

Title: D.I.R.T. (Designing in Real Time)

The current state of design engineering education fails to show the relationship of the design process and time thus, the future of engineering education needs a real time integrative platform to improve design development amongst engineering students.

Throughout our education we've understood that design lives between this space of art and science. The current state of engineering design education is prescribed in a conceptual framework we know as the design process. These design processes often appear as a linear progression of phases from inspiration, ideation, and implementation (Figure 1). The current design model is an idealized concept for how design should work without any constraints. However, this idealized process does not take the concept of time into consideration. In one of our courses titled "Organizational Teamwork," we learned skills of navigating a project team and were introduced to research surrounding design timelines (Figure 2). We found this as an interesting tool to approach the design process because it communicated the relationship between design and time. This concrete type of design model shows how people solve a design problem, specifically, the way a designer moves from the different steps in the design process and how much time they spend on each part. With this timeline, we better understand the real time integration of how people actually use the design process and holistically, how the distribution of time plays a role in a design project.

To better illustrate this problem, we, as seniors of a design engineering major, work on a capstone project spread into two quarters of our final year. This capstone allows students to apply their accumulated knowledge of both design and engineering in a final project. We work in groups to define a problem and develop a solution. While we have practiced each phase of the design project in a more isolated context through design activities and homework, this project presents a new kind of freeform design more reminiscent of projects in industry. With 10 weeks, major difficulty arises in how time plays an integral role in our project's success. In order to help students better understand the design process, the future of engineering education should explore how time is an extremely important factor when designing.

In the year 2040, we anticipate that the future of design would allow a platform for real time design tracking, feedback, and recommendation while working on a design project. We expect the tools for accessing information, design education, and efficiency to improve within the next 20 years. In 2040, we hope a student can use a design platform with augmented reality to track their own design process, time spent in each phase, and recommend next steps to allow one to understand their personalized design timelines and comprise a design profile of aggregate experiences.

Currently, students in engineering design education find difficulty in tracking their progress and learning. The projects we create are stored in online portfolios, resumes, or folders for which we fail to accurately reflect on the improvements of our own design development. Therefore, we foresee a future in creating student design profiles (Figure 3). These design profiles would store a student's design timelines of various projects and allow students to see actual data of how they've improved or changed their design process between different projects. Not only does this help students individually reflect on their design education, but also provides a tool to compare other student

timelines and how they might have approached the same or similar design space. The use of design profiles show what areas a student truly excels in. Students can view other students design profiles, as well as, allowing them to view the varying expertise other students may have. Understanding the strengths of other students and their own will improve team dynamics and create better solutions.

We believe, professionals can also use the platform to display their own design profiles and timelines for which allows students to access a database and view professional designer's timelines and how they solve problems. The use of design platform and design profiles provide a way to integrate conceptual design models and provide evidence of design models in practice. This helps students better understand how design works in real time and how time is one of the many constraints within a design model that must be accounted for.

With this, I would love to explore a persona. Meet Jim, a college design engineering student in the year 2040. In his first year, Jim learned the foundation of User Centered Design and Design Thinking through courses that introduce the design process as shown in Figure 1. Jim uses a design platform called "D.I.R.T." that allows Jim to work on his assignments and projects while guiding his design process. The platform can gather information both with augmented reality and Jim's usage patterns, allowing him to understand where he is in the design process. Jim can upload sketches, pictures, wireframes, and mock-ups into the platform that can help him save his work while aiding his progression. If Jim has spent several hours or days on a particular phase of the design process, the platform can help recommend if Jim should reiterate on a particular phase or continue to a different phase. Through the completion of a project, the platform would report a detailed design timeline similar to that shown in Figure 2. Jim can now see where he spent a lot of his time and gain insights for how he could have designed better. Jim now asks his classmate Sarah to compare his and her design timeline. Jim can see that he spent a lot of time in the prototyping phase of his project where Sarah spent a lot of her time in the understanding and observation phase of her project. With this platform, students can compare the quality of their work and how their process affected it. The class can also see how the professor or teacher's assistance, with multiple years of design experience, tackled a project and where they delineated their time in a particular design activity or project.

