TIM80C Lecture #4 4/13/17

Agenda

1) Product Spectrum

2) Project Phase I

3) Finish up "Product Dissection"

4) Function Structure

5) Product Design
   - FAST diagrams
   - Function structure
   - Morphological matrix

(1) Product Spectrum

"Product" refers to a spectrum

Value	Category	Example low-tech (Physical fitness)	Example high-tech (Business productivity software)
$	Product	jump rope	Microsoft Excel
$$	Solution	fitness gym	Microsoft Office
$$$	Services	personal trainer	Microsoft Office 365 (Cloud)
$$$$	Experience	health spa	Microsoft office 365 on a tablet running Windows 10

Project Phase 1

To identify a project as "best" we need high-level criteria to narrow down the ideas.

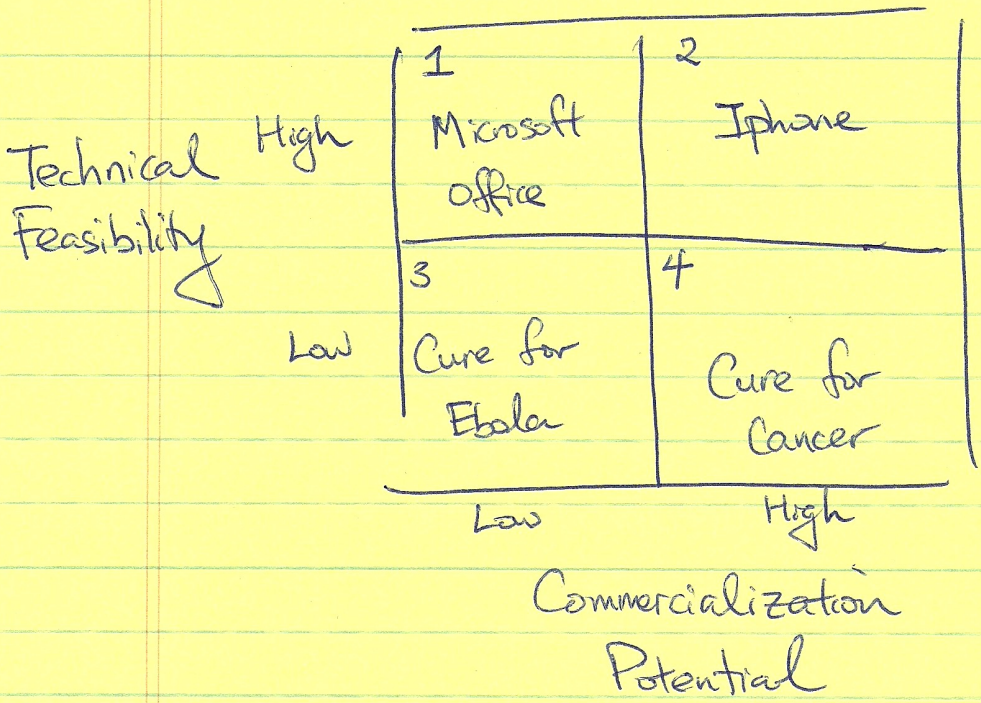
(1) Technical Feasibility

- can the idea be realized?

Typical goal for a startup: a working prototype in a reasonable amount of time (e.g. 3-4 months) at reasonable cost ($500K - $2m)

(2) Commercialization

Is there a market (customers willing and able to pay for your product)



Place your product ideas into the matrix and select from boxes 1 or 2.

If necessary, combine or alter ideas

Make sure the group likes the idea!

(3) More on Product Dissection

When is product dissection useful?

