COLLABORATIVE LEARNING

MHCI+D 2015 CAPSTONE PROJECT

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SMART®

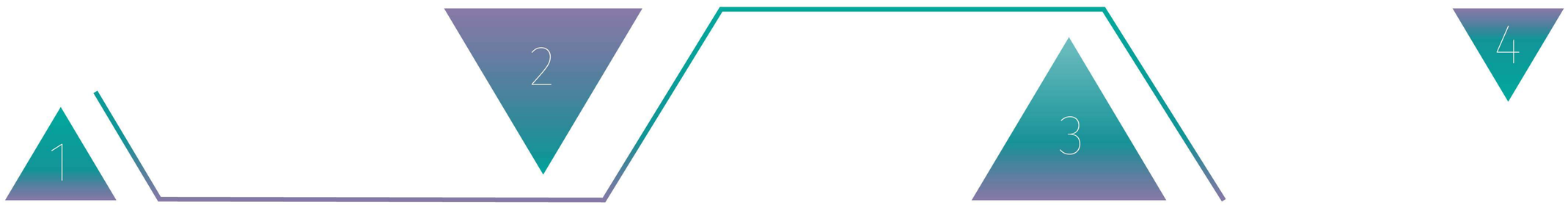
/Introduction

The Smart Collaborative learning project is one of MHCID program's capstone projects in 2015. Our team is sponsored by SMART technology and aim to build a product to improve the experience of students' team collaboration in education.

SMART is a pioneer in coming up with educational technology products. Its products are widely used in education and business. Based on SMART Technology company's strategic requirements, we decided to make a product which could be applied to students in high school or college teams, to help students solve their pain points in team collaboration. By doing secondary research and expert interviews, we narrowed down our scope into teamworks which happens in college with undergraduate students.

This project basically has four stages: investigate, ideation&refinement, prototype, and evaluation. It takes about 3 month to accomplish with 4 teammates. Ideally, this project will be applied into real education environment and help students and teachers improve the experience of team collaboration and assessment.

/Content



Investigate
04/2015-05/2015

Ideation&refinement
05/2015-07/2015

Prototype
07/2015-08/2015

Evaluation
08/2015

1 /Investigation
04/2015-05/2015

Currently, there's some problems happens during team collaboration frequently in class, which prevent high efficiency of teamwork. The goal of this project is to help student collaborate more efficiently and easily.

SECONDARY RESEARCH

In the early stage, each of us did a lot of secondary research focusing on team collaboration in middle school and high schools. The reason we target our audiences in middle and high school students is because of they have more team works than elementary school students and this product will help them benefit before go to college having more team-works.

According to the results of our secondary research, we found that:

- Project based collaborative learning activities could be assess by process, product and learning outcomes.
- Participants in face-to-face collaboration are less likely to equally distributed than computer mediated groups.
- Technology could help instructors to supervising individual or group performance.
- "Free-riders" are inherent challenge in group assignments and not all team members are contributing equally.
- Peer assessment is a common way of evaluating individual performance in teamworks, but group members are likely to do their best to avoid receiving low assessments from peers.
- To accurately evaluate students' contributions and to provide timely interventions, a teacher could use a summary of the tracked collaborative activities of the participating students.

After that, we came up with the following research questions which need to be answered by expert interview and observations.

1. What impact does teachers' assessment have on students' collaboration and interaction in group work?
2. What are the pain points in collaborative learning environments? How do teachers and students communicate with technology in the learning process?
3. How are students collaborating in group projects?
4. How are teachers involved in the process of student group projects?
5. What are the potential benefits of surfacing information on individual contribution in groups?

The results from secondary research helped us narrow down the specific design problem. With the current in-transparent of individual contribution in teamworks in middle schools, the design problem we generated is:

"How to surface information on individual contribution in collaborative group projects?"

EXPERT INTERVIEW

Jason Yip- Information School Professor

Our first interview was with Jason Yip, he is an associated professor in Information School in UW, and currently focusing on Digital Youth area. Jason told us he is working on a project which related with young kid and their parents. This project is about to build a tool for kids from immigration family in the US, to help the kids translate complex information to their parents whose English is not proficiency. He is glad that if us would want to join his research team and he has significant resource in local elementary schools which could allow us do more research with young kids. But actually, I don't think it's a good way for us to join Jason's research team, because this may not be exact what SMART company wants us to do, and I would like to explore the opportunities by our own instead of relying on others.

