

INTERFACE DESIGN FOR A MILITARY TRAINING TOOL

CHAPTER 1: FULL DETAIL MOCKUP

Design Decision:

While designing the mockup of OrMiS (a military based application) tablet and digital tabletop interface the main parameters that were considered were based upon the main user whom we expect to use the system. From the previous section of this report we know that our main users who will operate OrMiS will be retired military officers and may or may not have in depth technical skills.

Moreover, the feedback we received from wireframe testing was also taken into consideration while designing this interface. The late section of this report elaborates on specifics that were modified from the original wireframe structure.

Attention to each and every detail like color schemes, dimension of each button/icon and also textual information was based on these basic parameters.

The main parameters that we looked at were as follows:

1. **Design for Military Setting:** Overall outlook of the interface should be designed taking into consideration the military environment. Since this technology will be used in and around military environment, the overall structure should match the existing military setting. The tablet and digital tabletop screens should blend in with all other screens present in the vicinity. The emotion and feel of interface should be compatible with military based context.
2. **Design for old age users:** From the personas in previous section we know that majority of our users will be retired military officers over the age

of 55 years. Hence the interface should be user-friendly for old people.

The icons and buttons should be large enough for old users to recognize.

The font and color should be readable.

3. **Design for broad range of users:** As we found from persons that the retired military officers may or may not have technical background. Hence the interface should take into consideration a broad range of users. There should enough information for new users to get familiarized with each and every icon. If a less commonly used icon is used there should be information provided explaining the functionality of the system.
4. **Carry forward the basics of existing interface:** Since this project is in continuation with an old existing system, it was made sure that we take some important elements from existing interface.

Selection of Colors

The main parameters discussed above were into consideration while narrowing down the color selecting for mockup interface.

Military green:

The first very obvious choice was using military green or similar shade, since this system targets military setting. All major buttons and navigation bar will have a military green shade.

Black and Grey:

These two color choices came from the old OrMiS interface that was black and grey in color. Moreover, light grey that is the main background color goes well with military green that makes all the buttons more visible.

Yellow for font:

The main font color in OrMiS interface was yellow. The reason for making this choice was to make font clear. With military green background yellow is much brighter and more visible.

Use of Sober Colors:

Another important design decision that went while choosing color was the age factor. From the personas we know that our users are retired military officers who are 55 years and above. Hence, the color choice made gave a subdued and sober effect rather than having a bright and flashy look. Choosing dull colors could make the interface boring and make user loose interest in our system. Hence, the biggest challenge was to maintain simplicity without compromising on user engagement.

Selection of Font:

Taking our four main parameters into consideration the following fonts were selected.

1. Bebas Neue
2. Helvetica Neue
3. Segoe UI
4. Aria Black

Selection based on pre-existing system:

The BebasNeue, HelveticaNeueCyr-Medium, Segoe UI were three main fonts used in OrMiS interface. These selections were carry forwarded from old

interface. Since the users of this interface are already used to reading these fonts we believe this will reduce the learnability time.

Readability:

Another factor that was considered while selecting font was the ease of reading on a small tablet screen. Where more information (or number of words in a given space) was to be displayed, Bebas Neue was used as letters are much narrower and hence more information can be conveyed.

Familiarity with the font:

Arial black is one of the more commonly used fonts. A lot of important buttons and textual information was in Arial black as it is one of more commonly accepted fonts.

Age Factor

Another design decision that went into deciding the font was choosing a font that were easy to read by older users.

Graphics and Icons



SPECIFIC UNIT



TROOPS



*ARMS AND
AMMUNITION*



TANK

As shown in figure above the graphics specific to military application were used to represent various units on the tablet and digital tabletop interface. The first graphic (from the left) was used to represent a specific unit when more detailed information was to be shown about a tank. The second graphic represents location of troops in a particular location. The third graphic represents arms and ammunitions. And the last graphic represents a tank on a particular location of a map.

Whereas, some of other icons that we used were some commonly used icons from library. As shown below various icons like upload, edit, drop pin, flag, tagging, message, live view, calendar, graph and lock were used. We expect users to be familiar with some of these basic icons. There was also “more information” button on upload and edit option that gave user more details on the functionality of these icons.



DROP PIN



TAGGING INFO



UPLOAD



ADD INFO/EDIT



MESSAGE



PICTURE



DATA FILE



PERFORMANCE



CAPACITY



SCHEDULE








*PASSWORD
PROTECTED*



LIVEVIEW

Timeline graphics

The graphics used in timeline were used to represent an event that was registered during real time activity phase. The purpose of using these icons is to convey information about what details that each event contains.

| | |
|---|--|
|  | Movement: This icon represents an event that consists of movement of unit or troops to in a certain direction. |
|  | Textual Information: This icon represents a comment added or edited on an event during real time information gathering stage. |
|  | Picture Upload: This icon represents a screenshot/pictures is uploaded on an event during real time information gathering stage. |
|  | Action: This icon represents when an action command is added as an event during real time information gathering stage. |
|  | File Upload: This icon represents a file uploaded on an event during real time information gathering stage |

OrMiS Logo



The logo shown above was added to each page. This logo has been taken from the previously existing interface. The transparency of the logo was reduced to make it less visible. Having this logo will provide military context and make the application more engaging. Moreover, having same logo on other screen will also help to make an intuitive connection with other neighboring screens.

Navigation Bar



The navigation bar consists of four clickable links. Navigation bar is a part of masters page hence common in all tablet screen. The main function of navigation bar is to prevent user from getting lost at any point and direct them to three main functional screens (i.e. Timeline, Real Time Activity, Live View). The “home” link takes users back to introduction screen from any point. The “Timeline” link brings them to timeline filter screen from any point. RTA stands for real time activity and will bring user to real time activity screen. Whereas, live view will prompt the user to make a gesture on digital tabletop to view map. Till the time user makes a new selection, an old map from previous selection will be viewed. Based on

comments and feedback received from wireframe testing 'Edit' has been replaced by 'RTA'.

