What make the problem of system

Seunghee Suh

Human & Thought, sm5ssh@naver.com

Problem

- prob·lem (prblm)

  - *n.* 1. *A question to be considered, solved, or answered*: math problems; the problem of how to arrange transportation.
  - 2. A situation, matter, or person that presents perplexity or difficulty: was having problems breathing; considered the main problem to be his boss. See Usage Note at dilemma.
  - 3. A misgiving, objection, or complaint: I have a problem with his cynicism.
  - *adj.* 1. Difficult to deal with or control: a problem child.
  - 2. Dealing with a moral or social problem: a problem play.
  - *Idiom: no problem* Used to express confirmation of or compliance with a request.

  - [Middle English probleme, from Old French, from Latin problma, problmat-, from Greek, from proballein, *to throw before, put forward* : pro-, *before*; see **pro-**^{2} + ballein, bl-, *to throw*; see g^{w}el- in Indo-European roots.]

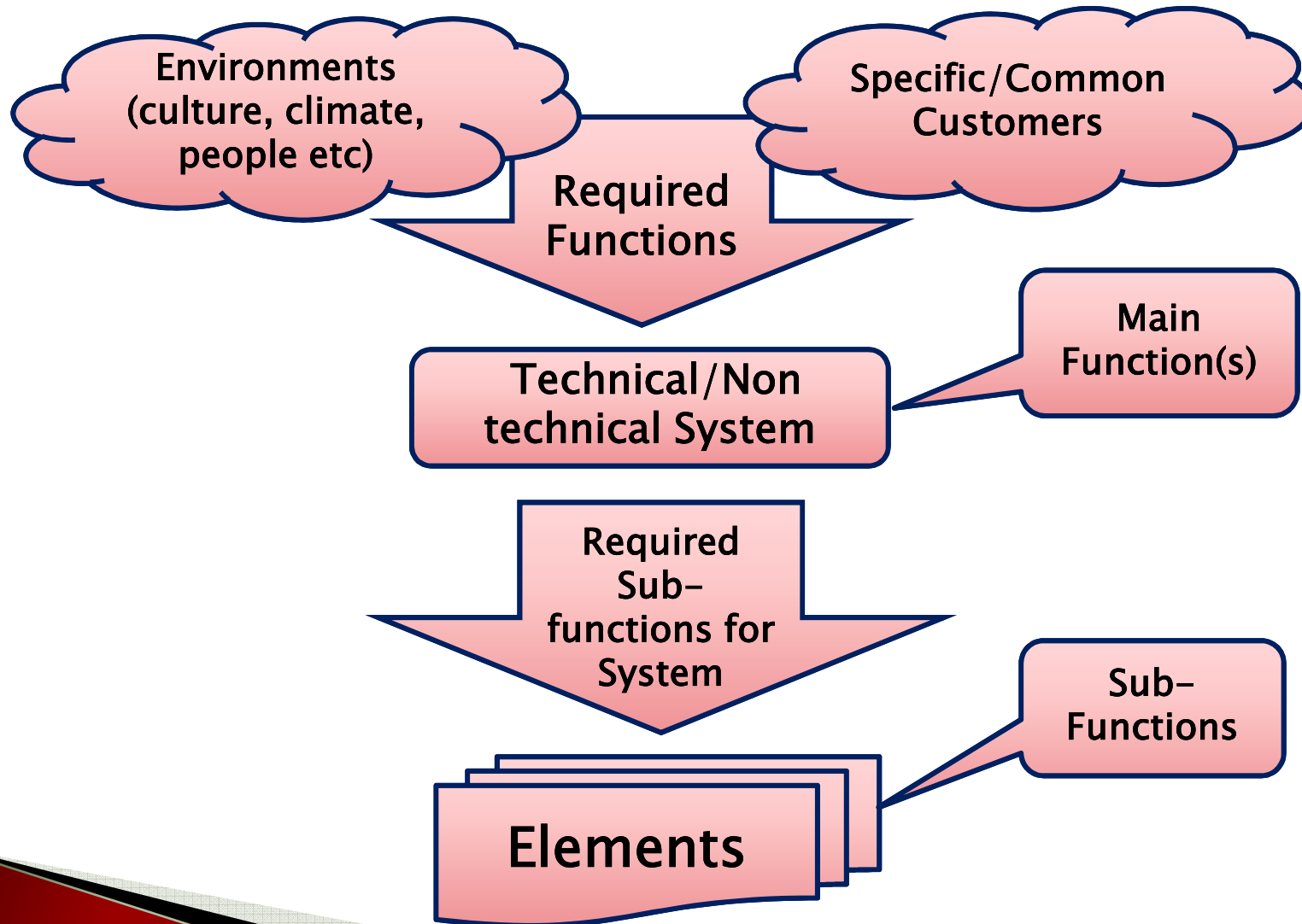 *The American Heritage® Dictionary of the English Language, Fourth Edition copyright ©2000 by Houghton Mifflin Company. Updated in 2009. Published by Houghton Mifflin Company. All rights reserved.*