Andrew Davidson- HCDE Professor

The second interview we conducted was with Andrew Davidson, he's a senior lecturer in HCDE department at UW. He has been teaching in Roosevelt High School and founded a computer science lab teaching computer science, programming, web design and other interactive media to high school students. He recently is doing a research about teaching Cleveland High School students Human Centered Design and some kind of computer science knowledge and encourage them come to UW HCDE department after they graduate from high school. We were very interested in his research activity and asked him the specific time of this workshop and want to be there observing. The information we get from Andrew is very useful, and we planed the first observation activity in Cleveland High School with HCDE students.

Elizabeth A Umbanhowar- Architecture Professor

Elizabeth is a lecturer in the department of Landscape Architecture, she has a course which has group assignments in summer quarter for undergraduate students. We contacted her to ask if we can come and talk with her about her opinion of assessing team projects. She was very open to us and shared her insights about assessing group work. She told us each group members has same grade based on their final deliverables, and mostly she'll ask students who they want to be in a same team, and she'll sign teams based on student's aspirations. She also agreed on us to observe her class and glad to help us with further research.

After this three interviews with college professors, we tried to change our target audiences to college students instead of high school students. Because of the time limitation and the obstacles of approaching high school students, college students are more easily to find and test with, and also, Elizabeth provided us a great opportunity to get the first hand information about team collaboration in her class. So we made a significant change on target users. But the design problem and research questions didn't have any change, it could also be applied in college teamwork.

HEURISTIC EVALUATION

Tool: GoogleDocs

Task: Identify individual works in a shared document

User: Team member

Tasks:

1. Find document in group's Google Drive folder.
2. Open document in the correct folder.
3. Click on "See Revision History" under "File" in the menu bar.
4. View a list of time-stamped revisions made during the document writing.
5. Select the revision that was made by a particular member of the group.
6. Wait for the document to return to the previous version of the document.
7. Scroll through the document to find the color-coded section indicating changes made by the member.
8. Memorize that part of the document. (Because it is not reflected in the final version)
9. Close the window for the See Revision History feature (to return to the final version) and scroll to the memorized part of the document.
10. Color code the part so it could be visualized in the final product.
11. Repeat step 3 to 10 for each revision made by the same member, until all parts of the document are color-coded.

Heuristic:

- *Recognition rather than recall:* The user should not have to remember information from one part of the dialogue to another.
- *Discoverability:* The targeted feature should be easily discoverable by the user.
- *Visibility of information:* Information about member's individual contribution should be visible in the document.
- *Ease of navigation:* System should provide easy access to contribution information.
- *Support multiple content types:* Ability to surface individual contributions across multiple content types, including text, images and other media.
- *Differentiation between indicator and content:* The method of indicating individual contribution should not interfere with content styling.
- *Support different types of contribution:* The tool should be able to incorporate types of student contribution beyond direct input to the document, e.g. discussions that led to the creation of content.

Learnings:

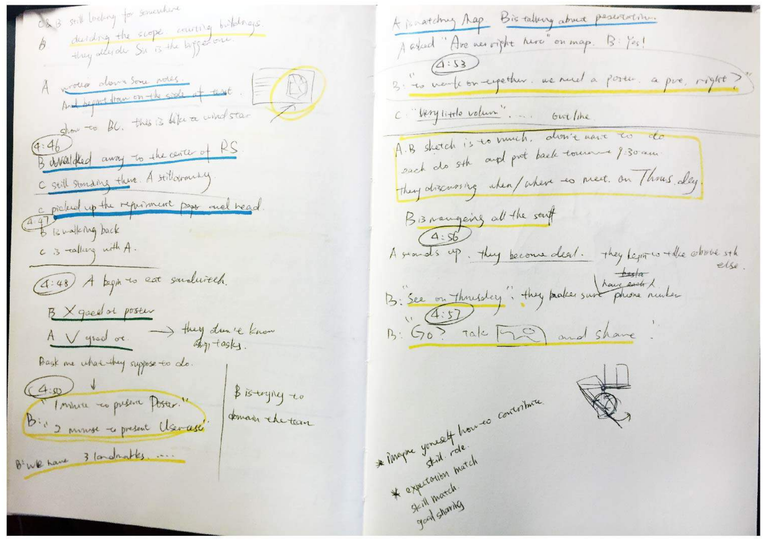
Through the heuristic evaluation of the tool, we have identified a number of design principles that are essential to the task of surfacing individual contribution in group work.

