



University of Jeddah
Faculty of engineering
Department of industrial engineering

ENIE 102 – introduction to engineering design
Dr. HANI IBRAHIM SHAFIK SOLIMAN
AAH

Problem definition
المبدعون – Grope name



Ahmed AL
Shaikh
1945070



Mohamed
Maqbol
1945125



Abdulaziz almosbahi
1944967



Ahmad
Alharbi
1945183



Abdulaziz Alshehri
1944994

AGENDA

DEFINE

GENERATE

DECIDE

IMPLEMENT

EVALUATE

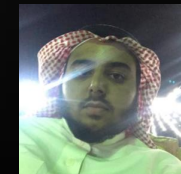


3 PROBLEM DEFINITION

STEP 1 – COLLECT AND ANALYZE INFORMATION AND DATA

- FINDING THE PROBLEM IS MORE ESSENTIAL THAN THE SOLUTION
- THE MOST DIFFICULT ASPECT OF PROBLEM IS UNDERSTANDING IT AND FINDING THE ROOT
- 3.1- THE FIRST FOUR STEPS USED BY EXPERT PROBLEM SOLVERS ARE
- 1- COLLECT AND ANALYZE INFORMATION AND DATA
- 2- TALK WITH PEOPLE FAMILIAR WITH THE PROBLEM
- 3- VIEW IT FIRSTHAND
- 4-CONFIRM ALL FINDINGS

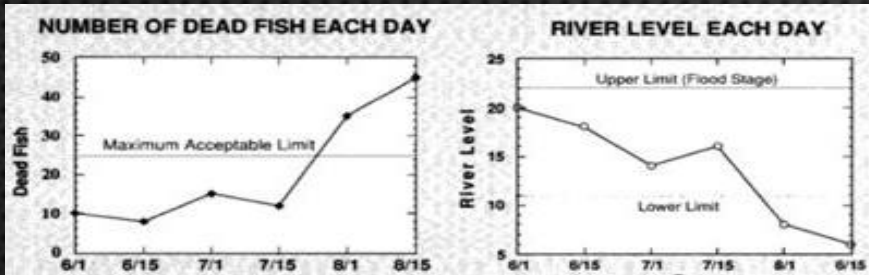
- LEARN AS MUCH AS YOU CAN
- WRITE DOWN OR LIST
- DETERMINE
- MAKE A SIMPLE SKITCH
- ANALYZE AND DISPLAY GRAPHICALLY



Ahmed AL
Shaikh
1945070

THE CASE OF THE DEAD FISH

- A CHEMICAL PLANT DISCHARGE WASTE INTO A RIVER
- BIOLOGISTS STUDIED THE RIVER AND REPORTED DEAD FISH NUMBERS



- THESE GRAPHS ARE CALLED TIME PLOTS AND CONTROL CHARTS
- THE GRAPHS SHOWS THAT THE PROBLEM WASN'T ABOUT THE WASTE BUT THE LOWER WATER LEVEL

GO TALK TO GORGE

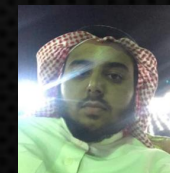
LIKE IN THE FLOWMETER STORY SOMETIMES THE ANSWER COMES FROM GORGE WHO HAVE YEARS OF EXPERIENCE AND SMART ON AVERAGE

STEP 2- TALK WITH PEOPLE FAMILIAR WITH THE PROBLEM

- ASK PENETRATING QUESTIONS BY
- LOOKING PAST THE OBVIOUS
- CHALLENGING THE BASIC PRIMES
- ASK FOR CLARIFICATION

Seeking advise

a major hotel had a problem with elevators, so the manager and his assist tried to find a solution to it when the doorman told them to bad, they can't build it outside because he was outside all the time and it worked



Ahmed AL Shaikh
1945070

Step 3 – view the problem firsthand

A factory in UK build a plant to produce a plastic product

The main piece is a reactor which is water cooled

when the plant started the plastic was dark nonuniform they reviewed

everything and the design but no solution until an engineer looked inside the reactor and

found the water wasn't getting in because of a switched valve



STEP-4 CONFIRM ALL KEY FINDINGS

➡ VERIFY AND CROSS CHECK YOUR DATA

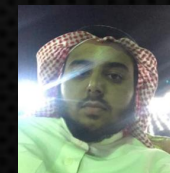
Confirm all allegations

a pulp and paper company called boxright installed a new process for cooking chemicals 2 years later it couldn't operate,

then boxright sued Courtland for breach of equipment

Courtland claimed that it was working by an engineering article

Then boxright found at the last pages would not work in industrial size so they won



