Captain America Shield UI

Manu Peethambar

HCC 613

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Introduction

This project is exploring the feasibility and creates a possibility of having a screen for Captain America shield in order to perform his tasks. I specifically focused on the unique needs of Captain America (Figure 1). There is no screen currently for this device and needs to be developed from scratch, however the findings from this design exercise could easily apply to a shield used by the soldiers in an army.

Figure 1.1. Captain America (The Super Soldier)

This project was developed by Manu Peethambar for HCC 613: User Interfacing and Development. It was completed in spring 2018 as part of the Human-Centered Computing MS program at UMBC.

This report is containing the initial user research, data visualization, brainstorming, and low/medium fidelity prototypes of the interface. User testing has been conducted both informal and formally, and their summations will also be included. Source material references will be included in an appendix.

Captain America (Cap) uses this device as his primary weapon which is virtually indestructible. It is composed of a unique alloy of vibranium - adamantium steel. This device is versatile used by Cap against his enemies, mainly, by throwing it at them and can perform mind bogglingly impossible tricks with it such as knocking off multiple opponents by throwing it in a projectile motion. This device is initially attached onto his

back magnetically and then he wears it over his forearm with a strap when he is in combat mode, as shown in Figure 1.2.

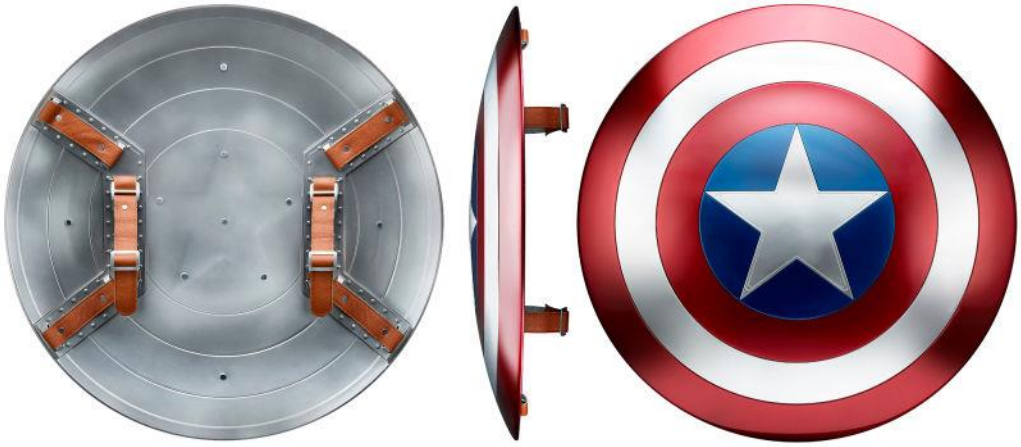

Figure 1.2. Captain America shield (Vibranium alloy)

Inspiration Statement

Sci-fi has constantly flabbergasted me and over and over it has demonstrated that the present sci-fi is tomorrow's cutting-edge innovation. I extremely needed to get a Marvel character for this project as I am a diehard Marvel fan. I have taken after their motion pictures over ages. Likewise, anything identified with innovation draws in me to find out about it or makes me think in the matter of how a futuristic technology thought could be actualized.
The experience will be empowering and for the way that my character does not and has never had a UI or a screen on the gadget/shield. This makes it additionally difficult to begin everything starting everything from scratch. The motivation behind why I grabbed this character is to have an awesome and dreary expectation to absorb information, and in addition, experimenting with something starting from scratch, raises one's learning and development over the standards and processes.

Gathering User Data

Source Material

The source material for this project primarily came from the comics and the movies. **Captain America (Steve Rogers)**, comic-strip superhero created by writer Joe Simon and artist Jack Kirby for Timely (later Marvel) Comics. The character debuted in March 1941 in *Captain America Comics* no. 1. In movies, Marvel Cinematic Universe films: The First Avenger (2011), The Avengers (2012), Captain America: The Winter Soldier (2014), Avengers: Age of Ultron (2015), Captain America: Civil War (2016) and Spider-Man: Homecoming (2017).

Inspirational Material

Like I already mentioned, science fiction has constantly propelled me to imagine and think past limits. The motivation material for this project principally originated from the comics and the motion pictures. Since the 1940s, the comic book character Captain America has been exhibited in an assortment of other media, including serial films, feature films, animations, and computer games.

User Analysis

Figure 2. Steve Rogers in the experiment(left), The first Avenger Captain America(Right)

1. **Real Name:** Steven Grant Rogers
2. **Occupation:** Crimefighter
3. He is said to be a formal and moral leader of the Avengers.
4. **Group Affiliation:** Avengers
5. **Base of Operations:** Avengers Mansion, New York City.
6. **First Appearance:** in Captain America Comics #1 (historical, 1941) and in Avengers (Vol. 1) #4 (modern, 1964)
7. **Height:** 6'2, **Weight:** 240 lbs, **Eye Color:** Blue, **Hair Color:** Blonde
8. **Powers:** Captain America has strength, agility, and endurance that are enhanced by the Super Soldier Serum. He has mastered many fighting skills including an American style judo.
9. **Weapon:** An indestructible shield weighing approximately 12 pounds that can be used for defense and can also be used offensively by being slung through the air at enemies.
10. Steve Rogers was unattractive, thin and bony.
11. Although he was frail and rejected for service in the **U.S. Army**, he was given a chance to serve his country.
12. General Chester Phillips offered him a place in a top-secret biological experiment, **Operation Rebirth**, a project intended to enhance US soldiers to the

height of physical perfection via the inventions and discoveries of Professor Abraham Erskine.

13. Steve Rogers was injected with the experimental **Super Soldier Serum** and exposed to **low-level radiation** to enhance the formula's effectiveness.
14. The process successfully altered his physiology from its frail state to the maximum of human efficiency, including greatly enhanced musculature and reflexes.
15. After combat training Captain America was transferred base to base under the guise of a private in the Army. All the while Cap was thwarting Hitler and the Nazis at every opportunity.
16. He is also exceptional in throwing in tiny projectile weapons, like toss knives across long distances which are aerodynamically designed to fly through the air.
17. Captain America's shield is his primary weapon, a concave disk 2.5 foot in diameter, weighing 12 pounds. It is made of a unique vibranium-steel alloy that has never been duplicated.
18. In several alternate timelines, the shield survives and comes to be possessed by other significant individuals.
19. Captain America has also used a **custom special Harley Davidson motorcycle**, modified by the **S.H.I.E.L.D.** weapons laboratory.
20. Captain America started the **hotline** which was a nationwide telephone service enabling American citizens to directly contact him with information pertaining to national security or crises beyond the scope of conventional authorities.
21. Captain America has become the **people's champion**, representing the people of America rather than the government.

Task Analysis

This was essentially created to have the different tasks Captain America is good at already and known for. He is the super soldier and has a vibranium shield which is the device where the technology will be hosted. He is the leader of Avengers and needs a good UI system to coordinate them well.

Self-Combat mode:

He uses his shield to block the opponent's attack if the opponent offense is hard to handle with his hands.

Captain America uses his shield against his enemies in offense, mainly, by launching/throwing it at them and has a tremendous ability to retract it.

He is good at disarming people and prominent with his different kick styles, mainly American style Judo. The shield even takes tremendous pressure and doesn't let captain feel the blow from a powerful hit as the force is evenly distributed.

Coordination with Avengers:
Captain is the formal leader of the Avengers. He has World War experience and has fought for America through time and been an absolute patriot. His experience is respected by all and known to be a great leader of the team on any mission and coordinates task among team members by delegating to the right person.

Environmental Analysis

Steve Rogers is the best in combat on ground and can fight any opponent on ground. He has fought alien beings and mutant enemies with the shield on earth while there are invaders on different parts of earth.
Using the shield, he can fight not just normal enemies but also humanoids. He uses this device in any kind of combat situations usually national emergency like on New York streets where there are public interference and he needs to make sure public safety is considered. He is also seen using his shield on a warship or in fact any kind of battleground.
He needs to have a closed area where he can knock the shield off multiple points such as walls or targets, or throw it to a target and fetch the shield himself in an open area.

Visualizing User Data

Empathy Map

Below in Figures 3 and 4 show empathy maps for self-combat mode and co-ordination with Avengers

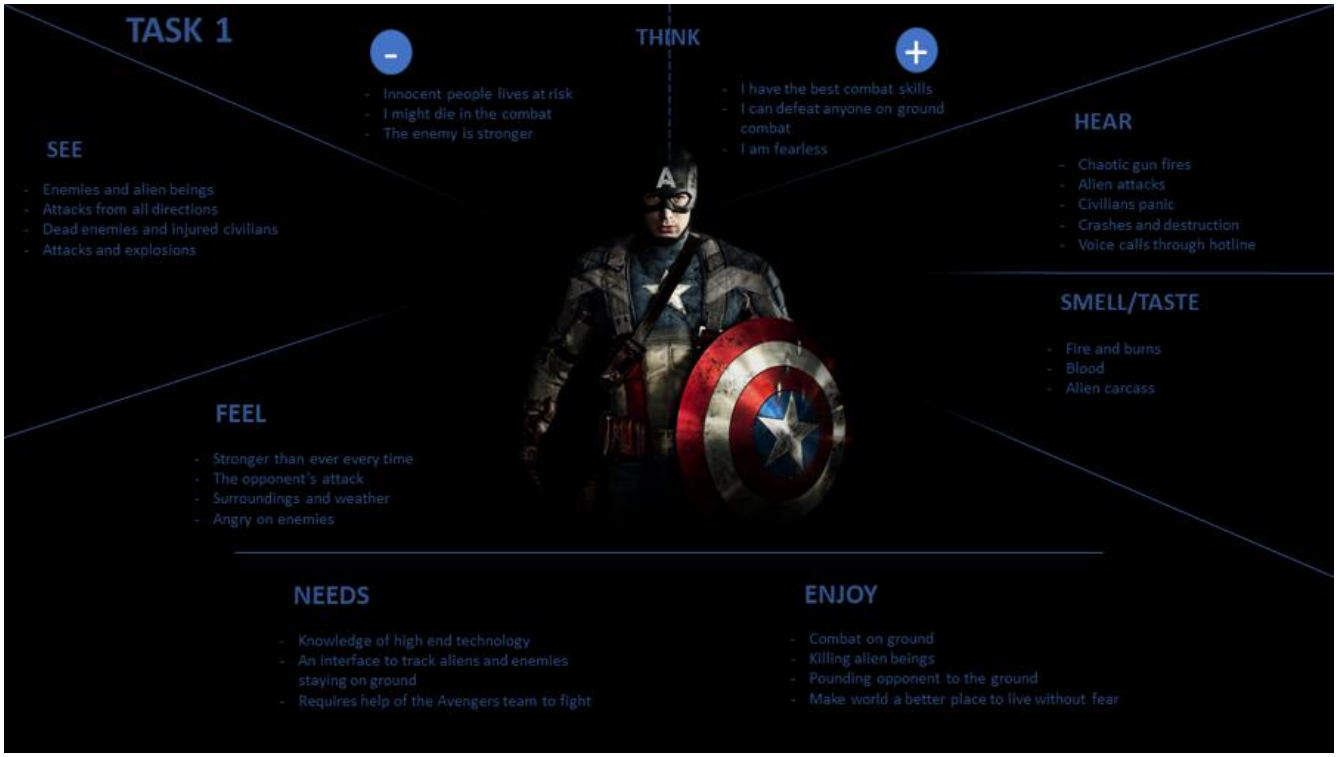

Figure 3. Captain America's empathy map when he is in a self-combat situation.

Figure 4. Captain America's empathy map when he is coordinating with avengers (Future UI).

Reflection on Empathy Map

An empathy map is a collaborative visualization map and technique used to articulate what we know about a user. It externalizes knowledge about users to create a shared understanding of the user needs, and aid in decision making.
Empathy map gives you an insight to relate to the thought process of the character you are designing for. On the other hand, it helped to put aside my assumptions and helped me to think from the user's perspective. It is the desire to understand the user and maintain the emotional distance, that defines real empathy. We are then able to connect to the real needs of the user better than projecting our preferences.
Captain America has different emotions while completing each of his tasks. He is alone and can bend the rules while he is in a self-combat mode but while associated with the Avengers, he feels a sense of responsibility and unity among the team he is heading and coordinating.

Extraordinaire Card

Below in Figure 5 you will find my Captain America extraordinaire card.

- Main scene – Captain America suited up for a mission showing the shield attached to his back.
- Alternative scene –At the center of the other card holding the shield.
- Detail scene – three detailed scenes: combat in war field, Captain America shield through the inside, avengers assembled.
- Surprising scene – Bottom right corner there are two scenes which show how weak Steve Rogers was given the super soldier serum and Captain America after the process.

Figure 5. Captain America's extraordinare card.

Reflection on Extraordinaire Card

Extraordinaire card is basically relative to a fictional character created using a written narrative to think about a real person using the end product. This also throws light on the concept of personas being used as a tool in user centered design, a narrative representation of a real user group. For example, personas are helpful in explaining design decisions to non-technical people to make them understand the target user

group. You can imagine how you might design a system differently for each person. This changed and triggered my mindset to put the user at the center of all design decisions alongside other people or characters who are directly or indirectly involved. It also made me realize that if you do not center your user and build around his needs, you end up creating a system for your own needs and not the user. Creating this card gave me the sense of centering the user as he is the main character and is the one representing a group of people of the same kind.

Hierarchical Task Analysis

Below in Figures 6 and 7 you will find Hierarchical Task Analysis(HTA) for both combat mode and avengers coordination.

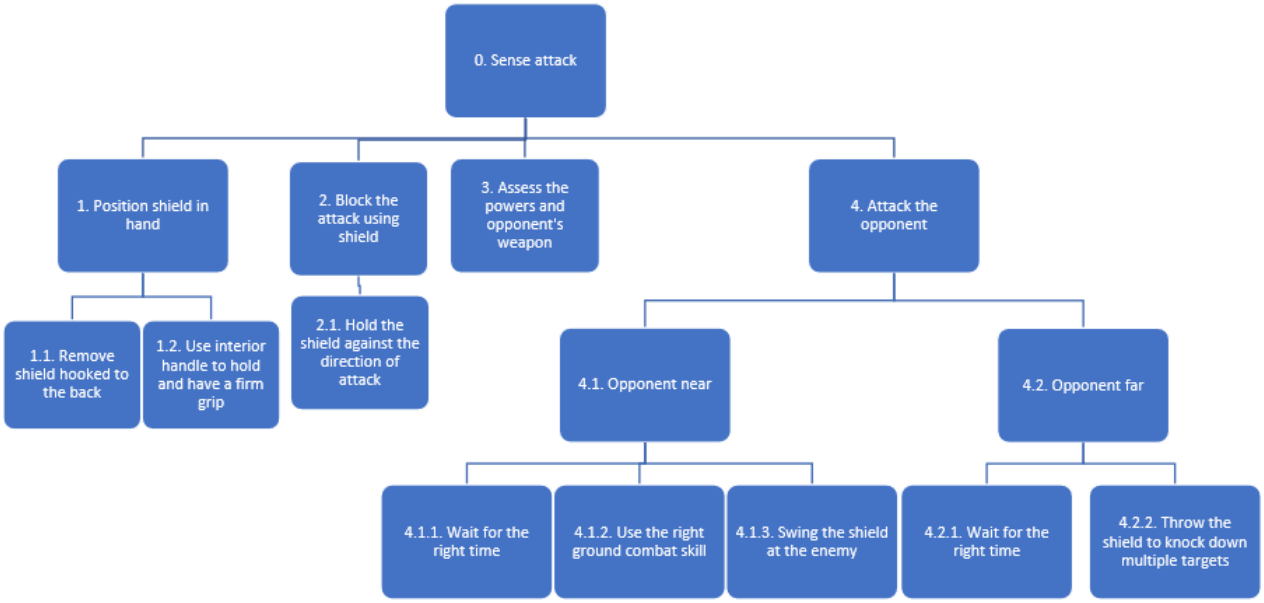

Figure 6. HTA for self-combat mode.

Plan 0:

If 0,

1. Do 1 by 1.1 and 1.2
2. If attacked, then do 2 by 2.1 and then do 3 while doing 2

Plan 1:

If 0,

1. After 3, Do 4
2. If 4.1, then do 4.1.1, 4.1.2 and 4.1.3
3. If 4.2, then do 4.2.1 and 4.2.2

The Introduction of the Shield UI using augmented reality to complete these tasks will elaborate more on the functions of this HTA. Please refer storyboards for better understanding.

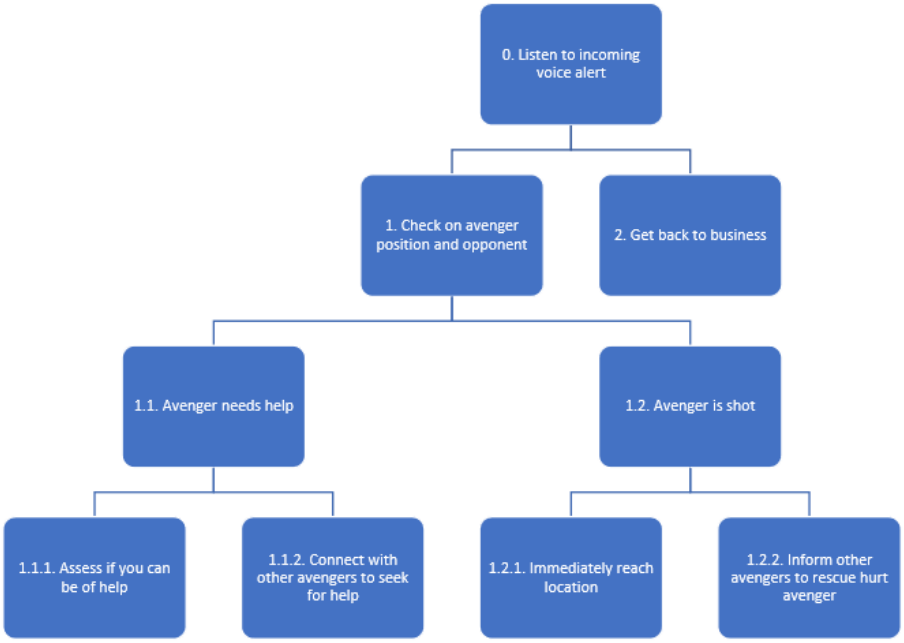

Figure 7. HTA for Avengers coordination.

