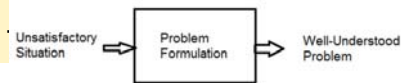


Problem Formulation: What is



- **Einstein:** “The mere _____ is far more essential than its solution, which may be merely a matter of mathematical or experimental skill.”
- **Problem Formulation:**
 - **Definition:** “The process of _____ a dissatisfied situation into a well-understood problem”
 - **Focus:** Understanding the problem (“Needs”), Not finding solution (“Approach”) to the problem
- **Why do we do this? What’s the purpose?**
 - **Need Identification**
 - **Problem Definition, and**
 - Clear set of **Requirements (Technical & Socio-Cultural)** that can guide the design process through to its completion



1

1

Identifying Needs and Defining Problem - “How to”

- **Identify Needs**
 - Dissatisfied situation - -- problem/needs or research topic of the team
 - Ask your project advisor what he/she **needs** for the team for the academic year
 - Ask what **specific problem** you’re asked to solve
 - Ask what does the **final product (solution) look like**
 - Don’t consider Solution yet --- this will limit your solution ideas
!!!
- **No Rush to get a solution (“Approach”)** While Needs are to be Identified: **if you’re in a hurry**
 - A **wrong problem** may be solved!
 - A **symptom (not the cause)** may be solved!
 - **A part** of the problem may be solved!
 - So, instead, spend more time for Problem Formulation

2

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Blind Men and the Elephant



- Lesson: Part vs. Whole

Checkout Line Complaints: Problem Identification



- Lesson: Symptoms vs. Root cause

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Practical Way of Problem Formulation

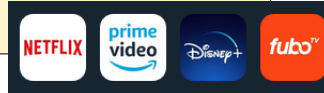


- **“ N-B Proposition Approach**
 - Customer's **Need**: “Hey, you know you have this problem”
 - **Benefits to the Customer**: “When I solve the problem, you'd have these many benefits”
- **EXAMPLE**: Proposition presented to a cable company executive for a [video-on-demand](#) system.
- **“I understand that you are looking to expand your business. I think we might be able to help.**
- **(Need) (Problem)**
 - Movie rentals represent a **\$5 billion business opportunity** that you **currently cannot access**.
 - The only parts of rentals that people really **dislike are the obligation to return the tapes plus the late fees**.
 - Customers find that it **is inconvenient and wastes time**.
- **Benefits**
 - You will **receive \$5 of new revenue per movie rented**, with a margin of 20 percent after paying for the movie costs.
 - Your customers will have all the **pause and fast forward functions of a VCR** when watching the movie, and they do **not have to return the movie when done**. Late fees are **gone**.
 - We estimate you could capture a **market share of 20 percent**.
 - ***Source: “Practice of Innovation” by C. R. Carlson**

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The last step – combine to 1 sentence statement



- **(Need) (Problem)**
 - Movie rentals represent a \$5 billion business opportunity that you currently cannot access.
 - The only parts of rentals that people really dislike are the obligation to return the tapes plus the late fees.
 - Customers find that it is inconvenient and wastes time.
- **Benefits**
 - You will receive \$5 of new revenue per movie rented, with a margin of 20 percent after paying for the movie costs.
 - Your customers will have all the pause and fast forward functions of a VCR when watching the movie, and they do not have to return the movie when done. Late fees are gone.
 - We estimate you could capture a market share of 20 percent.
- **Final 1-sentence “Problem Statement”** – combination of the essence of the Need and the Benefit
 - “The **need** of your company in the movie rental business in the current situation of customers’ inconvenience and time-waste of tape/cd return **is** to quickly provide a means to eliminate the tape return requirement **so that** it may capture at least 20 percent market share.”

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5

Problem Formulation – Exercise 1

- **Your customer**
 - **Crowded dorm room occupants**
- Write an **N-B proposition**:
 - 1) Write a Need(i. e., problem or undesired situation) (or bullet items)
 - 2)Write a Benefit (or bullet items) following the example proposition Examples
 - 3)Combine the Need and the Benefit into an 1-sentence statement



6

6

Exercise 1

□ Need:

□ Benefits:

□ Problem Statement


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7

Problem Formulation Exercise 2

- Situation: You hear Jimmy Hendrix and Eric Clapton and their music teams complain of numerous wires (power, signal, etc.) on stage and of tripping hazard.
- You make a proposition to Jimmy Hendrix and Eric Clapton (“a wireless guitar amplifier” – but without mentioning this in the proposition because it is a kind/part of solution approach. So mentioning of “wireless” should not be used in the proposition).
- Exercise Focus: You write (a) need statements and (b) benefit statements, and combine them into (c) 1-sentence problem statement



 eric-clapton-blues.mp3

 jimi-hendrix-blues.mp3

8

8

Exercise 2

□ Need:

□ Benefits:

□ Problem Statement

9

9

Team Formation Status & Your team's Problem Statement

□ Team Formation Status

□ Discuss this problem in your team's next weekly meeting

- Needs/Problem
- Benefits when solved
- 1-sentence problem statement

10

10