# Kepner-Tregoe Methodology

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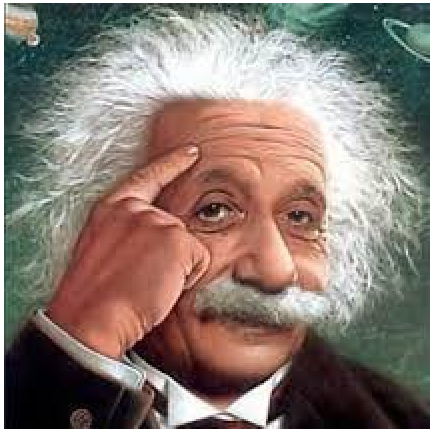
Department of business economy

KT was Developed by Charles H. Kepner and Benjamin B. Tregoe

**The formulation of a problem is far more essential than its solution, which may be merely a matter of mathematical or experimental skill"**

**- Albert Einstein**

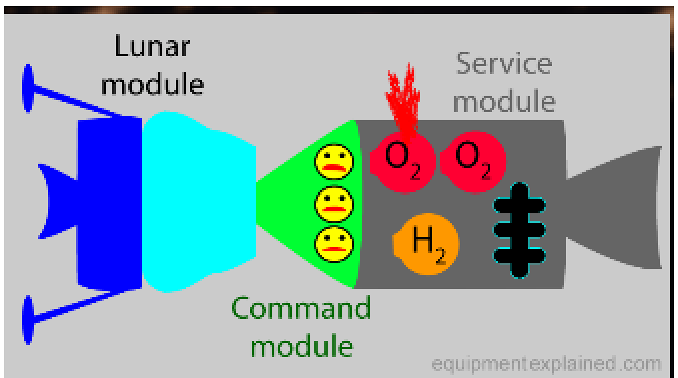


# Apollo 13 – Houston, Houston, do you read me ? We have a big problem….!

The Apollo 13 team is famous for bringing back the astronauts stranded in space by solving difficult and complex problems. The teams solving the problems has used the **Kepner-Tregoe** (KT) methodology!

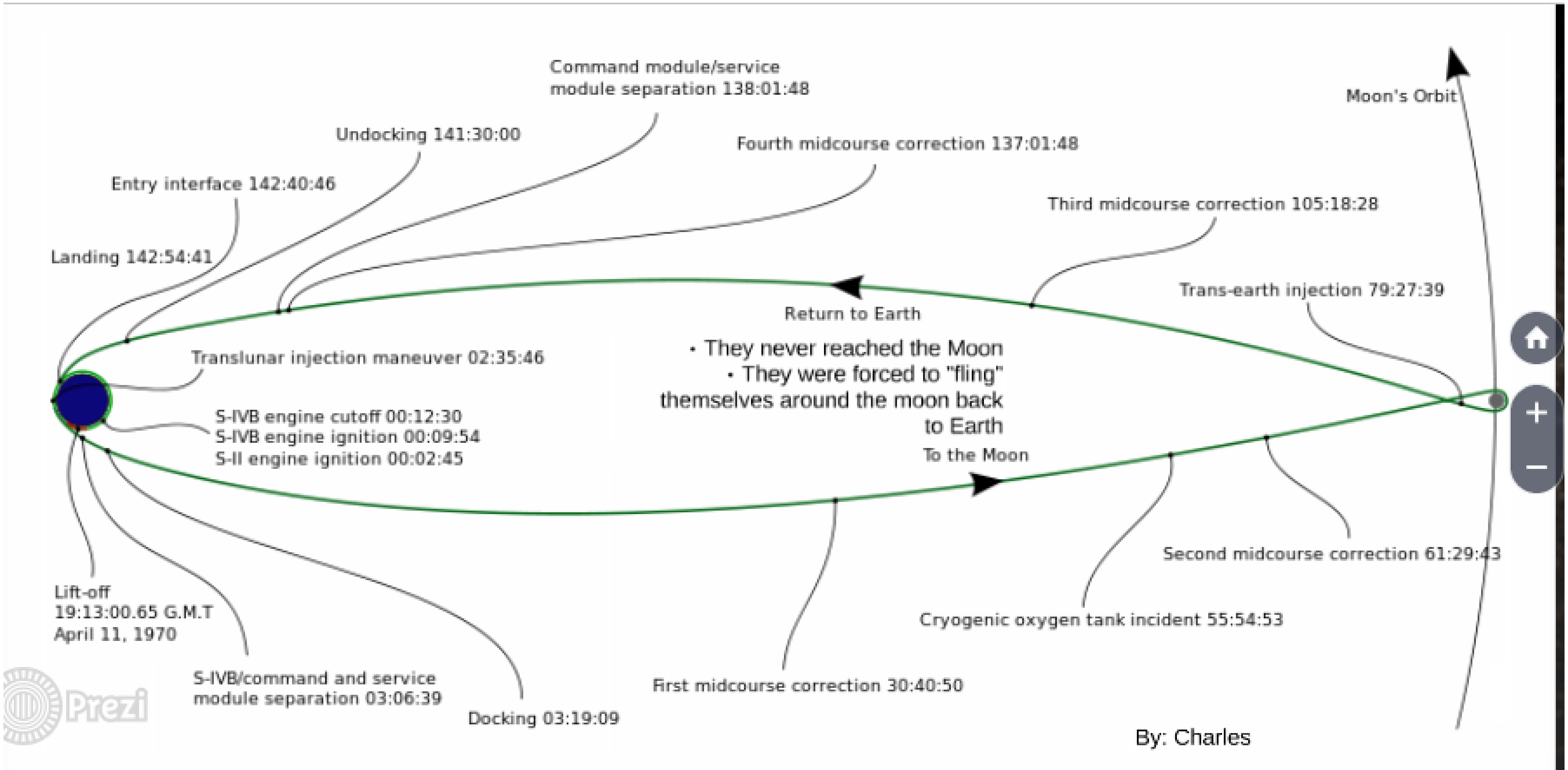
# Appolo 13 – description (problem and solution)