Plan 0:
If 0,

1. Do 1
2. If 1.1, then do 1.1.1, else do 1.1.2
3. Then do 2

Plan 1:
If 0,

1. Do 1
2. If 1.2, then do 1.2.1, else do 1.2.2
3. Then do 2

The Introduction of the Shield UI using augmented reality to complete these tasks will elaborate more on the functions of this HTA. Please refer storyboards for better understanding.

Reflection on Hierarchical Task Analysis

The first thing I had to concentrate on was the HTA with detailed plans listed down. I thoroughly enjoyed the suggestions and feedback given at class by a fellow classmate and it helped me know where I was not elaborating and where I had to work on. I was extremely enthusiastic in making my extraordinaire card and empathy maps and it came out well. I left them as is and started to concentrate on the plans involved in the HTA and elaborating them. I also got a feedback to show where Cap is being defeated in few comics and movie scenes. This is something which gave me more ideas on extending my tasks and having exceptions and negative cases.

Visualizing User Data Reflection

I was so perplexed initially about what these assignments were leading me to do. As I was a developer before, I considered the final product or goal and then worked towards achieving it. But this assignment has really taken a different dimension of why we go about things this way. This assignment has really changed the way I think about Captain America now than before as I had minimum knowledge and never liked him as a great Marvel character and Avenger. Mostly this character is not liked by many, maybe he is not the kind of guy who really is sound at technology but for his combat skills. I learnt this while I referred to many source materials. I started thinking as to this assignment could be a very good upgrade to getting him better at technology.

Creating these visualizations namely, empathy maps, extraordinaire cards, HTA are so crucial in having a mind map of what I wish to do next. I could easily relate this to a use case of a soldier using this shield in current world. Someday the use of this shield with the enhancements which I am planning to have in it would be a base to build a great defense and offence armor for the army. I certainly could also relate to an IT project scenario as to how designers in my previous projects used to create a step-wise analysis of every requirement the clients wanted to be delivered.

Considering the different visualizing techniques, I found the task analysis to be the most useful and caters to most projects. It gives you the detailed way to look at a situation or a product or a project and know in and out of the tasks you wish to perform. This lets us know the different error scenarios or the exceptions in a task. HTA gave me a connection to algorithms and flowcharts which I used to write before I had my code written in the right syntax. Task analysis is very much like having a road map of what the final system should be able to accomplish. It tests the ability of the system to have thought of all use cases. Another point is that there can be many ways to attain the same task.

Applying User Data to Select Screen Form Factor

Exploring alternatives

When brainstorming for this project the different questions I wanted to answer was “What is the size of the screen?”, “What shape should my screen take (Rectangle/Circular)?” and finally “What are the inputs and placement of nano camera for AR vision?”. These answers were very important as it made me realize that the extent of screen real estate I can use and the feasibility of inputs. Having nano cameras give AR feasibility. Biosensors / fingerprint for authentication purposes. Curved screen gives a great look and feel and more area to have multiple screen elements. There is even vibration for notifications.

For the brainstorm process I made use of three separate techniques: rolestorming, individual brainstorming and group brainstorming.

Rolestorming was one of the most effective step for me to know the relevance of my task analysis. I could relate to watching most of the movie clips over again and enacting it in front of my friends who share a common interest in the comics and movies in the Marvel Cinematic Universe. I could really understand how creation of any Marvel character or for that matter any other non-existing character is created with immense detailing in them. I picked up four scenes from the movies and pondered it over with my friends as to what I could list down and they could list down separately. I then finally merged both the versions to get possible answers for what I wanted to know. The advantage being it's not just me collecting data all by myself. Involvement of friends gave me a different perspective of how different people can come up with different observations with watching or enacting the same thing.

Brainstorming Reflection

The experience was energizing and for the fact that my character does not and has never possessed a UI or a screen on the device / shield. This makes it more challenging to start everything from scratch. Individual brainstorming was quite hard as I was not a great fan of Captain America and I lacked enough information. All that I could do is read or fetch information from different source materials. The reason why I picked up this character is to have a great and tedious learning curve, as well as trying out something from scratch which brings up one's knowledge and maturity over the principles and process. I mean that Captain America has not had any user experience screens or gadgets and it would be a challenge to design this system for him. When I performed group brainstorming with a group of friends who were diehard Marvel fans, I could get more information and get more insights for my direction. I would want to try out mind maps as I feel it aids to great understanding by representation of data.

Final screen location and size

Rolestorming and brainstorming ended up in abundance of data on his shield and Captain America himself. As a result of the data gathered and the brainstorming done, I decided to move forward with a semi-circular screen that shows up on the inner face of the shield. The initial questions which I had was answered during this process. The user can interact with the Shield UI by touch or voice or motion gestures. AR technology is the best technology for the shield as while blocking an attack, Captain is still able to view what is on the other side and assess what to do next. The screen is going to be semicircular (Please refer to the prototypes created for the Shield UI in further sections). Though the usage of a circular screen brings in plethora of challenges to design, I thought I would go ahead with this and learn more about how one perceives a circular design and uses it. This creates my boundaries of trying something new and paving a

path with a new mindset for the users of my device. But making this shift is not easy. It will require me to create more elegant, effective and creative solution for the circular design.

Brainstorming Evaluation Reflection

I initially had the idea of placing the screen on the back of the shield. The brainstorming techniques gave me the ability to expand user tasks and relate to how the UI can be of help in performing them. My tasks were clearly wired to the UI feasibility to make Captain America / user make his tasks simple by having one.

Low Fidelity Paper Prototype

Low Fidelity V1

I stuck to creating the prototype with a technique of representing screens within a black background and have good usage of screens that represent the overall flow of my tasks in V1. The person who reviewed my paper prototype was really impressed by my usage of lo-fi tools. I finally decided to retain my in-class analysis to upgrade med-fi prototype as the questions I had and the feedback given had more relevance to that.
The benefit of using a prototype in a rough state with minimal transitions is to give more of a simulated feeling of how things might work without all the hard work of actually mocking things up.

Initializing screen when Cap attaches the shield on to his forearm.

Circular menu showing:

- Missions
- Map
- Avenger List or database
- Notifications

Task 1 - **Combat – Defense / Offense or Block / Attack**

- Sense Attack.
- Position Shield in hand
  - Initially hooked to magnetic back hook – UI / Screen OFF
  - Attach to hand – UI / Screen ON
- Block Attack
  - Position shield against direction of attack
  - Absorb and store kinetic energy – Vibranium characteristics.
- Assess opponent's powers and weapons
  - Holding the shield against the opponent makes the screen show a AR view with the help of Nano camera at the center of the face of shield.
  - Gives opponent's details.
- Attack opponent
  - Opponent Near? – use the combat style suggested on the screen. You can use the KE stored in the shield and power swing it against the opponent.
  - Opponent Far? – Calculate distance and throw shield, and using the KE stored, knock off multiple opponents.

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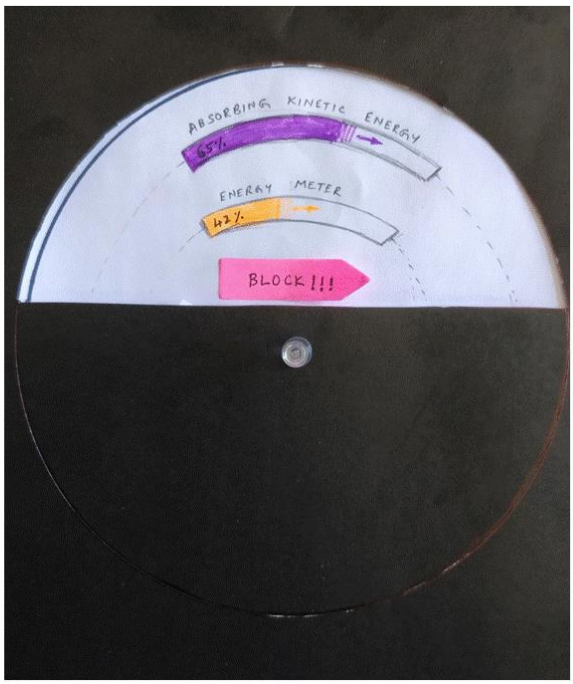

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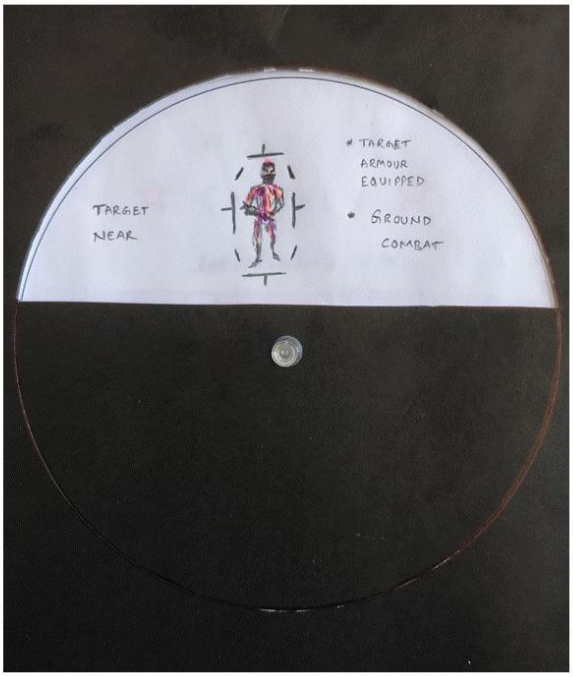

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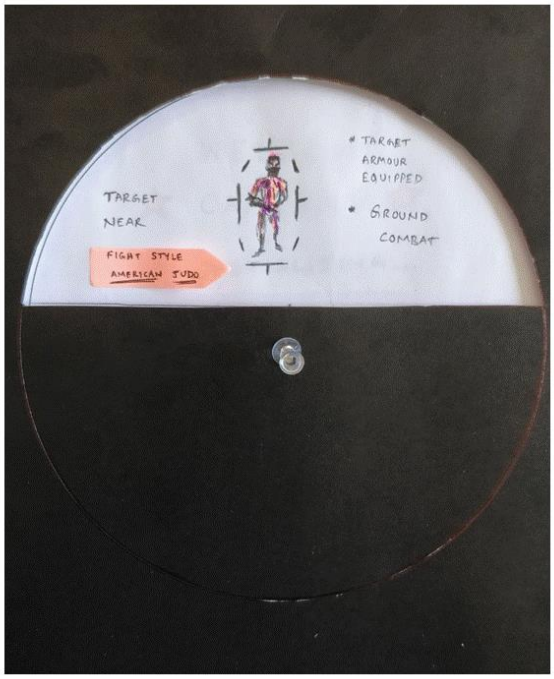

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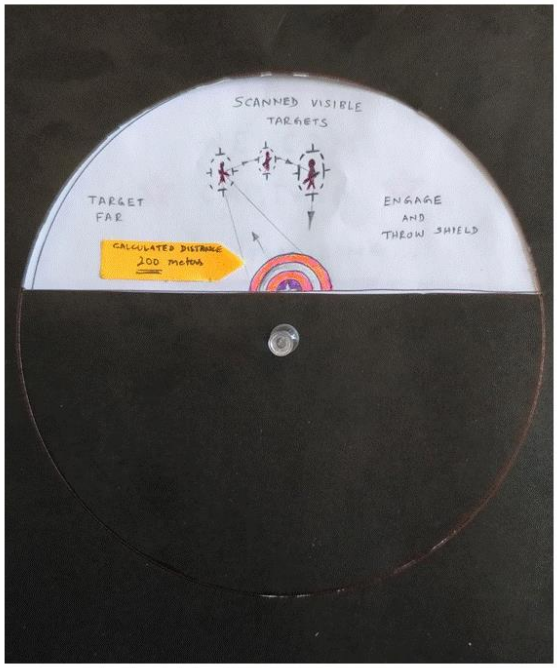
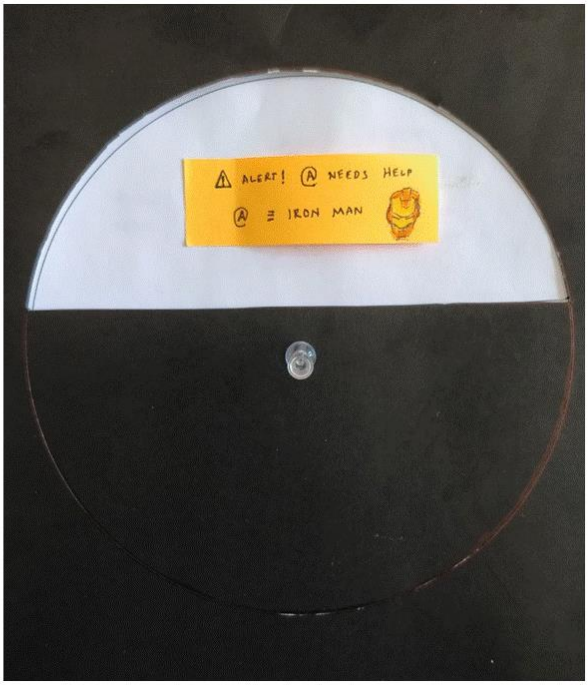


Task 2 – **Co-ordination with avengers**

While in combat and shield in hand:

- Incoming voice alert / Screen alert.
  - Check alert on screen.
- Check on avenger position and opponents.
  - Check Map view - Normal / 3D view.
- Avenger needs help:
  - If you are free: select “Go to help” to pick up the task.
  - If engaged in something: select “Alert other Avengers”.
- Avenger Shot:
  - Check Map for the location of Avenger – then head to the location.
  - Inform / Alert other Avengers to rescue Avenger.
  - Alert sent to Avengers to rescue Avenger.

- Incoming voice alert / Screen alert.
  - Check alert on screen.



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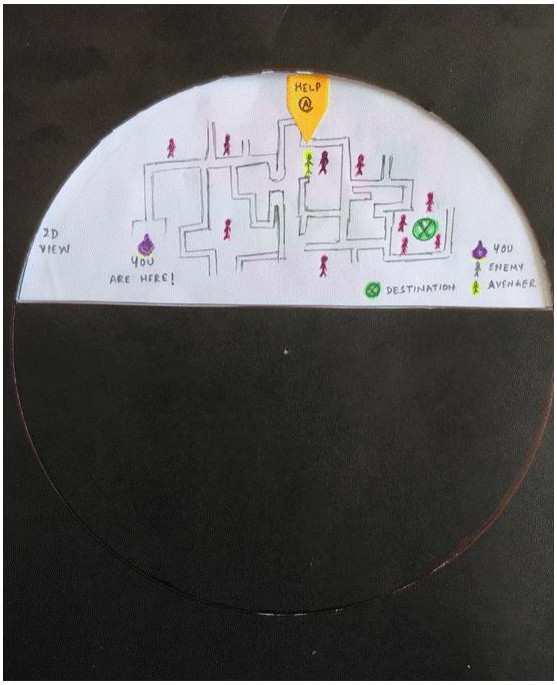
  - Check Map view - Normal / 3D view.



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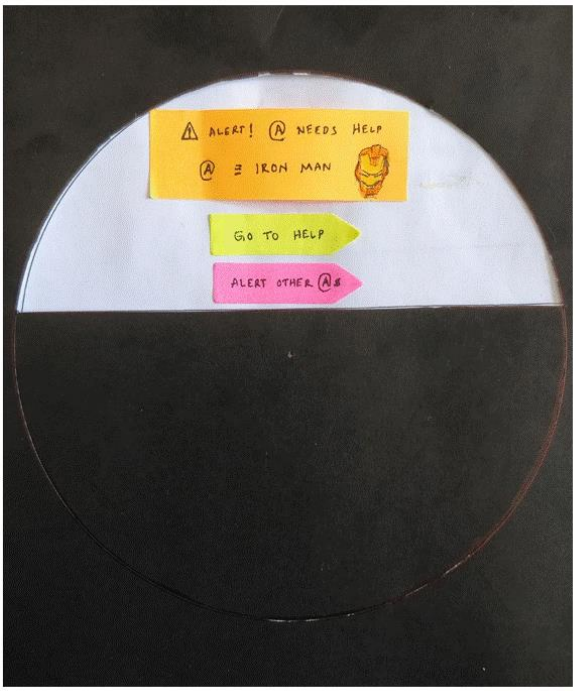

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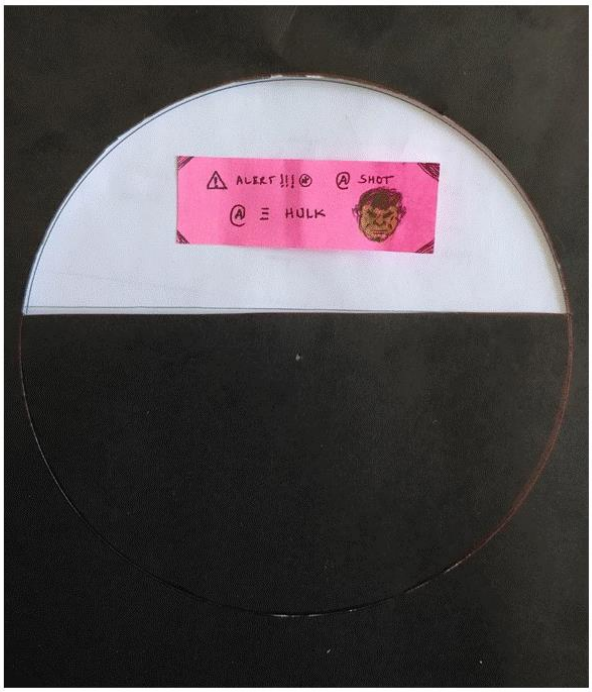
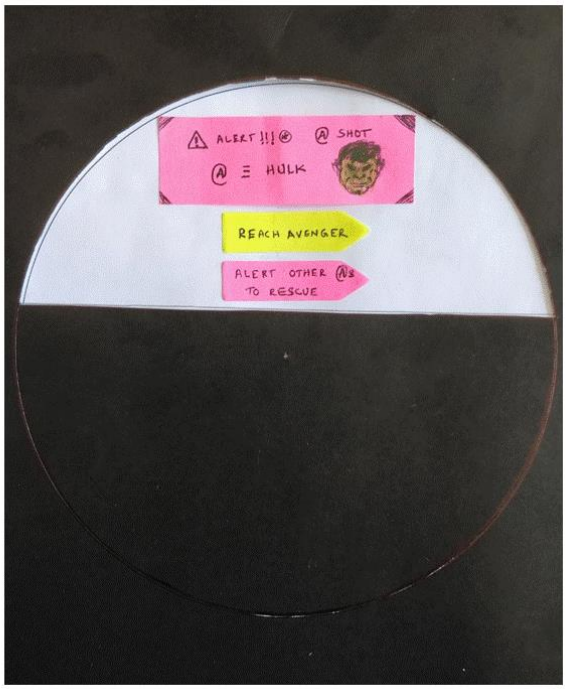


- Avenger Shot:
  - Check Map for the location of Avenger – then head to the location.