Rene Descartes

▸ **Descartes four methods**
  ◦ Accept as true only what is indubitable.
  ◦ Divide every question into manageable parts.
  ◦ Begin with the simplest issues and ascend to the more complex.
  ◦ Review frequently enough to retain the whole argument at once.

  • Rene Descartes, 1596 – 1650. French philosopher, mathematician, and writer , 'Father of Modern Philosophy'

System

Environments (culture, climate, people etc)

Specific/Common Customers

Required Functions

Technical/Non technical System

Main Function(s)

Required Sub-functions for System

Elements

Sub-Functions

Parameter

- ▶ **Function**
  - ◦ A function is an action that directly changes or maintains a controllable or measurable *parameter* of a (material) object

- ▶ **Parameter**
  - ◦ A parameter is a directly measurable or controllable characteristic associated with a material object which is affected by a function
    (Parameters are often physical characteristics)

Parameter

▸ **Technical Contradiction**
  ◦ If do something (+), a parameter is improving, the other is worsening.

▸ **Physical Contradiction**
  ◦ Physical contradiction occurs when parameter must simultaneously have different values
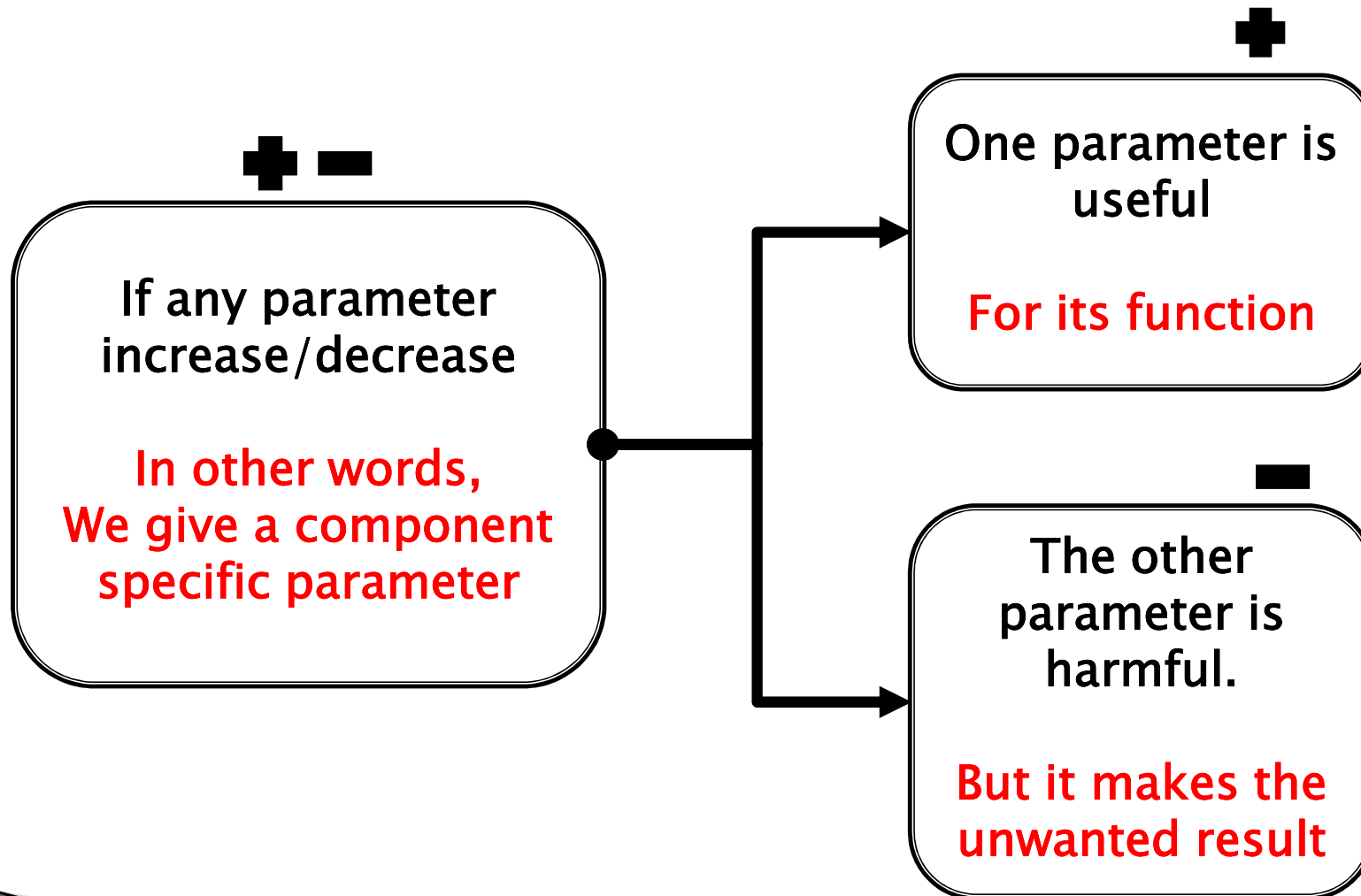
Parameter

▸ **Engineering Parameter**

○ Output parameter: what we want, so called dependent parameter, Y

○ Input parameter: control parameter to get what we want, so called independent parameter, X

