Tracking and Enhancing Productivity in Teams

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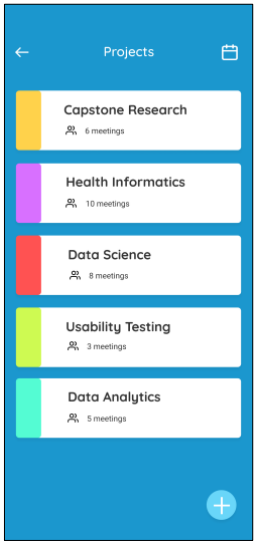
Abstract
Meetings are typical-a necessity for any organization or academia. They are opportunities for members of the team to exchange ideas and discuss objectives. Effective meetings can fulfill goals while saving time, money and talent. Properly managed team meetings provide a venue to set clear goals, assign tasks and expedite the decision-making process. In academia, students are simultaneously working on multiple team projects and they find it difficult to keep track of each meeting. Being students, we faced these problems on daily basis which motivated us to address this issue and come up with a design solution to create a healthy meeting environment. Huddle, our product concept, is a self-reflection tool that guides users through a visual data exploration. They can schedule meetings, stay on track of their action points, reflect on how the team is progressing in the project and make improvements to their current situation through the self as well as group reflection.

Author Keywords
Health analytics, Group Informatics, Personal Health Informatics, Data Tracking, Meetings, Productivity, Gamification

Motivation
Even though we hold meetings to discuss, decide, inform or collaborate with each other, most meetings will run into problems at one time or another. Often times there are issues like lack of clarity on meeting agendas, unpreparedness of team members, the



unequal contribution of members that might affect the overall productivity of the team. Several problems with unproductive meetings have been identified. A meeting setting would benefit from a collaborative shared platform where team members can keep track of various factors that contribute to a successful meeting. To do that, it was crucial to know the factors that affect a meeting which encouraged us to do user research and come up with a set of primary variables that influence team meetings. We also realized meeting dynamics can be improved by empowering team members with their meeting data and providing intrinsic motivation to help them reflect on their performance. This also inspired us to revolve our product concepts around self-reflection and behavior change. Over the course of the project, we broadened our vision and focused on areas of gamification and self-reflection to promote behavior change.

Statement of Contributions

Work meant to be done individually was split up equally with each team member and all the members participated and contributed during team meetings and brainstorming sessions. This was a collective effort where a balanced contribution from every member helped us develop Huddle.

Related Work

While a large number of applications have been developed to track the easily quantifiable data related to team or individual productivity, the study of social interactions and abstract factors affecting teams continues to be a matter of context.
There have been many research studies based on different social interactions within groups. They all differ in the factors they measure and the context in which these measurements are made.

Franz and Forsythe[1] [2] talk about group dynamics and the factors that affect the functioning of teams in their books. They talk about behavior patterns in groups and teams, including team formation and development, team cohesion, decision making and problem solving. Franz also talks about intervention techniques that can be used to improve these parameters in workplace environments.

Chiang et al. [3] narrow down the factors affecting team productivity by concentrating on coordination problems within software teams. They concentrate on factors that affect coordination among software teams, and aim to optimize the use of personnel and technology through a quantitative management of the project process.

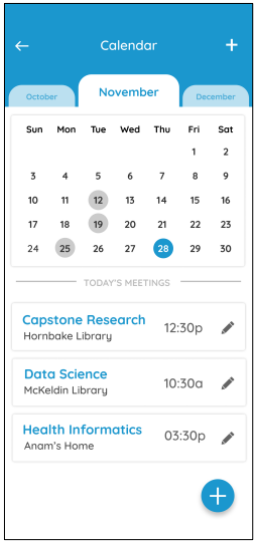
Kim et al. [4] present a real-time portable system that detects social interactions and provides persuasive feedback to enhance group collaboration. This idea aligns with our proposal of designing a framework. However, this paper describes the capture of real-time data and active feedback rather than reflection upon a volume of collected data as we plan to implement. However, this study does provide us with the concept of interaction and dominant assertion, which we can use to classify individual behaviors in a group.

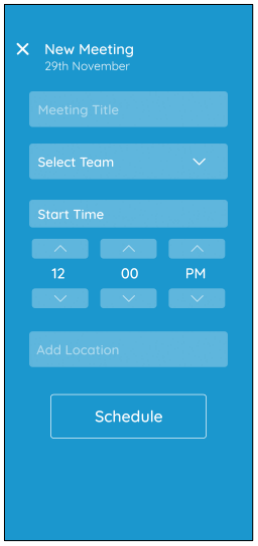
There are a lot of existing softwares and tools available in the market currently such as Toggl [5], Basecamp [6], DeskTime [7], Asana [8], iDoneThis [9], 15Five [10], Trello [11], Salesforce [12], Team-Track [14] that aids in tracking employee's time, tasks and workflow.