- Avenger Shot:
  - Inform / Alert other Avengers to rescue Avenger.



- Avenger Shot:
  - Alert sent to other Avengers to rescue Avenger.

Evaluation of Low Fidelity Paper Prototype

Pre-Planning

What design questions do you have about your prototype?
I wanted to know in circular display, is everything supposed to be in a circular fashion. It would not be appropriate to have a square screen behind the shield. Also, the way in which circles can be used for a menu navigation.

What specific question did you want to learn from your evaluation?
I wanted to know if my user is able to use the interface without any difficulty. Also, if the screens in my prototype were intuitive and effective to create a fully functional device or system.

What "role" did your user take? What information did they receive about the user?
Captain America / Steve Rogers, super soldier and the formal leader of Avengers. Very tough as a soldier and knows how to coordinate the team well, has world war experiences. Also, he possesses a vibranium steel alloy shield which is his weapon.

What task(s) did your user perform?

Task1: Self-combat mode – Block/Attack.
Task 2: Co-ordination between Avengers.

What compromises did you make with your prototype, and how did you help your user overcome them?

There are no colors, events, screen transitions, and needed a briefing on how to use the device and how to handle actions. Hard to design circular designs and especially on paper it gets even challenging.
I had used a pin at the center of the circle for the inner paper prototype to move and had 2 screens which created an effect of screen transitions. Functionality was taken into consideration in this prototype.

How did you document your partner's actions?
Notes were taken while the user used the prototype. The process was also documented using evaluation handouts. This data was accounted for further use and analysis.

Results from Low-Fidelity Paper Prototype Evaluation

	Participant	What is *clear* about prototype?	What is *confusing* about prototype?	What is *natural* about interaction?	What is *awkward* about interaction?
Task 1	**1**	Good illustrations	NA	UI is on the inner face and used by the user when held in hand	NA
	2	UI information	Lift shield to interact	Placement of screen	Lift shield to interact

	Participant	What is *clear* about prototype?	What is *confusing* about prototype?	What is *natural* about interaction?	What is *awkward* about interaction?
Task 2	1	Purpose is well illustrated	Which map to use when	Minimal form	Always must lift shield
	2	Maps and navigation	Nothing	Map	Nothing

Low Fidelity V2

Summary of Changes from V1

Between version 1 and 2 there were no visible changes based on the feedback. My evaluators were really impressed by the way the screens moved inside in a circular fashion. There were changes made and hence version 1 above can be considered as final version. I found my answers for the question of circular UI design, having mostly rounded menu and elements which are having rounded corners.

Figure 8. The tools used for low fidelity prototype.

Revised Low Fidelity Prototype

There were no visual changes with respect to elements in each screen. Hence, I decided to keep the prototype intact.

Reflection on Low Fidelity

Paper prototyping allows designers to quickly and inexpensively explore multiple iterations of designs. Prototypes can be submitted for testing and feedback, leading to better experiences for the business and for users. That's why paper-prototyping is a fundamental skill for any UX designer. Paper prototyping is based on sketching and this assignment brought me back memories of my childhood and those days where there was freehand drawing as the only means to represent stories in the form of sketches. The benefit of using a prototype in a rough state with minimal transitions is to give more of a simulated feeling of how things might work without all the hard work of actually mocking things up.

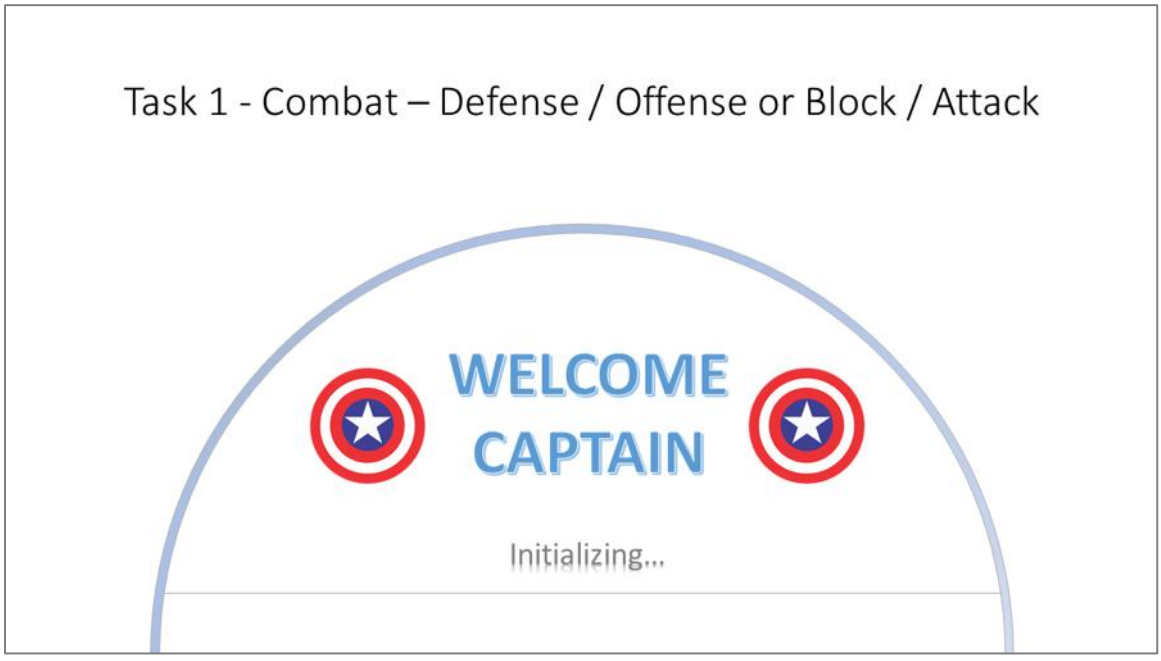
I used to work in the design studio of Deloitte Digital where I have seen paper prototyping extensively used. In every project, pitch, etc. the designers stick to create the paper prototypes. This is seen especially in the Front-end engineering teams.

Medium Fidelity Prototype in Slideware

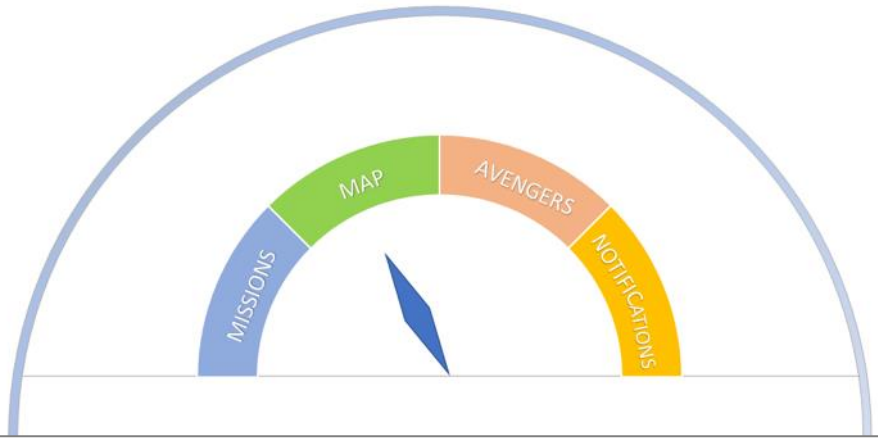
Medium Fidelity Prototype in Slideware V1

To create my Medium Fidelity prototype, I used Microsoft PowerPoint. I found it easy to use as I have extensively used it for creating client presentations at work. The prototype was so near to my expectation of the UI, I wish to create and most of the blocked questions are now answered. I could not complete transitional effects in every screen as my design requires a storyline for showing how the screens show up. I feel this is a near representation of what my end product would look like. I can concentrate now on the feedback received and think of better usage of my screen layout. I have immense screen area compared to a lot of screen layouts in production today having a UI filled with relevant data in them. I could also relate to how my tasks were transforming the future UI in my device using slideware and designing for great visual appeal. People mostly crib about the challenges involved in very small and medium screen sizes but having a semi-circular UI screen 2.5 foot in diameter is a huge layout and comes with its own challenges to design. In addition to this the use of vibrant colors for visual appeal and to match Captain America's branding, in medium fidelity prototyping was another added advantage to convey the task in a better way. On paper prototyping it was quite hard to adapt to changes as you may have to re-do the whole page or screen unless there is a small change. In medium prototype slideware it is always revisit and change thing by deleting elements on the screen and adding more elements.

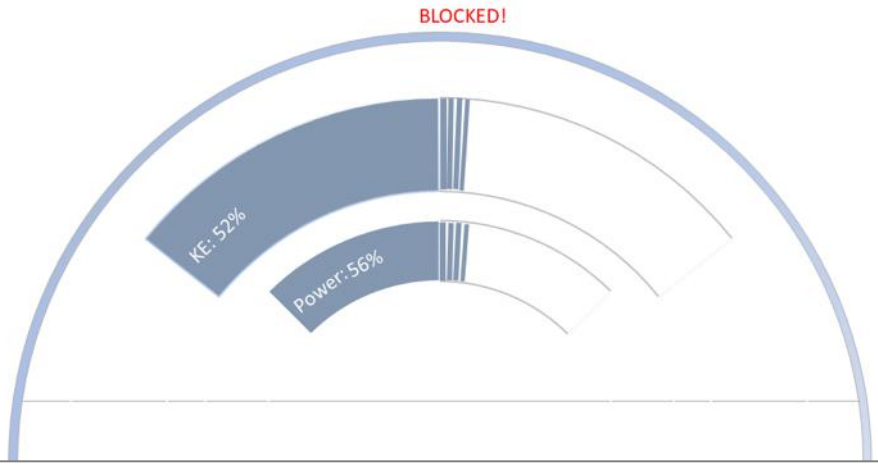
Figure 9. Different screens used for medium fidelity prototype. (see below)



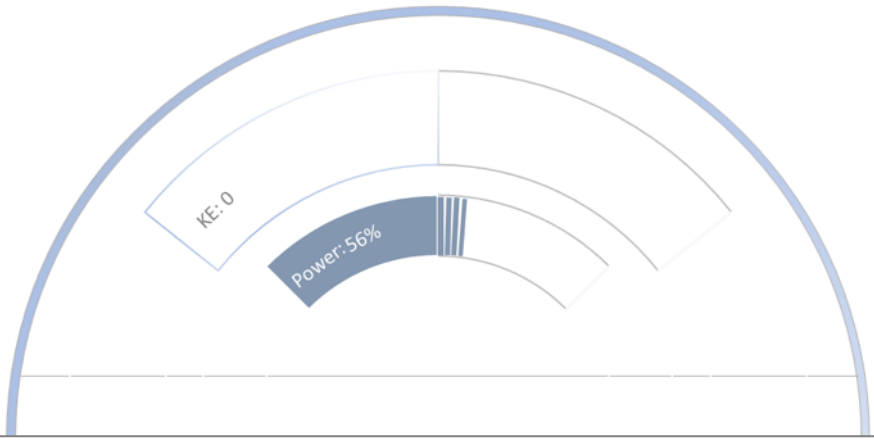
At all instances the user can access the menu



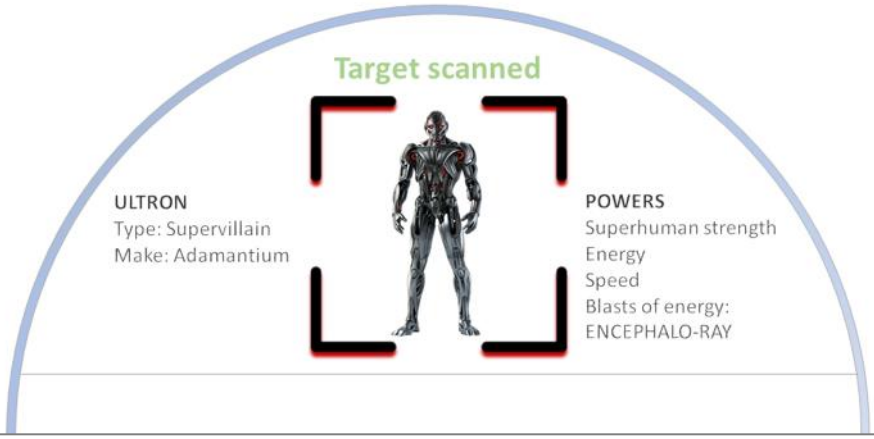
Kinetic energy increases to 52% after contact / attack on shield by blocking



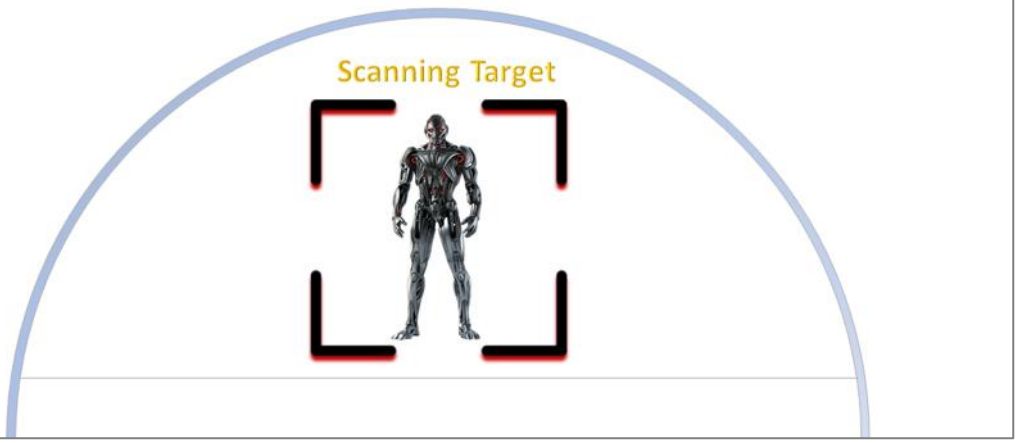
Kinetic energy is 0 before contact / attack on shield by blocking



AR view: Target is scanned and you get information about the target

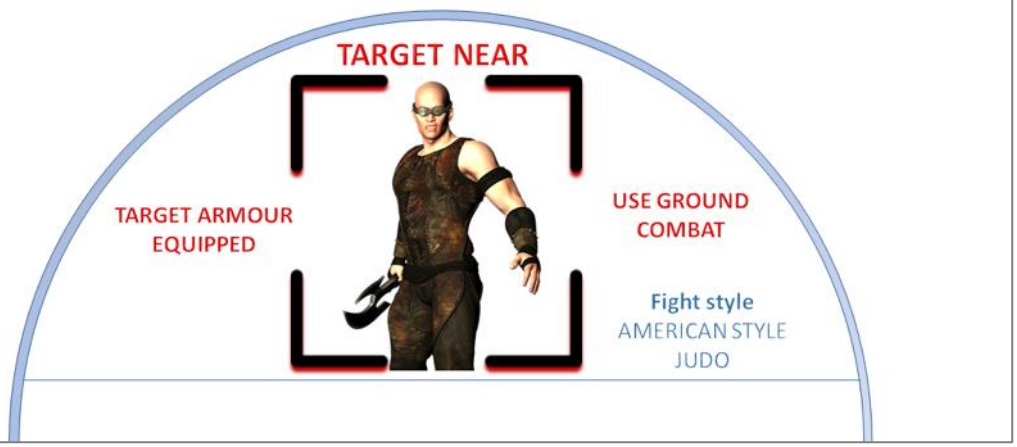


Hold the shield against the line of visible target to scan and get information about the target using the nano camera

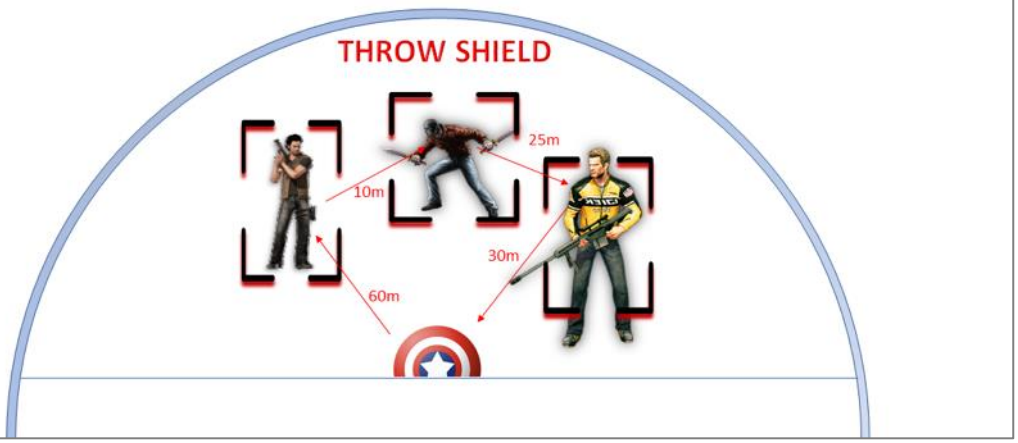


Target is scanned and it is near

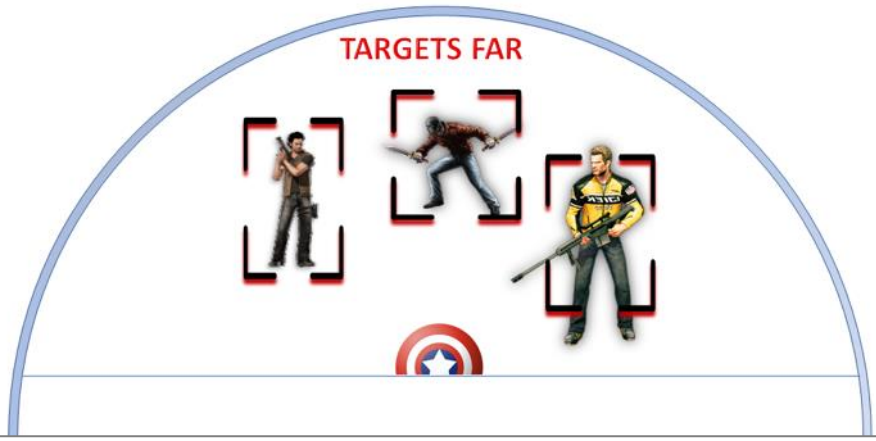
You need not throw the shield but can use the fight style mentioned as ground combat - American style judo



