Designing is a problem-solving method used to develop solutions leading to the creation of articles, systems, or environments.

DESIGN PROCESS

THE UNIVERSITY OF BRITISH COLUMBIA

UBC engineering

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Faculty of Applied Science

UBC Okanagan Engineering | UBC Applied Science

GOALS

II. To conduct high-quality and leading-edge research, and to facilitate its application for the benefit of society.

III. To recruit outstanding students, faculty and staff, and to foster their development and career goals.

SCHOOL OF MANUFACTURING, ELECTRONICS & INDUSTRIAL PROCESSES

Mechanical Engineering

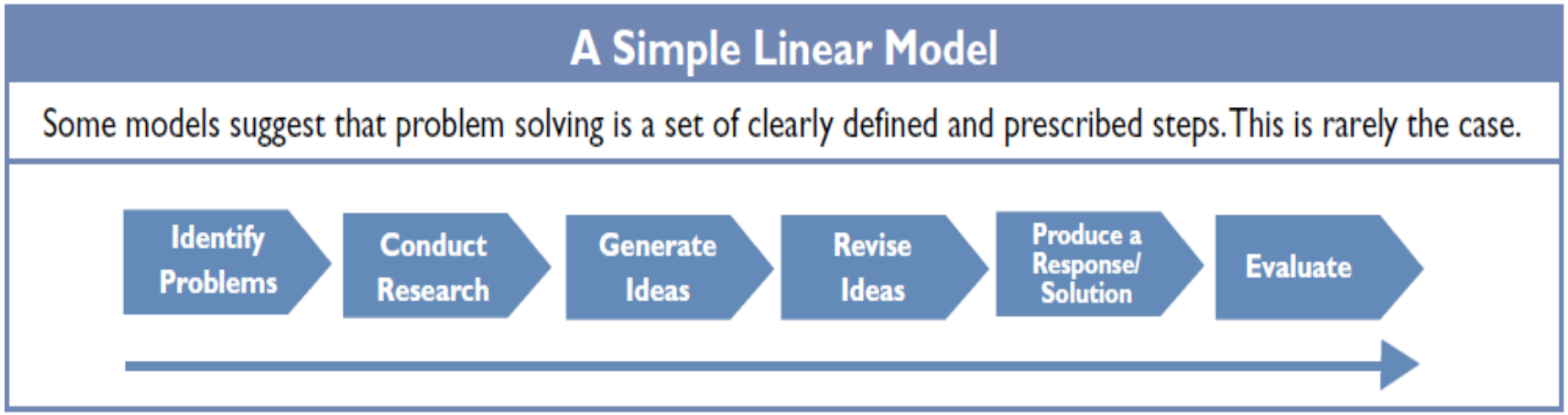
| Full-time | Bachelor of Engineering

BCIT | BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

The program is designed to enable students to become effective problem solvers as well as critical and creative thinkers, while stressing ethical responsibilities in professional conduct and engineering work.

Linear Model of Design

- Although this maybe ideal, may not be realistic in our projects or life.



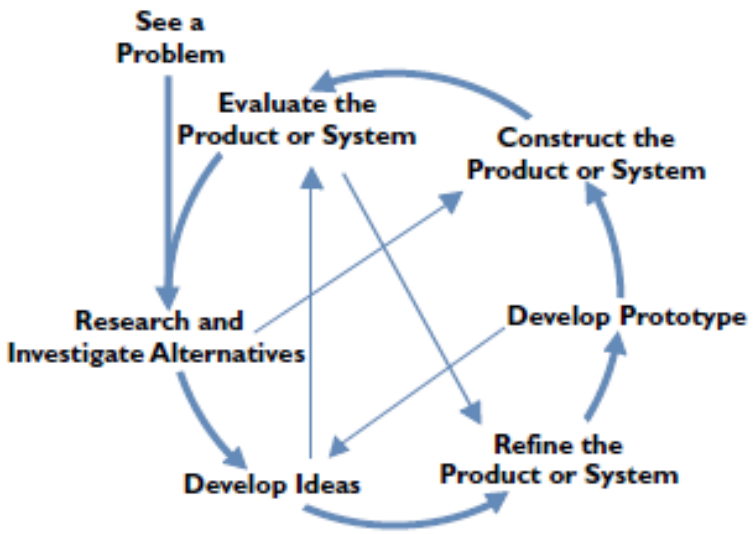
Action and Interactive Models

Action Model

Some models suggest a continuous flow of activity, from problem identification to the development of a refined product.

Interactive Model

Interactive models illustrate the complexity of a process, in which at any time you might move to any point in the process in order to figure something out.