https://spectrum.ieee.org/tech-history/space-age/apollo-13-we-have-a-solution




https://prezi.com/_ohiqi4xzcxt/tier-v-problems-and-solutions-on-apollo-13/

# Appolo 13 – description (problem and solution)



# What is it K-T methodology ?

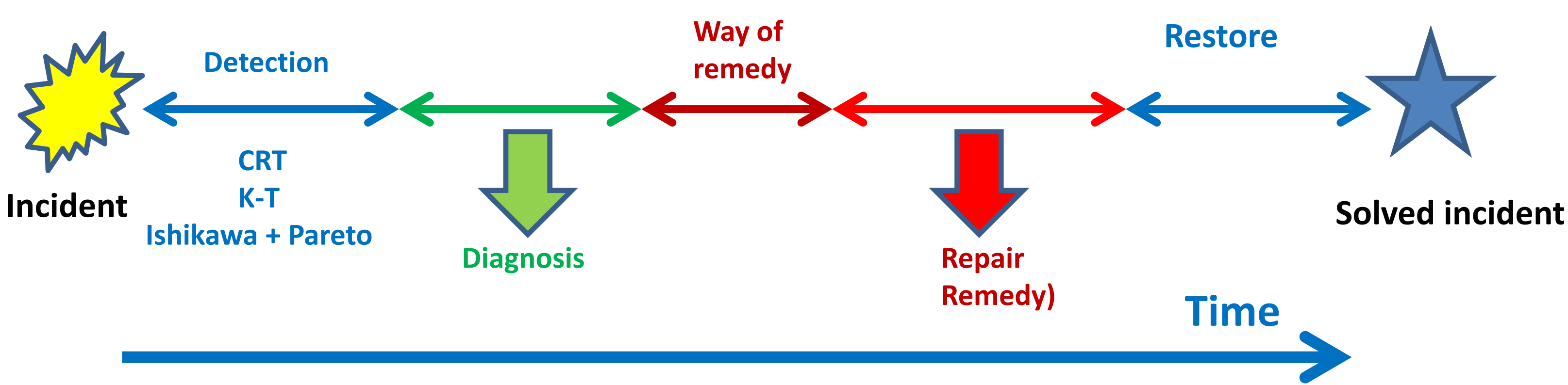
**Kepner -Tregoe is used for decision making (finding best possible choice)**

**It is** a structured methodology for **evaluating** , **gathering** & **prioritizing information.**

**It is** a detailed and complex method applicable in many areas, which is much broader than just **idea selection**.

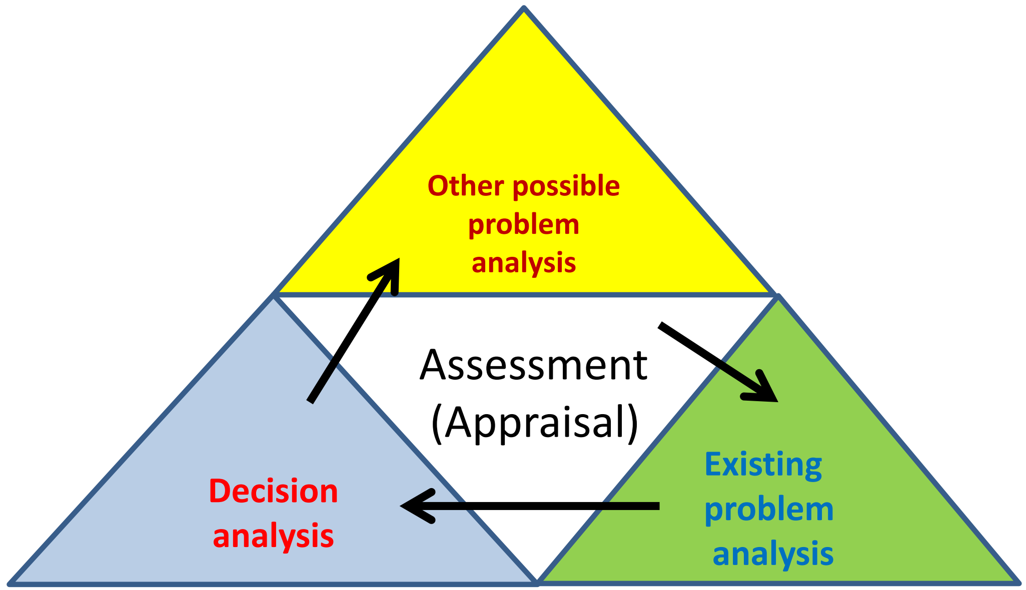
**It is** also called a **root cause analysis** and **decision-making method**.

**It is a step-by-step approach** for systematically solving problems, making decisions, and analyzing potential risks.



# Kepner-Tregoe spheres

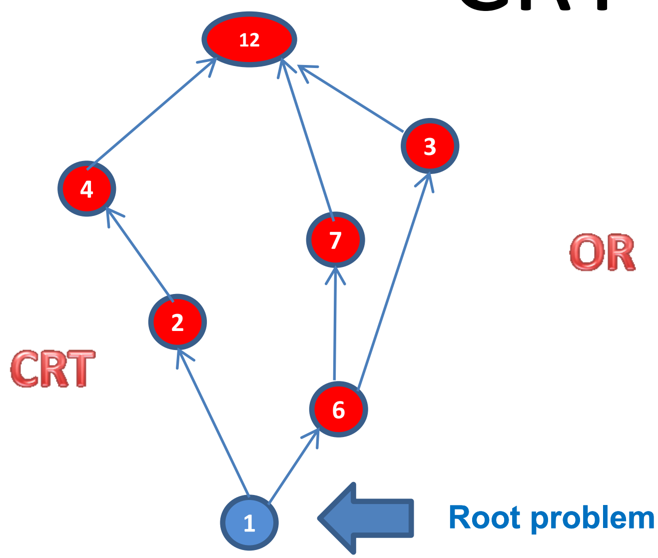
## Appraisal=review= assessment=evaluation

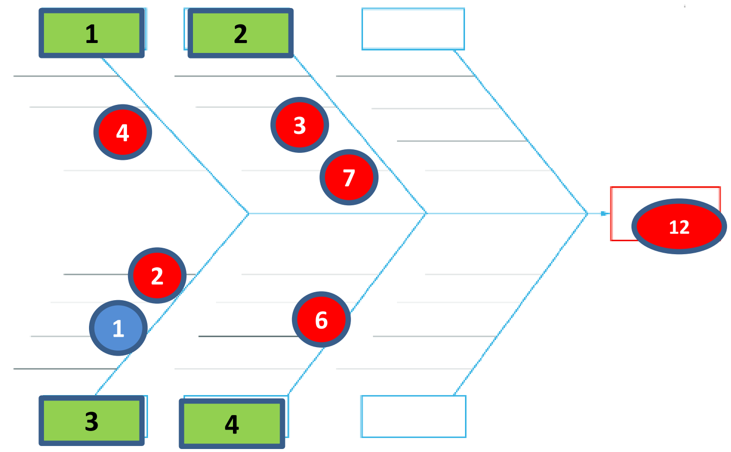


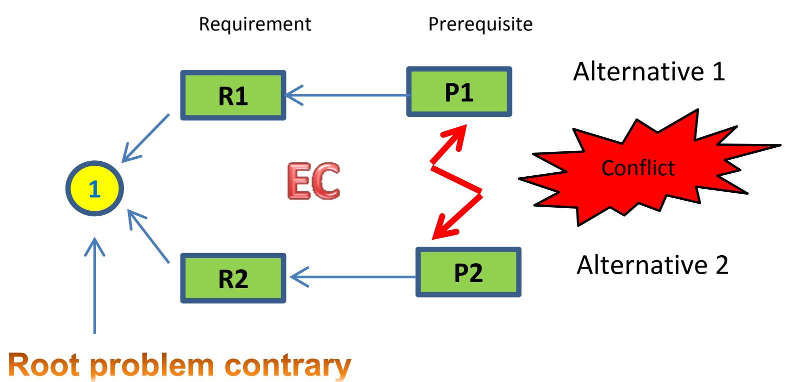

1. **Assessment (appraisal)** – priorities assigned to current situation
2. **Existing Problem analysis –** to find the root problem (cause)
3. **Decision analysis** – to select a way to react (remedy action )
4. **Future (other related) problem analysis -** e.g**.** risk analysis