Distance calculated to throw b/w multiple targets

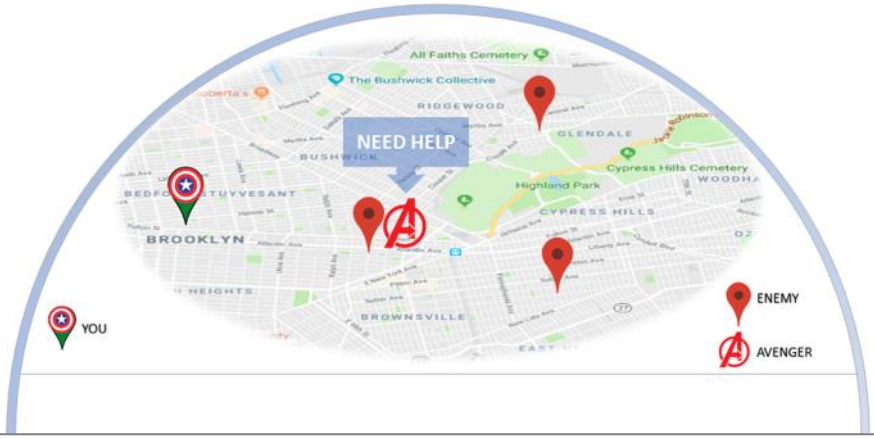


Multiple targets are scanned and they are far



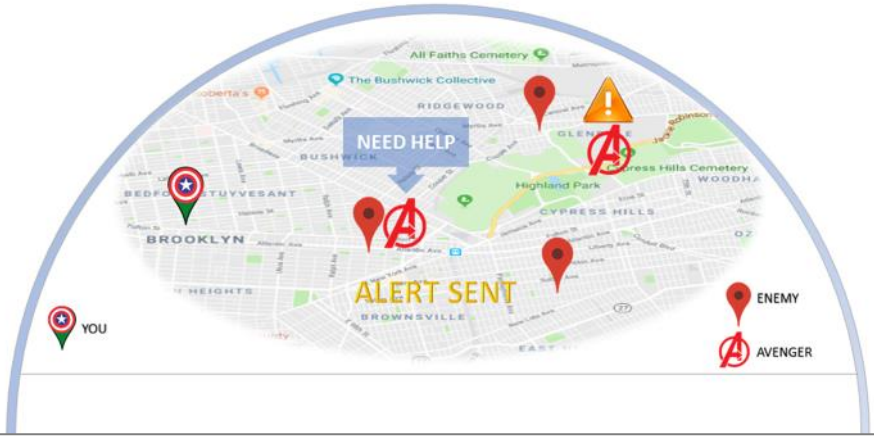
TASK 2: Co-ordination with Avengers

Check map to check avenger location

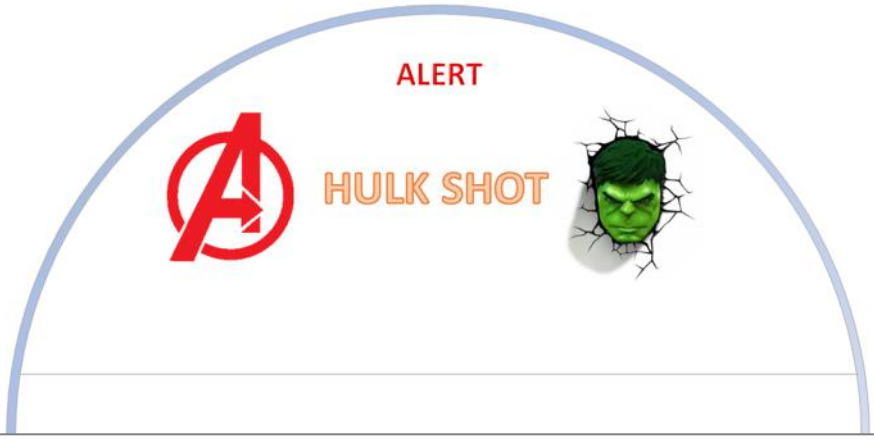


Select an action to go forward and help the avenger or alert others on team

Alert sent to other avenger as Cap is engaged in something else

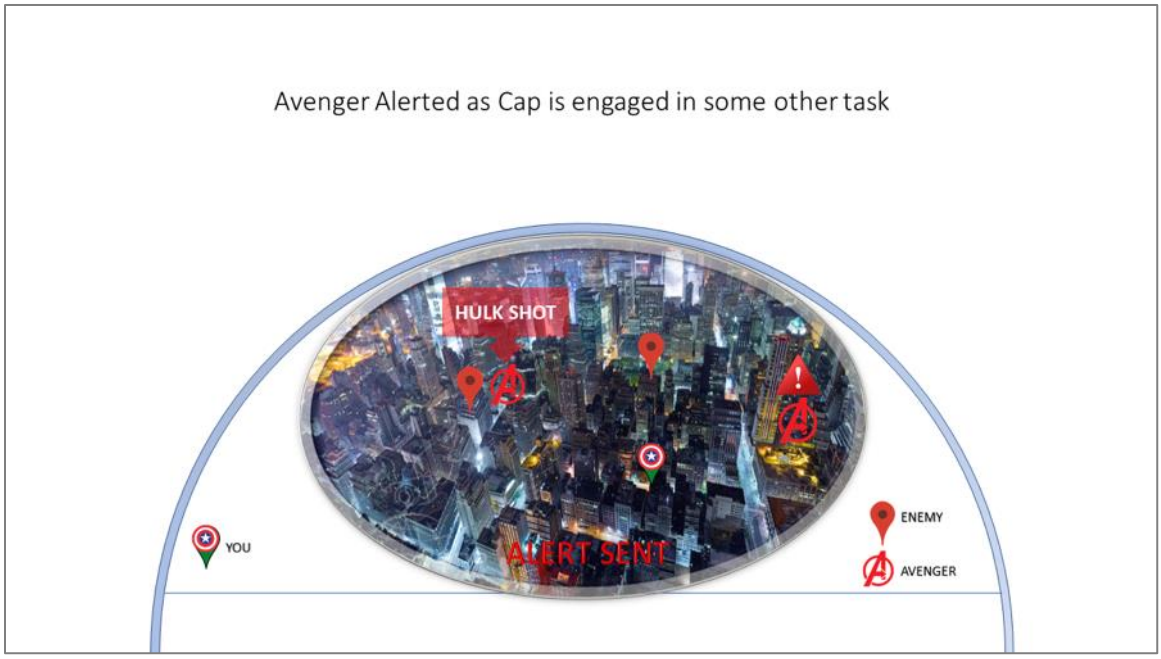


Another scenario where hulk is down



3D view of map showing Hulk is shot

Select an action to go forward and help the avenger or alert others on team



Evaluation of Medium Fidelity Slideware Prototype

Pre-Planning

What design questions do you have about your prototype?
I was pretty much confident that the functionality was clear but I wanted to be clear about organizing data for visual appeal. Also wanted to use whitespace effectively. Finally, with higher fidelity I am concerned about typography(font-face), color, and transitions.

What specific question did you want to learn from your evaluation?
Have an overall flow of the application in the UI. Span of this project and tasks involved are huge, where to limit those?

What "role" did your user take? What information did they receive about the user?
Captain America using the shield. He is the leader of Avengers team and a super soldier who is the best in ground combat skills but is not good at using screens and technology.

What task(s) did your user perform?

Task1: Self combat.
Task 2: Coordination with Avengers.

What compromises did you make with your prototype, and how did you help your user overcome them?

There are no interactions in the prototype currently. Slides do most of the intuition and there is one-line narration for each slide.

How did you document your partner's actions?
Notes were taken while the user used the prototype. The process was also documented using evaluation handouts. This data was accounted for further use and analysis.

Results from Medium-Fidelity Slideware Prototype Evaluation

	Participant	What is *clear* about prototype?	What is *confusing* about prototype?	What is *natural* about interaction?	What is *awkward* about interaction?
Task 1	1	Flow of execution	Nothing	Simple design	Nothing
	2	Layout and actions	Nothing	Intuitive	Nothing
	3	Screen content	Narration required	User-friendly	Nothing

	Participant	What is *clear* about prototype?	What is *confusing* about prototype?	What is *natural* about interaction?	What is *awkward* about interaction?
Task 2	1	Method of communication	Nothing	Simple alerts	Nothing
	2	Coordination between Avengers	Nothing	Notifications	Nothing
	3	Navigation	Nothing	Elements on the map	Nothing

Medium Fidelity V2

Summary of Changes from V1

Between version 1 and 2 there were no visible changes based on the feedback I received from my user tests but for the menu layout which needs to be made common across all screens so that the user need not go to the map every time from menu. I found my answers to my specific questions about type-face, color and transitions. Having a modern typeface and saturated colors and essential AR view transitions would be the most suitable to exercise in medium fidelity prototype. Narration of screens were required as not every screen could be navigated This can be better shown in my medium fidelity prototype using a fancy tool or coding.

Revised Medium Fidelity Prototype

There was not much visual difference with respect to elements in each screen but I decided to keep the menu available for the user at all times at the radius of the circular screen, a suggestion from a participant. This made me remove couple of slides which seemed out of place where Captain checks the menu to go to the map while there is a notification in the Avengers coordination task. I will be able to better showcase the transitions in my medium (using fancy tools) and high-fidelity prototypes where a complete overview of the end product can be visualized.

Reflection on Medium Fidelity with Slideware

A little planning goes a long way. Most presentations are written in PowerPoint and it's the simplest tool which is used by many. It basically gives everyone the ease of use and has a very small learning curve. Since the point of your slides is to illustrate and expand what you are going to say to your audience. You should know what you intend to say and then figure out how to visualize it. In addition to this you have hyperlinks, animations and transitions which enhance and give most capabilities to a designer to create a good medium fidelity prototype to begin with until you move towards high fidelity including most of the scenarios. PowerPoint is easily testable and shareable anywhere without having to pay a price for it. Cost is involved in most other fancy tools and are OS platforms dependent. I used to find most of designers at Deloitte Digital in a front-end engineering setup use PowerPoint as the first form of prototyping tool to start with among agile teams to get a better understanding of the mock-ups to start with and then go for other fancy tools.

Medium Fidelity Prototype in UI Design Tools

Medium Fidelity Prototype in UI Design Tools V1

I created this medium fidelity prototype using HTML5, CSS3, JavaScript and jQuery. I used Sublime text editor for working on the codebase and created the repository on my GitHub account. The prototype was hosted using GitHub pages for users to view and play around with the prototype.

Codebase:
https://github.com/manupeethambar/capShield

Demo:
https://manupeethambar.github.io/capShield/Start.html

Evaluation of Medium Fidelity UI Design Tools Prototype

Pre-Planning

What design questions do you have about your prototype?
Does the prototype do justice to all the required tasks? Changes required in the prototype.

What specific question did you want to learn from your evaluation?
Any functionality errors. Regression testing the completed functions and event handlers.

What "role" did your user take? What information did they know about this user?
Captain America's shield with an inbuilt screen showing the Shield UI behind it.

What task(s) did your user perform?

Task1: Self-combat

Task 2: Coordination with Avengers

What compromises did you make with your prototype, and how did you help your user overcome them?

I have included gif backgrounds to fake few screen's look and feel.

How did you document your partner's actions?

Notes were taken and feedback in the handout was taken primarily for further iterations.

Results from Medium-Fidelity UI Design Tools Prototype Evaluation

	Participant	What is *clear* about prototype?	What is *confusing* about prototype?	What is *natural* about interaction?	What is *awkward* about interaction?
Task 1	1	Interaction flow	Which page I am on	Keywords or labels	Nothing
	2	Well structured	No back button	Self-explanatory	Nothing

	Participant	What is *clear* about prototype?	What is *confusing* about prototype?	What is *natural* about interaction?	What is *awkward* about interaction?
Task 2	1	Placement of options	Back to previous screen	Interaction flow	Nothing
	2	Good execution and flow	Nothing	Map navigation	Nothing

Medium Fidelity V2

Summary of Changes from V1

I have not changed any elements on the prototype from version as there were no visual change required with respect to a medium fidelity prototype. I will certainly include the feedback received in the high fidelity one where it will make more sense to have a back button as essentially Captain America just would not be having these buttons everywhere on the page. There will be involvement of the AR system automatically showing him the scanned person in front of him. The storytelling phase will make more justice to explain all these scenarios.

Revised UI Design Tools Prototype

I used gif images for few backgrounds which fakes a graphic look and feel and aids to visual appeal. The menu was created using CSS transforms and has a smooth transition effect when it appears and greys out the background. I have also used font-icons in the menu to improve attention. I could essentially create different pages and add them to

this code and the prototype would work just fine. I can take this prototype forward and improvise it to a fully functional high-fidelity prototype.