- Information about member's contribution should be visible in the final product.
- Such information should not alter the original document's content.
- While color coding is an effective way to indicate different member's contribution, the indicator should be easily differentiated from the document's styling.
- The tool should be compatible with multiple types of content and contribution, including those that might not be easily tracked automatically by the system, e.g. discussions/sketches that lead to creation of content.

OBSERVATION

Course: Urban Planning in Department of Architecture

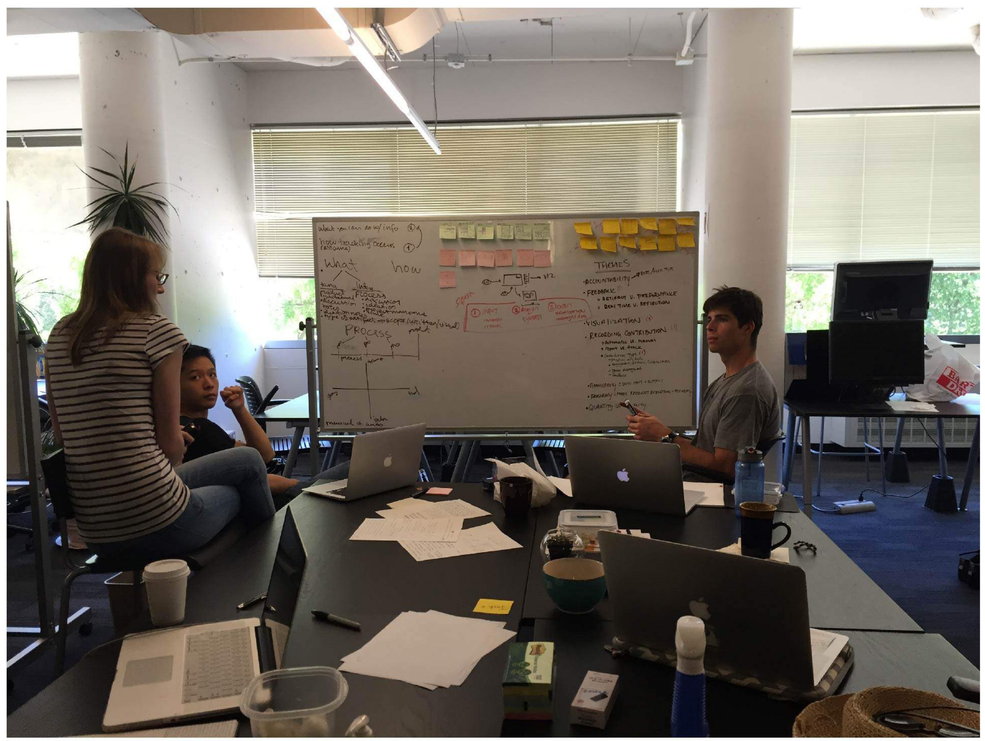
Instructure: Elizabeth Umbanhowar



We did observation in Elizabeth's urban planning class for undergraduates. During the class time, her signed the student into four teams which has 3-4 team members. The requirements of these students are go to the specific place and analysis the landscape there, make a poster and present on next week. Each of us went to observed one group. There were 3 person in my team, I took some note while observing their behavior. The older male in this team tried to be the leader and managed most of their activities in the upcoming days before the presentation. They seems not very familiar with each other. The younger male and another female seems more quiet. Actually they didn't collaborated much during the class, just some discussion and signed each person some tasks and went back. So in this observation, I think someone who speak more is likely to become the team leader, and people don't know each other is hard to collaborate very well in a short time.