**Source :** Kepner-Tregoe methodology

# CRT-Ishikawa




| | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| John | 8 | 7 | 4 | 3 | 5 | 6 |
| Caroline | 9 | 5 | 7 | 8 | 5 | 6 |
| Mean | *8,5* | 6 | 5,5 | 5,5 | 5 | 6 |

**1** = Nature (see, forest, mountains, jungle, river,..)

**2** = Hotel type

**3** = Amenities (pool, golf course, wellness,.. )

**4** = Period (spring, summer, fall, winter).

**Alternative means how to solve problem and what kind of pay-off you will get**

# Access situation - situation appraisal

- Identify concerns (**problems**) by listing them (**detection stage**)
- Separate the level of concern (**importance**, **magnitude,** and level of **influence**) related to listed problems.
- Set the **priority level =importance** to measure the seriousness of impacts (**influence**), urgency and growth potential
- Decide what action to take next (step by step approach)
- Plan for **who** is involved, **what** they will be doing, **where** they will be involved, **when** it happened and the **extent** of involvement (**magnitude**)

# Used terminology

- Importance=magnitude=level of influence
- Priority levels (https://asana.com/resources/priority-matrix )
- Step-by-step approach
- **Questions**:
  - Who
  - What
  - Where
  - When
  - Extent

# Importance

- Is it important ?
- Who is concerned ?
- Which core process does it restrict ?
- Is it possible to find a temporary solution to work it around (not solve) the problem ?

# Step-by-Step Approach 8-step

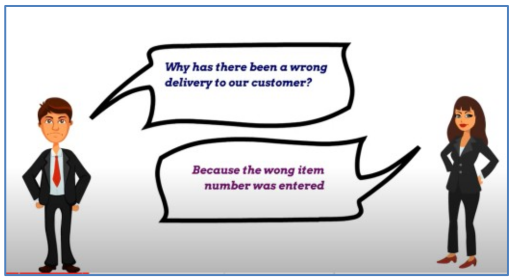
- **8-Step Problem Solving Process (one possibility)**

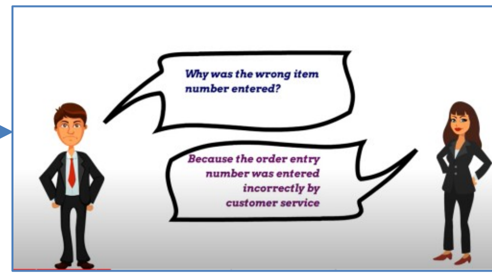
1. Step 1: Define the Problem. What is the problem? ...
2. Step 2: Clarify the Problem. ...
3. Step 3: Define the Goals. ...
4. Step 4: Identify Root Cause of the Problem. ...
5. Step 5: Develop Action Plan. ...
6. Step 6: Execute Action Plan. ...
7. Step 7: Evaluate the Results. ...
8. Step 8: Continuously Improve

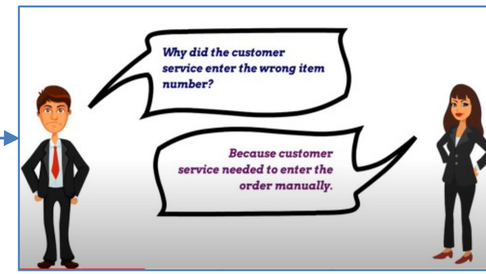
- **Similar to Deming cycle (see OM intro)**

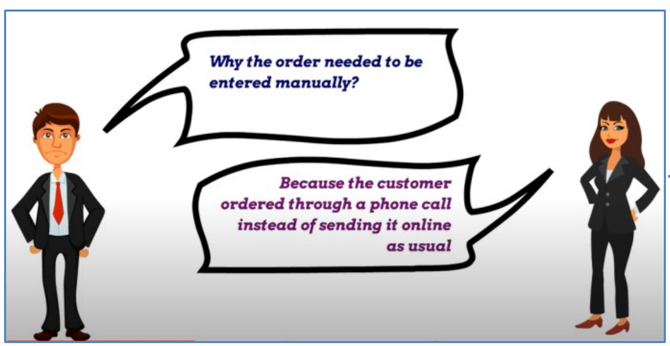
# Step-by-Step Approach 5 Whys-method I.

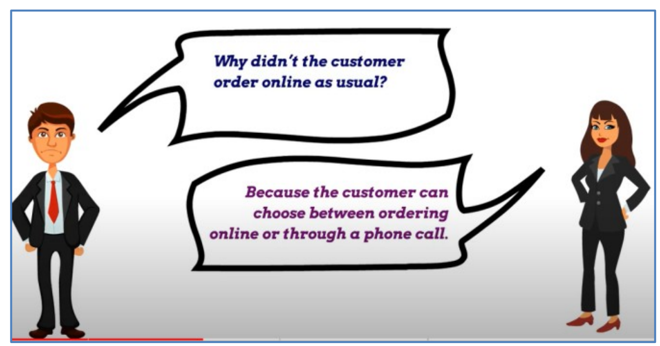

The method is to go step by step to get the real cause of a problem by asking Why? Questions



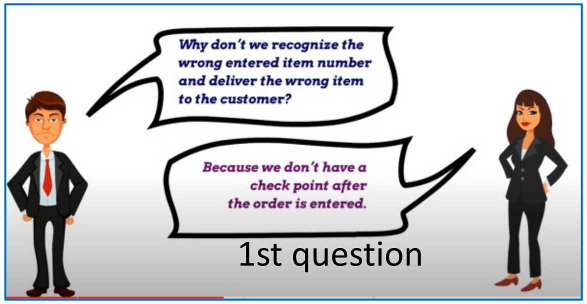



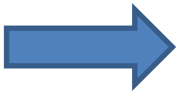



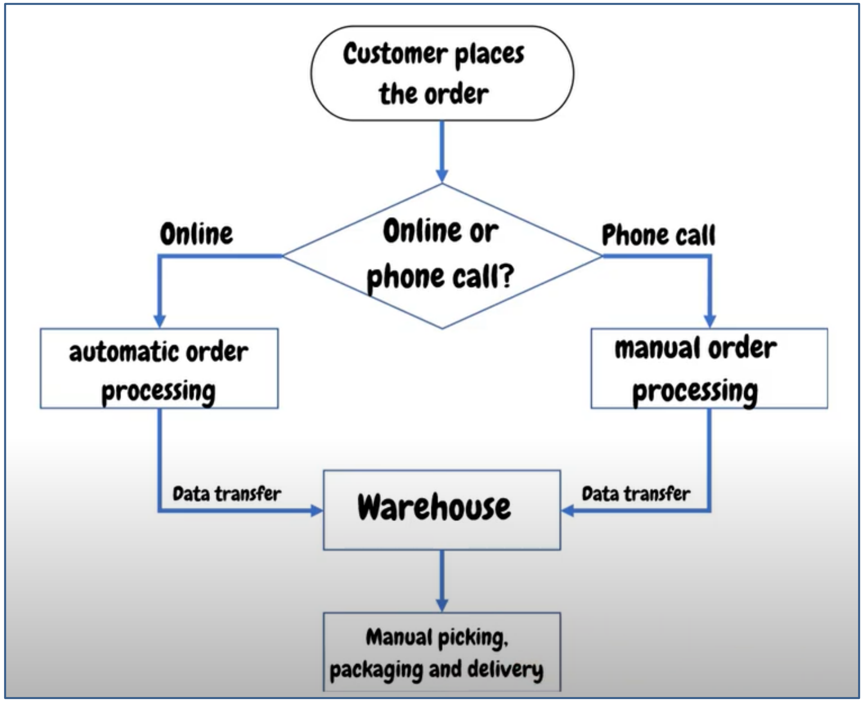




Here is a set of the first five questions, followed by the next question to find the root cause