Figure 9.1. Welcome screen

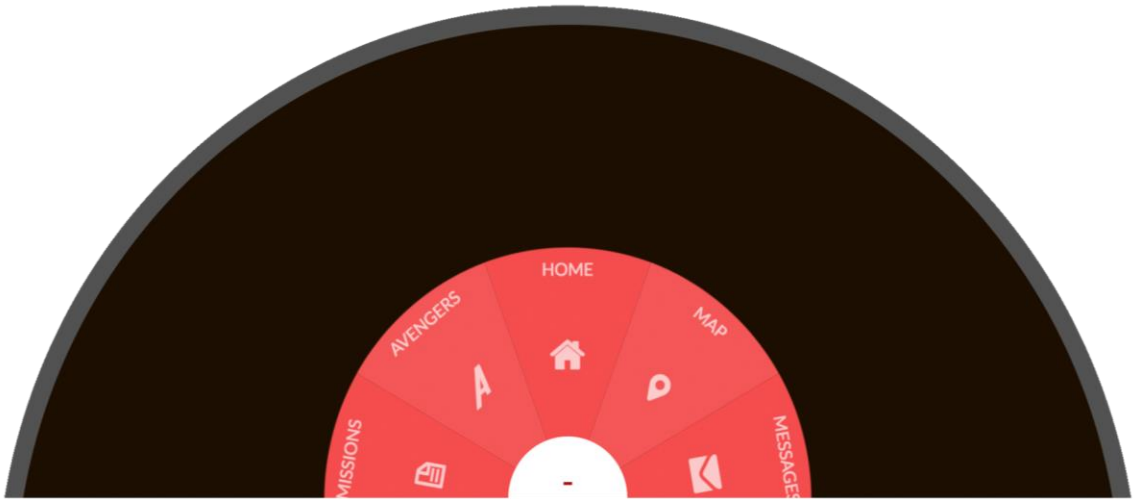


Figure 9.2. Menu showing different functions

Figure 9.3. AR system scanning far targets

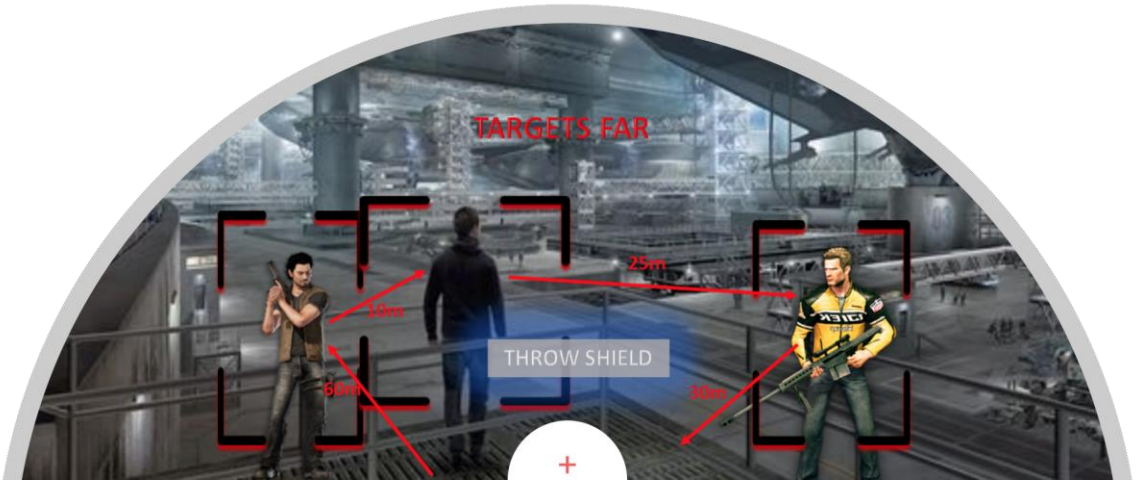


Figure 9.4. AR showing the calculated distance to throw the shield

Figure 9.5. AR system scanning near target

Figure 9.6. AR system showing target details and fight style

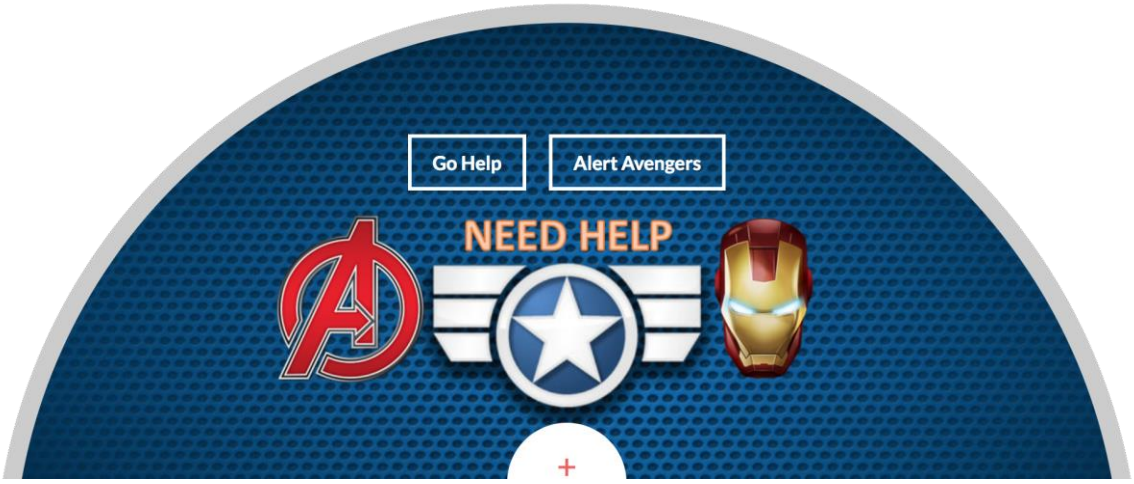


Figure 9.7. UI showing a notification received

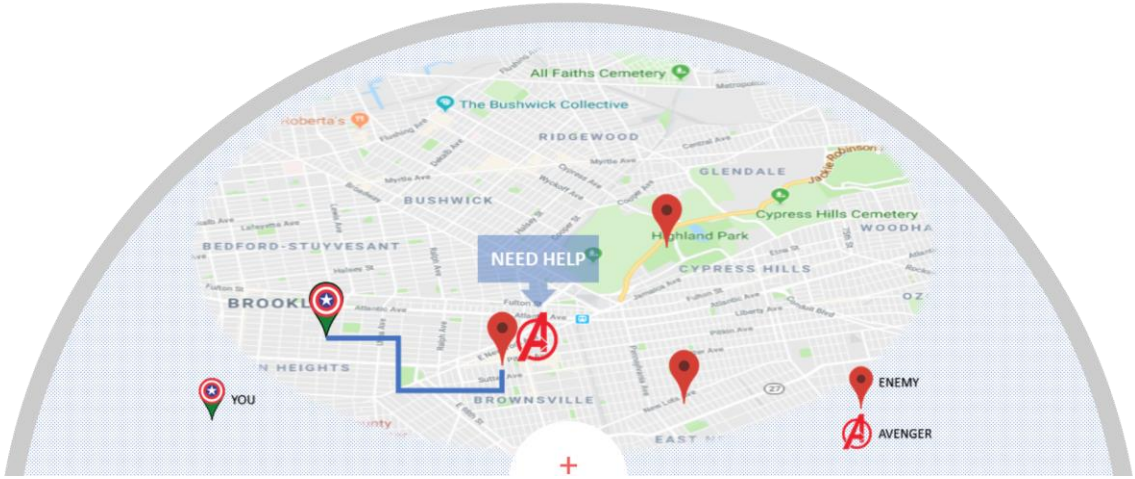


Figure 9.8. UI showing the navigation on map

Figure 9.9. AR system showing details of Ultron

Reflection on Medium Fidelity with UI Design Tools

I had trouble picking up a fancy prototyping tool which could give me the limitless usage of elements for a circular design. Circular design is not simple and requires a lot of thinking and specific forms of elements. I cannot apply a box type menu in a circular design. As I had decided to continue the idea of circular menu available to the user at all times, I had to think through the process of using circular design principles and create circular elements. There was no tool giving me these elements which created circular metaphors or actionable items. The final resort for me to go forward with this was to code the prototype using HTML5, CSS3, CSS transforms, JavaScript and JQuery. These gave me the liberty to create anything I desire for in any shape and not limit elements given by a fancy tool which will not work for my design. This was developed from scratch and I uploaded the code on GitHub account and used GitHub Pages for viewing the web page containing the prototype. The experience was very intensive considering the fact that you need to code everything that appears on the screen.

A quick overview of the prototyping coding languages used:
HTML5 is hypertext markup language used for structuring and presenting content on the World Wide Web.
CSS3 is the third and the latest evolution of Cascading Style Sheets language. It brings long-awaited novelties, like rounded corners, shadows, gradients, transitions or animations, as well as, flexible box or grid layouts.
JavaScript, often abbreviated as JS, is a high-level, interpreted programming language. It is a language which is also characterized as dynamic, prototype-based and multi-paradigm.
JQuery is a JavaScript library which is mainly used to have document object model (DOM) manipulations.

I was a front-end developer in Deloitte digital studio where I have developed data heavy pages with responsive web design and JS frameworks. As developers we used to get visual design document with red-lines or prototypes created with HTML Canvas and some code to showcase the prototype of the entire application. There is always an edge to a developer to create anything he needs with no restrictions or limitations.

Story Design

Story 1: Captain America, infiltrating Batroc's Ship to rescue hostages
Synopsis:
Captain America and Agent Romanoff infiltrate the ship which had been taken over by terrorists lead by Batroc. Georges Batroc is a mercenary and a master of the French form of kick boxing known as savate. Cap with agent Romanoff gets onto a ship full of bad guys by sneaking in. Takes down the security one by one. He does a Sneak attack / offence strategy on multiple securities or bad guys spread out across the ship.
When he has multiple people facing him, he uses his ground combat skills and shield to throw at them, knock them down and gets it back by transfer of energy between multiple opponents.
He uses his Shield UI to get the map and co-ordinates to head to a different mission where he is required.

Story 2: Captain America vs Loki – Fighting Loki and arrest him
Synopsis:
Loki, the god in Norse Mythology that loves to annoy anyone to entertain himself had detained few civilians and forcing to kneel to him accepting that he is God. While Loki was about to kill a civilian using his Chitauri Scepter (Loki's weapon) who did not agree to kneel in front of him, Captain America intercepts the attack with his shield by holding it against the attack line. The shield, made of vibranium absorbs the energy of the attack and immediately releases it back on Loki. He also knows that he cannot defeat Loki with his powers in place but waits for avengers to come in by keeping him engaged in a fight until Avengers ship helicarrier arrived along with Iron man. Captain America used maps and co-ordinates on it for locating his team and sending them an alert. The helicarrier and iron man gets the alert and they reach the location to help Captain America arrest Loki. Loki is arrested and taken to Avengers' custody.
Captain America saves a civilian's life and arrest Loki with the help of his team being coordinated well.

Story 3: Captain America – Fighting Ultron to save Vision
Synopsis:
Captain America checks the co-ordinates of Ultron in a truck on a highway, gets onto the speeding truck by jumping off a flyover to rescue the package of vision which Ultron wanted to use it for his new body by transformation. He is on a mission to save the package of Vision and keep Ultron engaged in the fight.

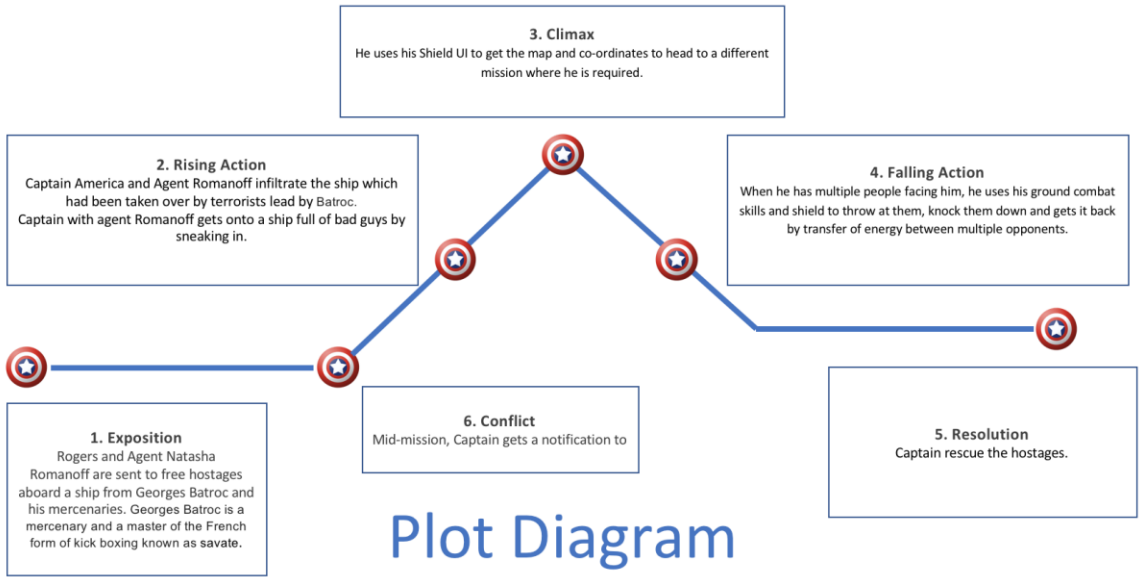
Captain used his shield and combat techniques to fight Ultron on top of the truck by punching him, throwing the shield at him. The shield gave him feedback of knowing how much force he could take and the AR view of Ultron with his details.
When he lost the shield in the combat, this was observed by hawkeye coordinated with agent Romanov to get it back for Captain to use it again.
He then brings his team in to save Vision package by alerting them on his co-ordinates.

Story 4: Captain America Fighting a Humaniod – Fighting Iron man
Synopsis:
Captain fights Iron man in civil war where he had to save his friend's life. Captain tries to save his friend from Iron man and gets engaged in a fight. Captain used his shield and combat techniques to fight Iron man by punching him, throwing the shield at him. The fight takes place in a closed environment. The shield helped him in blocking attacks and swinging it back at him. Captain used the shield by holding it against the line of attack. Cap Shield AR view gave him feedback of how he needs to fight Iron man and more details on the force it could take and also how and where to attack humanoid's suit. Finally breaking his arc reactor with his shield, Captain stopped Iron man from functioning. He was able to destroy a powerful humanoid suit functioning with the help of the shield.

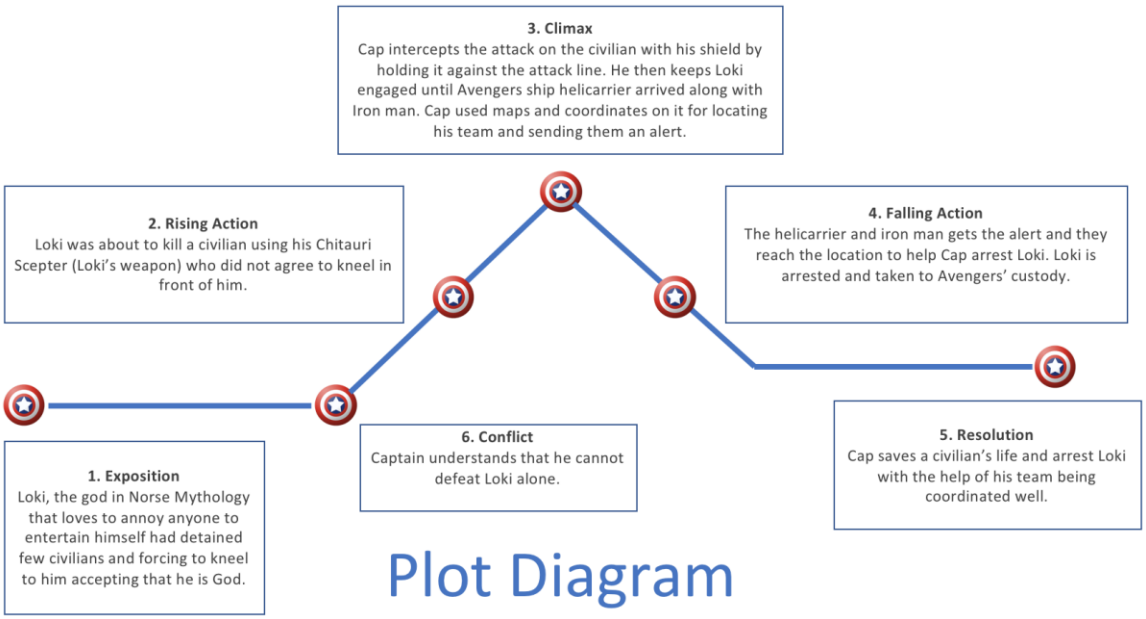
The stories for this assignment was partly derived from few scenes from Captain America character involved movies and partly from my HTA tasks influenced by my imagination.
From the first version to the second one I decided to go ahead with two stories which I felt was very strong to have all my HTA tasks in and fit well. I also wanted it to be easier for the users to know how the Shield UI helps captain in his tasks. I refined the stories to be understandable by the audience by giving some background of the actual scene. Otherwise people who do not follow Marvel or their characters will make no sense of what is going on. My thought process is to have all these go into my final video and to fit in the right frame. I need to direct a short film on this character and I need the audience to understand the scene by having some background on what is happening and what is the vision behind it.

Story Visualization

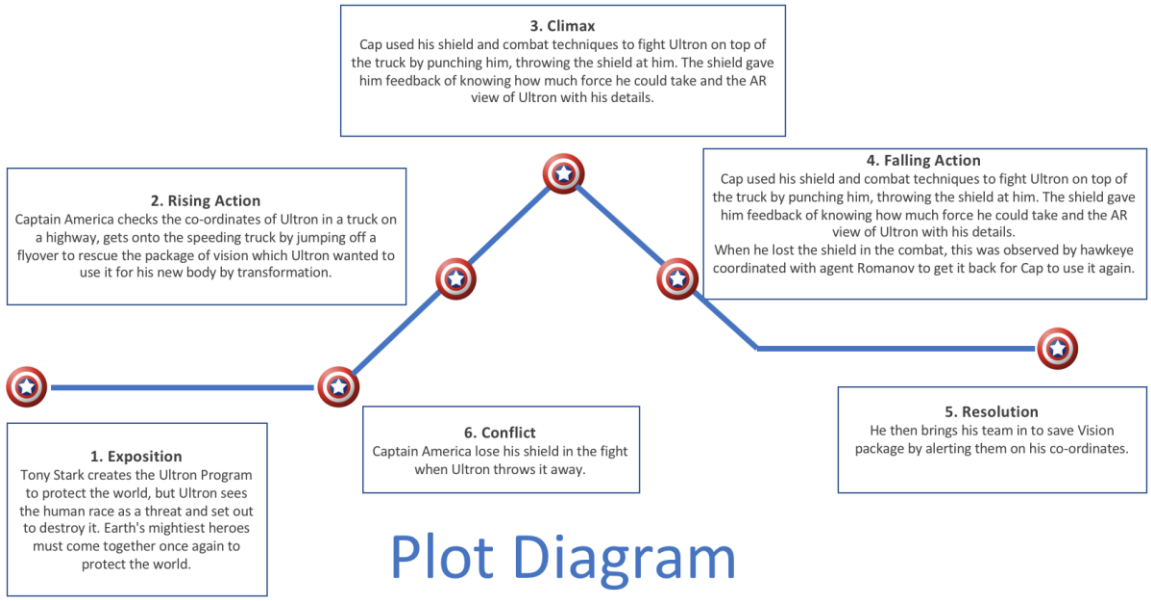
Story 1: Captain America, infiltrating Batroc's Ship to rescue hostages



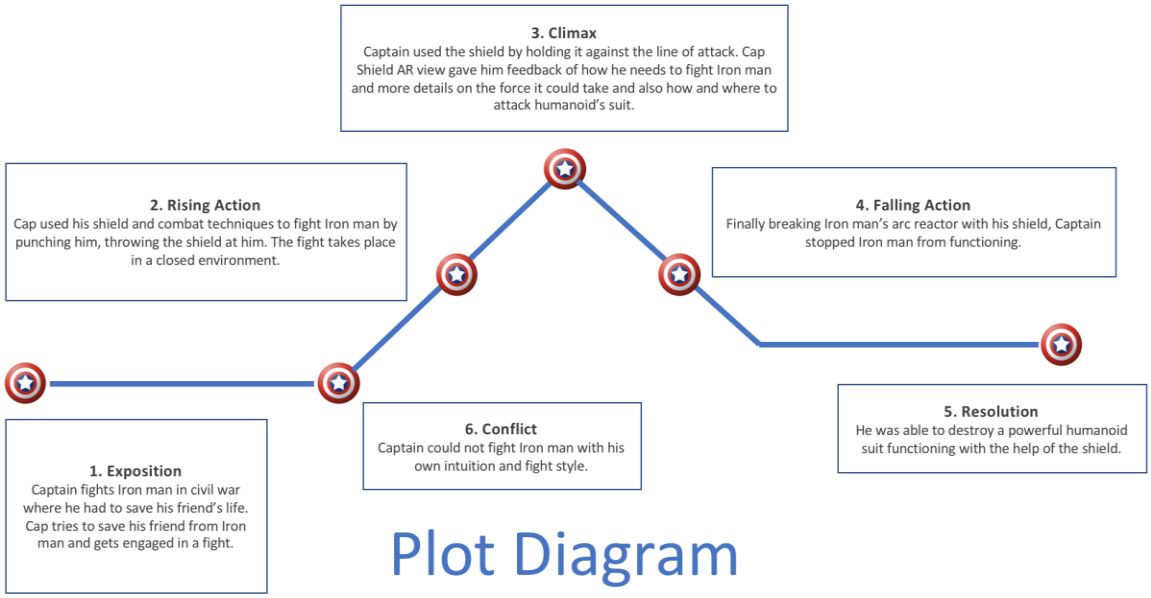
Story 2: Captain America vs Loki – Fighting Loki and arrest him



Story 3: Captain America – Fighting Ultron to save Vision



Story 4: Captain America Fighting a Humanoid – Fighting Iron man



Reflection

I can say that all the four stories involved how Captain America is going to use the new Shield UI for his tasks and based on a story line which runs in few scenes in the movies. I basically watched movie scenes of Captain America repeatedly, specifically where he fails to understand that he is not the right match to the opponent and gets into a fight without thinking twice. I wanted to bring in my Shield UI helping him to change the way

he fights and co-ordinates with his team. The brainstorming mainly was through the whole process of having the idea of using my work on the Shield UI to facilitate him in the scenes and instances where it was difficult for him to think beforehand what to do.

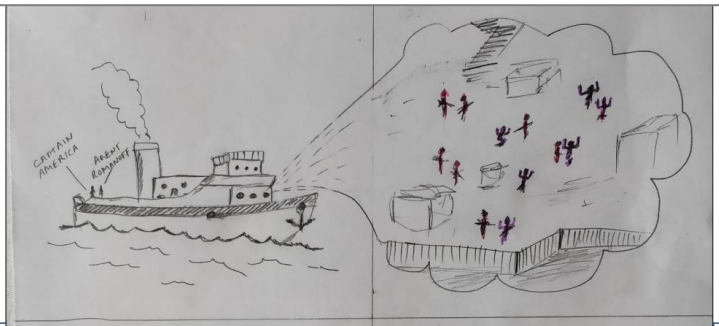
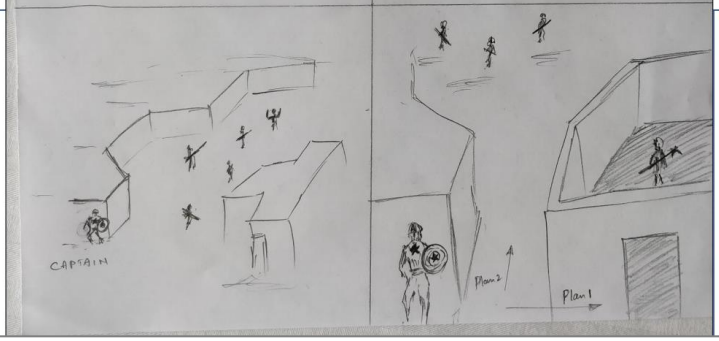
The story visualization tool I used was Microsoft PowerPoint with a simple story diagram which was based on the diagram provided by Dr. Hurst. I added Captain America's shield moving through those story lines in the diagram to basically have the importance of the shield throughout his scenes. I wanted to create a branding pattern for the shield throughout the project. I believe this visualization created a story line and simple to understand representation.