We propose the future of undergraduate engineering design education would integrate a design platform, design profiles, and design timelines into an engineering curriculum. The current method of teaching design represents an idealized and abstract description of the design process. The use of a design timelines can introduce, in a contextual and grounded way, the concept of time. The design platform and design profiles give students a holistic understanding of design on a concrete level, meaning there is a detailed temporal breakdown of how they designed their project. In order to achieve our proposed idea for the future of design education, we must do further research on the development of real time tracking, coding, and analyzing of design in action. We feel that the current state of design engineering education leaves students with a gap in understanding both the design process and the context of time within it. As students soon graduating from a design engineering major we feel this type of tool would equip future students tackle the future challenges and problems.

Figures:

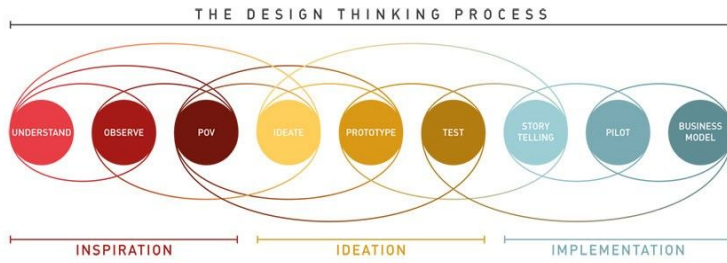


Figure 1: The linear progression of the design process - (IDEO process Wikimedia Commons, 2011)

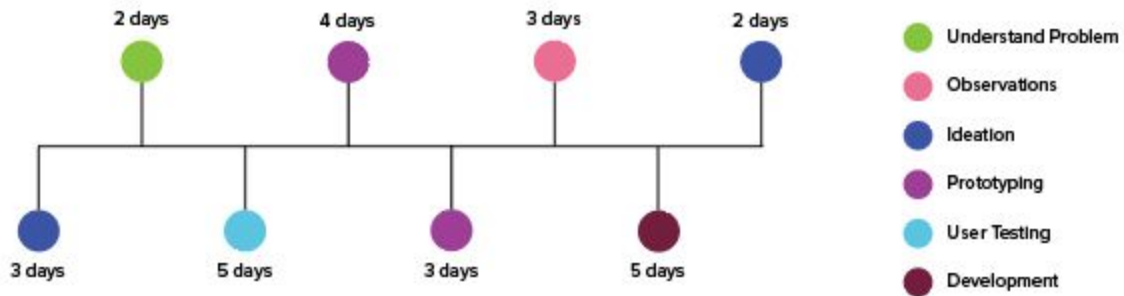


Figure 2: Theoretical Design Timeline of a project

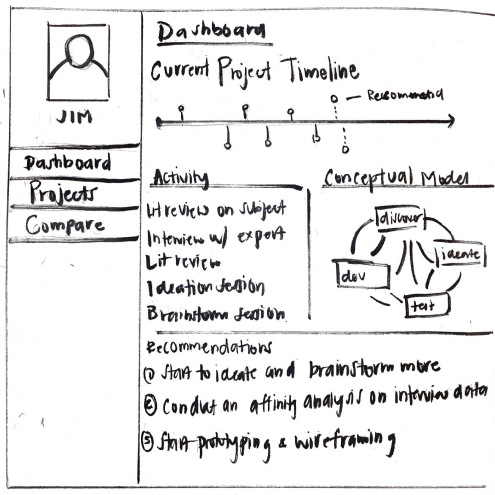


Figure 3: Sketch for design platform interface to assist student with design engineering project

References:

IDEO process Wikimedia Commons. (2011). Commons.wikimedia.org. Retrieved 5 April 2017, from https://commons.wikimedia.org/wiki/File%3AIDEO_process.png