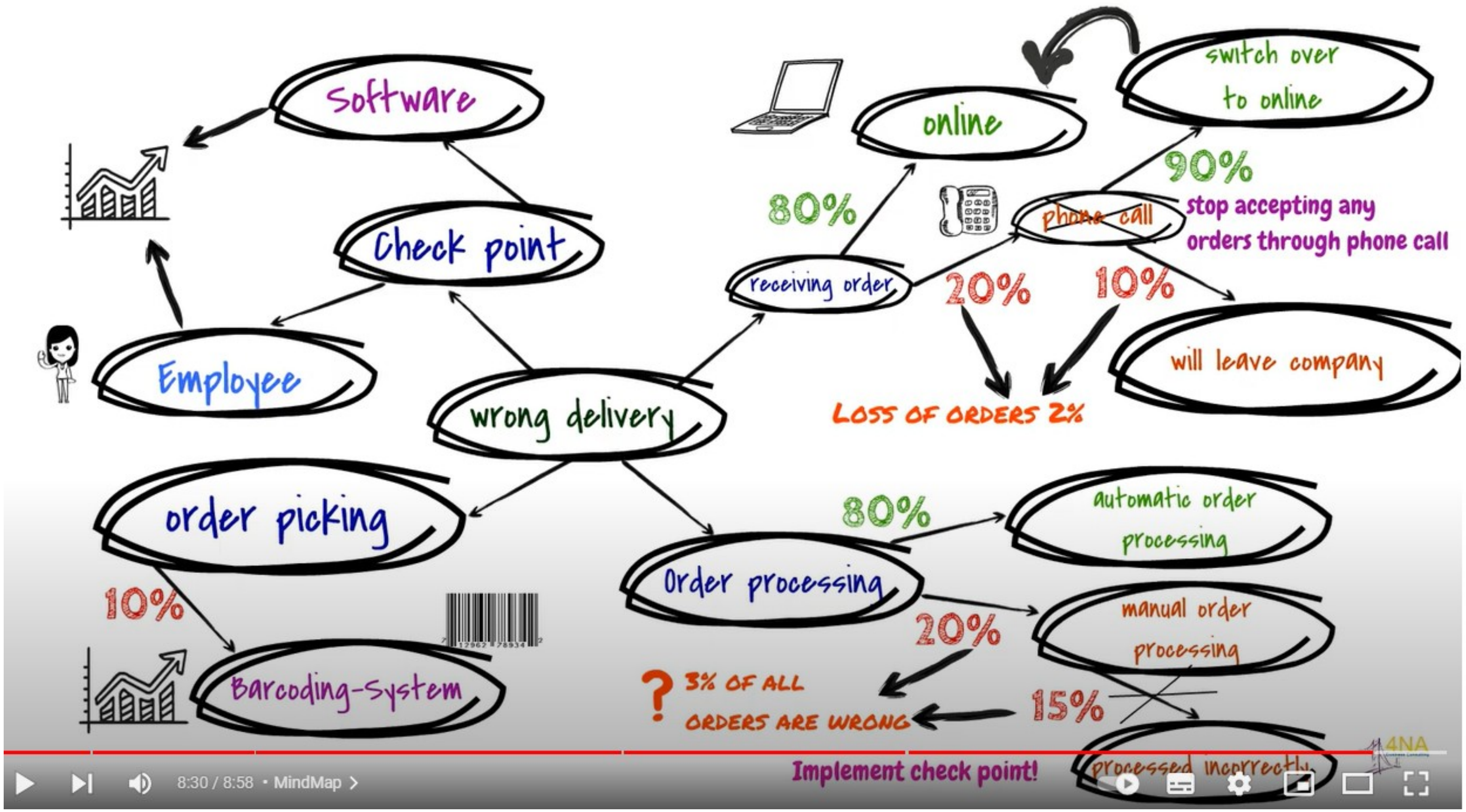
# Step-by-Step Approach 5 Whys-method II.



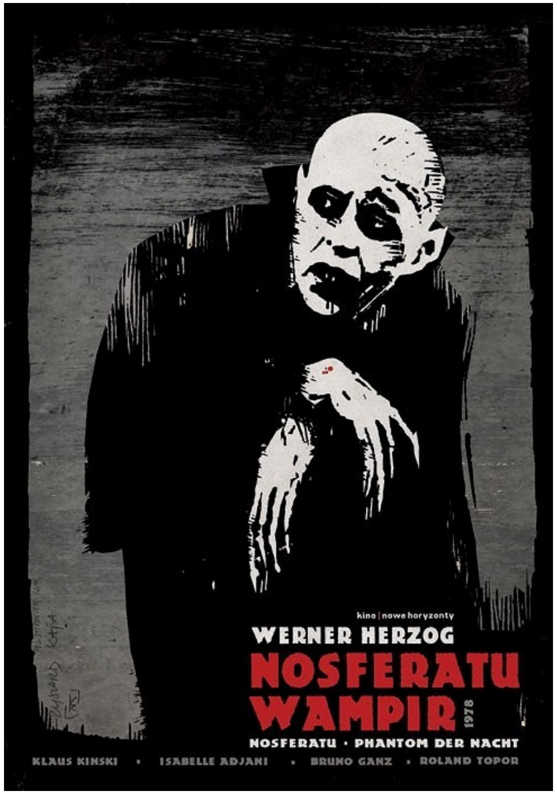


# Graphical representation of the process




**At the end of this KT presentation is a link to the presentation you will view as homework**

# Questions and the fabulous world of the vampires




**To keep this very unusual economic comparisons in your mind**

# WHO WHAT WHEN WHERE EXTENT

Reverse blood transfusion

The mysterious castle of Prince Dracula in the Romanian Carpathians

The Vampire of Nosferatu arrives in Hamburg on an old Romanian sailing ship

A vampire always attacks under cover of night

More potential victims of a greedy vampire

# **Making decision** *(A choice between two or more alternatives)*

- Identify what is being decided (quality, used **Operation Management** methods)
- Establish and classify objectives (main ones, minor ones,..) - *goals*
- Separate the objectives into **must** ***(must to have)*** and **want** ***(nice to have)*** categories (we have to assign **importance factors** from 1-10, where 10 is the most important **want** objective) and assign criterion rating (weights)
- Generate the alternatives - **we can do it that way or we can take another way as well**
- Evaluate the alternatives by scoring the **wants** against the main (**must**)objective – ***see next slides***
- Review adverse (harmful) consequences of your corrective steps (risk evaluation, risk assessment,risk mitigation)
- Make the best possible choice **what to do**