Design Process

We followed a user-centric design process starting from user research, brainstorming sessions based on the insights from the interviews, development of scenario and sketches to aid our brainstorming sessions, low and hi-fidelity prototypes, interactive prototypes.

Meetings are painful: deciding when to meet and where to meet, discussing our agendas without any deviations





add to our troubles. Taking this as our design problem, in this project we attempt to solve this challenge and help teams enhance their meeting productivities by reflecting on their own meeting data. This way we will help them assess the factors that are influencing their meeting productivity and thereby aid in strategizing measures to enhance better communication and productivity by minimizing hold-ups.

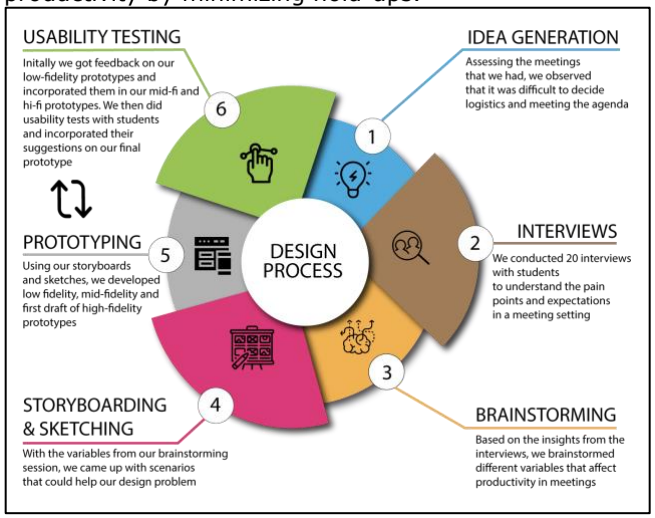


Figure 1 Our Design Process that led to Huddle

For the scope of this project, we are focusing mainly on students working on academic projects. We conducted interviews with 20 students from the University of Maryland and spoke to them about their experiences with meetings(their likes, dislikes, what are their expectations and what is lacking). We started by briefing them about our design project, asked them to recall about the last meeting that they had had and to reflect on their experience with that meeting. They walked us through the meeting - what (in their perspective) went well and what went wrong, how they resolved conflicts and did they employ any workarounds.

With the insights that we received from these interviews, we brainstormed on the variables that could be included in our reflection tool for the teams to track their data.

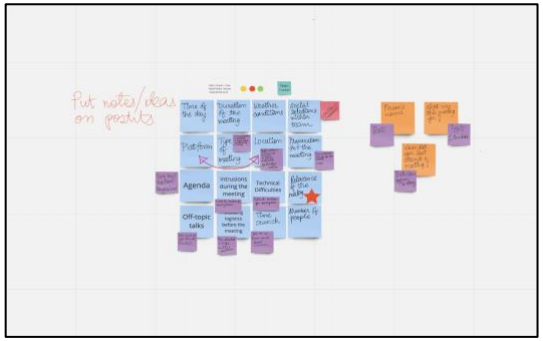


Figure 2 Our RealTimeBoard to decide on the influential variables

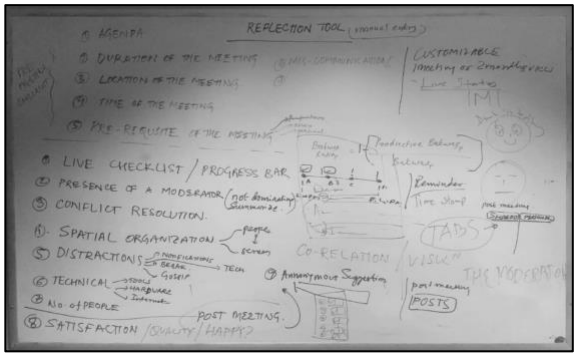
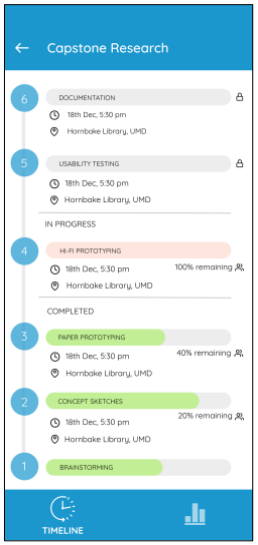
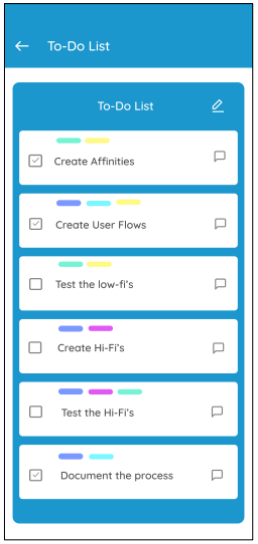