I could relate this to the story design or storytelling which designers in my previous company use to create most of the visual patterns to know how the end user reacts to the product. This is also used to create presentations or advertising the product to the clients while pitching for projects. This is a very strong technique to show how your character uses this device or product in real life where audience know the need and usage. I also feel storytelling happens unintentionally in real life always. Whenever we discuss with friends about some comic or novel or a movie we tend to give some background and plots and climax.

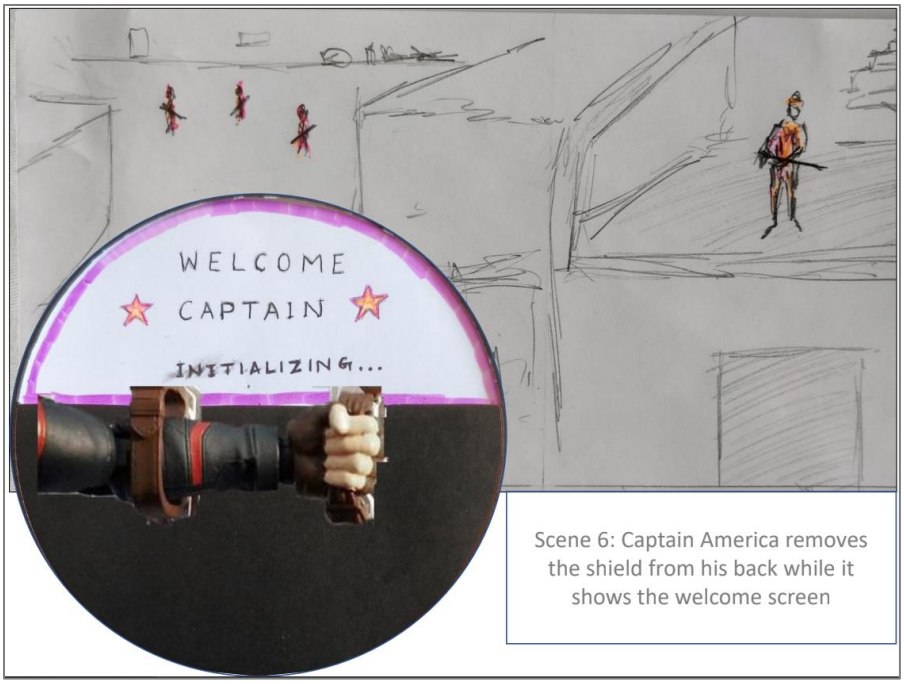
Storyboard and Script Writing

Storyboards were created using sketches created initially for low fidelity prototype and sketches which were made to show the scene according to the storyline. This task gave me the liberty to visualize and materialize how my video in future would look like and what are different frames involved. I could realize the work and effort the script writers and direction team goes through while creating a marvel movie. Also, storyboarding and script writing gave me the essence of how comics are written and walk us through a story.

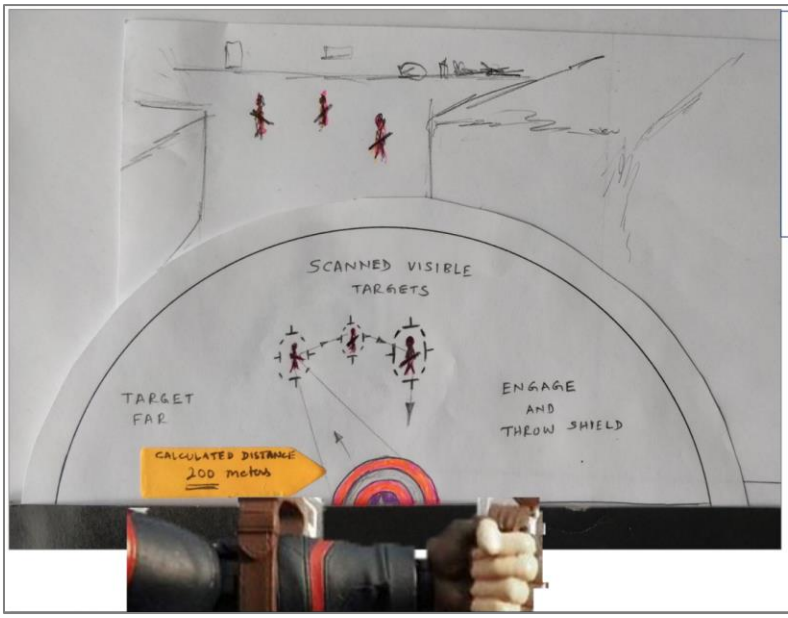
Storyboard 1: Captain America, infiltrating Batroc's Ship to rescue hostages

Scene 1: Captain America and Agent Romanoff enter the ship of terrorists lead by Batroc to rescue hostages		Scene 2: Showing terrorists group and hostages on the ship
Scene 3: Captain America is sneaking in strategically		Scene 4: Captain America uses his shield UI to check the map of the mission and know the co-ordinates of the terrorists and his team

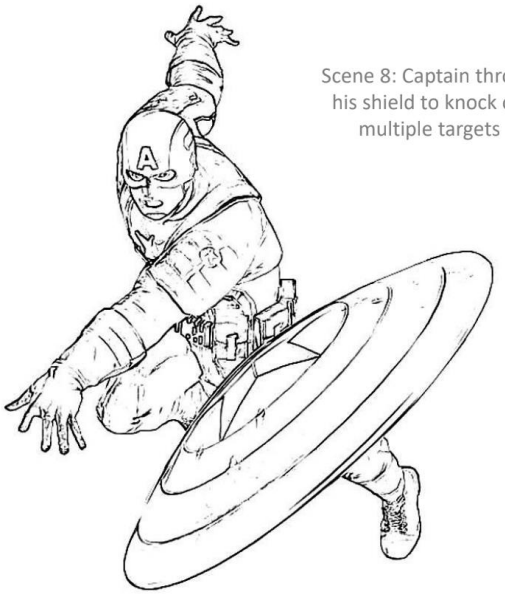
Scene 5: Captain America facing his far opponents



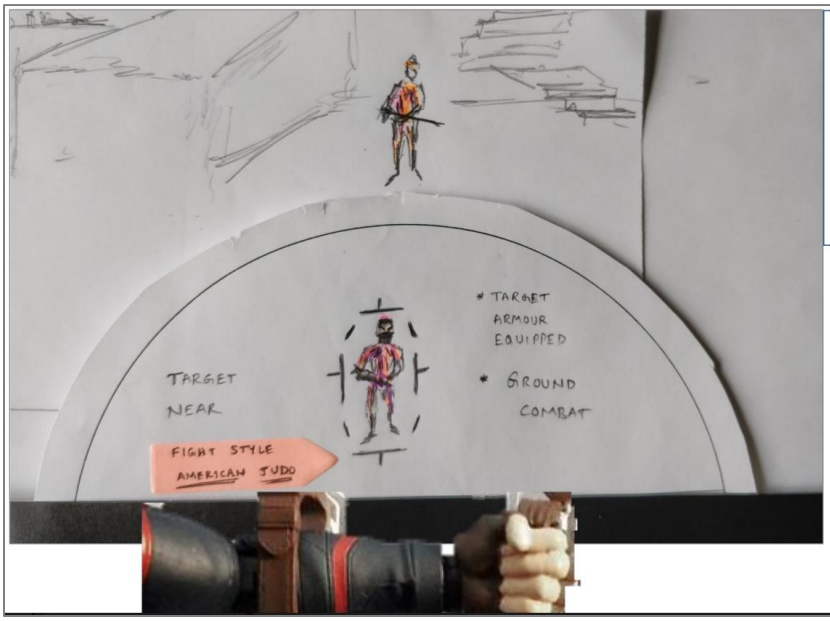
Scene 6: Captain America removes the shield from his back while it shows the welcome screen



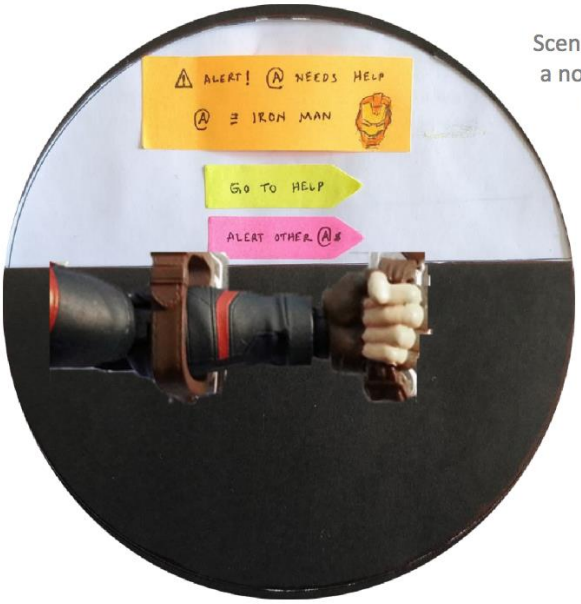
Scene 7: The AR view scans the visible targets to give Captain a legend: distance, target far and throw shield



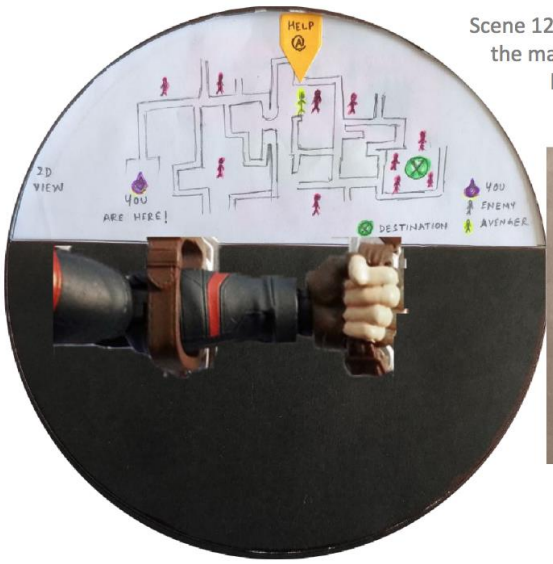
Scene 8: Captain throws his shield to knock off multiple targets



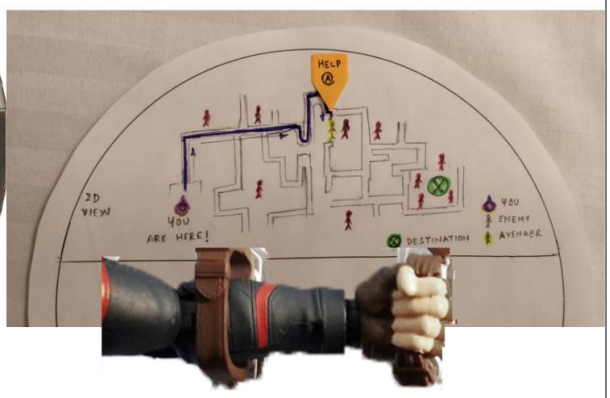
Scene 9: The AR view scans the visible targets to give Captain a legend: distance, target far and throw shield



Scene 11: Captain receives a notification stating Iron man needs help

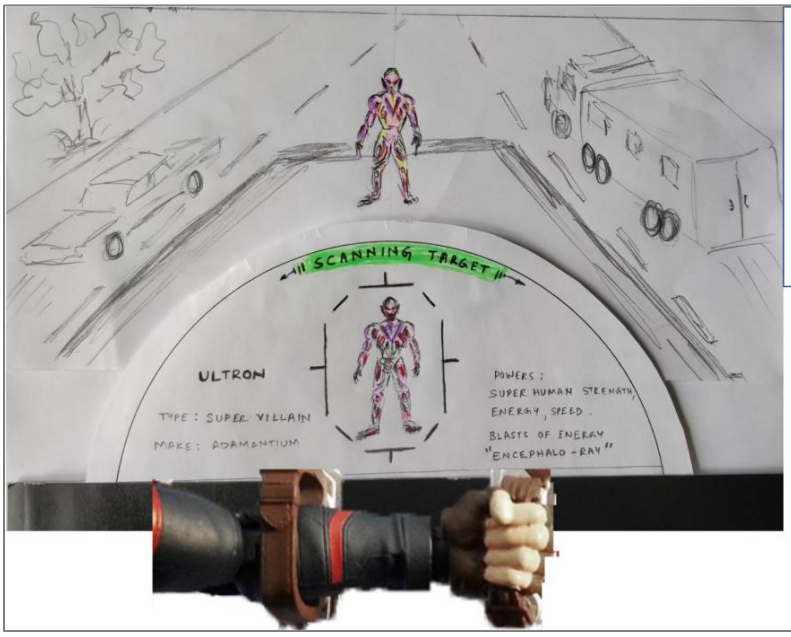


Scene 12: Captain checks the map to go to the location

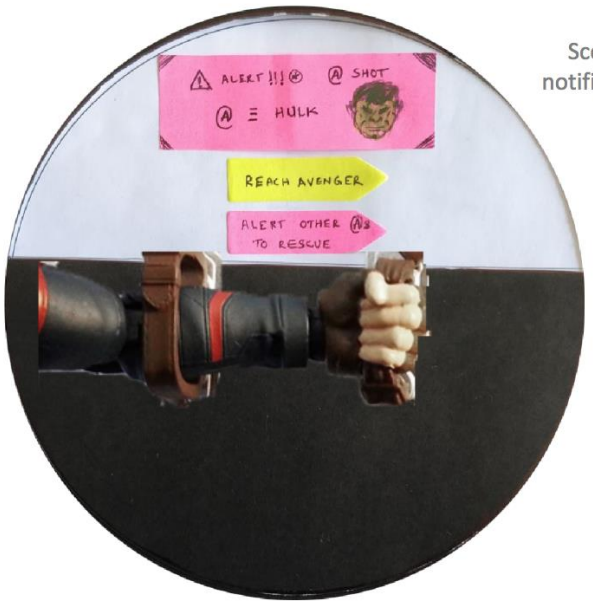


Storyboard 2: Captain America – Fighting Ultron to save Vision

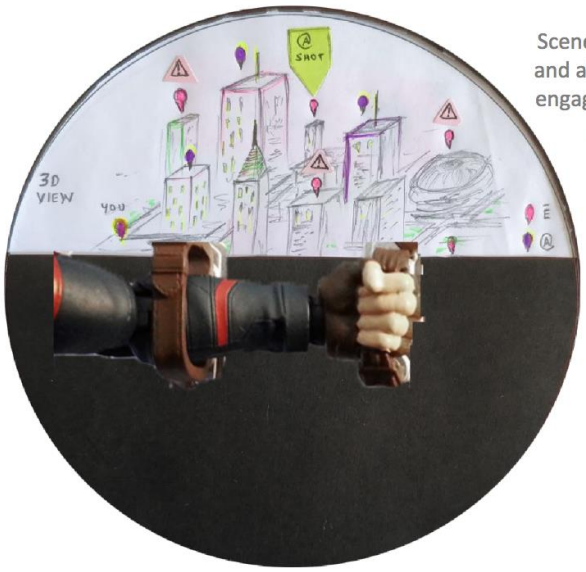
Scene1: Captain America checks the co-ordinates of Ultron in a truck on a highway, gets onto the speeding truck by jumping off a flyover



Scene 2: The AR view scans the visible target ULTRON to give Captain a legend: type, make and powers of scanned enemy



Scene 3: Captain receives a notification stating Hulk is down



Scene 4: Captain checks the map and alerts other avengers as he is engaged in saving Vision package and fighting ULTRON

Script

I used my story design and visualizations to create my script. I used the narrative script for running through my storyline and showing the complex UI technology of the shield. I considered this to be better for showcasing my user and the technology. On the other hand, having a dialogue screenplay would take more time to show what is going on and I wanted to keep the storyline lean, the leaner the better. Hence, I provided what is just necessary by giving more importance on key actions and moments and what is necessary to move the story along.
Writing lean did not necessarily mean to let go the description but using specific words for images, actions and emotions. Using details that are important to develop my character and the plot was necessary to engage the audience.
Writing in present tense was awkward. It took me a while to develop that kind of rhythm. I learnt that I had to make it present tense and active.
As a screenwriter, introducing the character at the start gave me an opportunity to establish the character's personality. Also introducing the places is as important as people that inhabit them. Read the script in appendix to understand these techniques I followed and implemented.

Storyboard Evaluation and Revisions

Initially the storyboards were shown to peers for evaluation and discussion which ended up with good feedback. Feedback was to add more details of user's interaction with the technology and reduce unwanted description in the story. I included more screens and spacing for emphasizing technology of the shield and UI interactions. This also helped me to have a revised version of the storyboard ready to be included as frames in my first video draft.

Storyboard and Script Reflection

Storyboard and script writing developed my ideas and vision of the final video in this project. I normally started sketching storyboards and realized that I had created sketches for my paper prototype. These were of good quality to be reused for interactions on the shield UI. I had to sketch the story related screens where the characters were supposed to be introduced and the scenarios to be included for major plot points. Script demonstrating the concept and how it meets functionality needed to be picturized well and how user interacts with the device in different scenarios and tasks. Wide angle, close ups, point of view sketches were thought through to highlight the composition of the storyline.
Writing a script was the first step to showcase the exposition, rising action, climax, falling action and conclusion. The story board should introduce characters and theme of the story and what are the scenes involved. It also talks about how the character is showcased in the story and the center of attraction of most of the scenes. Script help as

a skeleton for the storyboard and creates a base or foundation to get going with sketching. The script should connect with the audience. Demonstration of the concept and how it meets functionality of the shield UI and how Captain America interacts with the device in different scenarios were of utmost concern.