  The million dollars question

# Concise overview of the previous text

- Must-to-have
- Nice-to-have

**One of the key issues in the implementation of ERP systems**

- Importance factor =score (10-1)=satisfaction score
  - 10 = the highest importance
  - 1 = the lowest importance
- Risks
  - Importance factor could be also e.g. 100-1

# Some statement of **underestimation** of Information Technology

- I think there is a world market for maybe five computers (IBM chairman statement from the year 1943)

- There is no reason anyone would want a computer in his or her home (President of Digital Equipment 1977)

- I can assure you that data processing is a fad (craze),that won´t last out the year (Editor Prentice-Hall 1957)

- Document management is nice-to-have, not must-to-have (Director of the company still burdened in manual business process)

# Criteria rating

| "Must" Criteria | Car 1 | Car 2 | Car 3 | Car 4 |
|---|---|---|---|---|
| Cost under \$9,000 | Yes | Yes | Yes | Yes |
| Available within one week | Yes | Yes | Yes | No |

| "Want" Criteria | Importance* | Car 1 Criterion rating | Car 1 Weighted score | Car 2 Criterion rating | Car 2 Weighted score | Car 3 Criterion rating | Car 3 Weighted score |
|---|---|---|---|---|---|---|---|
| Good gas mileage | 7 | 5 | $7 \times 5 = 35$ | 6 | $7 \times 6 = 42$ | 8 | $7 \times 8 = 56$ |
| Sporty | 8 | 5 | $8 \times 5 = 40$ | 7 | $8 \times 7 = 56$ | 4 | $8 \times 4 = 32$ |
| Color (blue) | 3 | 10 | $3 \times 10 = 30$ | 0 | $3 \times 0 = 0$ | 0 | $3 \times 0 = 0$ |
| AM/FM stereo | 5 | 7 | $5 \times 7 = 35$ | 8 | $5 \times 8 = 40$ | 3 | $5 \times 3 = 15$ |
| Good condition | 10 | 5 | $10 \times 5 = 50$ | 6 | $10 \times 6 = 60$ | 8 | $10 \times 8 = 80$ |
| Low mileage | 6 | 6 | $6 \times 6 = 36$ | 4 | $6 \times 4 = 24$ | 5 | $6 \times 5 = 30$ |
| Relatively new | 7 | 3 | $7 \times 3 = 21$ | 5 | $7 \times 5 = 35$ | 5 | $7 \times 5 = 35$ |
| TOTAL WEIGHTED SCORE (WS) | | | 247 | | 257 | | 248 |

**See similar example on the next slide**

Importance can be understood as a Satisfaction score, meaning desirable but not essential.
Criteria rating is related to want criteria and every car property

# Which car to buy ?

| MUSTS | A | B | C | D |
|---|---|---|---|---|
| Power Brakes | GO | GO | GO | GO |
| Power Steering | GO | GO | GO | GO |
| AM/FM Stereo | GO | GO | NO GO | GO |
| Automatic | GO | GO | NO GO | GO |
| Under $15,000 | GO | GO | GO | GO |

| WANTS | Weight | Score | W x S | Score | W x S | Score | W x S | Score | W x S |
|---|---|---|---|---|---|---|---|---|---|
| AirCon | 10 | 10 | 100 | 0 | 0 | | | 10 | 100 |
| Cassette | 7 | 6 | 42 | 10 | 70 | | | 10 | 70 |
| Antilock Brakes | 9 | 0 | 0 | 10 | 90 | | | 0 | 0 |
| Air Bag | 8 | 5 | 40 | 10 | 80 | | | 5 | 40 |
| Rear Demist | 6 | 10 | 60 | 0 | 0 | | | 0 | 0 |
| Engine Size | 6 | 8 | 48 | 6 | 36 | | | 10 | 60 |
| Central Lock | 5 | 5 | 25 | 10 | 50 | | | 5 | 25 |
| Metal Paint | 4 | 0 | 0 | 10 | 40 | | | 10 | 40 |
| Warranty | 8 | 10 | 80 | 7 | 56 | | | 3 | 24 |
| Resale Value | 7 | 7 | 49 | 7 | 49 | | | 4 | 28 |
| | TOTALS | | 444 | | 471 | | | | 387 |

Criterion rating

Importance score, meaning desirable but not essential

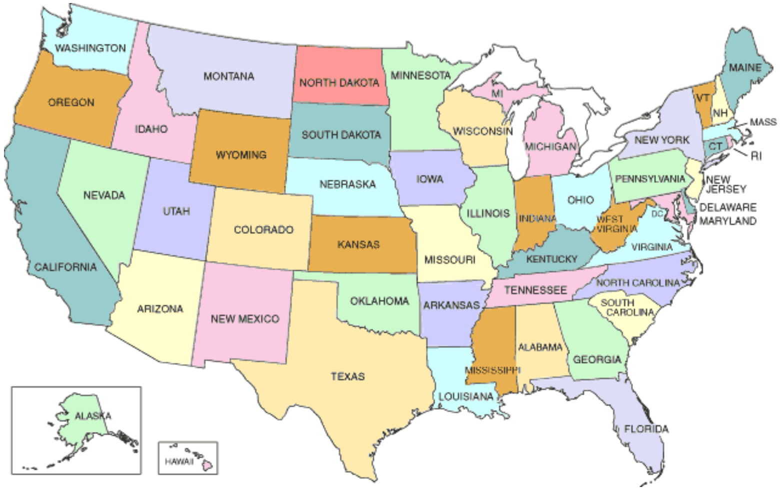
# Another similar problem to be solved

**Step 1 Problem**: **Pick a replacement vehicle for the motor pool fleet**

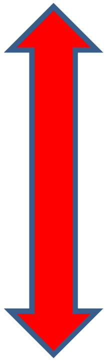
The definition of the problem dictates the requirements. As the vehicle is for a motor pool, the requirements will differ from those for a family car, for example.