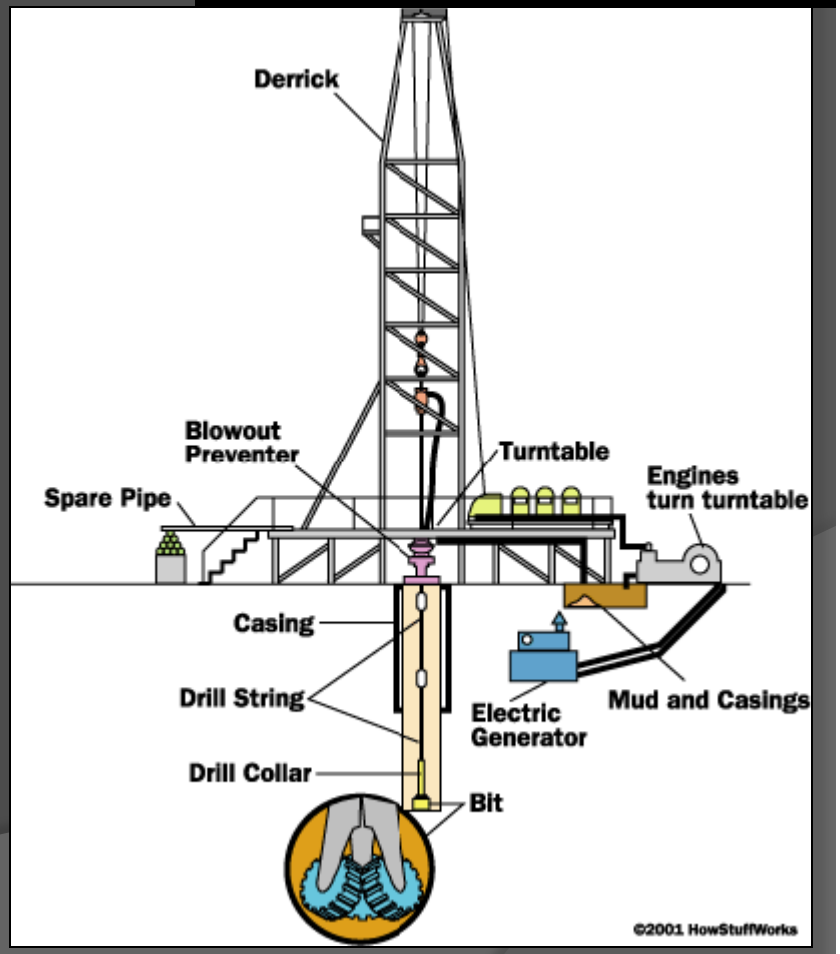


Ethical Considerations

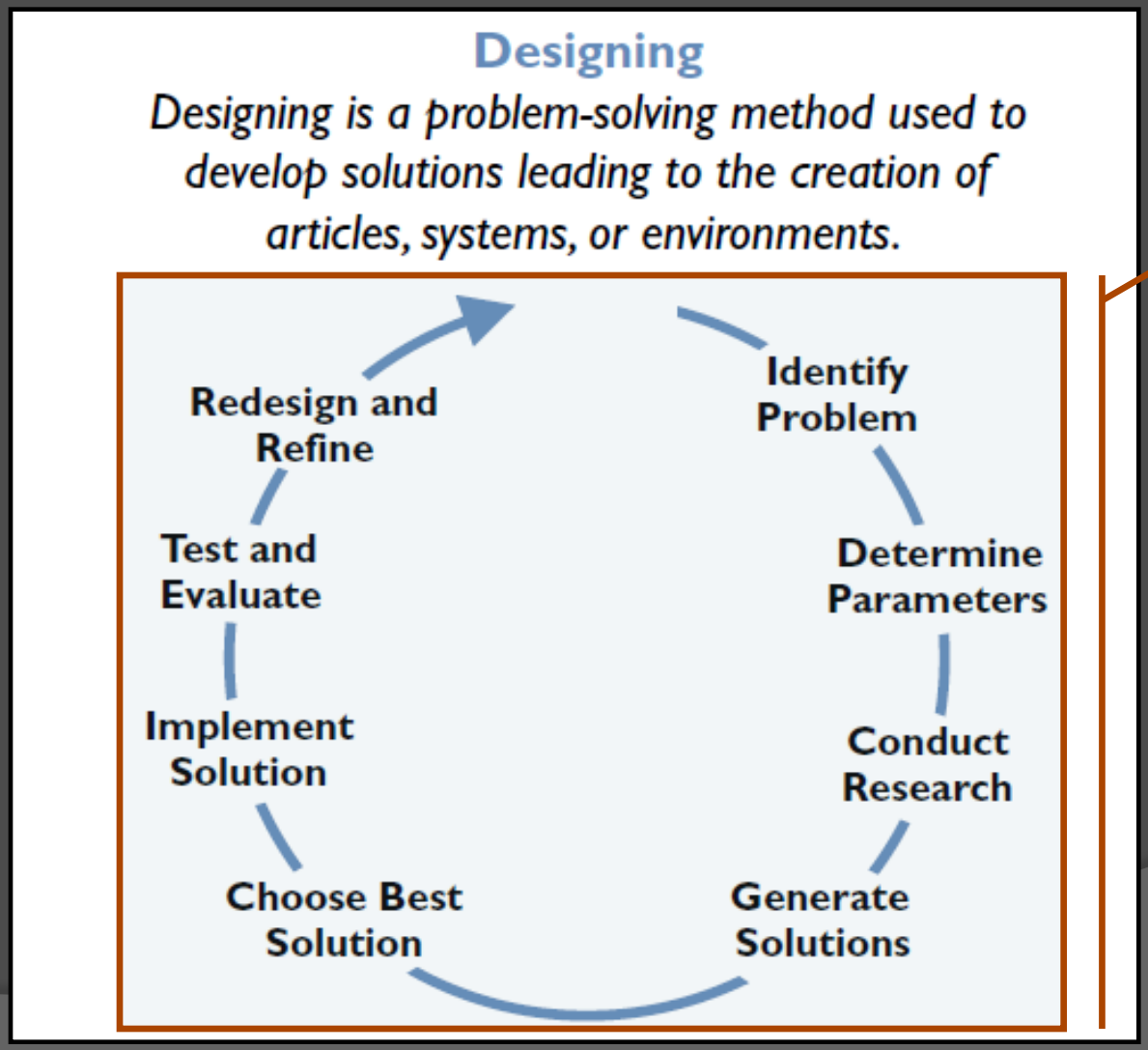
Social Impact

This is a method of solving problems used to appraise the social, environmental, and ethical implications of technological decisions.