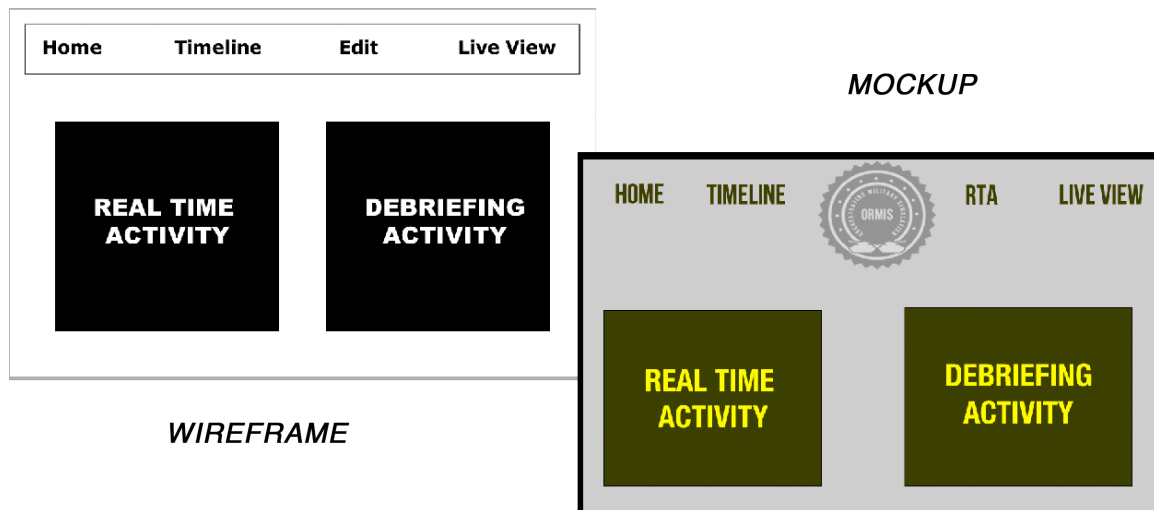
Use of black border

The black border used in mockup is just used for testing purpose. The think black border represents tablet interface whereas thick black border represents tabletop interface.

CHAPTER 2: FINAL MOCKUP

Feedback and information received from wireframe test was used to make required modification and based on comments received, there were some new screen added to the final mockup. The next section will elaborate on each and every screen describing appropriate modification and basic functionality of each page.

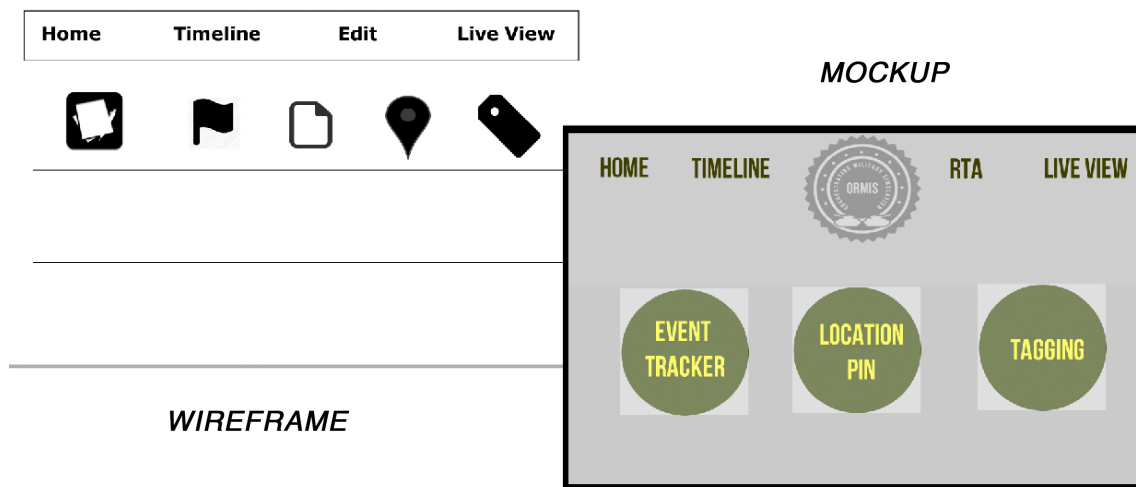
1. Introduction Screen



The figure above shows the introduction screen of our interface. The figure on the left is wireframe structure and the one right is the final mockup after taking

into consideration the color, the font and layout. Grey background was chosen to make application have a subdued effect. Since the application is target for retired military officer, the grey color makes a good background color. The two main button “Real time activity” and “Debriefing activity” are made more prominent with the military green shade and yellow Helvetica Neue font enhances readability. We expect users to look at these two buttons and take action accordingly. OrMiS logo has also been added to the final mockup. This logo was retrieved from original OrMiS interface.

2. Real Time Activity Screen

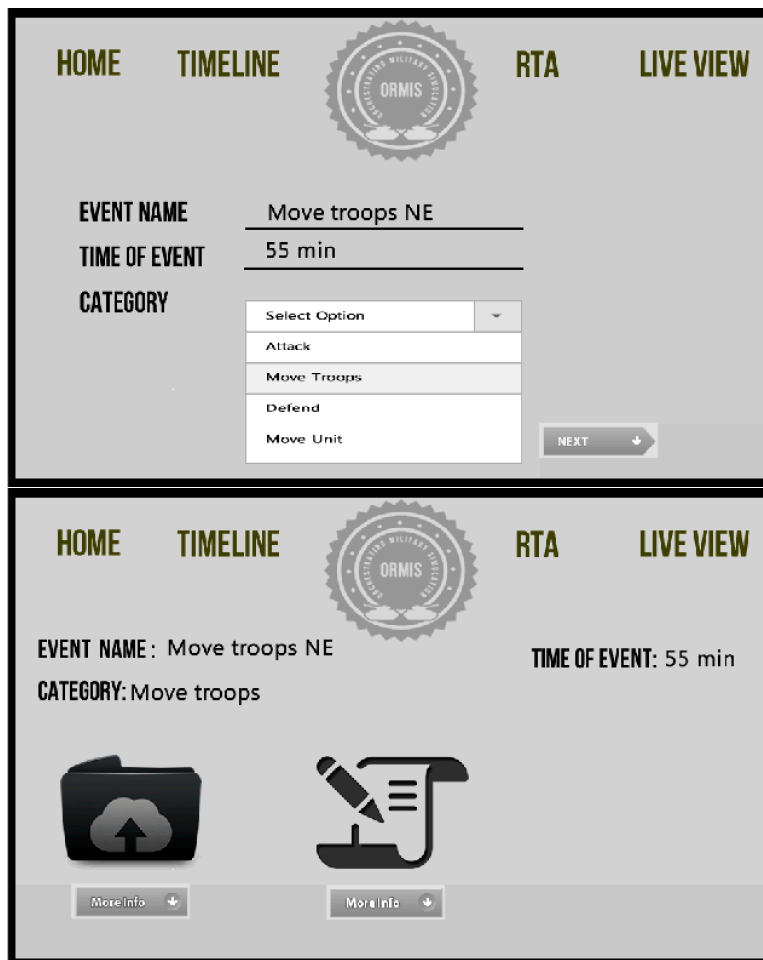


If the users opt to choose real time activity, they will direct to the real time activity screen. There has few modifications made to final mockup compared to wireframe based on feedback and lesson learned from wireframe testing. There were comments on functionality of wireframe icons and if they convey right information. Hence, we have decided to use textual information instead of raw

icons for this screen. Moreover, the task of this screen shown on wireframe as been subdivide into two screens instead of having all information on one single screen.