**Step 2 Requirements:**

1. Vehicle shall be made in **U. S. A.**
2. Vehicle shall seat at least **four adults**, but no more than **six adults**
3. Vehicle shall cost no more than **$28,000**
4. Vehicle shall be **new and the current model year**




Min

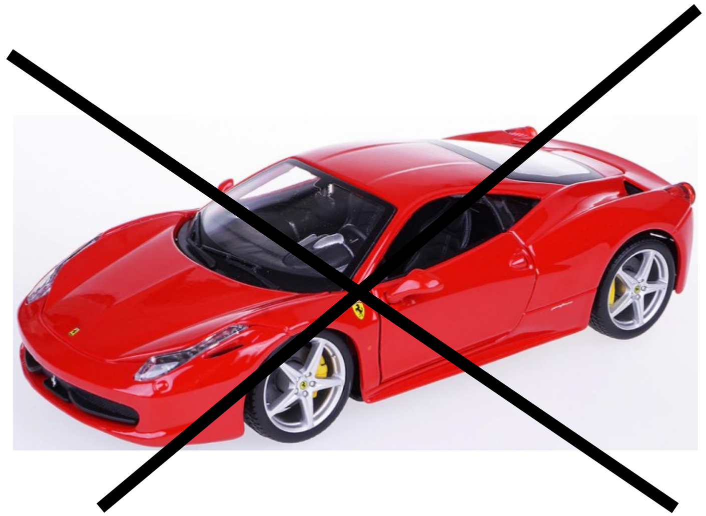


Max

Max 28000 USD

**New car (current model)**

# Step 3 and Step 4



**Step 3 Goals:**
· Maximize passenger comfort
· Maximize passenger safety
· Maximize fuel-efficiency
· Maximize reliability of the car
· Minimize investment cost

**Step 4 Alternatives:**
There are many alternatives but the requirements eliminate the consideration of a number of them:

Requirement 1 eliminates the products not manufactured in the USA
Requirement 2 eliminates vans, buses, and sports cars (Ferrari no !!!!)
Requirement 3 eliminates high-end luxury cars
Requirement 4 eliminates used vehicles

# Step 5

**Step 5 Criteria:**

“Maximize comfort” will be based on the combined rear  seat leg and shoulder room. (Note: front seat passenger  leg and shoulder room was found to be too nearly the same to discriminate among the alternatives.)  **5**

“Maximize safety” will be based on the total number of stars awarded by the National Highway Traffic Safety Administration for head-on and side impact.  **10**

“Maximize fuel efficiency” will be based on the EPA fuel consumption for city driving.  **7**

“Maximize reliability” will be based on the reliability rating given each vehicle by a consumer product testing company**. 9**

“Minimize Cost” will be based on the purchase price**. 10**

**Weighted criteria vector  C(5,10,7,9,10) are values assigned  by decision makers  !!!!**

# Kepner-Tregoe table

## (for 4 cars : Arrow, Baton, Carefree and Dash)

| Criteria/ Want objectives | Criteria Weight | *Arrow* | Alter-native Score | Total Score |
|---|---|---|---|---|
| Comfort | 5 | 86 in. rear seat leg and shoulder room, seats 5 | 6 | 30 |
| Safety | 10 | 14 stars | 5 | 50 |
| Fuel efficiency | 7 | 21 mpg | 9 | 63 |
| Reliability | 9 | 80 | 9 | 81 |
| Cost | 10 | $26,000 | 5 | 50 |
| | | **Total** | | **274** |
| | | *Baton* | | |
| Comfort | 5 | 88 in. rear seat leg and shoulder room, seats 6 | 9 | 45 |
| Safety | 10 | 17 stars | 8 | 80 |
| Fuel efficiency | 7 | 19 mpg | 8 | 56 |
| Reliability | 9 | 70 | 7 | 63 |
| Cost | 10 | $21,000 | 8 | 80 |
| | | **Total** | | **324** |
| | | *Carefree* | | |
| Comfort | 5 | 80 in. rear seat leg and shoulder room, seats 5 | 4 | 20 |
| Safety | 10 | 15 stars | 6 | 60 |
| Fuel efficiency | 7 | 22 mpg | 10 | 70 |
| Reliability | 9 | 65 | 5 | 45 |
| Cost | 10 | $17,000 | 10 | 100 |
| | | **Total** | | **295** |
| | | *Dash* | | |
| Comfort | 5 | 89 in rear seat leg and shoulder room, seats 6 | 10 | 50 |
| Safety | 10 | 19 stars | 10 | 100 |
| Fuel efficiency | 7 | 21 mpg | 9 | 63 |
| Reliability | 9 | 85 | 10 | 90 |
| Cost | 10 | $24,000 | 6 | 60 |
| | | **Total** | | **363** |

# Last step – Validation (check)

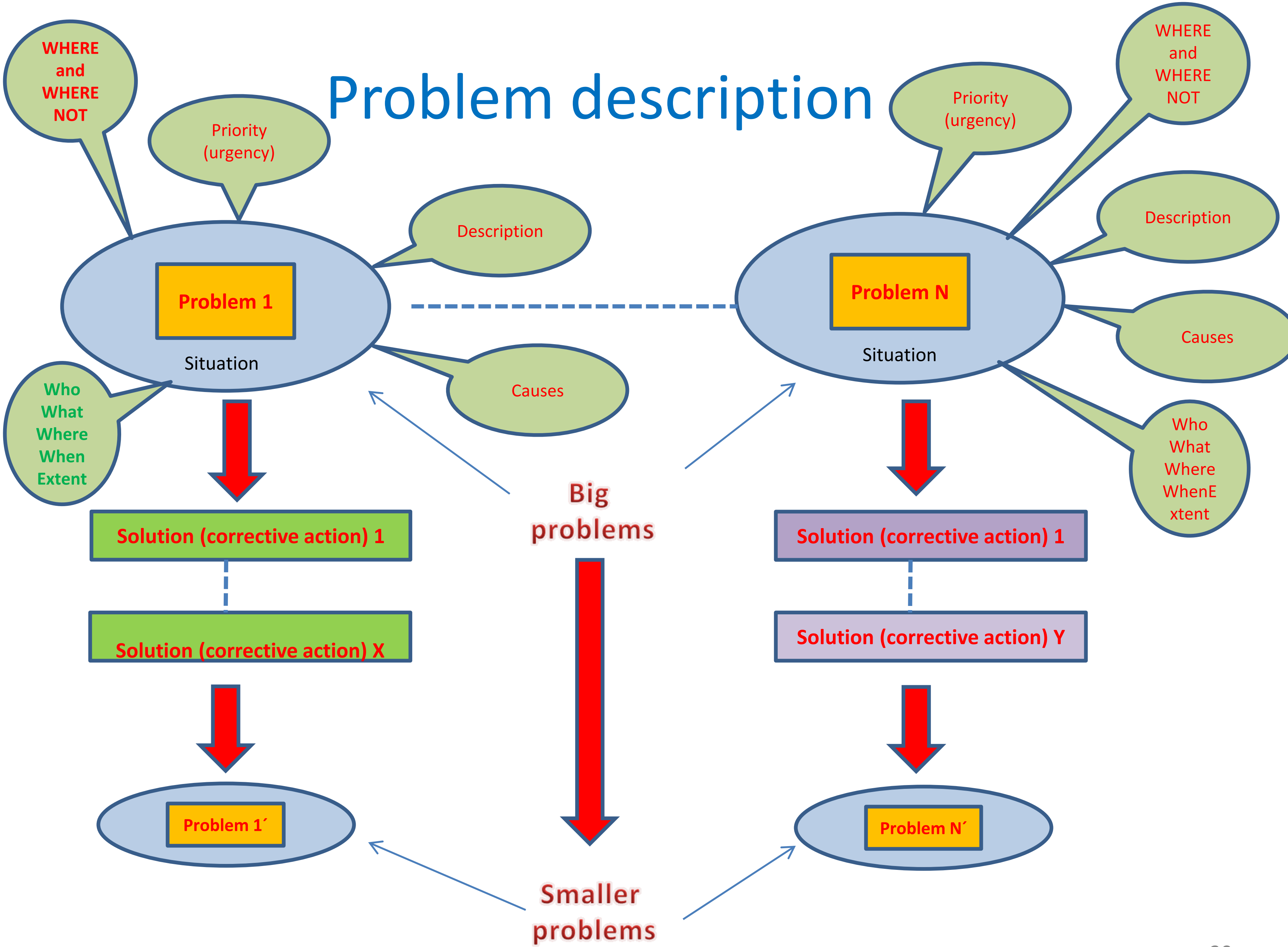
**Last Step  Validate Solution:**

The totals of the weighted scores show that the **Dash** most nearly meets the wants/goals (or put another way, has the most "benefits"). Dash meets all the requirements and solves the problem !!!