Ahmed AL Shaikh
1945070

3.2 DEFINING THE REAL PROBLEM

PROBLEM DEFINITION TECHNIQUES

- FINDING OUT WHERE THE PROBLEM CAME FROM
- EXPLORING THE PROBLEM
- PRESENT STATE DESIRED STATE & DUNCKER DIAGRAM
- STATEMENT RESTATEMENT
- K.T. PROBLEM ANALYSIS



Abdulaziz almosbahi

1944967

3.2A FINDING OUT WHERE THE PROBLEM CAME FROM

- **THIS TECHNIQUE FOCUSES ON FINDING OUT WHO INITIATED THE PROBLEM AND ASCERTAINING THE VALIDITY OF THE REASONING USED TO ARRIVE AT THE PROBLEM STATEMENT.**

- Where did the problem originate?
- Who posed the problem statement in the first place, your supervisor, his/her supervisor, a colleague in your project group, or someone else?
- Can that person explain the reasoning as to how they arrived at that particular problem statement?
- Are the reasoning and assumptions valid?
- Has that person considered the situation from a number of different viewpoints before arriving at the final problem statement?
- Have you used the first four steps to gather information about the problem?



Abdulaziz almosbahi
1944967

THE CASE OF THE DEAD FISH

- Stan is an engineer with six years of experience.
- Stan and his team to design the facilities.
- Articles appeared in the newspaper about the unusually large number of dead fish
- The company decided to try to treat the symptoms (many dead fish) by removing the toxic chemicals



Abdulaziz almosbahi
1944967

SWEET AND SOUR

- The sour gas is considered irritating because it causes wear on the pipes and equipment used to transport it.
- An expensive piping system is designed and installed that is resistant to sour gas corrosion
- it was found that the gas was sweet gas and did not require the anti-corrosion piping system



Abdulaziz almosbahi
1944967

EXPLORING THE PROBLEM

THE CASE OF THE DEAD FISH

- IDENTIFY AVAILABLE INFORMATION
- LEARN FUNDAMENTALS
- MISSING INFORMATION
- HYPOTHESIS
- MORE INFORMATION
- DEFINE THE REAL PROBLEM

DE-BOTTLENECKING A PROCESS

THERE WAS A CHEMICAL FACTORY MAKING ITS PRODUCT QUICKLY, AND THEY FOUND A PROBLEM WITH THE HEAT COOLANT, SO THE SOLUTION TO THE PROBLEM WAS THAT THEY WERE MAKING A BIGGER CHILLER.



Mohamed Maqbol
1945125

HITTING EM WHERE THEY ARE NOT

PRESENT STATE

MANY BULLETS PROJECTILES PENETRATING AIRCRAFT . •

MANY BULLETS PROJECTILES PENETRATING AIRCRAFT IN CRITICAL AND NONCRITICAL AREAS. •

DESIRED STATE

FEWER PLANES BEING SHOT DOWN . •

FEWER BULLET HOLES . •

FEWER BULLETS PROJECTILES PENETRATING CRITICAL AREA •



Mohamed Maqbol
1945125

USING THE PRESENT STATE\DESIRED STATE TECHNIQUE

WHEN WRITING THE DESIRED CASE FORM YOU SHOULD AVOID SOME •
VAGUE WORDS SUCH AS:

- BEST •
- MINIMUM •
- CHEAPEST •

SHOULD BE QUANTITATIVE WHEREVER POSSIBLE SUCH AS : •

THE CHILDREN'S PLAYGROUND MUST BE COMPLETED BY JULY 1, 1994 AT •
A COST OF LESS THAN \$ 100,000" INSTEAD OF "THE PLAYGROUND MUST
BE COMPLETED IN A REASONABLE TIME AT THE LOWEST COST.



Mohamed Maqbol
1945125

THE DUNKER DIAGRAM

- DUNKER DIAGRAM IS A DIAGRAM THAT HELPS IN OBTAINING SOLUTIONS PREPARED WITH THE CURRENT STATE
- DUNKER PLANNER CAN BE CATEGORIZED AS PROVIDING GENERAL SOLUTIONS, FUNCTIONAL SOLUTIONS AND SPECIFIC SOLUTIONS
- THERE ARE TWO GENERAL SOLUTIONS



Abdulaziz Alshehri
1944994

USING THE STATEMENT-RESTATEMENT TECHNIQUE

- WHEN WRITING A STATEMENT, ONE MUST LOOK AT THE STATE OF THE AMBIGUOUS OR UNCLEAR PROBLEM, AND THEN THE PROBLEM IS REFORMULATED IN VARIOUS FORMS
- WHEN REFORMULATING THE PROBLEM, ONE TRIES TO GENERALIZE IT MORE IN ORDER TO ARRIVE AT THE BROADEST FORM OF THE PROBLEM STATEMENT
- PROBLEM STATEMENT TRIGGERS



