ECSE-211
Design Principles and Methods

Lecture: Design 2

18 January 2019

Lab 1 → ✓

Groups → ? TRobo 90 /

Design – is problem solving

ill-conditioned

multiple solutions.

'Specs' → solution "design"

Engineering Design Process (EDP)

Design

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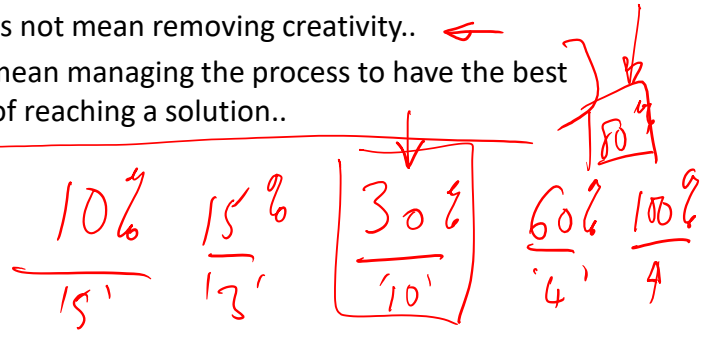
  - It does mean managing the process to have the best chance of reaching a solution..
  - So



Design

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- Problem solving requires a formal process…
  - This does not mean removing creativity..
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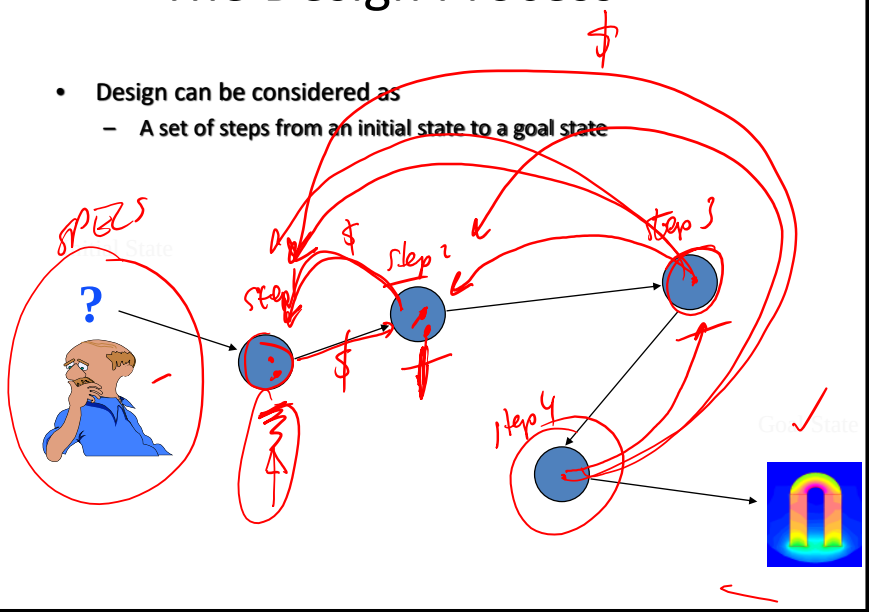
  - So
    - A series of steps need to be defined
    - Each step should be completed before the next one can occur
    - The output of each step is the input of the next one..

Design

- Design is a process
- The process needs to be managed
- By controlling what is happening,
  - the probability of success is increased
  - The cost of creating a design can be controlled
  - The current state and estimated time to finish is always available…
- But is it not infallible…

The Design Process

- Design can be considered as
  - A set of steps from an initial state to a goal state



The Design Process

- Back to the maze…
  - How do you know where to start?

The Design Process

- Back to the maze…
  - How do you know where to start?
  - How do you find your way to the end of the maze?
  - How do you continue if you make a mistake?

Design – A Set of Questions

- How do you start?
- How do you know when you have got to the end?

How Do You Know When a Goal has been Achieved?

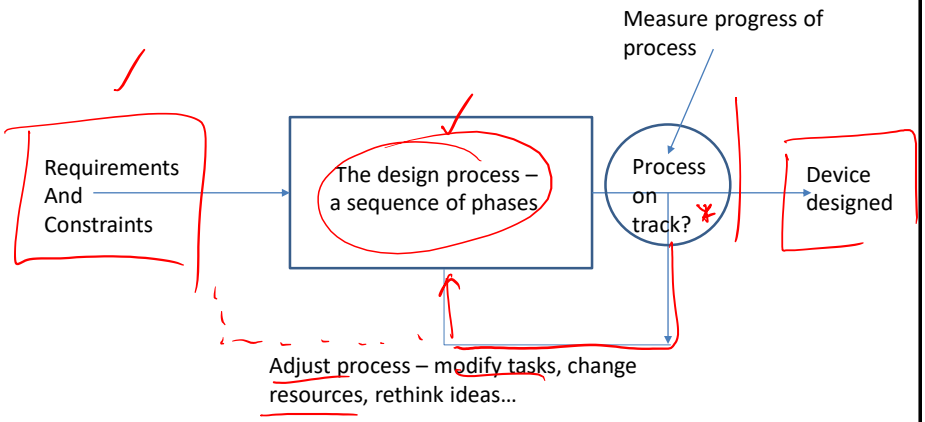
TEST

IT MUST DO X

DOES IT DO X?

TEST

Design as a Control Problem



How/When Do You Feedback?

Define each step.

end of each step

match output of step "Test"

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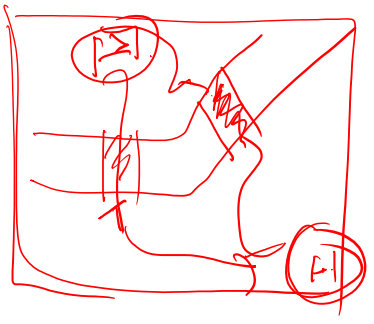
- OK – so what is the problem?
- What are we given?
  - A set of requirements
  - What is this?
    - A description, in some form, of the desired product/system

Design – How do you Start?

- Let's consider a design problem:

"Design an autonomous robot capable of capturing an opponent 'flag' and crossing a river to do it…."



Design – How do you Start?

- Let's consider a design problem:

"Design an autonomous robot capable of capturing an opponent 'flag' and crossing a river to do it…."

- Now what?

Design – How do you Start?

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  - The first issue is to UNDERSTAND the requirement
  - What does it mean?
  - What is really required?
  - …?

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Write out everything – make a list – Document!
Create a Set of User Requirements

Design – How do you Start?

- Make a list of questions…
  - Where do the questions come from?

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You!

But – how do you create questions? …. How does this all start?

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"the beginning is the hardest part"

Two Major Issues in Design

- 1. Solving the Problem and achieving a solution
  - Subject to:
    - What can be done physically
    - What exists to solve the problem
    - How much time is allowed
    - What skill level the design team has
    - What the budget is
    - …