtual reality gameplay of yugioh, the video is trying to address the immersion issue through using virtual reality to provide realistic environments for the players. The main takeaway would be providing players with a closer representation of card games to mimic a physical card game would help players to immerse into the games.

Andrew:
2 scientific papers:
https://ieeexplore-ieee-org.uproxy.library.dc-uoit.ca/document/5711053

> Jong-Hyoun Kim, & Cho, T. (2010). The initiative experiments for utilizing real cards in online trading card game. *5th International Conference on Computer Sciences and Convergence Information Technology*, *22*, 182–185. https://doi.org/10.1109/iccit.2010.5711053

Jong-Hyoun Kim and Teresa Cho’s paper titled *The initiative experiments for utilizing real cards in online Trading Card Game* addresses the problem of how current virtual card games can’t immerse players into the game. The players that play these games would be the ones benefiting from this. The problem is being addressed by conducting an experiment where Camera and AR

technology is used and integrated into a physical environment for use in virtual card games. By doing this they create a seamless connection between the physical and virtual worlds. The results by doing this revealed that having this connection increased immersion and player friendliness (Jong-Hyoun Kim & Cho, 2010). Our takeaway from this is that being able to have that immersion and tactile feeling while playing a card game gives the player a heightened sense of immersion and enjoyment.

Jong-Hyoun Kim and Teresa Cho address the problem of how current virtual card games can't immerse players into the game by conducting experiments that integrate Camera and AR technology to create a link between a physical game area and a virtual environment (Jong-Hyoun Kim & Cho, 2010). Smart-Tec have a line of products that are similar to this but instead of using cameras and AR, they use physical cards with NFC and RFID chips to communicate with an app on the user's phone (Smart-Tec, *Gaming*). This solution of using NFC and RFID technology was discussed in a reddit thread. The thread was mostly negative because users thought the current product by Smart-Tec, the *Fusionplay-Heroes* was too gimmicky and that it was weird you had to use the physical card **and** an app to play with no option for one or the other (Reddit, 2018). The takeaways from these resources are that NFC and RFID technology can be used for a project like ours, just in a way different from how Smart-Tec has done it and that bridging the gap between physical and virtual card games will not only increase player immersion levels but their enjoyment.

These resources all address being immersed in games. Jennett et al. addresses the problem of if immersion is measurable and quantifiable by conducting three different experiments. These experiments included having the participants switch from an immersive to non immersive task, measuring haptic information such as eye movements during immersive tasks, and investigating effects of an imposed pace of interaction on immersion. The results and takeaway from these experiments showed that not only can immersion be measured but that immersion be negative as well as positive (Jennett et al., 2008). Their research benefits other researchers aiming to involve immersion into their projects or reports.

https://www.researchgate.net/profile/Gerhard-Weber-4/publication/282674989_TactileHaptic_User_Interfaces_for_Tabletops_and_Tablets/links/5965c3e0a6fdcc69f148dcb5/Tactile-Haptic-User-Interfaces-for-Tabletops-and-Tablets.pdf#page=11
^Maybe

https://www.sciencedirect.com/science/article/abs/pii/S1071581908000499

Jennett, C., Cox, A. L., Cairns, P., Dhoparee, S., Epps, A., Tijs, T., & Walton, A. (2008). Measuring and defining the experience of immersion in games. *International Journal of Human-Computer Studies*, *66*(9), 641–661. https://doi.org/10.1016/j.ijhcs.2008.04.004

Jennett et al.'s paper titled *Measuring and defining the experience of immersion in games* address the problem of if immersion is quantifiable measurable. This benefits researchers that

aim to involve immersion in their projects and reports. The problem is addressed by conducting three different experiments. These experiments included having the participants switch from an immersive to non immersive task, measuring haptic information such as eye movements during immersive tasks, and investigating effects of an imposed pace of interaction on immersion. The results of the experiments and the key takeaways showed that immersion can be measured and immersion isn't just a positive experience as it can induce negative emotions (Jennett et al., 2008).

(Jennett et al., 2008)

1 commercial devices/patents:

https://cardmachinery.en.made-in-china.com/product/vwEamxZdnjWp/China-13-56MHz-Poker-NFC-RFID-Smart-Playing-Cards.html

https://www.smart-tec.com/en/applications/gaming

> *Gaming*. Gaming applications with RFID and NFC technology. (n.d.). https://www.smart-tec.com/en/applications/gaming

Smart-Tec has a line of products that addresses the problem of linking real world projects to a computer game world. Their product *FusionPlay-Heroes* does this by integrating RFID and NFC technology into physical cards that can communicate with an app on the user's smartphone to interact with a game. This resulted in a product that allows users a gateway between the physical and virtual world (Smart-Tec, *Gaming*). Our takeaway is that RFID and NFC technology would be a feasible way to replicate this feeling for our own project.

https://www.moddb.com/games/fusionplay-heroes/news/fusionplay-heroes-the-first-mobile-nfc-card-game-is-now-released

1 solutions reported and discussed on websites (e.g., YouTube, Reddit, others):

https://www.reddit.com/r/tabletopgamedesign/comments/95xtu1/something_really_unique_an_nfc_card_game_what_do/

r/tabletopgamedesign - something really unique: An NFC card game. what do you think? is this the future of card games?. Reddit. (2018, August 9). https://www.reddit.com/r/tabletopgamedesign/comments/95xtu1/something_really_unique_an_nfc_card_game_what_do/

A solution to the problem discussed on *reddit* describes the same methods used by Smart-Tec. The reddit thread discusses their *Fusionplay-Heroes* product while addressing if it's technology could be the future of boardgames. The thread is mostly negative with people stating that it's too gimmicky and listing other reasons as to why it won't work. The reason for this is because the game requires every player to get the app and also buy the physical cards with no option to play just the app or with just the cards.