- Identify consequences and effects
- Develop a value system through critical thinking
- Judge benefits and disadvantages of technological applications
- Make ethical decisions

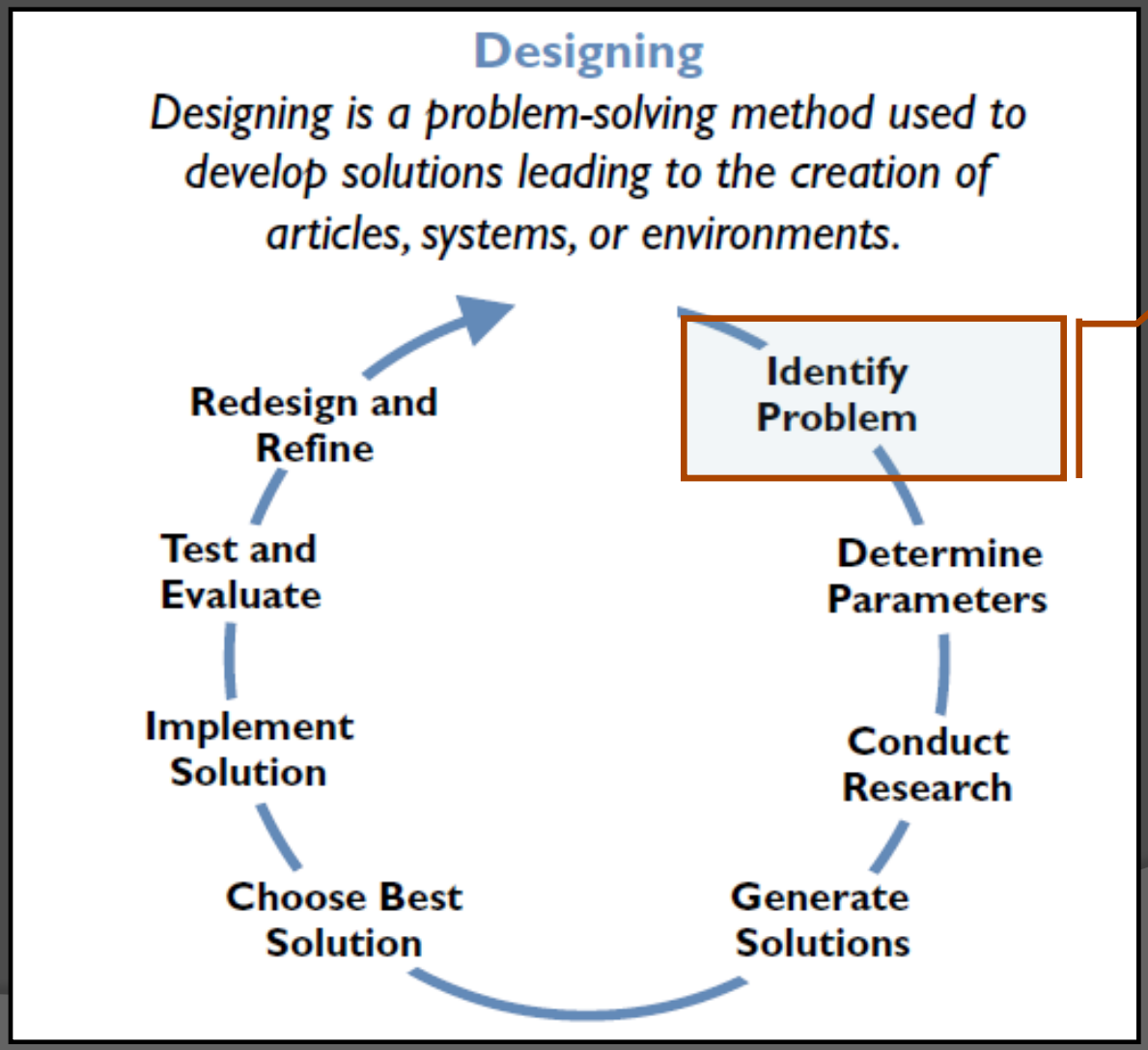


Design Process (Cyclical)



We will use this model for our projects.