(1) Understand the relationship between a product's function and form

(why) ↑ function

(how) ↑ form

(2) Identify how a product can fail

(3) Clarify what is new and different about a product

(4) designing new products

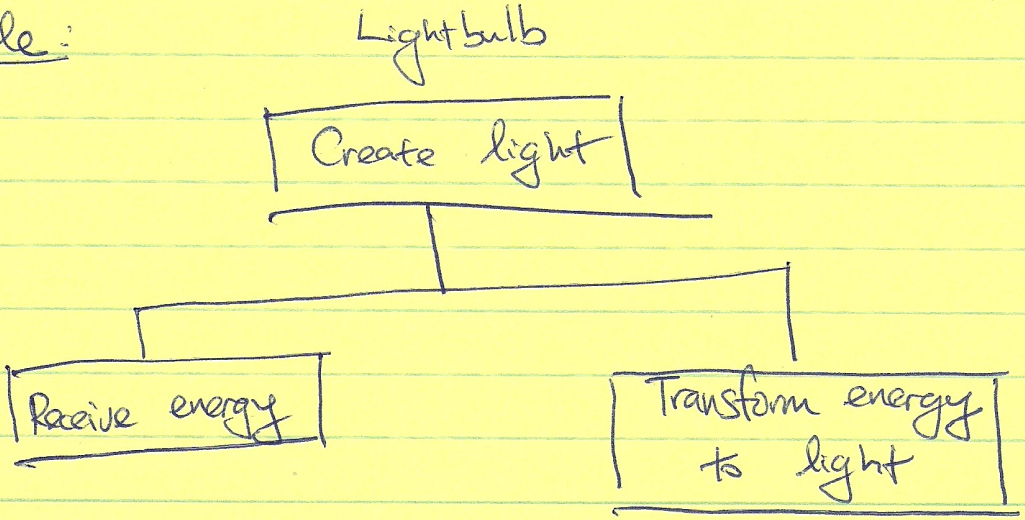
(4) Function Structure

To design a new product (specify its form), we need to determine what the product will do (specify its functions).

Functions → Form ; NOT Form → Function

We need an abstract representation of the product that allows us to create a design concept (form) for the product.

Example:



This abstract representation is called the function structure for the product.

(5) Creating a new product (product design)

Challenge: design new products using the best possible form for the desired functions.

Approach: Systematically explore the design space that is defined by the product's function structure.

Product Design Process: 9 steps

Step 1: State the overall purpose or objective of the new product.

Example (lightbulb)

Design an energy efficient product that produces light in the home.

Step 2: Dissect existing products that are similar to the desired product

Example: lecture 3 lightbulb

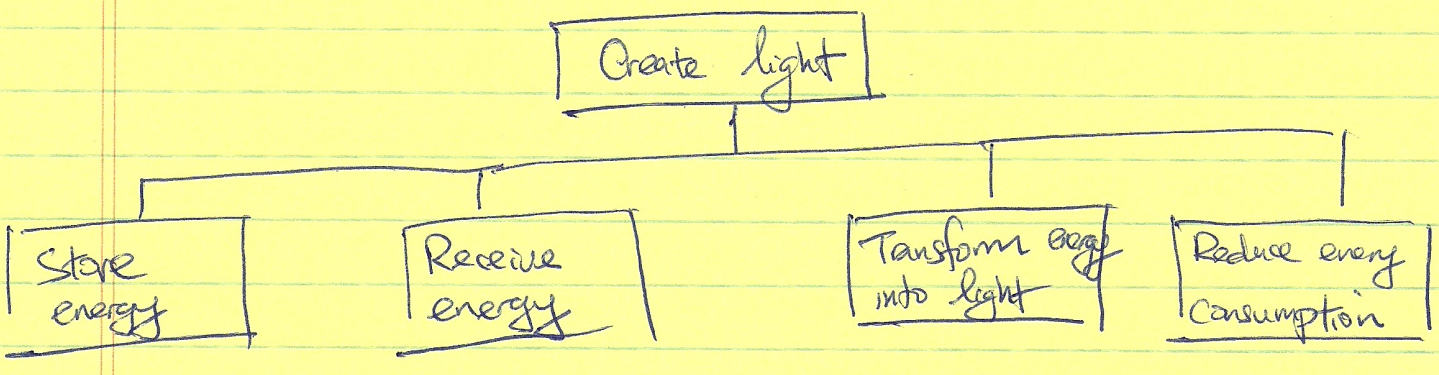
Step 3: Create a function structure for the new product

(1) remove the realizations ("hows") from the FAST diagram,

(2) review functions ("why's") for any that imply a specific form

(3) Add, remove, and/or modify the subfunctions until the function structure address the objectives in step 1.

