1 Introduction to Design and the Concept Development Process

What is design?

Depending on the industry we are talking about, design can have many different definitions. Most generally, "design" is a process for deliberately creating a product to meet a set of needs. Mobile app development requires both engineering design and product design. Engineering design focuses on physics, such as speed, mass and other performance measures while product design also considers user and consumers by asking what the user wants in a product.

Have the students discuss...

- 1. What is design?
- 2. Pick an app that you're familiar with was it designed? Why do you say that? How do you think it was designed? Who do you think designed it?
- 3. What products/mobile applications a) work b) do not work and why?

Concept development process

In this chapter, we will focus on concept development and the first two of its three components: clarifying requirements, concept generation and concept selection.

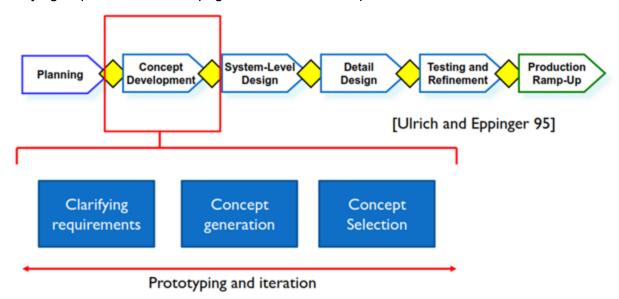


Figure 1 - The design process with the three detailed stages of concept development

The initial concept development process is important because a better design process leads to a better design outcome. Decisions made during the early stages of design tightly constrain future options. It is estimated that 70% cost of a product is determined in the first 30% of the design cycle.

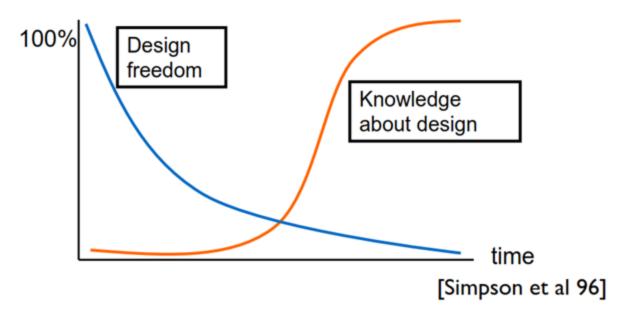


Figure 2 Early phase decisions tightly constrain future choices

Ways to innovate

There are three main sources of innovation: technology, market and users. Though in reality, all products are a combination of more than one source.

Technology: Innovation can be achieved through a new form of technology, either by creating or utilising it. Inventing a new technology can be slow due to the nature of research and development and is often a risky process financially. The better option is to think "we have a new technology, what is it good for?" In this case, MIT App Inventor is our new technology and it is good for creating Android apps, thus narrowing down the type of product we will create.

Market: Market innovations come from changes in the market. These changes can be changes in demographic trends, such as aging baby boomers, or changes in competitors. The Galaxy Tablet was invented when Samsung's competitor, Apple, came out with the iPad. Market innovations. Market inspired product designs are often based on existing product concepts.

Users: Product needs can be found by observing an individual. It does not necessarily assume a pre-existing concept. While observation process can require only a few participants, the result may not be representative.

Class Objectives

- 1. Basic theory for product design and development
 - a. Design methodology concept generation/creativity, concept selection
 - b. Good design process generally leads to good design outcome
- 2. Principles of design representation

- a. Sketches, prototypes language of design
- b. Communication, idea evaluation
- c. Craftsmanship, engineering excellence
- 3. Working with stakeholders
 - a. Gather user needs evaluate designs with user feedback

There are three overall class goals for this design curriculum. Firstly, it will teach basic theory for product design and development. We will discuss the design methodology including concept generation/creativity and concept selection, as a good design process generally leads to a good design outcome. Secondly, we will touch upon principles of design representation specific to mobile app development, such as sketches, prototypes, communication and idea evaluation. Lastly, we will learn to work with stakeholders, gathering user needs and evaluating designs with user feedback.

Design logbooks

All of your students in an app development course should have a design logbook. They should be filled with text, sketches, calculations, estimates and anything that is remotely relevant to their projects. Design logbooks can be used to record thinking on a project, to capture ideas so they will not be forgotten, to explore and test ideas and to preserve intellectual property. For good practice, encourage students to purchase "padded" notebooks (non-spiral) so that pages cannot be torn out (for the sake of preserving intellectual property), to keep the notebook on them in case ideas strike, and to sign and date pages.

Concept generation

Concept generation is the process of generating new ideas. It is supposed to be synthetic rather than analytical. The purpose is not to judge the feasibility of solutions but instead to keep coming up with ideas regardless of practicality. This approach is often different to what students are taught in their math and science classes, as there is no right answer in brainstorming and they are to not think critically about their solutions.

There are four steps in the creative process.

- 1. Preparation collecting information about a problem
- 2. Incubation unconscious recombination of ideas (requires conscious thinking about the problem)
- 3. Illumination moment of inspiration
- 4. Verification implementation/testing of the idea

For example, using the creative process to decrease car accidents by creating the MIT App Inventor app, No Texting While Driving:

- 1. Preparation Largest cause of accidents? Number of teens that drink and drive? Text and drive?
- 2. Incubation *thinking in the shower*
- 3. Illumination ideas: push notifications on iPhones with reminders to put on seatbelt, to

- not drink and drive etc., cars with breathalyser attachments, app that reads text messages aloud while driving
- 4. Verification testing the text msg reading application:create the application or simulate the experience by having someone read text messages outloud to the driver.

Creativity requires fluency (large amounts of ideas), flexibility of ideas (range of ideas) and originality. It is important to not focus on practically when generating ideas. Doing so would impede the flow of ideas and impractical ideas often point toward more practical options. Common problems that occur when brainstorming include using the first idea that pops up, inadequate competitive review, not involving entire team in process and missing potentially strong solutions.

Have students brainstorm in group of 3-4, what "future classrooms" would look like. Give them 8 minutes. Ask them to present their favorite answer with the class.

Tell students to brainstorm with the following guidelines:

- Aim for large number of ideas
- Ignore practically
- Set time limit
- Set aim
- Appoint facilitator
- One person at a time
- Individual brainstorm first