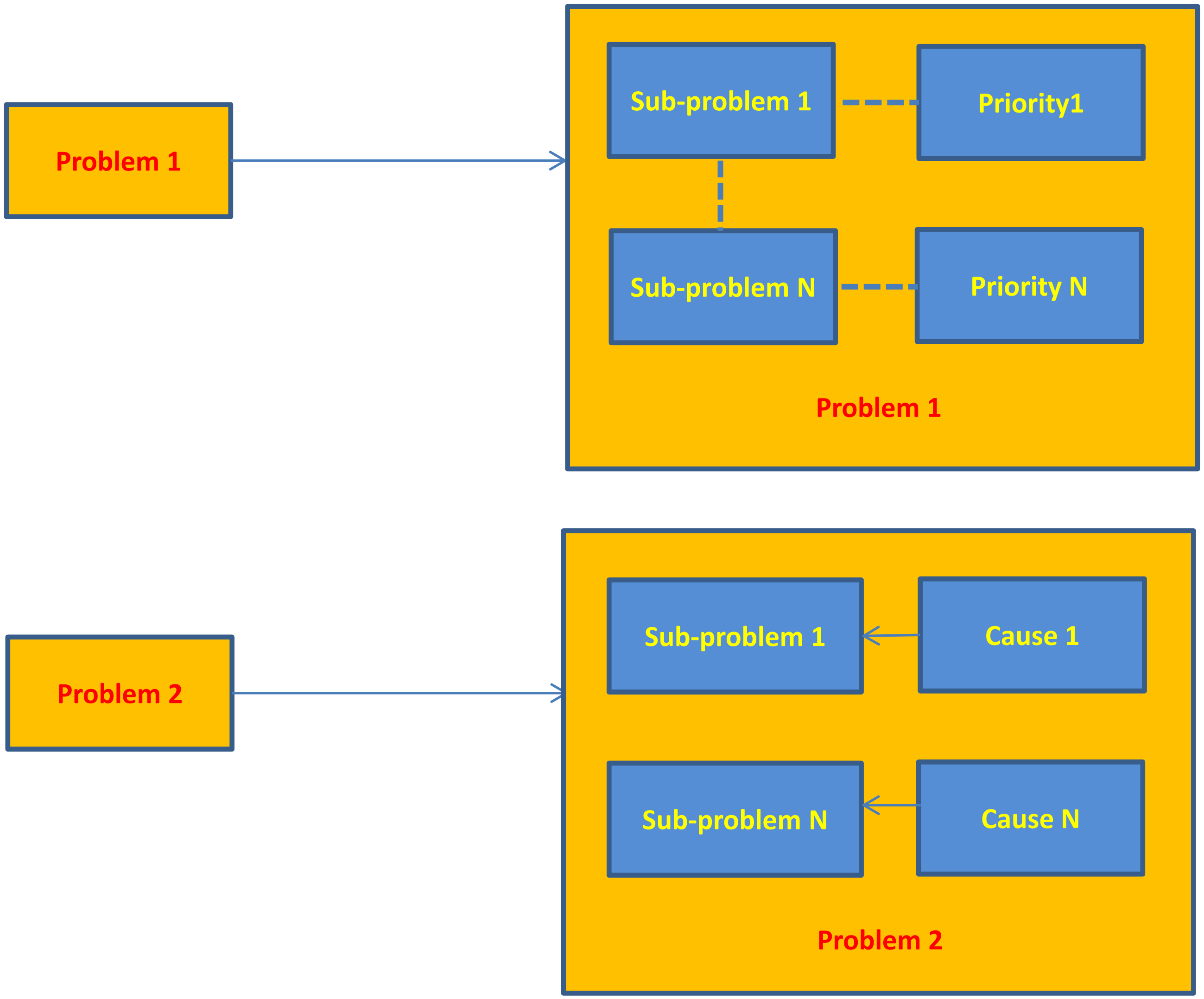
# Uncover and handle problems
## (problem analysis) – see step-by –step approach

- State the problem **(definition and description of the problem)**
- Specify the problem by asking **what is** and **what is not, who is and who is not…**
- Develop possible causes of the problem (similar to CRT or Ishikawa FBD approaches) - > **(problem detection)**
- Test and verify possible causes
- Determine the most probable cause **(root cause)**
- Verify any assumptions
- Try the best possible solution and monitor what will be a situation after applied correctives step