Abdulaziz Alshehri
1944994

MAKING AN OPPOSITE STATEMENT

- TAKING ASPIRIN TABLETS IS A FOUL TASTING EXPERIENCE.
- COMPANIES DECIDED TO DO SOMETHING ABOUT IT.
- THE INSTRUCTIONS GIVEN BY MANGER TO FIND A WAY TO PUT A PLEASANT TASTING COATING ON ASPIRIN TABLETS.
- THE RESULTING COATING WAS VERY NO UNIFORM AND THIS LED TO AN UNACCEPTABLE PRODUCT.
- LET'S APPLY THE TRIGGERS TO THIS PROBLEM:
- **TRIGGER 1 EMPHASIZE DIFFERENT PARTS OF STATEMENT.**
- PUT COATING ON TABLET.
- **TRIGGER 2 MAKE AN OPPOSITE STATEMENT.**
- MAKE COATING OFF TABLET.
- THIS IDEA LED TO ONE OF THE NEWER TECHNIQUES FOR COATING PILLS.



Ahmad
Alharbi
1945183

WANTED: EXOTIC MATERIALS, OR?

- IN 1960s SCIENTISTS RECOGNIZED THAT THERE WAS NO AVAILABLE MATERIALS THAT WOULD SURVIVE THE HIGH TEMPERATURE GENERATED ON THE CAPSULE SURFACE.
- INSTRUCTION WAS FIND A MATERIAL ABLE TO WITHSTAND THE TEMPERATURE.
- IN 1970s NO ONE HAD PRODUCT A SUITABLE MATERIAL.
- THE REAL PROBLEM WAS TO PROTECT THE ASTRONAUTS UPON REENTRY RATHER THAN TO FIND A MATERIAL THAT WOULD WITHSTAND SUCH HIGH TEMPERATURES.
- HOW DO METEORS EVENTUALLY REACH THE EARTH WITH DISINTEGRATION COMPLETELY?

STATEMENT – RESTATEMENT

- **STATEMENT 1:** FIND A MATERIAL THAT WILL WITHSTAND THE SURFACE TEMPERATURE OF THE CAPSULE RESULTING FROM FRICTIONAL HEATING UPON REENTRY INTO THE EARTH ATMOSPHERE.
- **RESTATEMENT 1:** FIND A WAY TO SLOW THE REENTRY INTO THE EARTH ATMOSPHERE OR TO REDESIGN THE CAPSULE SO THAT THE CAPSULE SURFACE TEMPERATURE WILL BE LOWER.
- **RESTATEMENT 2:** FIND WAY TO COOL THE CAPSULE OR ABSORB THE FRICTIONAL ENERGY DURING REENTRY SO THAT THE SURFACE TEMPERATURE WILL BE LOWER.
- **RESTATEMENT 3:** FIND A WAY TO PROTECT THE ASTRONAUTS ON THEIR REENTRY INTO THE EARTH ATMOSPHERE.
- **RESTATEMENT 4:** FIND A DISPOSABLE MATERIAL THAT COULD SURROUND THE CAPSULE AND CLOUD BE SACRIFICED TO ABSORB THE FRICTIONAL HEATING.



Ahmad Alharbi
1945183

3.2 EVALUATING THE PROBLEM DEFINITION

THE FOLLOWING CHECKLIST COULD HELP US IN THIS EVALUATION:

- HAVE ALL THE PIECES OF THE PROBLEM BEEN IDENTIFIED?
- HAVE ALL THE CONSTRAINTS BEEN IDENTIFIED?
- WHAT IS MISSING FROM THE PROBLEM DEFINITION?
- WHAT IS EXTRANEIOUS TO THE PROBLEM DEFINITION?
- HAVE YOU DISTINGUISHED FACT FROM OPINION?



Ahmad Alharbi
1945183

3.3 THE NEXT FOUR STEPS

- **THE FIRST FOUR STEPS OF EXPERIENCE PROBLEM SOLVERS:**

1. COLLECT AND ANALYZE INFORMATION AND DATA.
2. TALK WITH PEOPLE FAMILIAR WITH THE PROBLEM.
3. IF AT ALL POSSIBLE, VIEW THE PROBLEM FIRSTHAND.
4. CONFIRM ALL FINDINGS.

- **THE NEXT FOUR STEPS:**

5. DETERMINE IF THE PROBLEM SHOULD BE SOLVED.
6. CONTINUE TO GATHER INFORMATION AND SEARCH THE LITERATURE.
7. FROM SIMPLE HYPOTHESES AND QUICKLY TEST THEM.
8. BRAINSTORM POTENTIAL CAUSES AND SOLUTION ALTERNATIVES.



Ahmad Alharbi
1945183

THE END
THANK YOU
ANY QUESTIONS?

تقديم قروب

المبدعون