The main attention on this screen is focused on the three buttons in light green with yellow Helvetica Neue font. Since “Event tracker” is expected to be chosen more often, it is placed on left as users read from left to right. “Event tracker” is followed by “Location pin” and “Tagging” button.

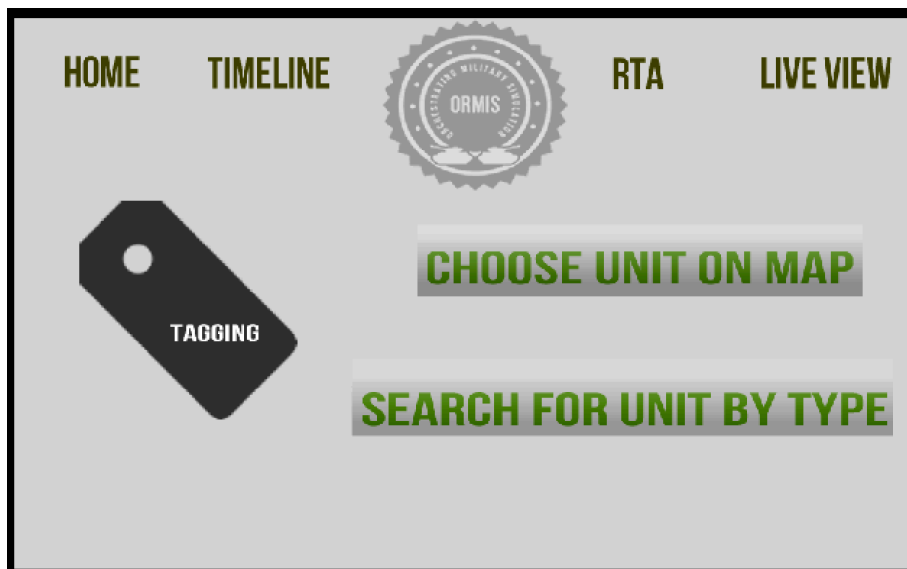
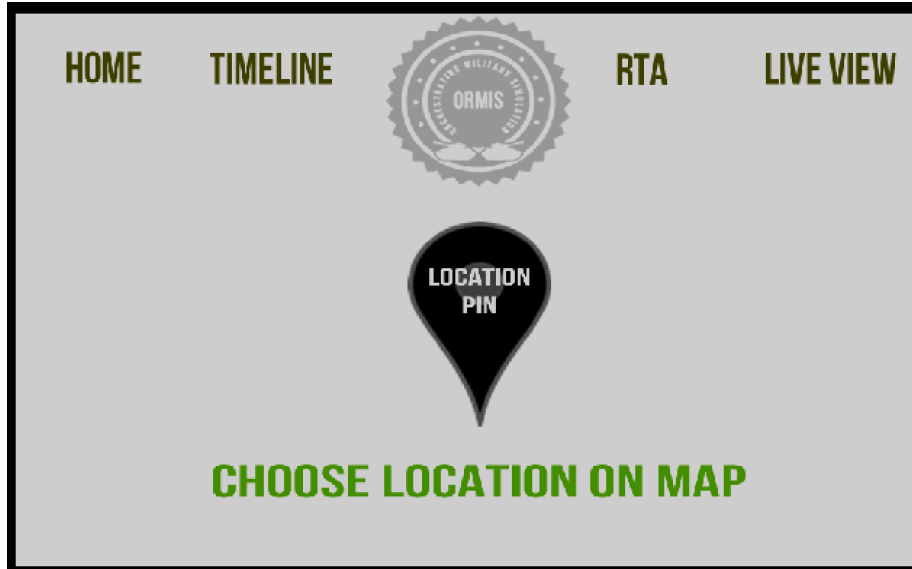
3. Event Tracker Detail





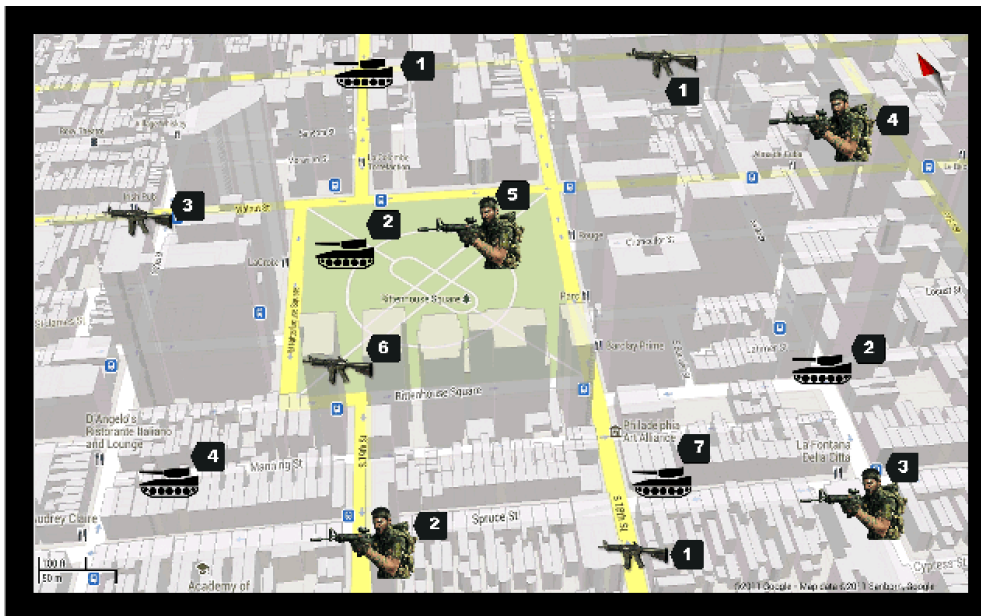
The above three screens are new addition in final mockup from the original wireframe. As mentioned in previous section, having too many icons on one screen were causing confusion for the users, hence we have decided to subdivide the task into three screens. The first screen prompts the users to add event tracking details like event name, time of event and category. This will provide a more detailed information and will be easier for user to progress in the task. The “Add/edit notes” and “Upload” icon has been added on the second screen. Moreover, a “More information” button can be used to get details on the functionality of the two buttons. From the wireframe testing in previous report we know that users were often confused about the functionality of these two icons, hence having more information option should solve this problem. The color of icons have been chosen black as it looks more prominent with the grey background.