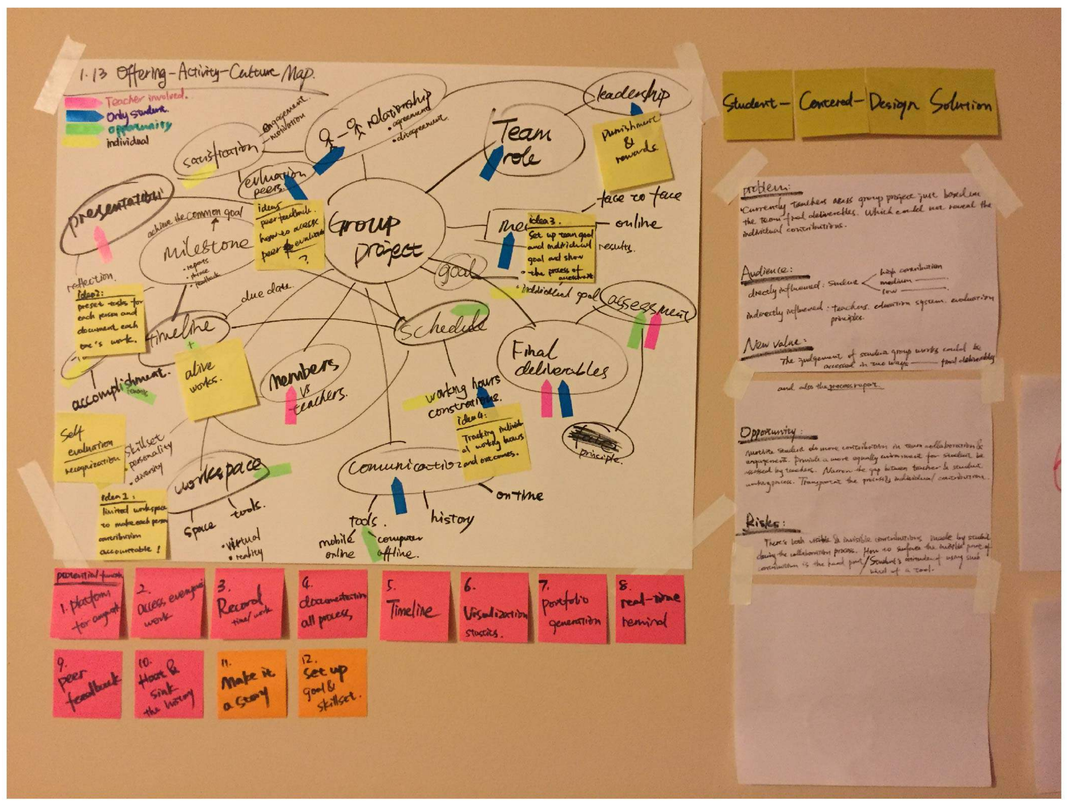
2 /Ideation&refinement

05/2015-06/2015



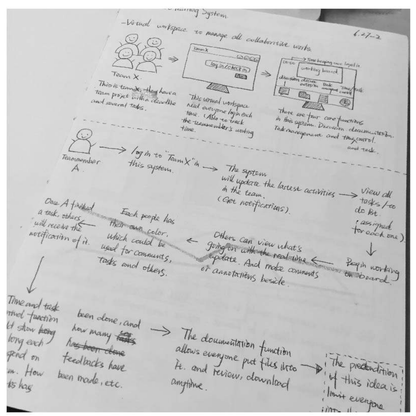
After doing the secondary research and some research activities, we begin to ideation brainstorming on our idea. The goal of our project is by surfacing individual contributions in teamwork, to motivate students make more contribution in team collaboration and help teachers access the process and individual efforts in team projects. Based on this goal, each of us did some brainstorming individually and generated some potential ideas, then come back and shared with other teammates.

Our ideas are focusing on team collaboration, surfacing individual works, process, final deliverables, and peer assessment.

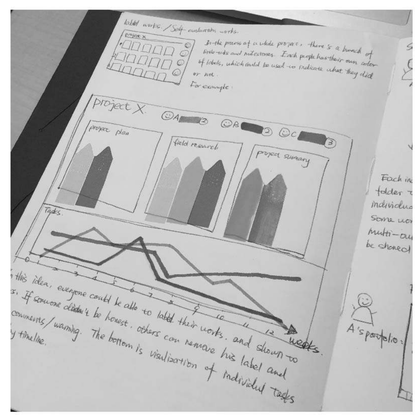


FIRST ROUND IDEATION

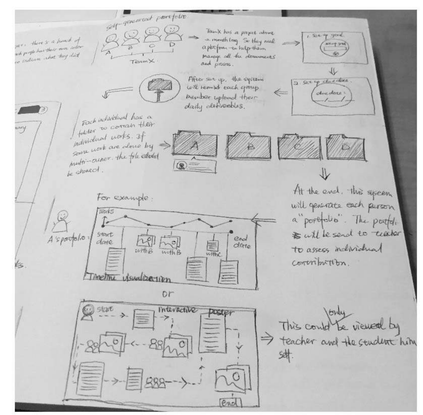
At first, we did ideation separately by ourselves, so I generated this mind map. I put some keywords and elements on it and tried to find the extension and connections between these key elements. And then, I listed some attributes which student might care about in their group working session, and some attributes teachers might care about in their assessment process. After that, I reviewed our design questions, and generated five ideas based on this mind map.