Design Process (Cyclical)

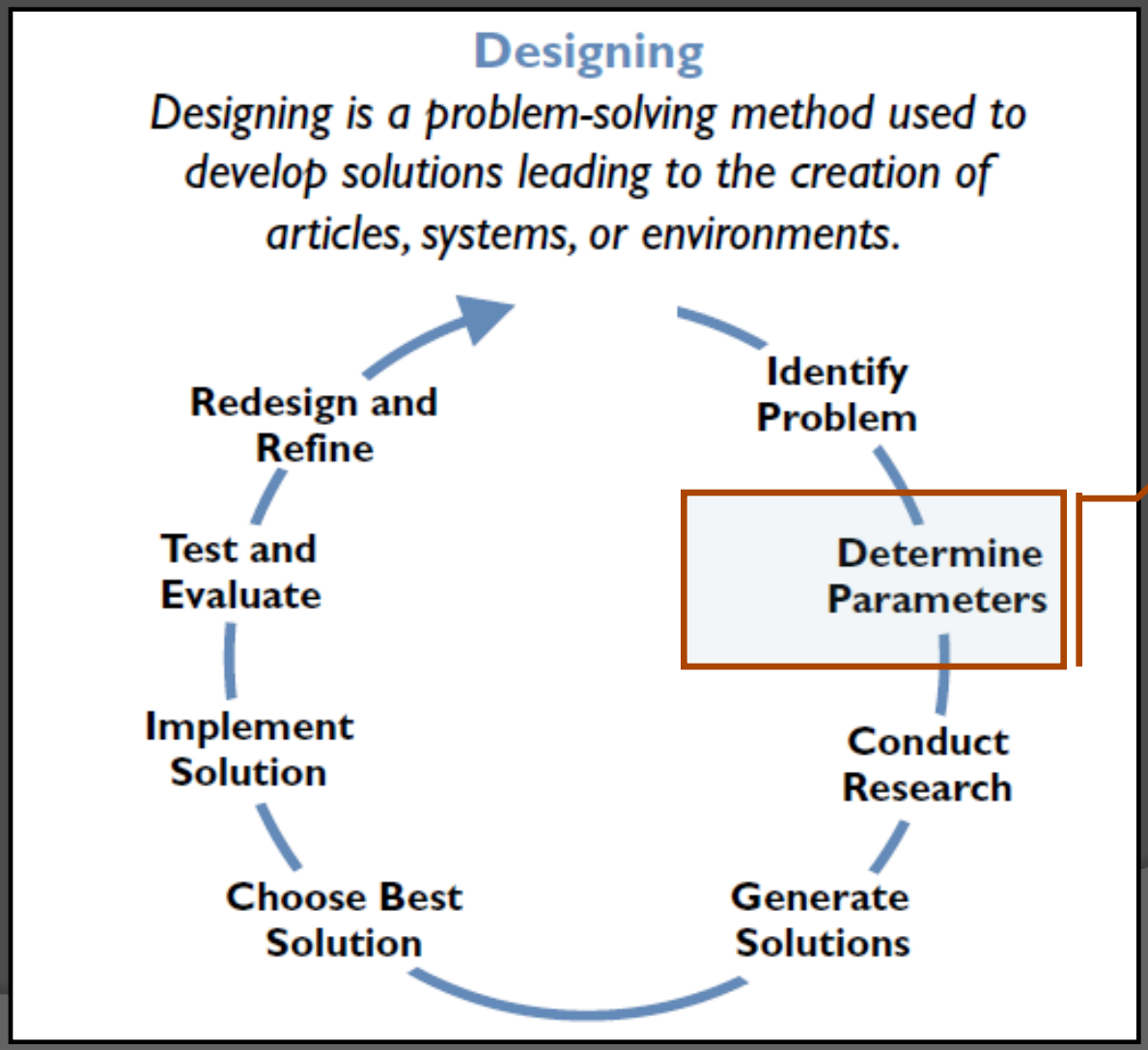


What are we building and why?

Problem Statement

- To design a device to throw a glass marble as far as possible, adjusts for accuracy (to hit the door) and eventually destroys cardboard castles only using the force of a counterweight.

Design Matrix (Cyclical)