4. Location Pin and Tagging

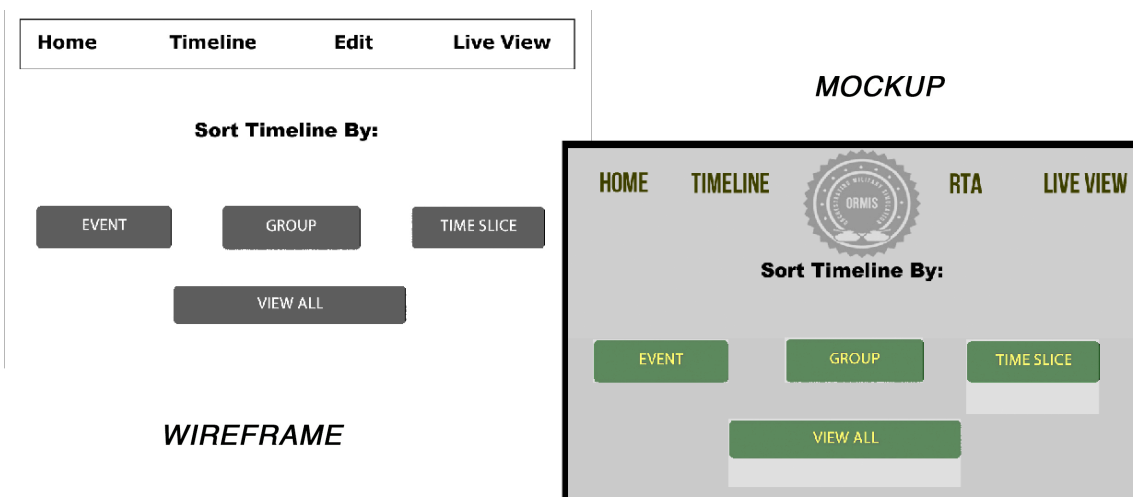


On the real time activity screen if the users opt to go with “Location pin” or “Tagging” button they are prompted to location pin or tagging screen as shown above. The purpose of location pin is to drop a pin on the map on a digital tabletop that can be used for further reference. The tagging screen is used to tag a unit on digital tabletop screen. The difference between both the screen is that in case of dropping pin, users will have to take next step on tabletop screen,

whereas in case of tagging they can either choose unit to be tagged on tablet screen or chose location on the digital tabletop map. The screenshot below shows the interface of digital tabletop screen with icons representing various units on the screen.



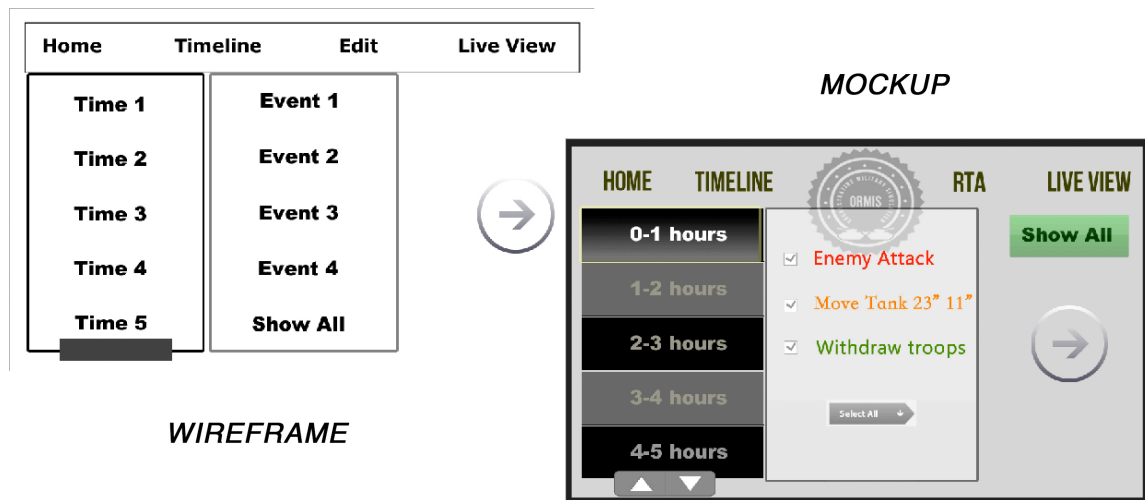
5. Debriefing Activity Screen (TimeLine Filter)



If the users choses to press the “Debriefing Activity” button on the main introduction screen they will be directed to the debriefing screen or the timeline

filter screen. In comparison with the wireframe this screen uses green button with yellow font. We expect users to chose “View All” button more often hence the size this button is larger than other three options.