Designing a Custom Prop or Special Effect

Description of Prop or Special Effect

For my first animated storyboard I used my sketches and paper prototype. Here I used my paper prototype as a prop by placing it on the sketches which gives the viewer a special effect first person view or point-of-view (POV) which is one of the foundations of film editing. Please refer to the storyboards in the previous section. It shows what the character/Captain America is looking at. My prop had to be nothing but Captain America's shield in different forms, either my paper prototype cut to the shape of an internal shield view (Please refer to the paper prototype section) or a digital recreation of the same using many fancy tools and applications.

Figure 10.1. Shield UI showing different scenarios while the prop/shield is used.

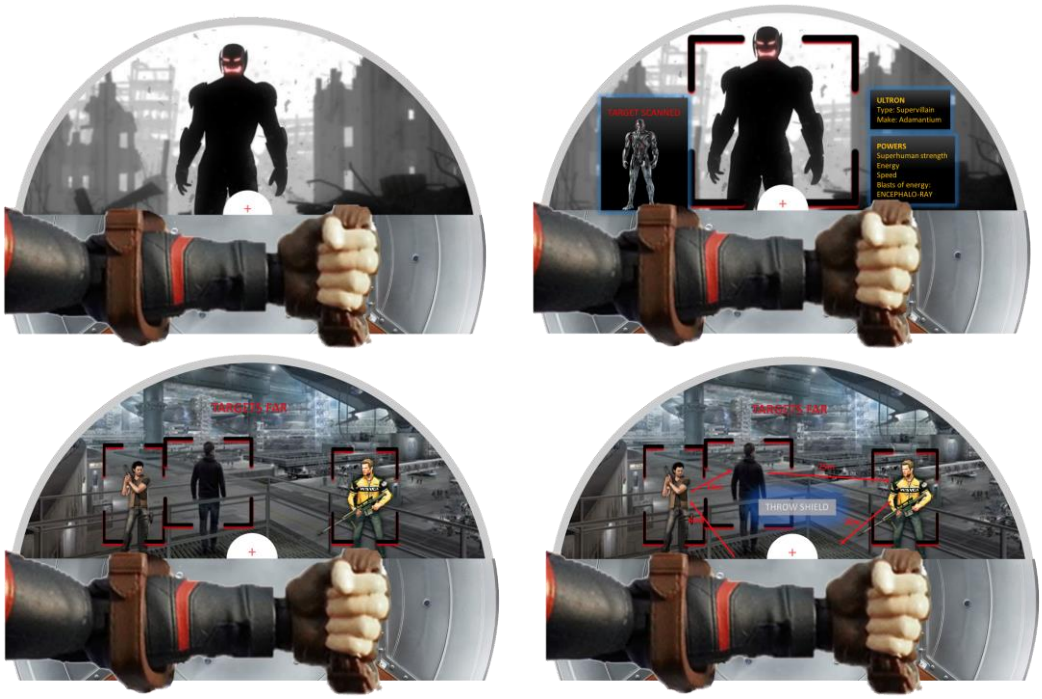


Figure 10.2. Shield UI showing different scenarios while the prop/shield is used.

Design Rationale for Prop or Special Effect

While I used my paper prototype as the prop, I wanted to start my first draft as a low-fidelity one to have a general idea of the whole process involved, basically the skeleton of the idea of the technology used in shield UI. I also wanted to throw light and showcase and credit my process to the viewers or audience.

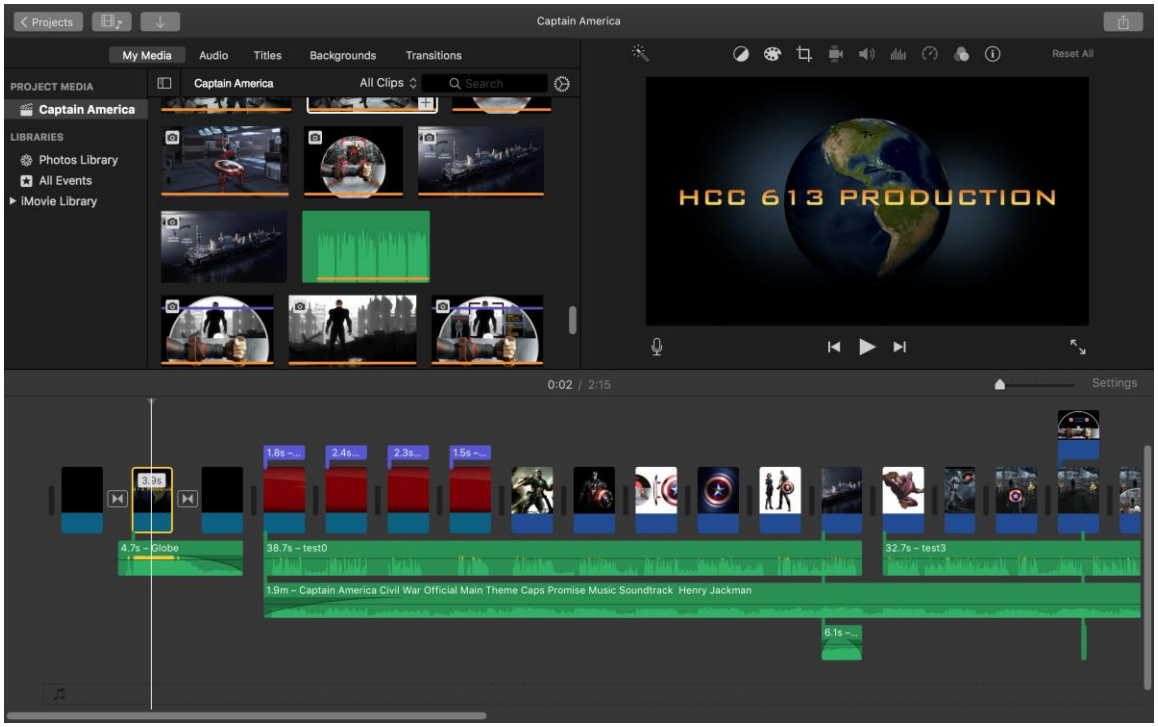
In the digital versions of the animated storyboards, which were developed in the future drafts, evolved into having special effects of animation with sound effects while Captain America moves his shield attached to his hand. Using stop motion technique, I could show the scanning of an opponent or target when Captain holds the shield against the line of sight. This was done having the same frame while nothing changes except the prop, shield UI screen as shown below.

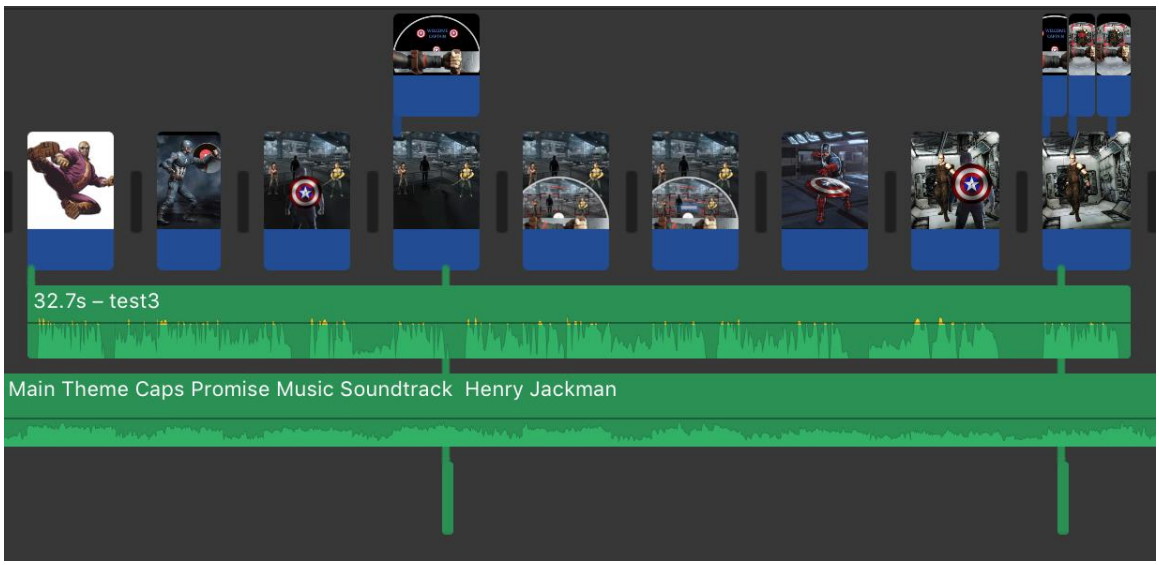
This prop and special effect is appropriate for me as a director and creator of the storyboard and the user as Captain America uses this shield to fight and is his defensive and offensive weapon. While he is in a combat situation, he cannot afford to use the touch interface as even a split-second shift of attention can be costly.
The special effect created using the shield movements and sounds show that the augmented reality system in the shield using the nano-camera automatically detects the shield motion gestures and displays the AR view of the opponent. Also, Captain can use his Shield UI using voice commands and while he is not in a combat, he can even have a touch interface to view map and navigation

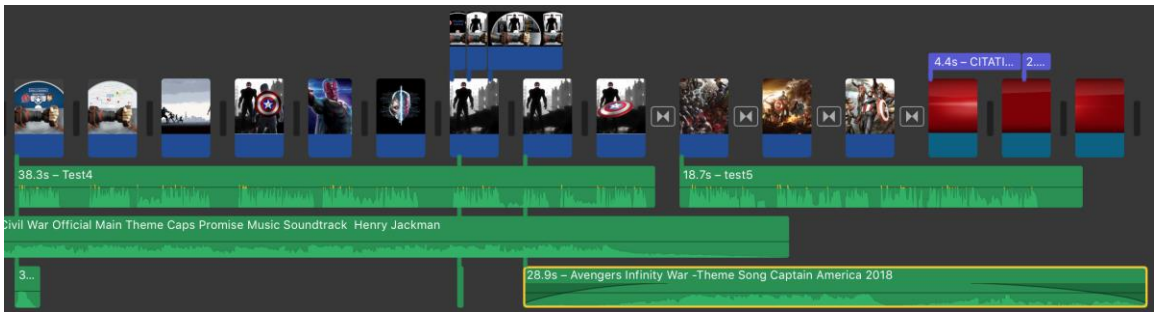
Designing and Evaluating Animated Storyboard

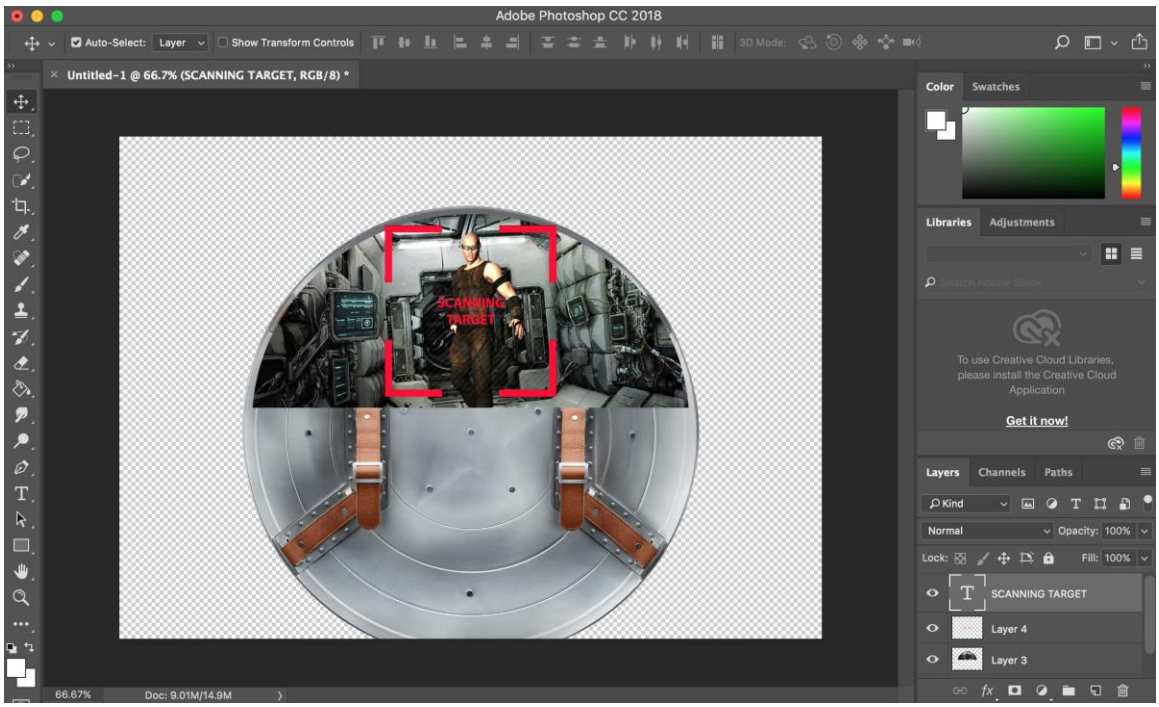
Designing Animated Storyboards

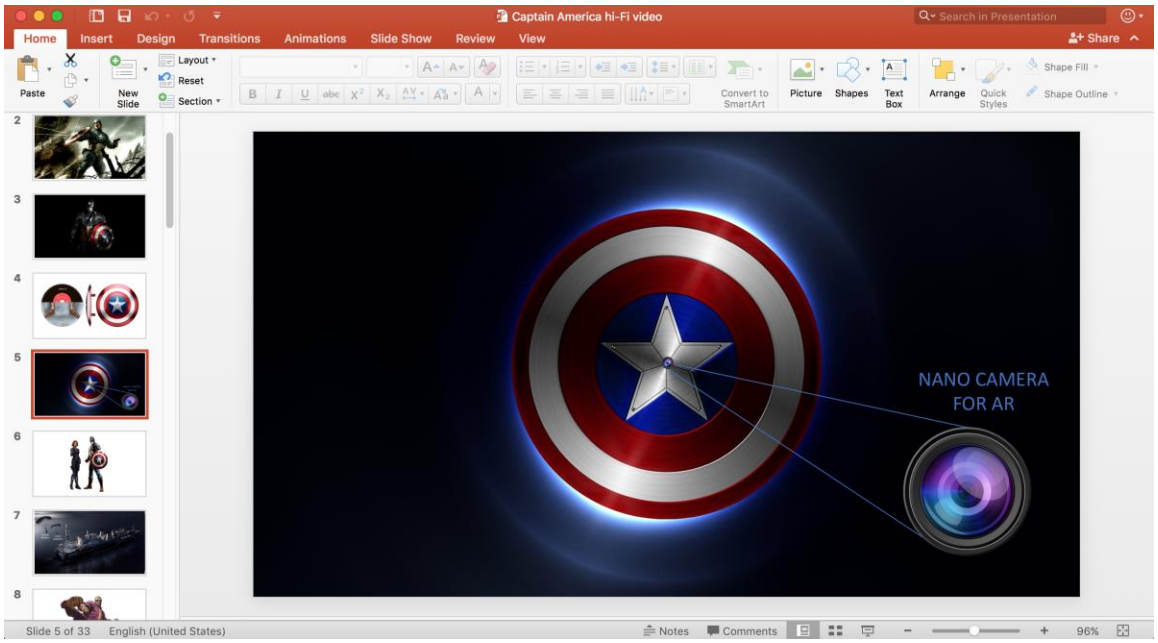
The video tool I used was movavi video editor for my first draft, which is a powerful alternative on Windows for iMovie on Mac. I tried Movavi Video Editor, a great piece of software with lots of functions which help you create your own video masterpiece from scratch on your personal computer or laptop. Movavi is simple yet powerful to use. As this was paid for windows for a pro version, it left a movavi watermark on my video.
I had to have a workaround for eliminating this. I finally resorted to use iMovie, a powerful tool and available only on iOS. There are few projects which you can get inspired before starting with your own video draft. It has its own sound library where you get plethora of sound effects. It has good presets of showing titles, backgrounds and transitions through your storyboard. The storyboard scenes were created using Adobe Photoshop and Microsoft PowerPoint.




32.7s – test3
Main Theme Caps Promise Music Soundtrack Henry Jackman

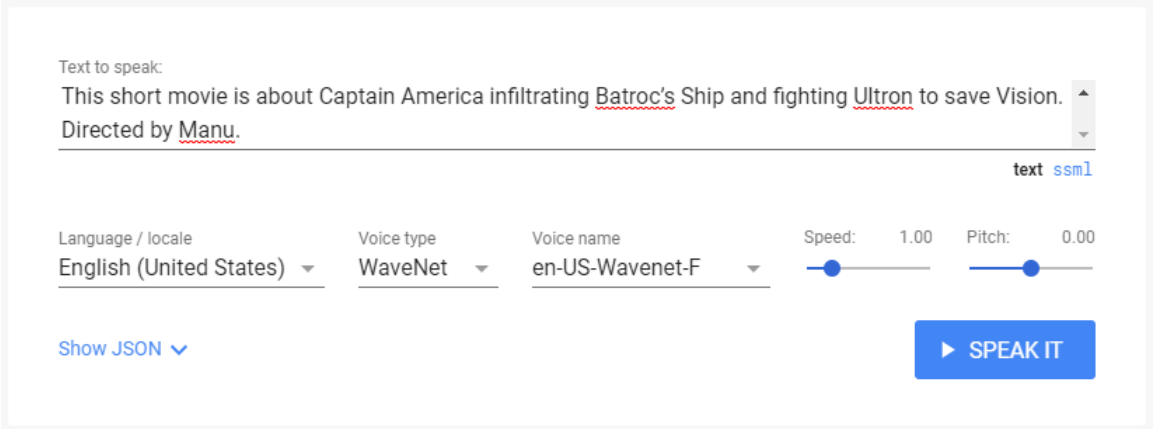

4.4s – CITATI...
2....
38.3s – Test4
18.7s – test5
Civil War Official Main Theme Caps Promise Music Soundtrack Henry Jackman
3...
28.9s – Avengers Infinity War -Theme Song Captain America 2018


Adobe Photoshop CC 2018
Auto-Select: Layer
Show Transform Controls
3D Mode:
Untitled-1 @ 66.7% (SCANNING TARGET, RGB/8) *
SCANNING TARGET
Color
Swatches
Libraries
Adjustments
To use Creative Cloud Libraries, please install the Creative Cloud Application
Get it now!
Layers
Channels
Paths
Kind
Normal
Opacity: 100%
Lock:
Fill: 100%
SCANNING TARGET
Layer 4
Layer 3
66.67%
Doc: 9.01M/14.9M



I used Watson text-to-speech online application for creating the narration in my initial draft. I would wish to create it closer to human voice with my higher fidelity videos. This was simple, yet very useful to use tool, to have a narrative with an expressive tone of Allison in US English.
I had a lot of constructive feedback and critiques from peers, Dr. Hurst and her teaching assistant on the audio being slightly robotic. I always followed google cloud products and their research on creating speech which is almost equivalent to a human speaking. My final draft of the animated storyboard had to involve this technology which I had presented in my last inspiration showcase during the course.