Figure 3 Brainstorming session on phase-wise influential variables that enhance and disrupt meetings

With the variables we had identified from the interviews, we narrowed them down to the ones which mattered the most for the students. We identified two scenarios - deciding logistics in an informal project meeting and staggered arrivals of team members





leading to unmet agenda. We developed storyboards for the aforementioned scenarios.

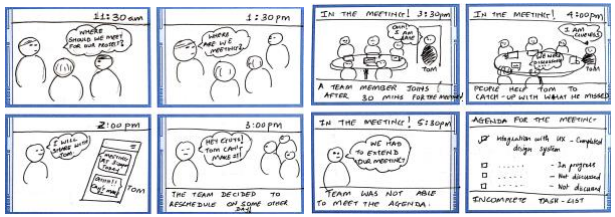


Figure 4 Storyboarding our scenarios

Developing the storyboards opened our creative minds to sketches and low-fidelity wireframes of how we could solve our design problem. With the two scenarios as our major themes, we made several sketches that would solve our design problem. Our main focus in these sketches was that since none of these variables can be automatically tracked and needs a manual entry, the user must spend very minimal time inputting data into the tracker so that they would be able to use this in a long run.

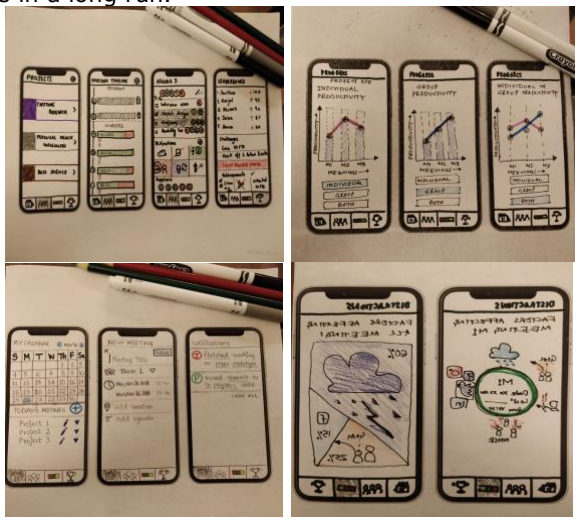


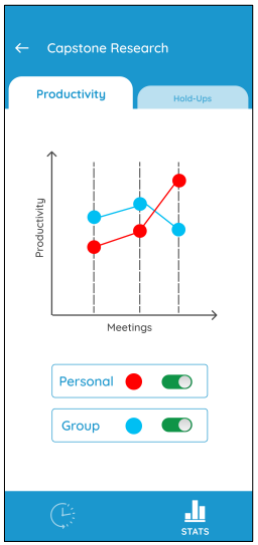
Figure 5 Low-fidelity prototypes of Huddle

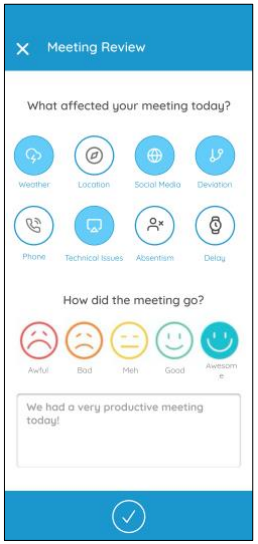
The design includes an addition of projects to Huddle. Once a project is added, the team members are also added indirectly their calendars are available on Huddle, using which a team member can see for a particular time if there is a conflict or not and schedule a meeting in an unconflicted time. Within each project, there is also a timeline of the meetings that have already happened and upcoming meetings. Within each meeting, the user would be able to view the action points discussed in the meeting(and who is assigned to the task- to keep track of who is doing what), a distraction checker containing common distraction themes that emerged out of our interview with the flexibility to add custom distractions if any. Once the user has input their data from the meeting, they can view their individual productivity levels for that meeting, as well as the team's productivity levels. At the end of a project, they can also view the major deviations that they have had and reflect upon how they could minimize it.