6. Sort by Timeslice screen



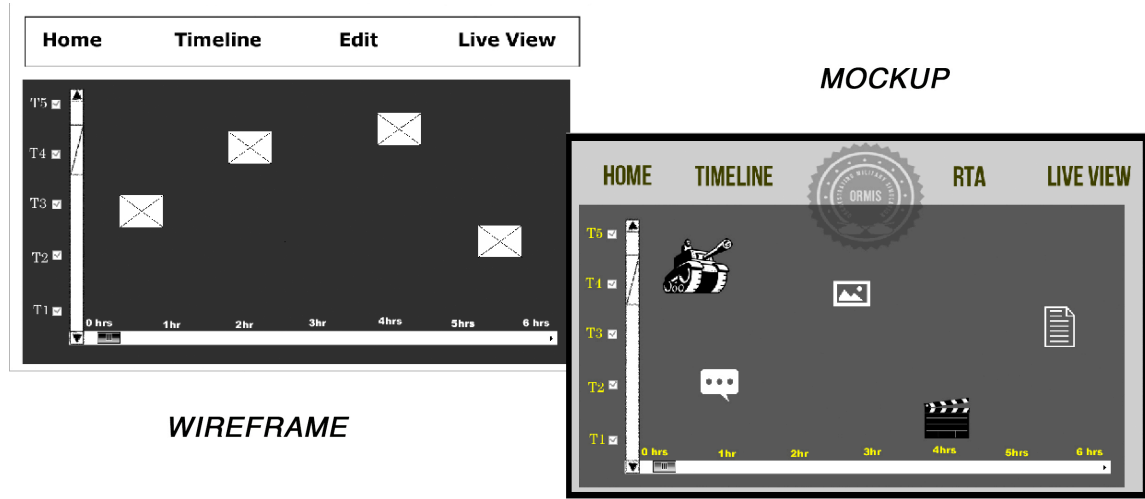
If the users opts for sort timeline by “Timeslice” button on the debriefing activity screen, they will have to face the sort with timeslice screen. The function of this screen is to help users choose a particular timeslice and also an events that occurred in that given timeslice. They can scroll down for more options and checkbox is provided to help select events. “Select all” button can be used to check all the event. Moreover, the “Show All” button is also available if the user decides to view all the information with all time slice. The function of this button is similar to view all button in previous screen.

The color-coding of events describes the types of event. For example: Red color is used for attack event, orange for movement of units or troops and green for withdraw or defense. These colors will help users make a better and faster

decision in term of selecting events. Moreover, the time slice selected will have white font versus the unselected timeslice with grey font.

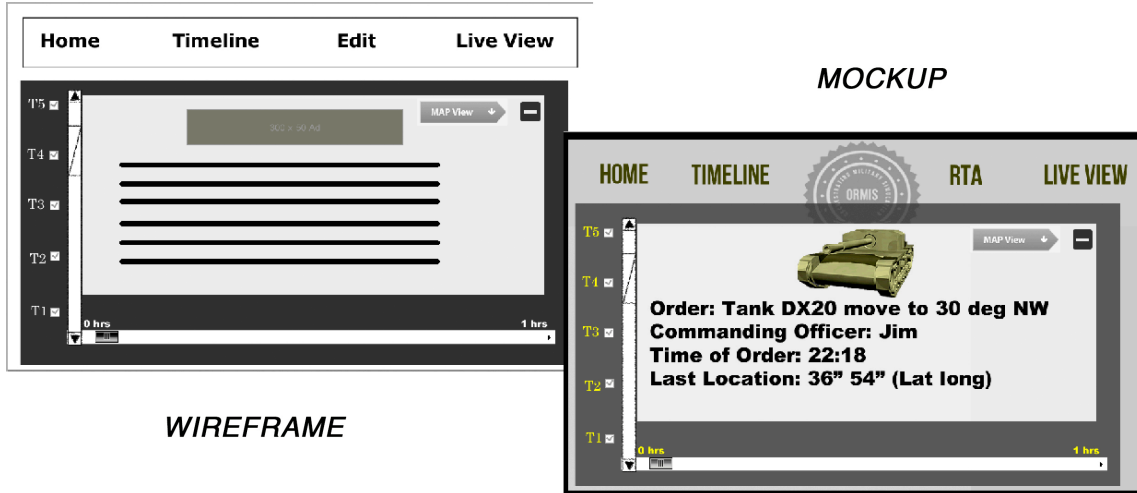
This design decision was made based on feedback and comments from wireframe testing phase.

7. Full TimeLine

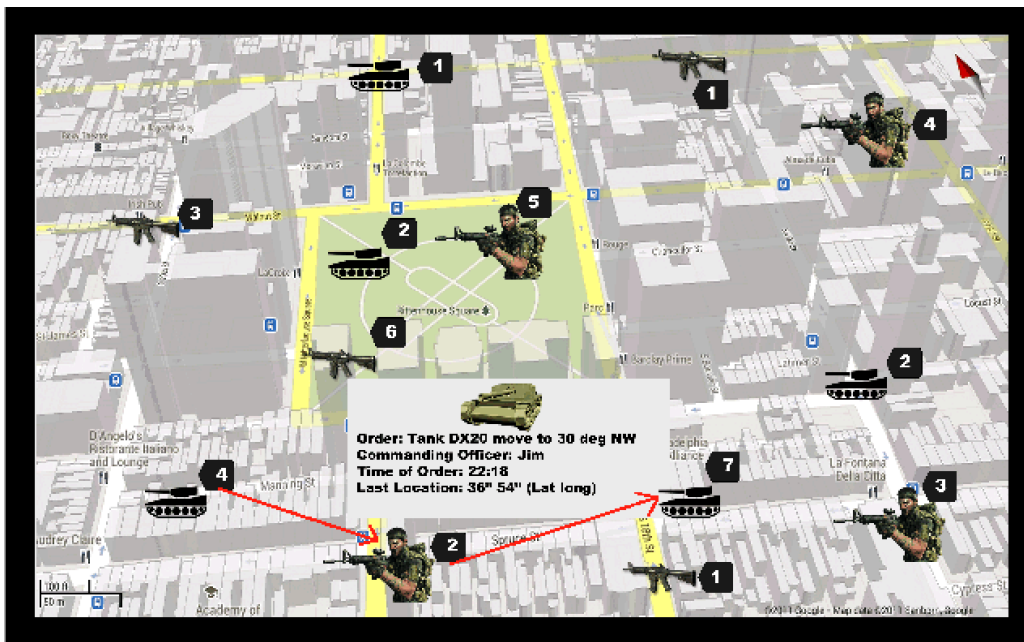


The full timeline screen comes when user tap on “View all” or “Show all” button on previous screens. As shown in figure above, the mock up has actual icons instead of boxes. The function of these icons is to convey message about the types of event that was registered in real time activity stage. The yellow font for textual information should improve readability. All icons on this screen are clickable and will provided details on the events for debriefing activity. The scroll bar on left and bottom can be used to move around on the timeline.