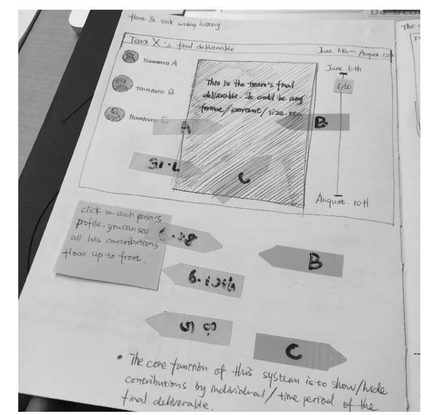
First idea: build an ideal virtual workspace for all group members. The goal of this is to track individual working hours and finished tasks, and make each person's effort accountable.



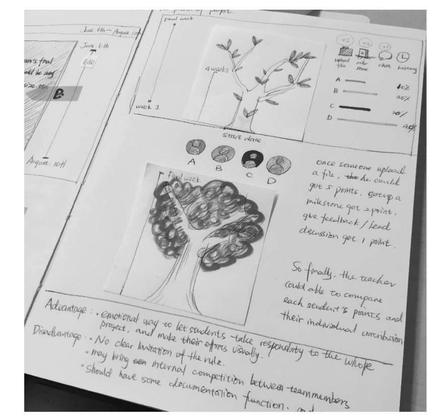
Second idea: focus on the final deliverable instead of the process. Each person has different color of tag could be used on the aftifacts they worked on.



Third idea: Make an individual work process folder which could document individual aftifacts and generate a portolio based on these aftifacts.

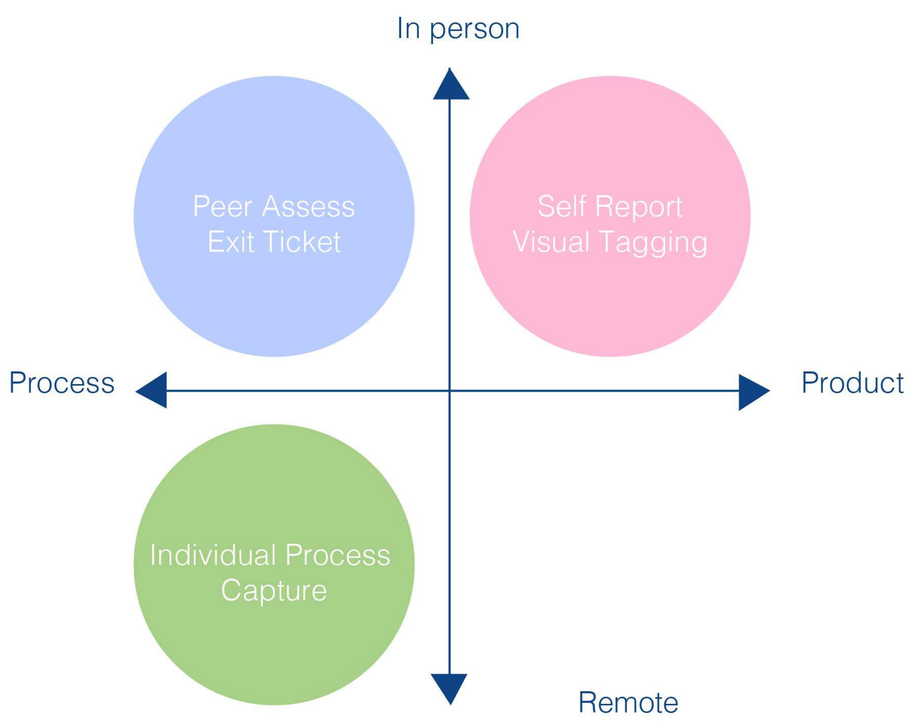


Forth idea: Tag individual works in a single document.



Fifth idea: The group assignment is a tree so each team members should make contributions to help the tree growing. And the individual work could be counted by uploading artifacts.