○ Every system has function(s) what customers want(Y) and we give components of the system specific parameters (X) for its function.
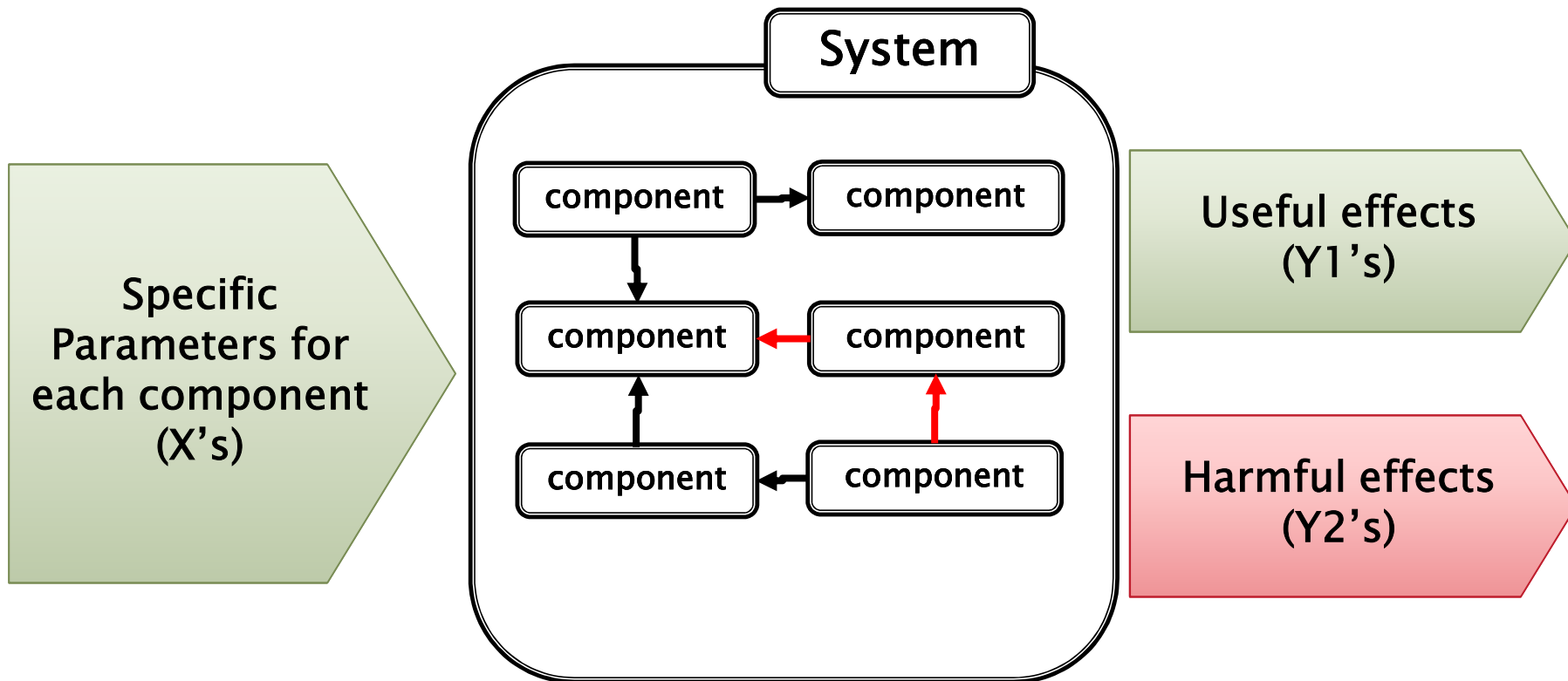
Problem

▸ What make the problem?

- 1st problem: main function of system.
  - We should design the system to satisfy customers desire.

- 2nd problem: contradiction
  - To perform the function of the system, we should design the components.
  - That means we should give the components specific parameter.
  - This causes the problem, "Contradiction."

Problem

+ **−**

If any parameter increase/decrease

**In other words,
We give a component specific parameter**

+

One parameter is useful

For its function

−

The other parameter is harmful.

But it makes the unwanted result

Scheme of Problem

Specific Parameters for each component (X's)

System

| component → component |
| component ← component |
| component ← component |

Useful effects (Y1's)

Harmful effects (Y2's)

Problem Analysis

▸ ENV
  ◦ Element – Name of feature – value of feature

▸ ARIZ 85-C
  ◦ How to get contradiction of element? Just formulate the negative effect. Then find out traditional solution to eliminate the negative effect. And find out new negative effect.

▸ Resources of system
  ◦ Herein, focus on components for the system.
  ◦ All of the system has components to perform the functions.
  ◦ Components have specific parameters for the sub-function.

Problem Analysis

▸ Analyze resources
  ◦ Components have sub-function(s) for main function(s)
  ◦ Components have parameter(X) for sub-function(s)
  ◦ Find the related parameters to improve the negative effect(problem).

component	Function	Parameter	contradiction
Name of component	Verb + Object	Name of feature	

A radio telescope

▶ **Problem status**

- To protect the radio telescope from thunderbolt, lightening conductor is built near the telescope. But it absorbs radio wave to prevent the telescope from receiving the signal.

- We must make the lightening conductor without any interference in radio wave.

- To make the problem model, we find out which parameter(s) are related with the problem.

A radio telescope

▸ Parameter-Problem-Analysis
  ◦ the lightening conductor without any interference

component	Function	Parameter	contradiction
Radio telescope	Receive radio wave	height, Dia. etc	–
Lightening conductor	Absorb thunderbolt	height, number of rod, conductance	Low conductance, remove the interference, but don't absorb the lightening. Reduce the number of the rod, remove the interference, but don't absorb the lightening

Thank you!

Global
TRIZ
Conference 2013 in Korea