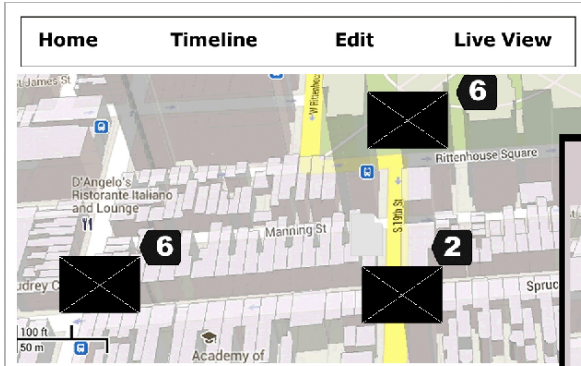
8. Detail on each unit



This screen is an additional tab that opens up with users click on any icon on the timeline. It provides users with a detailed information on the event or the unit. In comparison to wireframe an actual unit image has been placed along with textual details. On pressing the “Map view” button, the digital tabletop screen will provide the detailed information of unit or event along with progress (in red arrow).



9. Liveview Screen



WIREFRAME

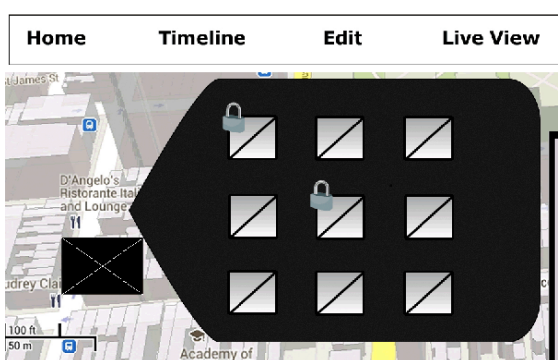
MOCKUP



The liveview screen is an automatic screen that comes up once a gesture is made on digital tabletop. The purpose of this screen is to provide duplicate view on digital tabletop along with clickable icons providing more details.

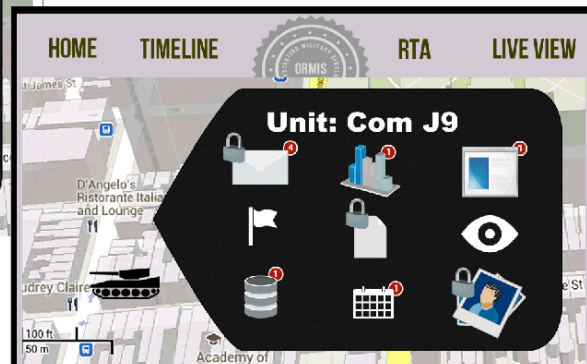
10. Liveview unit details

Once the user taps on any of the units on liveview screen, an additional tab will open up. This screen gives user access to all detailed information that has been previously recorded in the system.



WIREFRAME

MOCKUP



FINAL MOCKUP EVALUTION

Main Objective:

The evaluation process of mockup interface was based on the main design decisions that were made in the previous section of this report. The main elements we look to evaluate are:

1. Presentation of Content
2. Readability
3. Overall Layout
4. Understanding of Textual Information
5. Control
6. Consistency
7. Use of graphics/icons
8. Affective and Emotional impact assessment

Use of Color: Our first goal is to test the use of color for each screen. The color is very important element in persuasion. It plays very important role in engaging the user to perform certain task. The color-coding should be such that the users intuitively perform the action that is most suitable for the task. For example user is expected to click on a link or button that attracts his/her the most. Hence, we will test the interface on what attracts the users most and what action a user will perform first looking at the screen and then comparing it with what we intended users to do.

Use of Font/Textual information: Secondly, we will like to test the use of font in the interface. The fonts we have used in the system have been carried forwarded from a previously existing system. The main difference between previous and current system is that the previous interface applied just to digital tabletop whereas current system applies to both a handheld tablet and digital tabletop. Since, handheld tablet is a much small screen hence testing the readability of textual content is very important.

Consistency: The next element we will test is the consistency across different screen. Since the activity takes places between two screens the consistency in layout across the two screens as well as within tablet screen is very vital.

Clarity of Navigation Bar: The navigation bar is common across all tablet screens and the main function of navigation bar is to help user move around within the system without getting lost. We will test if the textual information in Navigation bar is clear and relevant. Moreover, information that should be added or deleted to provide more flexibility will be also tested.

Emotional Impact Assessment

Since this application is being designed for a military specific purpose and will be used in a very specialized environment. Moreover, the users of this application are also expected to have a similar mindset as all users share a military experience. Hence, our next goal will be test the overall emotion or feel of system with pre-existing emotion present in current environment and if it can fit in with the existing infrastructure. Testing will be done to analyze the level of happiness, professionalism, simplicity and engagement that our system portrays. Our aim is

to balance the simplistic feel, with keeping the user attracted and convey a professional feel.

Intuitiveness

Testing the persuasiveness of system in terms of intuitiveness is very vital part of our system. Each icon, button through its visual context should convey the right information. Each icon discussed in previous section will be tested if its visual representation helps users understand its functionality. Misrepresentation of icons can confuse the users and user can get lost or will end up choosing incorrect information.

Icons Testing

As described in first section, icons used for this interface are a combination of commonly used library icons and some military specific icons. We would like to see if users can understand the purpose of each icon and what information they might get from it.

Difference between clickable and non-clickable buttons/icons

There are lot of icons and buttons that can cause ambiguity in terms whether its clickable or just present to convey visual information. For example: The icons on timeline can be viewed as just objects and not clickable links. We would like to test users perception on these objects.

USER TESTING

Two screens were used to perform usability testing of final mockup. The first screen viewed tablet interface whereas the second screen viewed digital tabletop interface. We expect our participants to switch between appropriate screen whenever required.

User Group

There were 8 participants who took part in this study. Out of that 3 were Google employees who has good experience with use of touch technology and tablet based applications and they were between the age group of 23-25 years.

Whereas, the remaining 5 participants were university, undergrad and graduate students with engineering background between the age group of 24-29 years.

Each participant was asked to perform the following task as listed below.

Qualitative Measures

Part 1: Cognitive Walkthrough

For evaluating the usability of mockup, cognitive walkthrough approach was used where each participant were asked to go through each and every screen and press whatever button they thought was most appropriate. While the participant viewed each screen they were observed on how they approach the screen and the mockup was analyzed on functionality, consistency, readability, layout, control. The following sets of question were asked from each participant while they walked through the process.

1. What do you think is the main function of this page?
2. What part of screen draws your maximum attention?

3. What do you think about the textual information? From the given information can you understand the context of each icon/button?
4. Is there any element you find confusing?
5. What do you like about the page?
6. Is the flow of information from one screen to another clear?
7. Can you understand when action transforms from tablet screen to digital tabletop screen?