FIRST ROUND REFINEMENT



Each of us brought our ideas to group and we begin to refine our ideas and make them into themes. We made this 2 by 2 diagram to see the design scope and opportunity area, and after that, we address our three potential solutions into this area.

Exit Ticket

Because of the intangible contribution is difficult to capture in team collaboration. By encouraging group members to do peer assessment to each other after each group meeting session.

Visual Tagging

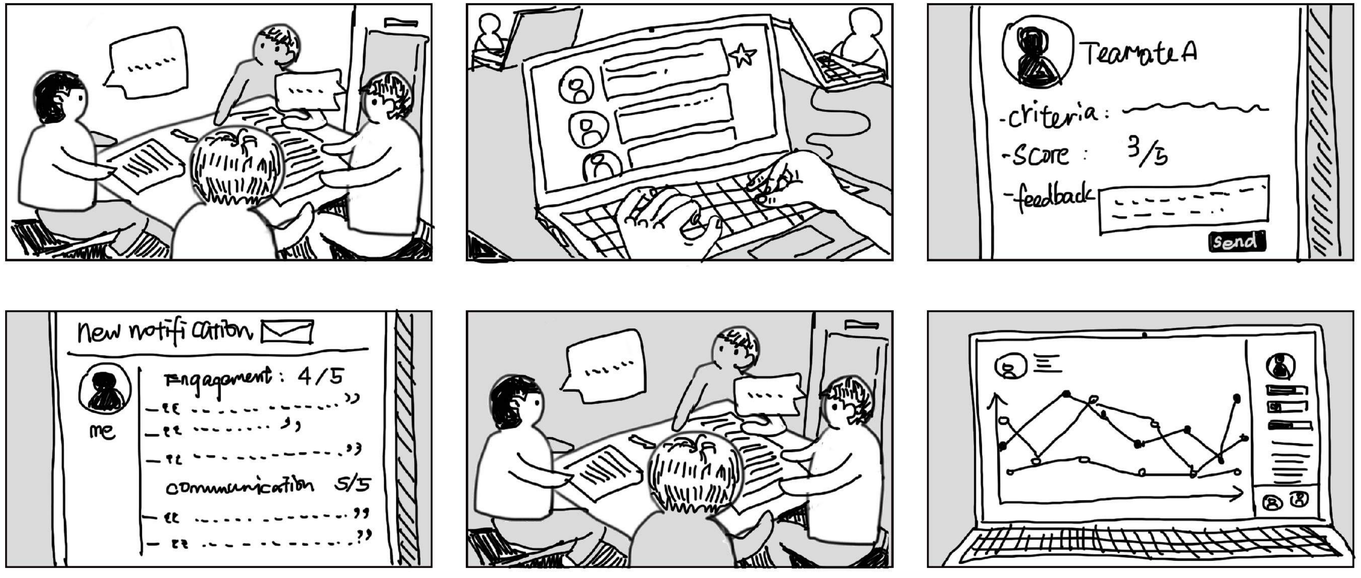
Currently the team deliverables couldn't show what and how each individual's work, so this tool allows individual tagging their contributions on the team deliverable.

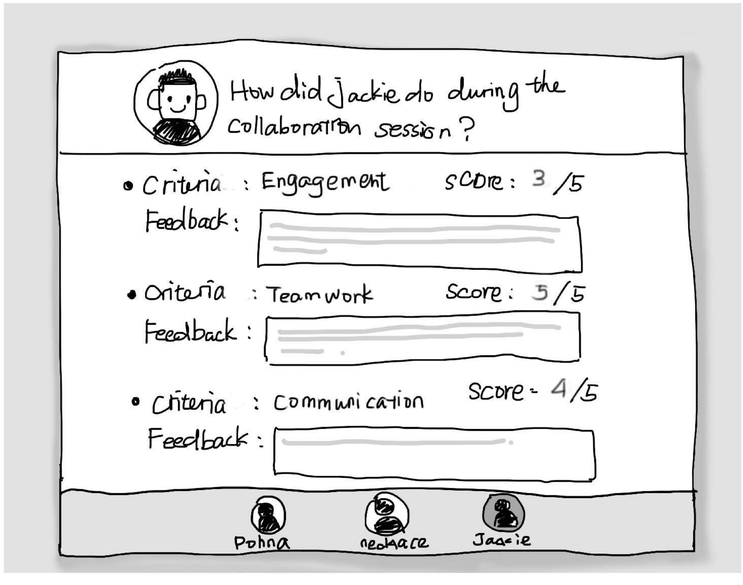
Individual Process Capture

By capturing an individual group member's process when working remotely on group deliverables, the process is recorded and could be reflected by group members.