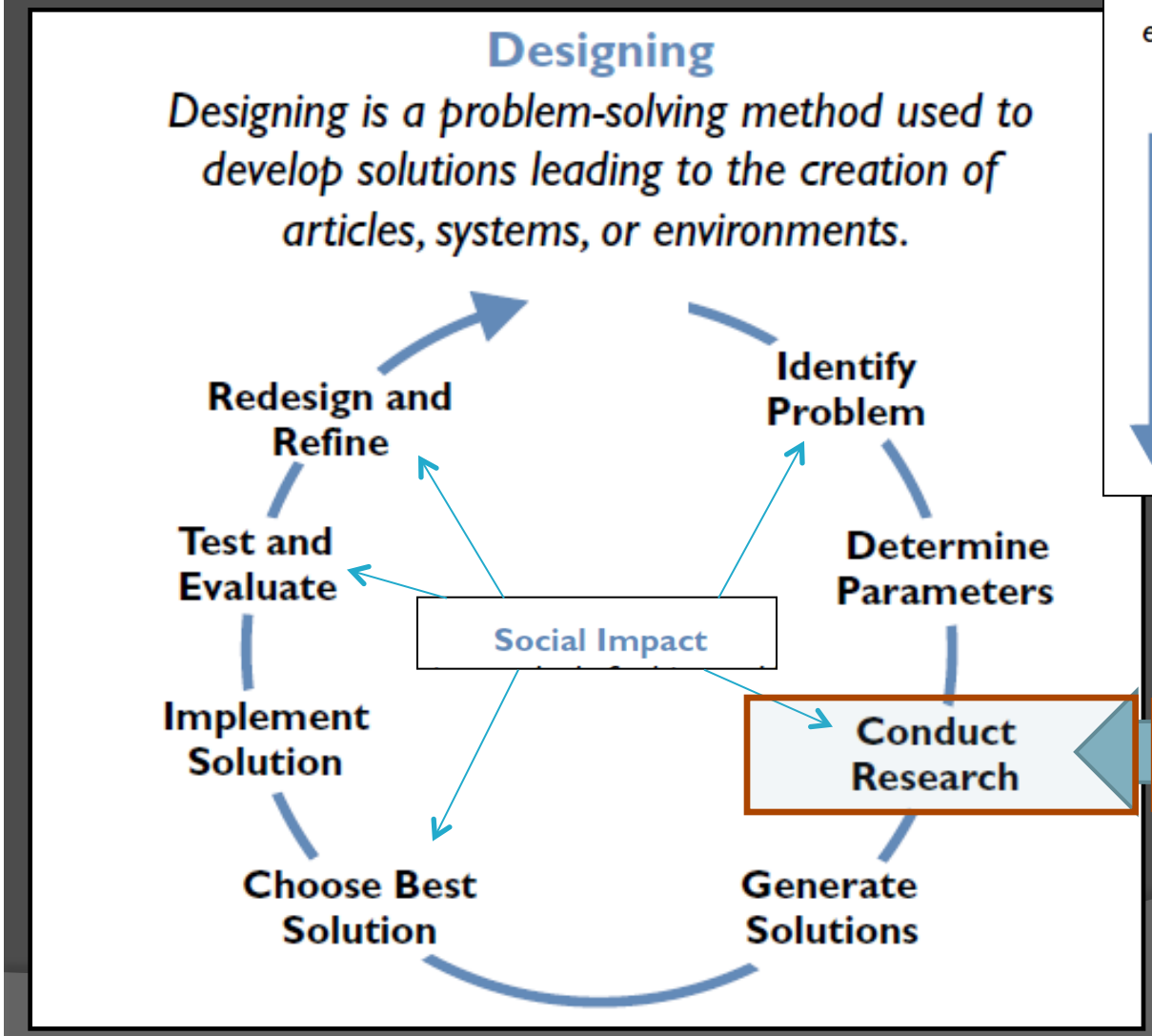


What are the parameters for this project?

Parameters: Trebuchet

- 2 to 3 Classes – Design and Draw
- 7 Shop Classes – Include 1 Class demonstrations and 1 Class for Testing
  - Possibility of extensions
- Structure: Wood (3/4”x3/4” or 3/8”x3/4”) and Dowel (1/8”.)
- Axle Piece – Dowel (1/4”)
- Glue is permitted, no other fasteners allowed.
- Pivot point of trebuchet is 12” from table surface.

