

Lecture 1, Jan 9, 2023

Lecture 2, Jan 11, 2023

Prototyping

- A model that demonstrates part(s)/concepts of the finished product
 - Could be physical, mathematical, graphical, etc
 - Serves a purpose – communicate, demonstrate, de-risk, and verify
- Prototyping is a process:
 1. Conceptualize/express/sketch ideas at a very high level
 2. Specify and flesh out details via CAD, pseudocode, schematics, etc to enable verification
 3. Building the prototype
 4. Evaluate the prototype, check against the concept and/or specification
- Systems Theory/Thinking Framework for Prototyping: Systems have a functional perspective, e.g. change in state to change of output, state machines, and a structural perspective, e.g. how parts connect together

Lecture 3, Jan 13, 2023

Design Dossier Assignment

- Artifacts are evidence of your work, e.g. meeting minutes, schematics, CAD, code versions
- The dossier includes an integrated summary that tells the assessor where and what things are
- Document everything, notes, pictures, other records
 - Meeting minutes are required!
- Consider an engineering notebook

Context Research

- Separate the design and the context, e.g. the design is helicopter, the context is on Mars
 - The context needs to be fully understood before we look at the design
 - Once you start looking at the design you're locked in
- Stay open-ended in the initial steps of context research to gather more than enough information about the social and cultural context
- For designs involving a community, the following areas may be included:
 - Culture (art and literature, customs, symbols)
 - History
 - Political systems/government
 - Economics
 - Natural environment
 - Geology
 - Demographics
 - etc
- *Open-ended* research is characterized by a persistent degree of uncertainty about why you're doing the research – the “why” appears later
 - This makes it hard to judge what information is important
- How will your **design** survive in the **world**?
 - Survive in a society, with people? For days/year/decades? From repair, funding, attention or use?
 - Can the community support the energy requirements? Is there government infrastructure or outside funding for repair? Does your stakeholder have the knowledge to fix it when it breaks? Will the design deepen social divisions to the point that the design is regretted?

Lecture 4, Jan 16, 2023

Project Management

- Multiple teams are often working on different parts of the project, possibly around the world. How do we deal with complex design situations?
 - Clear chain of command
 - Clearly communicated goals/expectations/timelines
 - Accountability
 - Organized communication channels
 - Frequent debrief meetings
 - Organization of roles/responsibilities/expertise
- Effective project team collaboration involves both team process and design process
 - A team charter guides everything the team does
 - A communication protocol is needed for decision making, conflict management, information management, and team interactions
 - Regular team meetings, with agendas, notes and action items
 - The meetings operationalize, track, and record technical design artefacts
 - Project schedule, tasks list, procurement and budget tracker
 - Project document repository to keep all these
 - Process review includes consideration for decisions, justification for updates, reflections and lessons learned
- Teamwork is framed by a team charter:
 - Team identity: common goals, shared values, mission, and expectations
 - Communication protocols: suitable collaboration platforms, communication practices and appropriate information exchange
 - Interaction protocols: decision-making, negotiation of priorities, conflict management, relationship building
- Team meetings progress the design work:
 - Meeting agenda: clear focus and expectations, maximize time usage
 - Meeting notes: track design progress, common understanding, clear interpretations, gather information, transparency, audit trail
 - Action items: track tasks, capture roles & responsibilities, avoid duplication, transparency, audit trail
- Process reviews improve the design work:
 - Justifications and considerations: considerations for decisions, justifications for updates, reasons for team actions
 - Reflections: Design work experiences, teamwork experiences & behaviours, achievements, challenges, future implications
 - Lessons learned: knowledge gained, desired/undesired outcomes, future modifications
 - * Look at the process and modify the team charter
- PM artifacts in dossier:
 - Team charter
 - * Team identity
 - * Communication protocol
 - * Interaction protocol
 - Meeting agendas
 - Meeting notes and action item
 - Team building activities
 - Meeting recordings (one in each phase)
- Project duties and responsibilities are tracked via meeting notes, recordings, etc

Value Propositions: Opportunity to Approach

- Main framework is the *design chain*

- Each part works in a space, which has *dimensions of consideration*
 - * e.g. individuals, groups, social structure in the context
 - * e.g. tasks addressed, degree of automation, human-technology interaction for approaches
- Value propositions link one space to another
- A value proposition describes the benefit customers can expect from your design
 - Links the opportunity space to the specific approach you take to provide value to stakeholders in that context
- Value propositions help define scope
 - From potential gains and current pains value propositions extract value
 - Are you creating new capabilities or addressing problems?
- There are multiple possible value propositions
- Go from context to approaches and then to design concepts, don't jump directly to design concepts
- Value propositions may affect different stakeholders differently
- Think about who are the stakeholders; who will you provide value for? **who will you leave out?**

Lecture 5, Jan 18, 2023

Problem Solving

- Understanding the problem, dissecting it and focusing on the aspects with the biggest impact and testing whether we could address them
- Efficient communication; understanding the problem from the client perspective

Lecture 6, Jan 20, 2023

Action Items for Week 4 Studio

- Evidence of exploration of context and approach
- A value proposition which links the context you will work within to the approaches you will consider
- Preliminary engineering requirements which describe design concepts within the approaches you will take

More on the Design Chain

- Between each link on the chain, apply FDCR to get to the next space
- Diverging in spaces, converging to links
- The value proposition is like a written statement that specifies the opportunity we're trying to address

Value Propositions Through Design For Social Justice

- United Nations' Sustainable Development Goals (SDGs) can help conceptualize or inspire value propositions
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Lecture 7, Jan 23, 2023

Lecture 8, Jan 25, 2023

Lecture 9, Jan 30, 2023

Lecture 10, Feb 1, 2023

Specifications vs. Requirements

- Design specifications capture prototype details
 - As opposed to design requirements, which specify what the prototype needs to do but not how it's done
 - Specifications are detailed and contain what components to use, how they are used, etc
- Requirements are about determining conceptual designs; specifications define how the prototype is actually built using components
- The line between requirements and specifications can be situational

Systems Integration

- Partitioning: Integrate and test in small chunks
 - Test small parts before testing the whole system
 - Test only when parts can be reliably connected, i.e. make sure interfaces are ready before testing
- Forethought: Plan integration from the start
 - Integration is a key design activity, not an afterthought
 - Limit design concepts from the start by considering interfacing needs
 - Plan out order of development using this
- Limitation: Integration of subsystems necessarily reduces their flexibility
 - Subsystem design space is bound by interfacing needs
- Intentional process: backup, isolate, inspect, revert and rollback

Lecture 11, Feb 6, 2022

Lecture 13, Feb 13, 2023

Prototyping

- Use proxies for parts that are too complicated
 - Good for stuff that are for communication, e.g. using a water bottle as the proxy for a patient
- Don't have to build or proxy every part of the system!
- Can be a scale model
- Show a particular aspect of the concept, or integration between concepts
- Selecting elements:
 - What is the highest risk part?
 - What functions are critical?
 - How does it interface with other elements of the context and is it possible to prototype that?

Lecture 14, Feb 27, 2023