STORYBOARDS AND SKETCHES

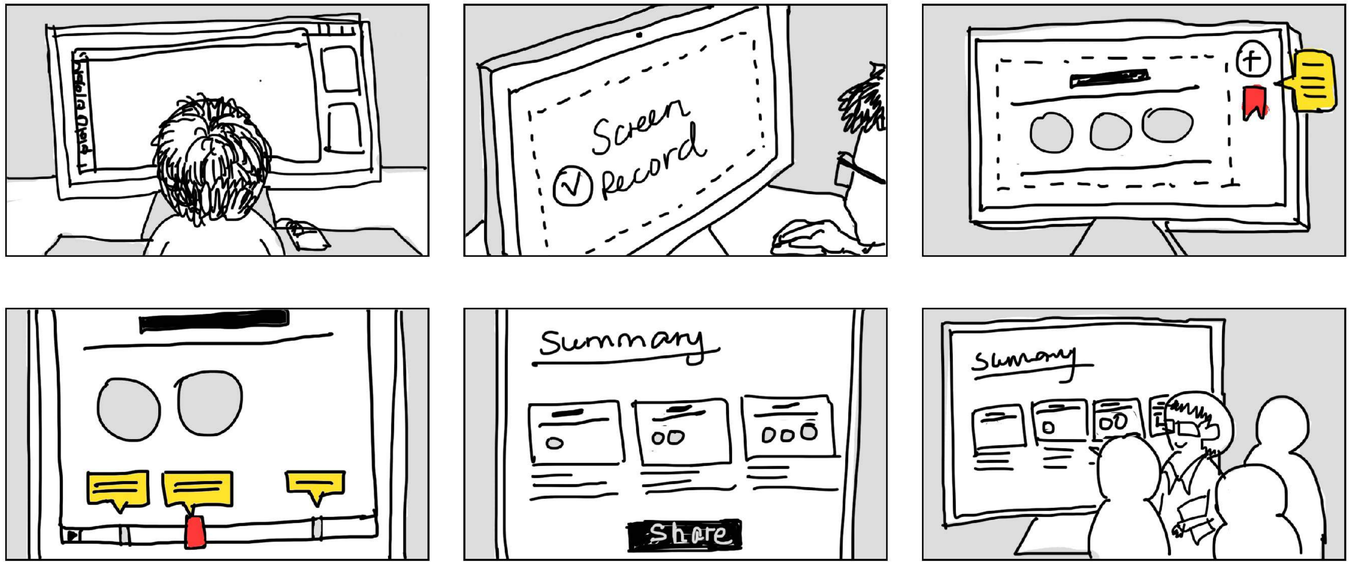
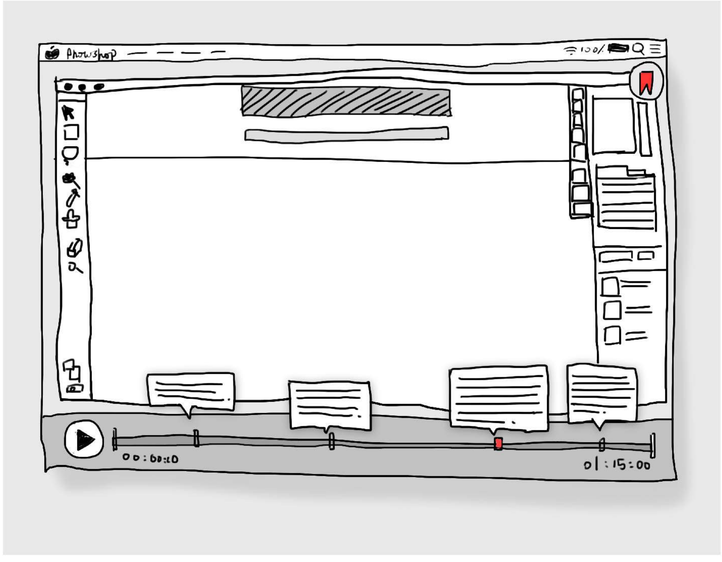
Idea1: Exit ticket





STORYBOARDS AND SKETCHES

Idea2: Visual tagging

STORYBOARDS AND SKETCHES

Idea3: Individual process capture