ECSE-211

Lecture 9

24 January 2016

Design III

Design is an iterative process

Design is related to use needs

* What are the components of the process?
* How do you manage them? Solution
R+D?

Design is a Process

- Process Management
  - Resources
    - People
    - Knowledge
    - Equipment
  - Tasks
    - Achieve goals – milestones
    - Dependencies

The Story So Far…

- We have been approached to produce a solution to a problem – *A design*
- Identify the requirements – what does the user need?
  - Do we understand it? – is everyone on the same page?
  - Can we solve it?
  - What is missing?
  - Do we have the knowledge?
    - Find/obtain it! (R&D)

The Design Process

The Design Problem

"Design an autonomous robot capable of finding and manipulating Styrofoam blocks while navigating within an enclosed area populated with known obstacles randomly placed...."

works alone

Design Knowledge

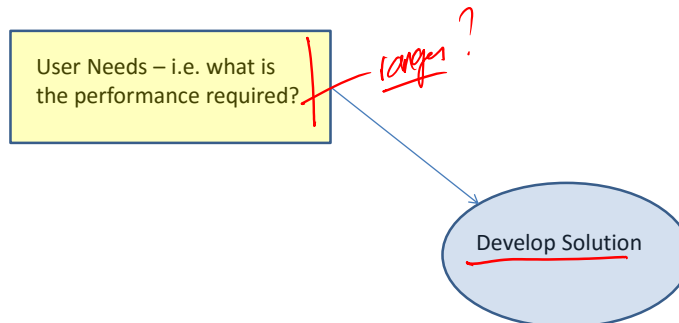# The Starting Point

- Categorize what you have to perform the solution
- Make lists ← *"document"*
- Generic information
- Start with the problem
  - What is it?
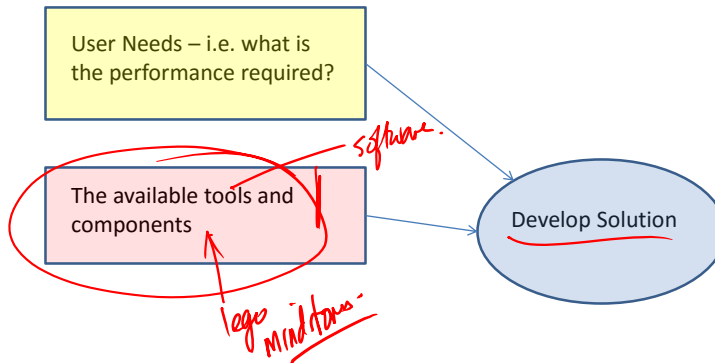 - Any obvious sub-problems?

communication

Design – Needs and Givens

- To solve a design problem, we have three (maybe more) major pieces of input:

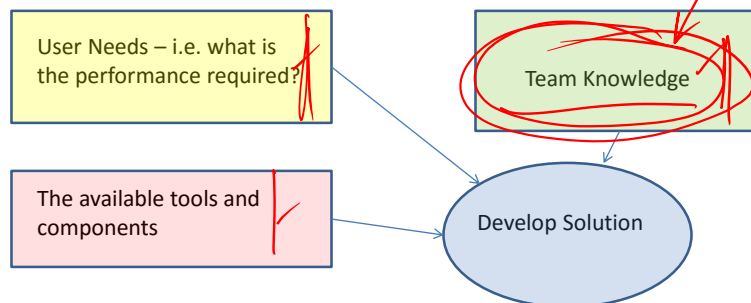User Needs – i.e. what is the performance required? — *ranges?*

Develop Solution

Design – Needs and Givens

- To solve a design problem, we have three (maybe more) major pieces of input:

User Needs – i.e. what is the performance required?

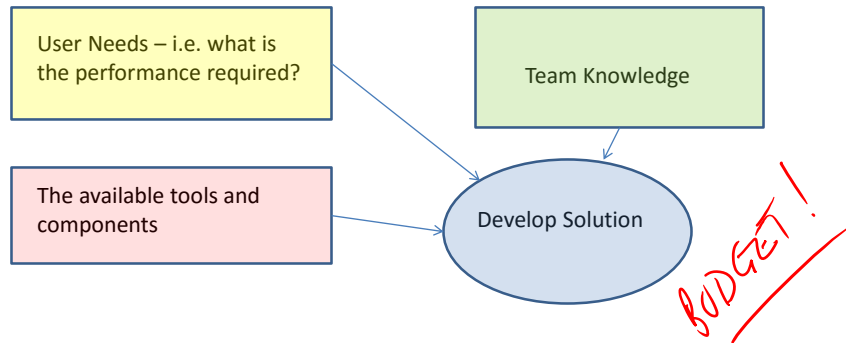The available tools and components

software.

lego mindstorms.

Develop Solution

Design – Needs and Givens

- To solve a design problem, we have three (maybe more) major pieces of input:

User Needs – i.e. what is the performance required?
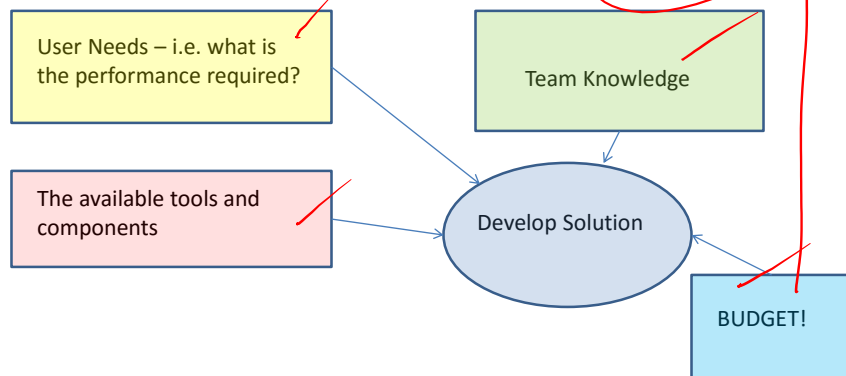
The available tools and components

Team Knowledge

Develop Solution

Design – Needs and Givens

- But… there is a fourth box…

User Needs – i.e. what is the performance required?		Team Knowledge
The available tools and components	Develop Solution	

BUDGET! (handwritten in red)

Design – Needs and Givens

- But… there is a fourth box…

"Materials = $
"People = $ (handwritten in red)

User Needs – i.e. what is the performance required?		Team Knowledge
The available tools and components	Develop Solution	

BUDGET!

Design 3 – How do you Start?

- We need to fill in the boxes..

Design 3 – How do you Start?

- We need to fill in the boxes..
- Make a list of questions…
  - Where do the questions come from?

The Design Problem

"Design an autonomous robot capable of finding and manipulating Styrofoam blocks while navigating within an enclosed area populated with known obstacles randomly placed…."

5 minutes

The Start – The First Box

- Identify the Problem
  - What must the device achieve?

objects?
weight?
time?

The Requirements Document

- The first piece of documentation in the system
- *Defines the first box*
- When completed, this should give a complete description of the needs of the client..
  - All questions should be answered before the real design can start..

The Requirements Document

- All Documents in the process must have:
  - A title
  - The author name
  - Date
  - Version number
  - Edit history