Ideal Design Process



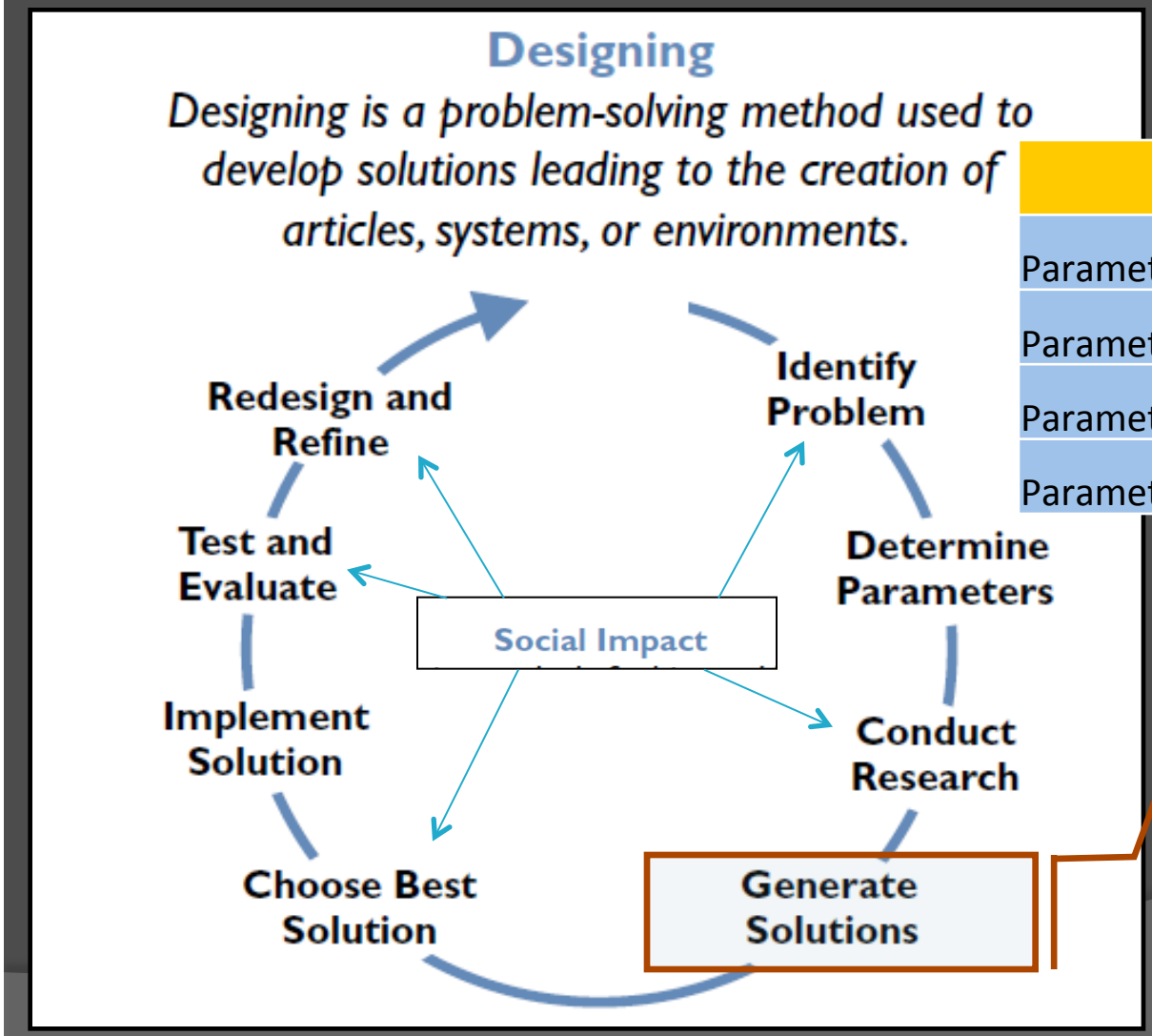
Social Impact

This is a method of solving problems used to appraise the social, environmental, and ethical implications of technological decisions.

- Identify consequences and effects
- Develop a value system through critical thinking
- Judge benefits and disadvantages of technological applications
- Make ethical decisions

- Important aspect of research to maintain engineering integrity.

Ideal Design Process



	Solution 1	Solution 2	Solution 3
Parameter 1	1	2	3
Parameter 2	3	1	2
Parameter 3	2	1	3
Parameter 4	3	2	1

Use a **Design Matrix** to find the Best Solution.

Design Matrix Example

- Rank the solutions in order of how effectively they speak to the parameters.
- Choose solution that solves/answers the most parameters in the best way.

	Solution 1	Solution 2	Solution 3
(x2) Parameter 1	7	10	9
Parameter 2	10	9	7
Parameter 3	9	8	4
Parameter 4	6	5	2

Solution 2 seems to achieve the highest rank.

Design Matrix Example

	Solution 1	Solution 2	Solution 3
(x2) Parameter 1	7	10	9
Parameter 2	10	9	7
Parameter 3	9	8	4
Parameter 4	6	5	2