Google cloud text-to-speech enabled me to synthesize a natural-sounding narration. This is available in multiple languages and 32 voice variants. It applies DeepMind's groundbreaking research on WaveNet, powered by Google's powerful neural network APIs on machine learning delivering the highest fidelity possible. One can change the language, voice type, preset voice names or even change the speed and pitch to have a totally different texture and quality of sound. It also gives a JSON object for developers who can extend this on their APIs and build on this platform.



Request URL

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https://texttospeech.googleapis.com/v1beta1/text:synthesize
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Request body

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    "text": "This short movie is about Captain America infiltrating Batroc's Ship
and fighting Ultron to save Vision. Directed by Manu."
  },
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    "name": "en-US-Wavenet-F"
  }
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Evaluating Animated Storyboards

My peers in the course evaluated the first draft of the animated storyboard. Everyone's work was presented in this session of evaluation which facilitated good learning from each other's work. Each evaluator was given 10 forms which had good blend of story related questions and the technology one has used.

I was really impressed by this evaluation process influenced by Dr. Hurst at this point of having the peers evaluate the work as they are the best ones to know what is going on and what is the motive and process behind all these drafts over weeks.

I also understood in the following weeks of evaluation, as to why Dr. Hurst emphasized over having different audience week after week to show a new draft video. My friends

who initially evaluated the second draft felt that it's the same video when I presented them the third one. This alarmed me and had to start showing different set of audience week after week to improvise my video. The evaluators consisted of a blend of diehard Marvel fans and also the ones who have hated science fiction and movies on them. I feel privileged to say this, one of my very close friends who was from this "dislike sci-fi group", is now a great fan of Marvel after watching my creation and work. He is on a sci-fi movie marathon since then.

Overview of Evaluators

Version Number	Total Number of Evaluators	Evaluation setting or recruitment technique	Main Theme from Evaluation
1	10	In-class evaluation with classmates	Blend of mixed reactions: storyline reduction, confusion with interaction
2	5	Video uploaded to google drive and shared using a sharable link to friends	Input not clear, continuity of two stories
3	5	Video uploaded to google drive and shared using a sharable link to a group of friends on WhatsApp	Input to the shield, High fidelity video expectations
4	5	Video uploaded to google drive and shared using a sharable link on Telegram application to a group of ex-colleagues who are designers	Uniformity of screens, gesture animations required
5	15	Video uploaded to google drive and shared using a sharable link to all the people who critiqued till now	Positive feedback and final draft catered to all feedback

Table [1]. Overview of animated storyboard evaluation process, number of evaluators, and main results.

Version 1: Low Fidelity Animated Storyboard with In-class Evaluation

Prototype Description

I was so excited to get to this stage of prototyping, storyboarding using low fidelity video. All the previous assignment chunks formulate or amalgamate here for the final video drafts. I used my low fidelity sketch and prototypes for including the main element of the project, the shield UI of Captain America. Sketches which I had created for my storyboard and scripts were essentially the place to start and continue. In fact, there were more scenes to be sketched and referred to for the additional scenes. These were few of the filler scenes required to support the actual full-length narration. Every new character introduced had to have a picture to show, every scenario and tasks had details in sketches so that the audience understand and minimize ambiguity.

I had to compromise on having to use a Mac for using iMovie. I had to settle down with the movavi video editor for atleast the first draft. I realized after I imported the video that movavi left a watermark on the frames which was very annoying to viewers. It was a lot of work which had to be done over iMovie again. The draft was still able to show

most of the frames without a watermark. I had to quickly find a way to get to use a Mac for my future versions. Also, there was compromise with respect to colors and digital UI as this was low fidelity and used sketches.

Overview of Evaluators

The animated storyboard was shown during our class session on a large projector and a short evaluation sheet was completed by 10 of my classmates.

Evaluation Feedback

Description of Feedback	Positive or Negative Feedback?	Number of people who said it
Not enough details about interaction: Gesture or touch or voice	Negative	[5/10]
Great narration	Positive	[5/10]
Large story	Negative	[4/10]
Good illustrations	Positive	[3/10]

Table [2]. Overview of common feedback from evaluation

Reflection on Feedback

The above all else assignment was to settle the issue of watermark. I lent a Mac workstation to reproduce the version on iMovie. I wish to lessen the narration by rethinking the content and taking out the additional bits wherever conceivable.
It was truly evident that even though, the peers comprehended what was the tale about, there were numerous points of interest they couldn't get. Initial step to take with a specific end goal to address this feedback is to reconsider the content and evacuate a few elements that could be viewed as unimportant. Moreover, it is critical to dispose words that don't give relevant data and subtle elements on how Captain America interacts with the system.
I want to continue the good work, which I was complemented on illustrations and good narration through my future drafts, when it gets to high-fidelity.

Version 2: Low Fidelity Animated storyboard with a group of old friends

Prototype Description

I utilized my low fidelity prototypes and sketches again for this draft too. Representations which I had made for my storyboard and content were basically the place to trial and proceed to my high-fidelity video. Indeed, there were more scenes to be outlined and alluded to for the extra scenes. These were few of the filler scenes required to help the real full-length portrayal.

I reduced the narration by rephrasing my script and thoughtfully shortening it. I wish to play around and settle most of the deficiencies in the initial drafts, with the goal that I can focus on the last fixes and effects in the later drafts.

Compromises and bargains again incorporate utilizing low fidelity sketches which won't be incorporated into the future versions as I would plan to incorporate high fidelity digitally edited frames which will make the audience more engaged in the future versions.

Overview of Evaluators

This time I uploaded the video to google drive and shared it to an old group of friends who were new to Marvel and who were acquainted well with Marvel characters and movies. They answered questions about how much they know about the character in the video, what technology is used, interaction with the technology, what made sense to them and what more could be added: character details or technology details or story.

Evaluation Feedback

Description of Feedback	Positive or Negative Feedback?	Number of people who said it
Output is clear in the shield UI based on AR	Positive	[5/5]
Input is not clear	Negative	[2/5]
Continuity of two stories	Negative	[2/5]
Appropriate use of technology	Positive	[4/5]

Table [3]. Overview of common feedback from evaluation

Reflection on Feedback

Video kept the audience very engaged and they seemed to have no distraction as compared to the first draft which had an annoying watermark. I could not work on the interaction bit as I could only show that using a prop or special effect using high fidelity frames. The reason being this technology is an augmented reality system which automatically detects the motion gestures of the shield while it is attached to Captain America's arm.
Couple of friends who have worked on AR technology previously and were developers could understand and were able to have positive feedback, although there was no interaction bit which was worked on in this draft, as they knew the rationale behind using AR and the application uses of the same.

Version 3: Low Fidelity Animated prototype with diehard Marvel fans and sci-fi haters evaluation

Prototype Description

The main goal of this prototype was to finally finish all workarounds as I planned to move to high-fidelity in my next version. I had clearly made essential changes to keep it ready for my friends who were diehard Marvel fans and sci-fi haters. I wanted to have the perfect blend of constructive criticism for the draft video in order to step forward to create a high fidelity one.

Compromises made included previously discussed low-fidelity draft ones. I wanted to employ the rule of getting things right at the low-fidelity stage before moving and dedicating time on high-fidelity draft. It seemed to few repeating audience that this was very similar to the prior version but my main focus was to get more feedback from the new viewers.

Overview of Evaluators

Video was uploaded to google drive and shared using a sharable link to a group of friends who were diehard Marvel fans and also sci-fi haters. They answered questions about how much they know about the character in the video, what technology is used, interaction with the technology, what made sense to them and what more could be added: character details or technology details or story.

Evaluation Feedback

Description of Feedback	Positive or Negative Feedback?	Number of people who said it
Purpose of Captain America being the leader of Avengers highlighted in story	Positive	[3/5]
Use of the smart Shield UI	Positive	[4/5]
High fidelity video expectations – Low-fi started seeming similar	Negative	[3/5]
Latest technology and its use makes sense in the shield	Positive	[2/5]

Table [4]. Overview of common feedback from evaluation

Reflection on Feedback

I contacted my prompt companions who are awesome Marvel fans and another who abhors sci-fi. I requested them to watch the video with their companions and associates at work when they have spare time (I presently see how a short 2+minutes video helps in quickly watching it and not requiring excessively of somebody's investment of time and effort). I at first was exceptionally hesitant to limit my video to 2 minutes. I am currently sinking into the way that individuals need to be engaged and seemed well and

good finished what they watch in the briefest way. Overall it would take a greatest of 5 minutes for viewing the video and evaluating it utilizing the evaluation form.

There was a considerable measure of energy while the watchers viewed the video. They were exceptionally amped up for the work we do. My friends were more energized when I said that I will think about their significant criticism to make my last draft of the video. They are anticipating the following draft release and are eager to observe how their expectations are met through evaluates and input. I see a feeling of inclusion and excitement among all as this idea of presenting an AR system inside Captain America shield is a pioneer to itself and altogether different experience to the Marvel audience and others also.

Version 4: High Fidelity Animated prototype with ex-colleagues (designers)

Prototype Description

I increased the fidelity from a low fidelity video loaded with hand drawn representations and sketches, and for the most part a black and white theme with couple of basic hues, to a high fidelity one. It was a tedious procedure to redo everything except for I had this vison of moving from a lo-fi video to a hi-fi video, a comparative procedure to what occurred in the low-fidelity to high-fidelity prototypes.
I will be having my last and final video draft using special effects and animations which would finally cater to all feedback received through these draft versions.

Overview of Evaluators

The animated storyboard was uploaded to google drive and shared using a sharable link. They answered questions about how much they know about the character in the video, what technology is used, interaction with the technology, what made sense to them and what more could be added: character details or technology details or story.

Evaluation Feedback

Description of Feedback	Positive or Negative Feedback?	Number of people who said it
Navigation and map is used well	Positive	[4/5]
Story navigates well to two different locations and storyline.	Positive	[3/5]
Uniformity of screens	Negative	[3/5]
Gesture animation required	Negative	[2/5]

Table [5]. Overview of common feedback from evaluation

Reflection on Feedback

Dr. Hurst always gave me specific challenges on the most proficient method to revisit the video versions week after week. Regardless of whether there was a great deal of

work and imaginative idea included, I continued propelling myself on finding different approaches to get it going. I anticipate keeping the uniformity between screens and including animations in final draft which will indicate Captain America moving the shield for his interactions and AR system functioning.

Version 5: Final Draft - High Fidelity Prototype with anxious all round ex-audience

Prototype Description

This being my last video draft, I had to touch base on all the relevant feedback over five weeks of changes in drafts. There was rigorous learning, brainstorming and critiques involved in these weeks. I mainly wanted to concentrate on the motion sensing bit for AR system functioning and changes in the screen for uniformity suggested by Dr. Hurst. The most important message to convey through this version was to revisit all the evaluators who were associated with the previous versions and have a tribute to all their valuable feedback over weeks to have my final version.

This time there were no compromises made while making the video and all the feedback points were clearly addressed.

Overview of Evaluators

The evaluators were given the sharable link to watch the final draft video. This time there were no particular questions asked, however I needed to allow them to stand up their genuine assessment.

Evaluation Feedback

Description of Feedback	Positive or Negative Feedback?	Number of people who said it
Very good detailing of frames	Positive	[10/15]
Interactions can easily be understood	Positive	[12/15]
Very good storyline and narration	Positive	[13/15]
Adequate sound effects	Positive	[9/15]
Audio clarity is exceptional	Positive	[12/15]

Table [6]. Overview of common feedback from evaluation

Reflection on Feedback

Generally, I would state that feedback I got from all round evaluators was certain and they all comprehended the technology and how the user interacted with it. By and large, the changes in the visual part of the video alongside the story was generally welcomed.

Every one of the evaluators since the beginning was demonstrated the last draft. They were surprised and excited to see how all their inputs tended to create a final draft of the video.

Final Reflection and Conclusion

If I had only one hour to solve a problem, I would spend up to two-third of that hour in attempting to define what the problem is – This was the learning I earned through this whole process of design so far. The best thing to know the usability goals or constraints is through user research and not research on google. Data collected through real users is unlimited source of ideas. Building the persona, and specially designing this special UI screen to make tasks simple to the character engages the designer in a constant unit testing and regression testing loop until the finished prototype model is achieved. The purpose of a sci-fi character or the persona and the design process behind it is to create reliable and realistic representations of your key audience segments for reference. Focusing on user goals, current behavior and pain points are usually good for communicating research insights and this relates to user and entire product development process.

I believe my design will do real justice to the usage of shield UI for Captain America as it is pretty intuitive and he is believed to be backward in technology usage. He is very fast in learning and I feel this will help him in managing his tasks with ease. This concept will create a new thought process on circular design and the rationale behind it. Though challenging, it is always good to think out of the box and try something totally unconventional. On the other hand, there are few constraints which needs a story to be narrated to exhibit the overall usage of the device and how feasible it is for any user to use it. There are few elements which are exceptions in instances where the device is lost during a fight and the means to track it. It can be better explained in the storytelling process.

I had trouble getting a favor prototyping tool which could give me the boundless utilization of components for a circular interface. Circular isn't basic and requires a ton of reasoning and specific types of components. All this paved me to write my own code and have the liberty to create anything from scratch to a finished prototype. The stories for scripts were incompletely gotten from couple of scenes from Captain America character included films and halfway from my HTA analysis, influenced by my creative ability.

I can state that all the four stories included how Captain America will utilize the new Shield UI for his undertakings and in view of a story line. Storyboards were made utilizing sketches made at first for low fidelity prototype and sketches which were made to demonstrate the scene as indicated by the storyline. This assignment gave me the freedom to envision and appear how my video in future would look like and what are distinctive frames included.

I utilized my story design and representations to make my script content. I utilized the narrative script type for going through my storyline and demonstrating the complex UI innovation of the shield.

I needed to begin my first video draft as a low-fidelity one to have a general thought of the entire procedure included, fundamentally the skeleton of the possibility of the innovation utilized as a part of shield UI. I likewise needed to toss light and grandstand and credit my procedure to the audience.
By and large, I discovered this experience very challenging since it requires a psychological procedure that one needs to get used to. This process plainly characterizes the cutoff points and limits of each progression taken, which some way or another power us to take a pre-characterized structure. Its upside is that it makes the procedure considerably more reliable and encourages documentation. Since this is an all-round organized process, moving from one stage to the other feels truly regular.

I need to state that this has been an exceptionally fascinating journey. The procedure was difficult, for the most part because of the brief timeframe given for turning in expectations, yet in the meantime, it has been exceptionally fulfilling. The philosophy proposed all through the whole procedure has certainly helped me with a specific end goal to enhance the nature of work I can deliver and be perfect in what I am doing going over iterations.

Acknowledgements

I might want to thank each and every one of my classmates from HCC 613 at UMBC, for taking the time and exertion of assessing my material and giving profitable input and feedback. It unquestionably helped me to create thoughts that I executed in the prototypes and videos. I additionally might want to thank every one of my companions, friends and ex-colleagues who helped me to assess my work done on this course venture. Their remarks and proposals urged me to search for new thoughts and answers for every issue that was introduced all through the whole procedure. Their significant input gave me another point of view and persuaded me to make new methodologies on the conceptualization and outline of new interfaces. I am also obliged to my mentor, Dr.Hurst who was an integral part of the process of guiding me in the right direction whenever I was lost or wanted a challenge. Her suggestions and recommendations were really helpful at the time of focusing on the functionalities and implementation of my prototypes.

Citations

1. Captain America: https://en.wikipedia.org/wiki/Captain_America
2. Steve Rogers: http://marvel.com/universe/Captain_America_(Steve_Rogers)
3. Movies: Marvel Cinematic Universe. https://en.wikipedia.org/wiki/Marvel_Cinematic_Universe
4. Comics: http://marvel.wikia.com/wiki/Captain_America_Comic_Books
5. http://marvelcinematicuniverse.wikia.com
6. http://disney.wikia.com
7. marvel studios art: imgur
8. http://wallhere.com
9. http://deviantart.com
10. Video tool: Movavi video editor, iMovie, Microsoft Powerpoint, Adobe Photoshop.
11. Audio tool: Watson text-to-speech, https://cloud.google.com/text-to-speech/
12. Captain America official main theme civil war Cap's promise sountrack by Henry Jackman.
13. Avengers infinity war theme song – Captain America 2018.
14. Special sound effects - www.freecound.org

Appendix

Video Narration Script

- This short movie is about Captain America infiltrating Batroc's Ship and fighting Ultron to save Vision. Directed by Manu.
- Steve Rogers, a military soldier, also Captain America is the leader of Avengers.
- Being Captain America, comes at a price as he attempts to take down a terrorist organization and rescue hostages.
- He has a new shield, which has a touch UI screen inside showing augmented reality view by gesture recognition, using a nano camera at the center of the face of the shield.
- Captain America and Agent Romanoff infiltrate the ship which had been taken over by terrorists led by Georges Batroc.
- Batroc is a mercenary and a master of the French form of kick boxing known as savate.
- Captain America uses his Shield UI to fight the bad guys on the ship who are spread across.
- Captain America takes down the security one by one by sneak attack.
- When he has multiple far opponents, augmented reality view alerts him to throw shield, and the distance to throw the shield.
- He locks multiple targets and throws the shield to knock them off.
- When the target is near, the shield UI alerts him to use American style judo.
- After the Batroc mission, Captain gets a notification and voice alert from Iron man asking for help.
- Captain heads to the location by using the navigation in the Shield UI.
- Avengers had to reassemble to stop Ultron from causing mass destruction.
- Captain America checks the co-ordinates of Ultron to rescue the package of vision.
- Vision is a synthetic human body which Ultron wanted to upload his mind into and transform.
- The shield UI gave him feedback by displaying augmented reality view of Ultron with his details.
- Cap used his shield and combat techniques to fight Ultron by punching him, throwing the shield at him.
- He then brings his team to save Vision by alerting them on his co-ordinates.
- Avengers go into action to try and defeat a virtually impossible enemy together.
- Earth's mightiest heroes led by Captain America come together once again to protect the world from global extinction and keep peace and harmony.