

TIM 80C

Lecture #4

4/7/16

Agenda

- 1) Product Spectrum
- 2) Project Phase I
- 3) Finish up "Product Dissection"
- 4) Function Structure
- 5) Product Design
 - FAST Diagrams
 - Function Structures
 - ~~Matrix~~ Morphological Matrices

(1) Product Spectrum

value	category	example	spectrum example
\$	product	low-tech physical fitness jump rope	high-tech business productivity software Microsoft Excel
\$\$	solutions	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 start-up: 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 & able to pay for the product)?

TECHNICAL FEASIBILITY	High	1 microsoft office	2 Iphone
	Low	3 cure for ebola	4 cure for cancer
		Low	High
		commercialization potential	

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

↑
how

↑
why?

(2) identify how a product can fail

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

(4) designing new products

(1) Function Structure

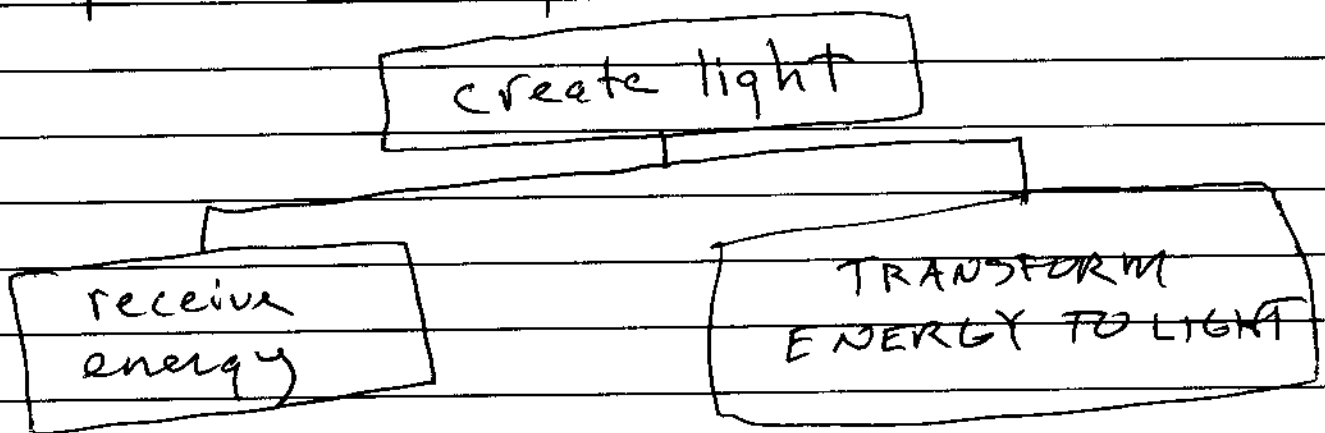
To design a new product (specify its form), we need to determine what the product will do (specify its functions).

Functions \rightarrow Form ; NOT Form \rightarrow Function

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

Example:

lightbulb



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

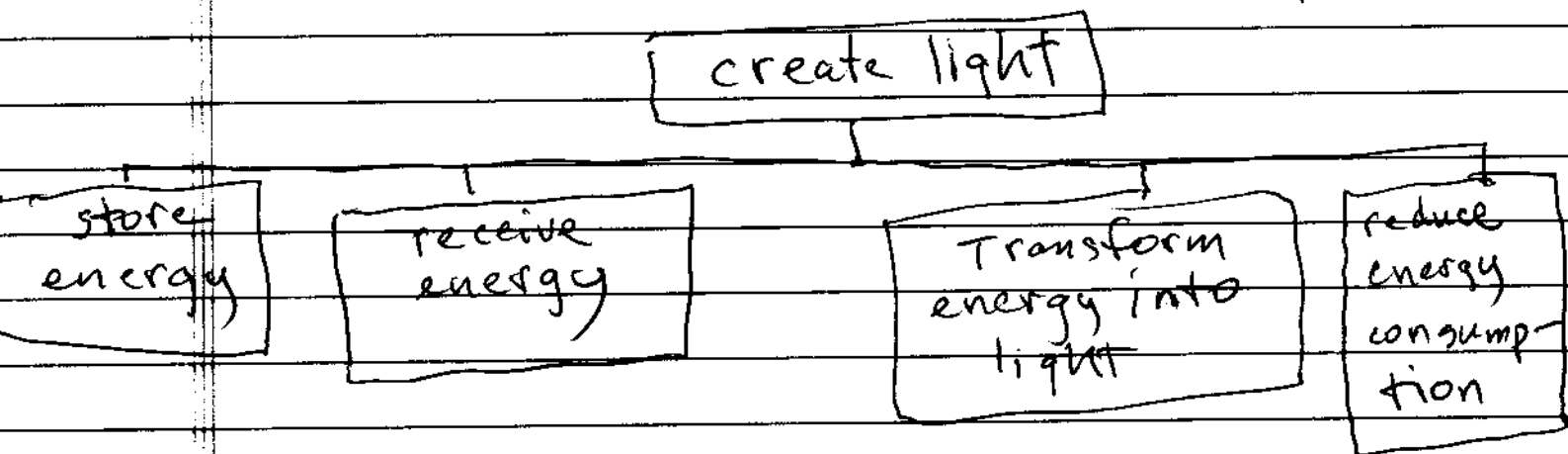
step 2: Dissect existing products that are similar to the desired product.

Example: Lecture 3 lightbulb

step 3: Create a Function Structure for the new product

- (1) remove the realizations ("how's") from the FAST diagram
- (2) review functions ("why's") for any that imply a specific form
- (3) Add, remove, and/or modify the sub functions until the Function Structure address the objectives in step 1.

Example: energy-efficient lightbulb



Step 4: For each leaf (sub-function) in a Function-Structure tree, generate several alternatives → "solution-principles" - for realizing the sub-functions.

Use structured brainstorming!

Step 5: Organize the sub-functions and solution-principles into a matrix (table)

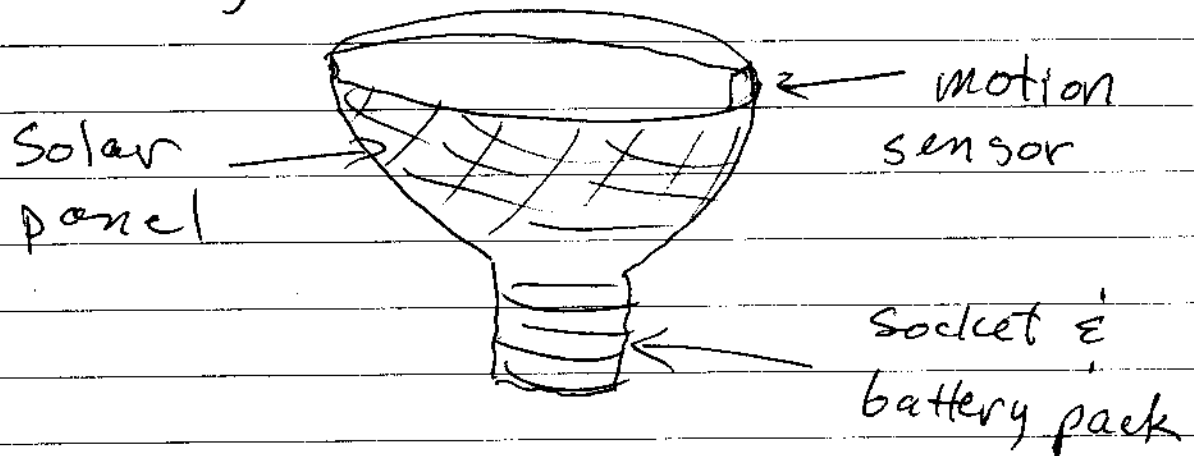
F-S	SP1	SP2	SP3	SP4	...
Receive energy	120V power lines	solar	chemical Reaction	nuclear power	...
translate energy to light	Filament	LED	bioluminescence	CFL	...
Reducing energy consumption	None	timer	dimmer	motion sensor	



step 6: use a 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
	15	16	16

Scale: 1 = poor 5 = excellent

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

(TIM 105: weighting criteria...)