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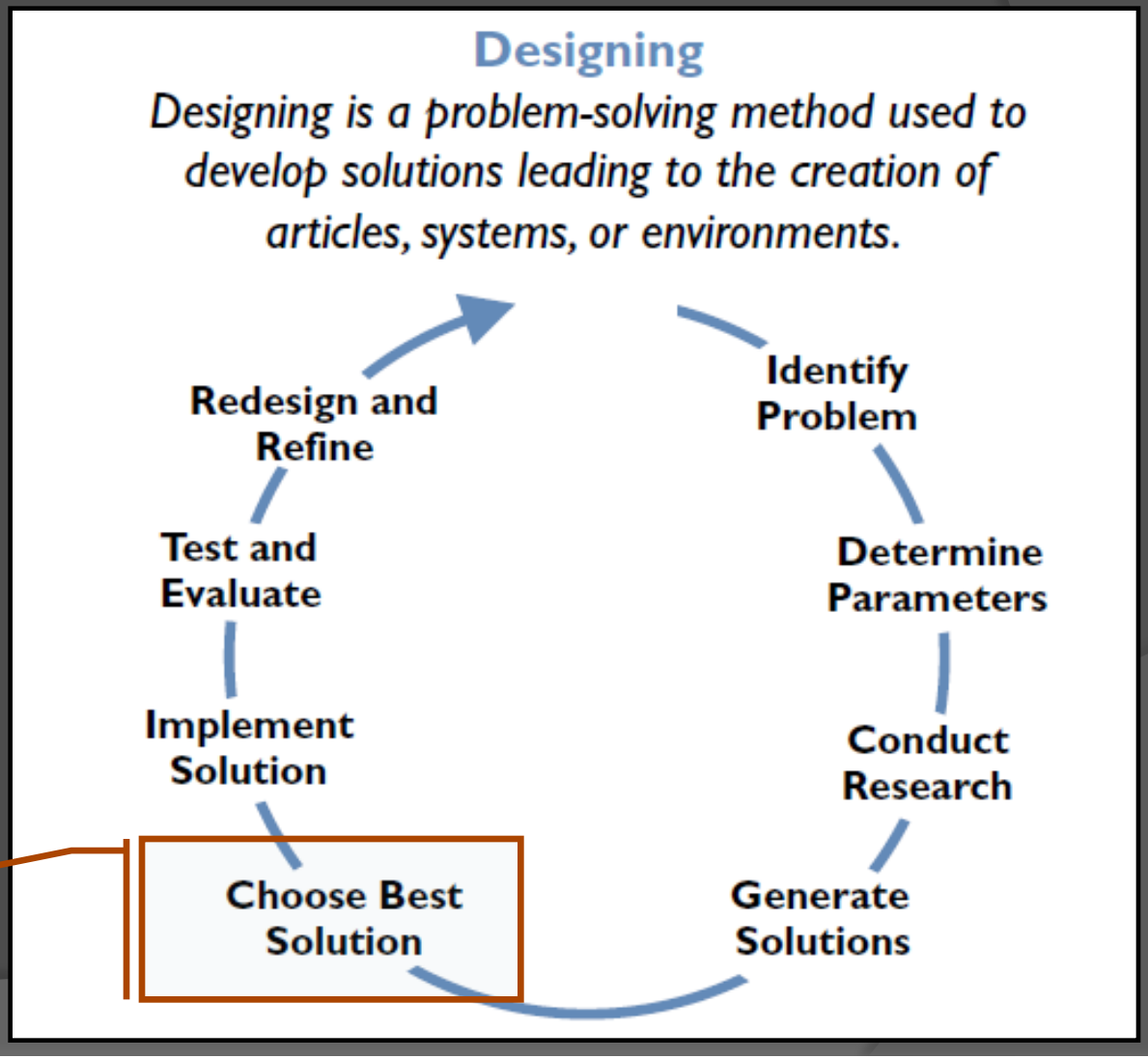
- Simple numerical value to decide best solution.

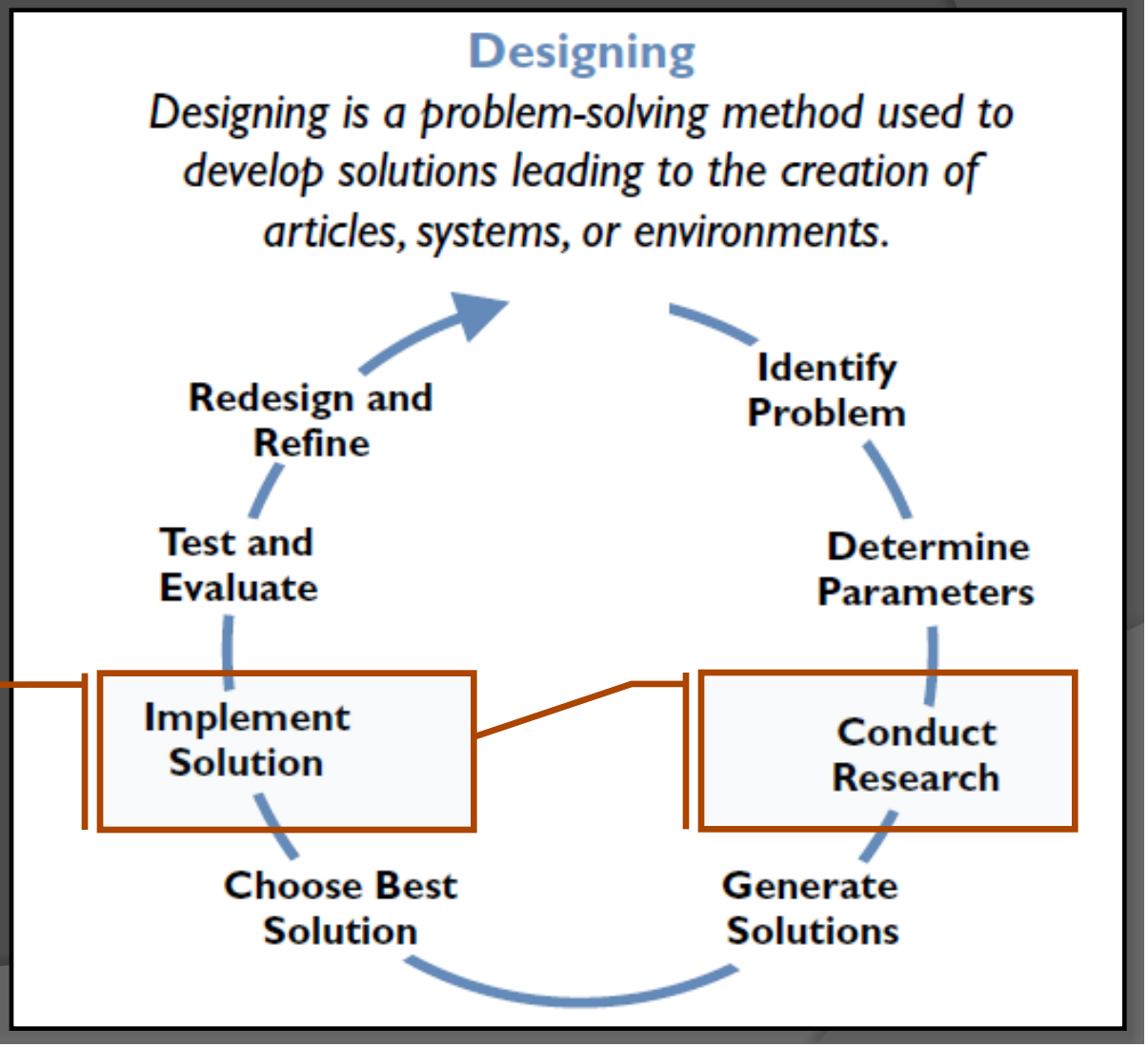
Design Process (Cyclical)