Quantitative Measures

Part 2: Survey

In the end once the participant scrolled through each screen they were asked to fill the following survey.

1. What is the overall emotional impact when scrolling through each page?

(Using Kansei Scale)

1 _____ 2 _____ 3 _____ 4 _____ 5

Traditional Modern

1 _____ 2 _____ 3 _____ 4 _____ 5

Simple Complex

1 _____ 2 _____ 3 _____ 4 _____ 5

Sad Happy

1 _____ 2 _____ 3 _____ 4 _____ 5

Dull Bright

1 _____ 2 _____ 3 _____ 4 _____ 5

Unprofessional Professional

2. What was the most visible color?

- ✓ Military Green
- ✓ Yellow
- ✓ Grey
- ✓ Black
- ✓ White
- ✓ Green

3. Were the terms/icon clear in what role they represent?

Not clear Very clear
1 _____ 2 _____ 3 _____ 4 _____ 5

4. Was it easy to understand if link are clickable to not?

Not clear Very clear
1 _____ 2 _____ 3 _____ 4 _____ 5

5. How readable was the textual information?

Can be improved Was clear enough
1 _____ 2 _____ 3 _____ 4 _____ 5

Part 3: Error Rate

Each participant was tested on the number of clicks it takes to click the most important element of the pages based on our design. For example: If we feel we want our users to click “Real time activity” button first, we will count on numbers of clicks they make before actually clicking that button. This number will be accounted as error count for each page.

Benchmarks:

The benchmarks we have set are based on our design understanding and what we expect users to do.

1. We expect users to recognize the most important element of the screen first based on our design decision. The table below shows the expected outcome versus the actual outcome. The number of extra clicks will be counted as the error rate for that page.
2. The most prominent color of the mockup should be grey background and the military green color on overall analysis. As we are designing this system for military application we want the overall interface to fit in with military environment and grey color will reflect the subdued feel of the interface.
3. The font should be easily readable.
4. The icons should convey their functionality.

Comparison between benchmark and actual results is made in the next section of this report.

RESULTS

Qualitative Analysis

Functionality

The result of basic functionality was found to be quite satisfactory. Participants were able to figure out intended purpose of each page. The two pages where participants were found to be confused were the dropping pin page and the view all timeline page. The dropping page required users to take next action on digital

tabletop screen. Three of participants were trying to click on non-clickable textual information on this page. Whereas, the time page contained scroll bar and icons. Two participants thought that this should be the last page and were stuck on this page. One participant commented

“ I have no idea what to do next. Is this the end of application? I can use the scroll bar but don't understand where to click.”

Textual Content

The textual information was interpreted clearly in most cases. There was some confusion on “Choose location on map” as lot of participants were waiting for the map to appear rather than making a gesture on digital tabletop.

Some of icons on timeline were also found to be confusing and less intuitive. One participant thought that it will be nice to have an information tab giving brief description of the icon.

Information Flow

When participants were asked about the flow of information from one screen to another most of them that the click they made previous was relevant to where they were directed. The only confusion was in the case of dropping pin and tagging page. But this was expected, as these pages require next action to be performed on digital tabletop screen.

Confusing Elements

There was lot of confusion in term of recognizing whether a link is clickable or not. A lot of times participants ended up clicking textual information that was not clickable. Moreover, the icons on timeline page were interpreted as non-

clickable. But it was interesting to see that when the zoomed in view of timeline was shown in time slice page, majority of participants recognized the icons were clickable.

The event select part of timeslice select page was found to be confusing. There was also confusion whether time is clickable or not.

“The shading of time is confusing. It’s hard to figure out if I can click this or not. I would just click on show all and proceed.”

There was also comment on the show all versus view all button.

“Is there any difference between show all and view all button? Will it view all the time for that event. I think this is little confusing for me to understand.”

Most likable features

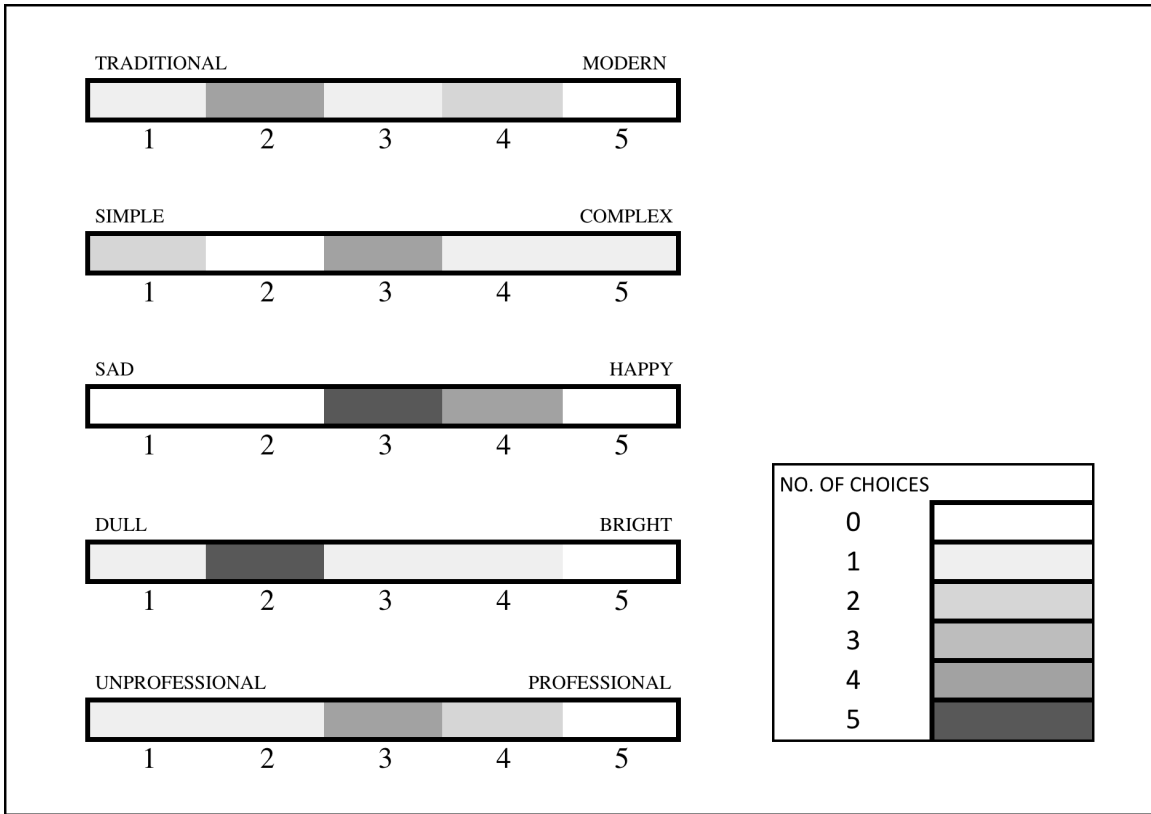
Two participants expressed liking towards more information button on event tracking page. Participants also thought that the yellow color font makes the information readable and looks great with green buttons.

