TIM 80C Lecture #3 (4/7/15)

Agenda

1) Problem-Solving

2) Product Dissection

3) Homework # 1

4) Preliminary Project Proposal
1. Problem-Solving (Structured)

Problem: How do we create comprehensive solutions to complex open-ended problems?

Approach: Structured Problem-Solving

- Define the real problem
- Plan the approach (steps) to solving the problem
- Execute (implement) the plan ⇒ Results
- Check work
- Learn/generalize from the results
Example: Improve the home computer

Step 1: Define the problem

Assess the existing home computer with respect to user needs and develop a set of guidelines/ recommendations for improvement with respect to user needs.

Step 2: Create a plan

1) Identify the different types of computers used at home (desktops, laptops, tablet, smartphones) and select one to focus on.

2) Determine user needs for the selected type of computer
   - Personal experience
   - Survey friends
   - Internet research
3) Assess how well existing products satisfy the identified user needs:
   - Personal experience
   - Survey friends
   - Internet research

4) Create a table with recommendations for improvement:
   - Structured Brainstorming

**Step 3:** Execute the plan

<table>
<thead>
<tr>
<th>Customer Need</th>
<th>Assessment</th>
<th>Recommendations</th>
</tr>
</thead>
</table>

**Step 4:** Draw Conclusions

Are existing products doing a good job of satisfying user needs?
2 Product Dissection

Motivation: Before we can create new products, we need to understand how to analyze or dissect existing products.

Problem: How do we dissect a product?

Approach: Apply Structured Problem-Solving

Step 1: Define the problem

How do you analyze a product in a way that enables us to understand what the product does (functions) and how the product works (form)?

Step 2: Plan the approach

1) Get familiar with the product
   a) "Play" with it
   b) Do internet research on the product

(housstuffworks.com is a good source for basic info)
2) Determine function and form

Function: verb-noun combination that indicates the purpose of the product

Example: Apple MacBook Pro laptop

Main Function: Provide Mobile Computing

Sub Functions:
- Input Information
- Process Information
- Display Information
- Provide Mobility
Form: physical configuration of the product which realizes the functions of the product.

Example: MacBook Pro


- Intel I7 Processor
- Retina Display
- Aluminium Chassis
- Battery (lithium)
- Keyboard

3) Create a structured diagram of the relationships between the functions and the form (realizations) for the product.
Result: FAST diagram

Function Analysis System Technique

(\sim 1970 Bytheway)
Simple Example: Light bulb

Hows

- Edison Socket
  - Receive Energy
    - 120 Volt Mains
    - Create Energy into light
      - Transform Energy into light

WHYS

- Create light

- Tungsten Filament
  - Support wires
  - Glass Bulb
  - Inert Gas (Argon)
  - Provide on O_{2} free atmosphere
    - Create a very high temperature (~4,000 °F)

3. Homework 1

Problem 1: Structured Problem-Solving

See example from problem solving ①

Problem 2: Product dissection

See example from product dissection ②

Couple of suggestions:

- Must be a real product (e.g. MacBook Pro) not a type of product (e.g. laptop)

- Dissect a product you own (if possible)

- Dissecting complex products is an iterative, trial and error process

Homework 1 will be due next Tuesday (4/14) instead of Thursday (4/9)

TA (Sabina) office hours will be on Friday from 9:00-1:00 E2 558
Additional Instructor Office Hours

Thursday: 2:30 - 4:00 pm

E2 595
4. Preliminary Project Proposal

Each project group must meet with the instructor (Tyke) today (4-7pm) to firm up a product idea to work on this quarter.

Question: What kind of product should your startup develop?

- Software products (iPhone app)
- Hardware products (Solar panel)
- Hardware + Software (VR headsets)

Answer: What are successful high-tech companies (not startups) doing?

Google: Search engines → Self-driving cars
Wearable Tech
Smart phones

Apple: Desktop computers → Mobile devices
Operating System
Computers
Microsoft: Operating Systems → gaming systems
Smart phones
tables
OS, productivity
Software

Oracle: database software → Software,
data center
hardware (Servers, storage, network)

Facebook: Social networks → advertising,
VR, data center
games

Just software → easy to copy (Zynga)
Just hardware → commodity products (Dell)

Your Start-up should aim to develop a product that combines both hardware and software components (smart products)