SOLUTION 2

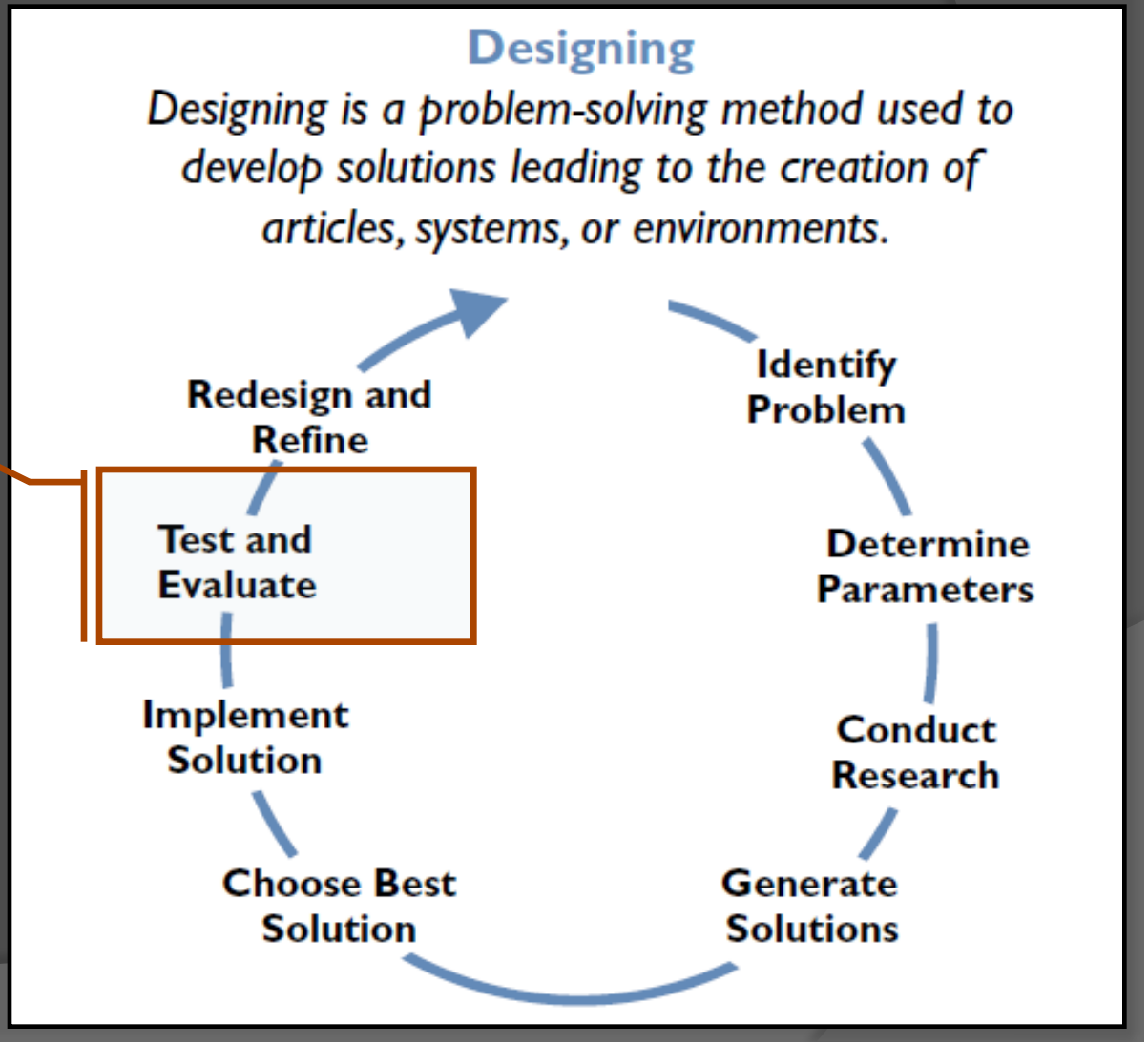
Design Process (Cyclical)

Working Drawing, Production Plan, Prototype & Build.



Design Process (Cyclical)

- We will have to make minor changes to our projects during the test and evaluation period.



Design Matrix (Cyclical)

- Often times we will close a project following the test and evaluation period.
- Although it is likely at this point you will have a better idea of how you can improve your project.