“I like yellow. Its catchy and draws my attention towards the button.”

Quantitative Analysis

Below are the results for quantitative data analysis.







As shown below, from the Kansei Scale test it was found that final mockup was rated as traditional, neutral in simplicity, neutral in conveying happiness, dull and rather professional interface. The table below list the comparison between the expected outcome versus actual outcome.



Comparison from Benchmark

| Question | Expected Benchmark | Result |
|--------------------------------|---------------------------|------------------|
| Traditional or Modern | Traditional to Neutral | Neutral |
| Simple or Complex | Simple | Neutral |
| Sad or Happy | Neutral | Neutral to Happy |
| Dull or Bright | More towards dull | Neutral to Dull |
| Unprofessional or Professional | Professional | Neutral |

The table below provides result from the most dominant color. Our final result matches with the expected outcome as grey and green were found to me most visible color.

| Most Visible Color | | No. of Responses |
|---|----------------|------------------|
|  | Military Green | 2 |
|  | Yellow | 1 |
|  | Grey | 3 |
|  | White | 0 |
|  | Black | 0 |
|  | Green | 2 |

Below is the results for clarity of icons, easiness to find clickable link and readability of text.

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | Av. |
|------------|----|----|----|----|----|----|----|----|------|
| Question 3 | 2 | 2 | 3 | 4 | 2 | 1 | 3 | 4 | 2.6 |
| Question 4 | 4 | 4 | 5 | 2 | 3 | 4 | 2 | 4 | 3.5 |
| Question 5 | 4 | 5 | 4 | 5 | 5 | 4 | 4 | 3 | 4.25 |

Comparison with Benchmark

| Question | Expected Benchmark | Result |
|------------------------------|--------------------|------------------|
| Icons were clear or not | Clear | Neutral |
| Easy to find clickable links | Neutral to clear | Neutral to clear |
| Readability of Text | Was clear | Was clear |

The table below elaborated on the error rate and its comparison from expected benchmark. The view all timeline page and location pin page was found to have maximum errors.

| Screen Name: | Expected Action (Benchmark) | Users Action (Data from 8 of participants) | Error rate (No. Of false clicks) |
|---------------------------------|-----------------------------|--|----------------------------------|
| Introduction Screen | Real Time Activity | 6: Real Time Activity 1: Debriefing Activity 1: Liveview | 3 clicks |
| Real Time Activity Screen | Event Tracker | 4: Event Tracker 2: Location Pin 2: Tagging | 3 clicks |
| Event Trackers: Add information | Fill form and click next | 8: Fill form and click next | No error |

| | | | |
|-------------------------------------|--|--|----------------|
| Event Trackers: Icon select page | Upload or Add notes button | 3: Upload icon 2: Add note icon 1: Event name 1: OrMiS Logo | 4 clicks |
| Event Trackers: Type info | Type on keypad | 8: Type on keypad | No error |
| Location pin | No action on tablet | 4: Pin 2: Clicked on non clickable area 2: Where is map? | 8 clicks |
| Tagging | “Choose from map” or “Search unit by type” | 6: Choose from map 1: Search unit by type 1: Clicked on tag | 1 click |
| Timeline sorting | View all | 4: View all 1: Clicked on text 2: Group 1: Event | 7 clicks |
| Sort by Timeslice | Select one timeslice and check all and then next | 2: Followed expected path 5: Show all 2: Other path | Not applicable |
| Viewall Timeline | Click on either icon | 3: Clicked on icon 4: Scroll bars 1: Home | 11 clicks |
| Timeslice | Click on either icon | 7: Clicked on icon 1: Scroll bar | 2 clicks |
| Unit detail | Click on map view or minimize | 6: Mapview 2: Minimize | 2 clicks |
| Live View | Click on the small numbers or icons | 2: Zoom action 4: Clicked on icon 2: Clicked on number | 2 clicks |
| Liveview: Details | Click on icons | 8: Click on icons | No error |

Strength and Weakness

From the quantitative and qualitative results section following weakness were found:

Weakness

1. Some of icons are still not clear in terms of their functionality.
2. There is lot of confusion in terms of what is clickable and what is not.

3. The textual content can be more self-explanatory.
4. The connection between the tablet and digital tabletop causes confusion.

Strengths

1. The flow of information between screens is excellent.
2. The color used for buttons, background, font is very clear in terms of readability and brings a military context to the application.
3. The dimension of button appropriate and helps user understand the most important element of the screen.

Discussion

On comparing the initial design parameters that were set to design final mockup and comparing them with our final results we can conclude that our mockup was found to be satisfactory. Since this application is military specific and targets old users it will be interesting to the result of usability testing conducted on older people. Most of our participants in this study were young adults between the age of 21-28 years. A more details understanding of the system can obtained if the system is tested on participants with previous military experience. Some of the changes made from wireframe stage were gladly accepted by the users and the error rate was reduced for those screens. The color scheme was found to appropriate and reflected the military setting that we intended to during the design process.

Top priority for next phase

1. Improving existing Mockup Interface:

The connection between tablet and digital tabletop was found to cause lot of ambiguity. In next stage we will like to address this issue by providing feedback on tablet interface asking user to take next action on digital tabletop screen.

There are some icons on timeline and live view screen that are causing confusion. Hence, we will like to eliminate this problem by providing more information on functionality of icon. The more information button on upload and add notes was found to be useful. Hence a similar option could address this issue.

2. Interaction Design- Use of gestures

In the next phase we will like to add more functionality to OrMiS application by providing object transfer option. Hence, more gestures will be tested in order to understand what command matches with users mental model.