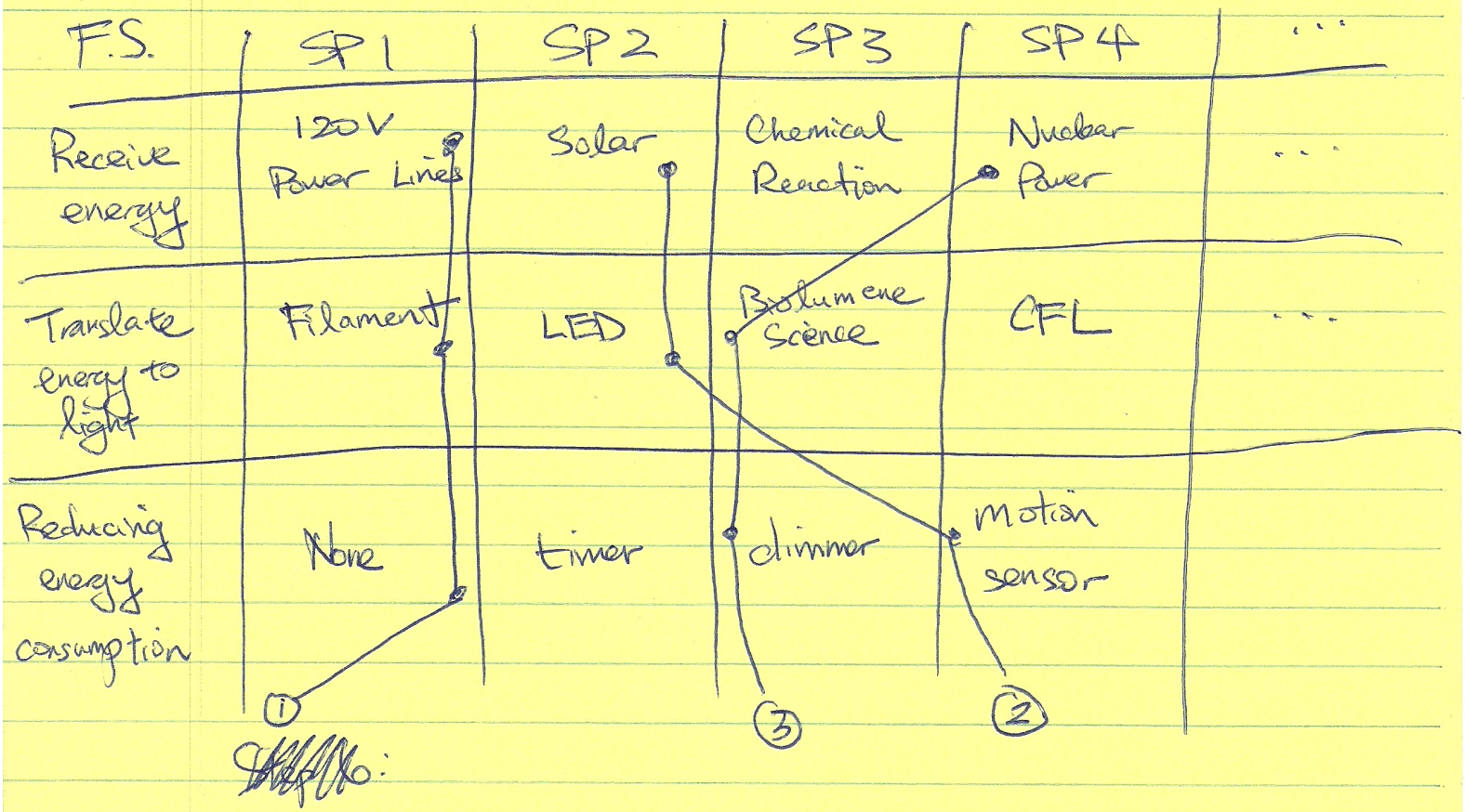
Example: energy-efficient lightbulb



Step 4: For each leaf (subfunction) in a function-structure tree, generate several alternatives — "solution-principles" — for realizing the subfunctions.

(Use structured brainstorming!)

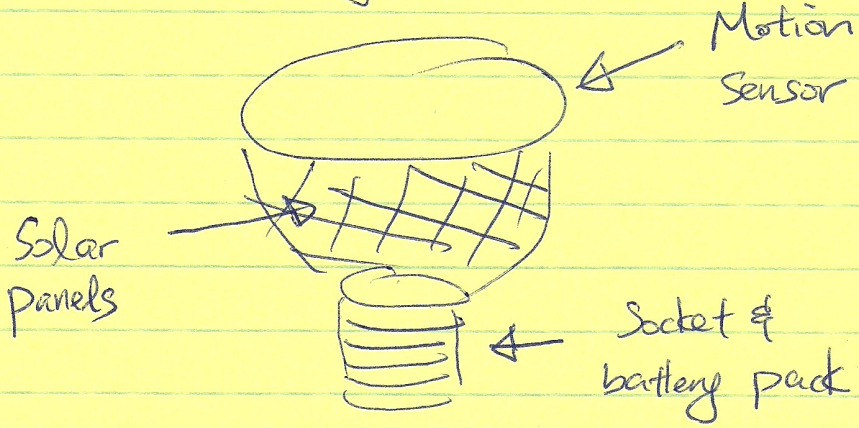
Step 5: Organize the sub-functions and solutionprinciples into a matrix (table).



Step 6: Use morphological matrix to generate several alternative design concepts.

Step 7: Write a brief description of how each concept works.

Example: Solar panels on the bulb charge a battery pack located in the socket that powers an LED. Motion sensor turns off the LED when the room is empty.



Step 8: Create a set of criteria to evaluate how well the design concepts satisfy the user needs (design objectives), and compare.

Criteria	Concept 1	Concept 2	Concept 3
technical feasibility	5	4	1
Commercial potential	1	3-4	4
Performance	2	4	5
Aesthetics	2	2	5
Price	5	2	1

Scale: 1 = poor, 5 = excellent

Step 9: Select the best design concept, and develop it into a product.