Citation:
Scientific paper:

Dresden. (2014, November 16). The Proceedings of Workshop Tactile/Haptic User Interfaces for Tabletops and Tablets 2014. Germany. https://www.researchgate.net/profile/Gerhard-Weber-4/publication/282674989_TactileHaptic_User_Interfaces_for_Tabletops_and_Tablets/links/5965c3e0a6fdcc69f148dcb5/Tactile-Haptic-User-Interfaces-for-Tabletops-and-Tablets.pdf#page=11

Jong-Hyoun Kim & Teresa Cho. (2011, February 10). *The initiative experiments for utilizing real cards in online Trading Card Game*. IEEE Explore. https://ieeexplore-ieee-org.uproxy.library.dc-uoit.ca/document/5711053

Rory McGloin, Kirstie Farrar & Marina Krcmar. (2013, February 13). *Video Games, Immersion, and Cognitive Aggression: Does the Controller Matter?*. Ontario Tech Library Login. https://www-tandfonline-com.uproxy.library.dc-uoit.ca/doi/full/10.1080/15213269.2012.752428#d1e255

Williams, K. D. (2014, September). *The effects of dissociation, game controllers, and 3D versus 2D on presence and enjoyment*. Ontario Tech Library Login. https://www-sciencedirect-com.uproxy.library.dc-uoit.ca/science/article/pii/S0747563214003264

Commercial device/patents:

FusionPlay_Konrad. (2018, October 15). *FusionPlay heroes, the first mobile NFC card game, is now released! news*. ModDB. https://www.moddb.com/games/fusionplay-heroes/news/fusionplay-heroes-the-first-mobile-nfc-card-game-is-now-released

Gaming. Gaming applications with RFID and NFC technology. (n.d.). https://www.smart-tec.com/en/applications/gaming

[hot item] 13.56mhz poker NFC RFID Smart Playing Cards. Made. (n.d.). https://cardmachinery.en.made-in-china.com/product/vwEamxZdnjWp/China-13-56MHz-Poker-NFC-RFID-Smart-Playing-Cards.html

Yu-Gi-Oh! master duel. (n.d.). https://www.konami.com/yugioh/masterduel/eu/en/

Solutions reported and discussed on websites (e.g., YouTube, Reddit, others):

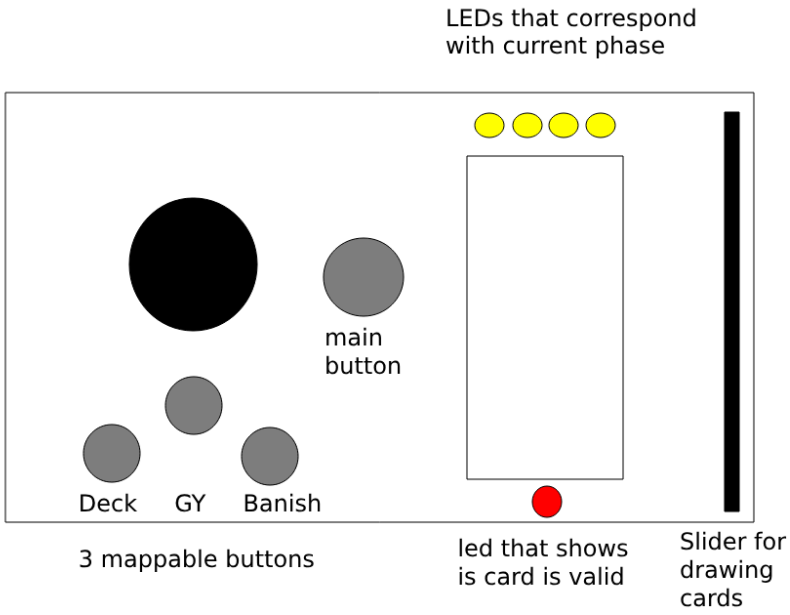
FusionPlay_Konrad. (n.d.). *R/tabletopgamedesign - something really unique: An NFC card game. what do you think? is this the future of card games?*. Reddit. https://www.reddit.com/r/tabletopgamedesign/comments/95xtu1/something_really_unique_an_nfc_card_game_what_do/

Rhymestyle. (2024, March 22). *Soo I Played The NEW Yu-Gi-Oh! VR Game*. YouTube. https://www.youtube.com/watch?v=TUt__qvptvg

Project progression presentations will allow you to showcase your progress thus far.
What to present:

- The problem you are tackling
    - What is it?
    - Why is it important to address?
    - How do you plan to address it?
- The context
    - What other similar solutions exist?
    - How have others tried to solve the problem?
    - What gaps and opportunities did you identify?
- Design thinking
    - Summarize the design thinking process focusing on:
        - The problem and needs from a user point of view
        - Sketches and paper prototypes
        - The top valid, absurd, and promising ideas from Brainstorming
    - Electronics
        - System architecture being proposed
        - Simulation
        - Real component integration

Use an elevator pitch approach to the slides. Each group will have 5 to 8 minutes to present + 2 minutes for questions, and you can indicate before the presentation if you would like to have this assessed as the video report for assignment 1.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Slider for
drawing
cards