We did a usability testing with our low-fidelity prototypes and incorporated the suggestions in our mid-fidelity and high-fidelity prototypes.

Design Rationale and Results

Our proposed design solution, Huddle is a **Self-Reflection** Tool for **Visual Data Exploration**. The tool is based on **manual data tracking**. In this section we discuss how this tool incorporates various features for self-reflection such as displaying **trends**, analyzing **co-relations** and providing **data summary**. We also present the ways in which the design solution intuitively incorporates **behavior change techniques** encouraging effective work behavior.





Use of synchronized calendars and meeting schedulers, progress visualizers, and to-do checklists/agendas

The use of synchronized calendars (amongst team members) ensures a consolidated platform to review individual schedules and decide upon mutually convenient times for scheduling meetings. A project planner helps create a plan of meetings and displays progress of individual meetings. A shared to-do list with color tags representing team members displays work accomplished and progress of individual team member. This design **prompts intention formation**, encouraging team members to setup goals and agendas and adhere to it.

Use of meeting review pages comprising of factors affecting the meeting and tracking individual and group satisfaction levels

The meeting review page comprises of numerous (tertiary) factors or hold-ups that could possibly affect any meeting such as weather, choice of location, social media distraction, deviation form agenda, technical difficulty, absenteeism of members, delay etc. The user is encouraged to tag individual meetings with these factors and additional factors if necessary. This page also presents a Likert scale-based tracker to record user satisfaction levels. This design intervention helps in **self-monitoring of behavior**, and prompts **barrier identification**.

Use of statistical analysis to display trends in meeting effectiveness and visualizing co-relations with hold-up/tertiary factors

The productivity is accessed in terms of the effectiveness of team meetings. Here, the trends are generated with data form the satisfaction levels and percentage completion of agenda. A filter helps analyze individual vs group productivity trends. A tree map visualizes tertiary factors and their effects. The **trends** of productivity, it's **correlation** with tertiary factors and **data-summary** helps not only in **identifying barriers** and **self-monitoring**, but also helps in planning ways of **overcoming a barrier.**

Use of leader boards to encourage healthy work behavior

Timely completion of agendas helps users earn action points. This is reflected on a leader board where users on the top are the ones who effectively work on to-dos help ensure meeting prerequisites are covered. Incomplete to-do earns 0 points towards leaderboards. This design intervention is an effective use of **gamification** towards **positive behavior change** through **social-comparison**.

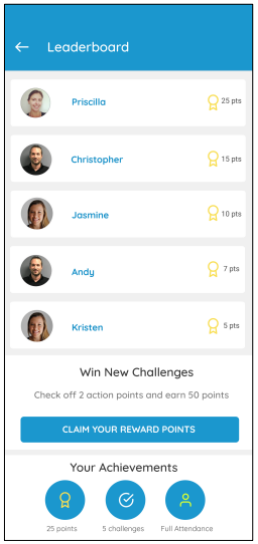
Future Work

Expanding scope beyond small teams

Our research focused on understanding the variables that affect team productivity in smaller groups (<6 members). Future work could dive into understanding team dynamics within larger group settings and how these dynamics are different from teams with fewer members. This would further help us understand the factors that influence productivity in bigger teams and how the design of huddle could be transformed to fit the needs of a wider set of teams.

Exploring environments beyond academia

All our participants in our user study were graduate and undergraduate students at UMD who are currently an active part of a team project. Therefore, our findings and design decisions are not generalizable to settings other than academia. Further research could be conducted with people outside of this domain such as working-class professionals who regularly work and collaborate in teams. This would help us understand factors that affect a team's productivity which was not observed in our current research (for example, the effect of hierarchy on teams).



Customizable visualizations for enhanced self-reflection

Currently, Huddle displays two types of visualizations: line charts displaying personal and group productivity and visuals depicting major holdups during the meetings. Future work could give users the ability to customize and filter their charts (based on individual hold-ups and meetings for example) to get a more granular look into the collected data and easily observe correlations between productivity and hold-ups for higher-order self-reflections.

Development and Deployment of the platform

We aim to go forward with the development of the Huddle mobile app for both Android and iOS platforms. This would later pave the way for deployment studies to assess how teams make use of the tool, what are the insights they get out of it and what are the different ways they reflect on the data collected.

Conclusion

In this paper, we have presented Huddle, a productivity tracking tool which helps teams keep track of their meetings and allows users to reflect on their own and the teams' productivity levels through data-driven visualizations. Huddle, with its ability to facilitate self and group reflection, is an ideal tool for teams looking to enhance their efficiency and productivity.

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