

# MUCP DESIGN PROCESS

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School of Cities

# Design

- The word “**design**” is often used as a generic term that refers to anything that was made by a conscious human effort.
- Design is also a **process** that is used to systematically solve problems.

# What is a Design Process?

- A **design process** is a systematic problem-solving strategy, with criteria and constraints, used to develop many possible solutions to solve or satisfy human needs or wants and to narrow down the possible solutions to one final choice. (*ITEA Standards for Technological Literacy*)

# Why

- Demystifies the process of problem solving
  - Provides a structured approach to thinking about how to design a solution to a problem
  - Assures that you understand the problem before jumping to a solution
  - Assures that you consider and evaluate alternatives before deciding on the final design

# Stages of the Design Process

1. Problem Identification
2. Requirements and constraints
3. Research
4. Explore possibilities
5. Select approach
6. Construct and refine solution
7. Evaluation
8. Communicate results

# Problem Identification

- Who are the stakeholders?
- What are their use cases?
- What are they trying to achieve?
- What impedes their ability to achieve them?

# Requirements and Constraints

- Requirements

- Performance
- Reliability
- Energy

- Constraints

- Economic
- Environmental
- Ethical and Legal
- Health and Safety
- Manufacturability
- Political and Social
- Sustainability

# Research

- Conduct interviews with those affected by the problem - stakeholders.
- Research solutions that may already exist; identify shortcomings and reasons why they aren't appropriate to a given situation.
- Compile ideas and report findings to the team.



# Explore Possibilities

- Brainstorm

- A group problem-solving process in which each person in the group presents ideas in an open forum.
- Generate and record ideas.
  - No judgment
  - Wild ideas encouraged
  - Quantity over quality
  - Build on others ideas



- Refine

- Consider further development of ideas with constraints and tradeoffs.
- Explore alternative ideas based on further knowledge and technologies.

# Select Approach

- Review brainstormed information and answer any lingering questions.
- Evaluate each solution
- Select final idea that rates highest and through group consensus.
  - Note if consensus does not agree with decision matrix results then you have not captured all of the requirements and constraints



# Decision-matrix (Pugh method)

Criteria	Baseline	Alternative Solution		
	Current Solution	Alternative 1	Alternative 2	Alternative 3
Feasibility	5	1	1	1
Cost	4	-1	-1	0
Long Term Benefit	1	0	-1	1
Maintainability	3	0	0	-1
Availability of Resources	2	1	0	-1
Sum of all Positives		7	5	6
Sum of all Negatives		4	5	5
Sum of all Neutrals		0	0	0
<b>Total</b>		<b>3</b>	<b>0</b>	<b>1</b>

[https://en.wikipedia.org/wiki/Decision-matrix\\_method](https://en.wikipedia.org/wiki/Decision-matrix_method)

# Construct and Refine Solution

- Explore the idea in greater detail with annotated sketches.
- Make critical decisions such as material types and manufacturing methods.
- Generate through computer models detailed sketches to further refine the idea.
- Produce working drawings so the idea can be built.
- Make models to help communicate the idea, and study aspects such as shape, form, fit, or texture.
- Construct a prototype from the working drawings, so the solution can be tested.

# Evaluation


- Design experiments and test the prototype in controlled and working environments.
- Gather performance data; analyze and check results against established criteria.
- Conduct a formal critique to flesh out areas of concerns, identify shortcomings, and establish any need for redesign work.

# Communicate Results

- Design Report
  - Captures all of the stages
- Slides presentation
  - Summarizes stages
- Poster
  - Summarizes stages

# MUCP Student Deliverables

- Project Requirements
- Design Proposal
- Design Review and Critique
- Final Report and Deliverable
  - Design Portfolio
  - PowerPoint
  - Final report
  - Poster
  - Design Showcase



Major student deliverables that stems from the design process