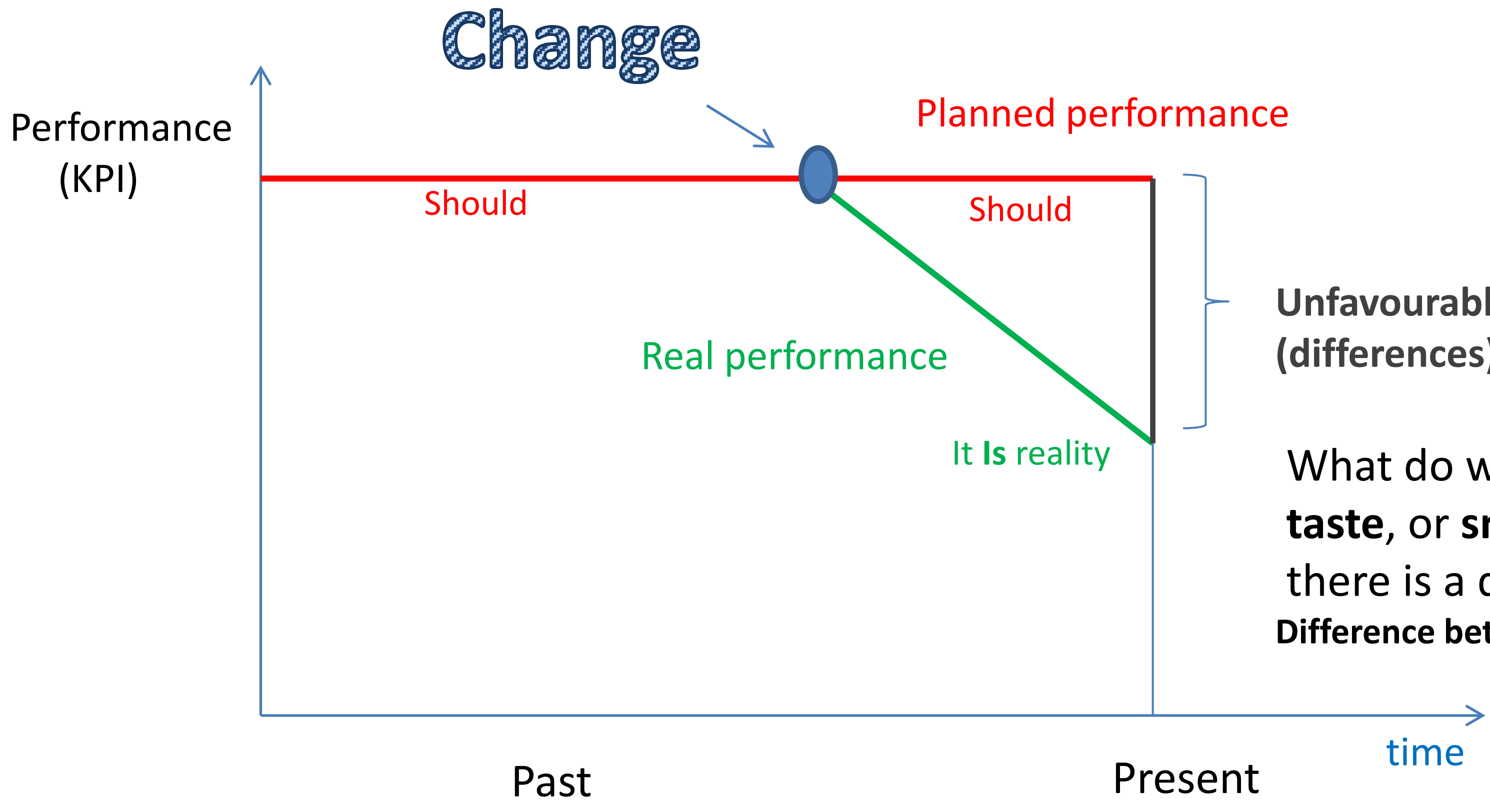
# Problem description



# Decomposition, priorities and causes



# Example of problem manifestation
## (decrease of performance)




What do we **see, hear**, **feel**, **taste**, or **smell** that tells us there is a deviation?

**Difference between Shoud and Is**

Final effect of the Change = **PROBLEM** (e.g. server crashed, hard disk with database crashed)

Then we have to ask: **Who, *What, Where, When*, How and to what *Extent*** *–Size (how much, how many)*?

# Deviation analysis - questions related to WHAT

- What has the deviation? What does not have the deviation?
- What is the specific deviation? What is not the deviation?
- What similar object(s) could have the deviation, but does not?
- What other deviations could be reasonably observed, but are not?

**The questions :**

WHEN It is
WHERE It is
WHO It was
HOW It happened

It is

&

WHEN
WHERE
WHO
HOW

Is Not

are similar in content, so we do not include them here for sake of simlicity

# Server crashed !!!! (home study !!!)

- **Server crashed** (this is a very poor and not clear problem definition)
- **The e-mail system crashed after the 3rd shift support engineer applied hot-fix XYZ to Exchange Server 123** (better definition of the problem)
- **Comment :** WHO is not mentioned here but could be : Different staff (3 shift) – see table

| | IS | COULD BE but IS NOT | DIFFERENCES | CHANGES |
|---|---|---|---|---|
| WHAT | System failure | Similar systems/situations not failed | ? | ? |
| WHERE | Failure location | Other locations that did not fail | ? | ? |
| WHEN | Failure time | Other times where failure did not occur | ? | ? |
| EXTENT | Other failed systems | Other systems without failure | ? | ? |

| | IS | COULD BE but IS NOT | DIFFERENCES | CHANGES |
|---|---|---|---|---|
| WHAT | Exchange Server 123 crashed upon application of hot-fix XYZ | Other Exchange Servers getting hot-fix XYZ | Different staff (3rd shift) applied this hot-fix | New patch procedure from vendor |
| WHERE | 3rd floor production room without vendor/ contractor support | Anywhere else with vendor/ contractor support | Normally done by vendor | New procedure, first time 3rd shift applies hot-fixes |
| WHEN | Last night, 1:35am | Any other time or location | None noted | |
| EXTENT | Any Exchange Server on 3rd floor | Other servers | | |

History (and best practice) says that the root cause of the problem is probably due to some **recent change**. **WHAT, WHERE, WHEN and EXTENT will be shown on next slides**

# Test the Most Probable Cause
# (home study !!!)

Clarifying problem Analysis (example)

| Potential root cause: | True if: | Probable root cause? |
|---|---|---|
| Exchange Server 123 has something wrong with it | Only Exchange Server 123 has this problem | Maybe |
| Procedure incorrect | Same procedure crashes another server | Probably |
| Technician error | Problem did not always reoccur | Probably not |

We have to ask (where Qi =QUESTION i) :

| **Question** | **IS** | **IS NOT** |
|---|---|---|
| *What (identify)* | *Q1* | *Q2* |
| *Where (locate)* | *Q3* | *Q4* |
| *When (timing)* | *Q5* | *Q6* |
| *Extent (magnitude)* | *Q7* | *Q8* |

# Problem Analysis - What

## Is

- What specific object(s) has the deviation?
- What is the specific deviation?

Example for Is :

1. What specific **object** **IS** related to the defect?
   Inventory Valuation Objects in **database A**
2. What specifically is the defect (deviation)?
   Inventory Adjustment does not work

1-> see setup of the database and see differences
2->see algorithm used for calculation and parameter used.
You can see , that in production calculation related algorithm is not functional

## Is Not

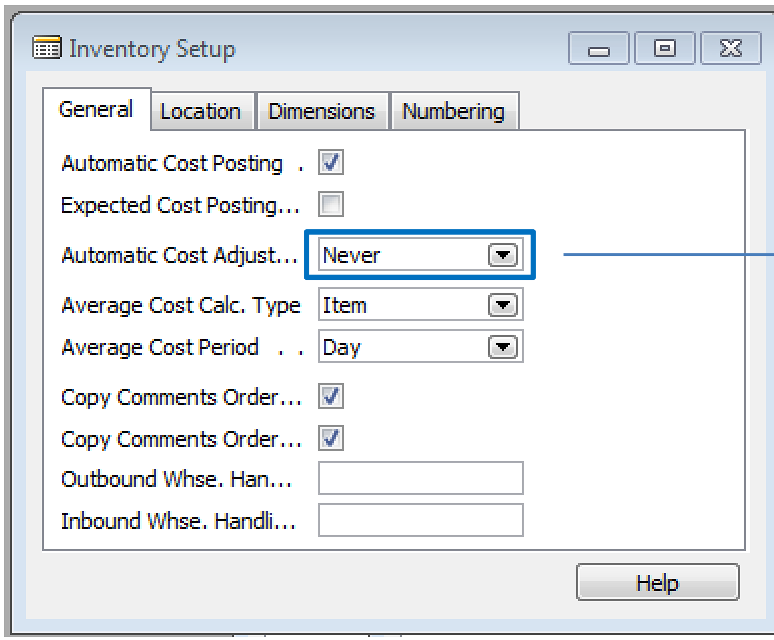
- What similar object(s) could have the deviation, but does not? (It did not happen)
- What other deviations could be reasonably observed, but are not? (It did not happen)

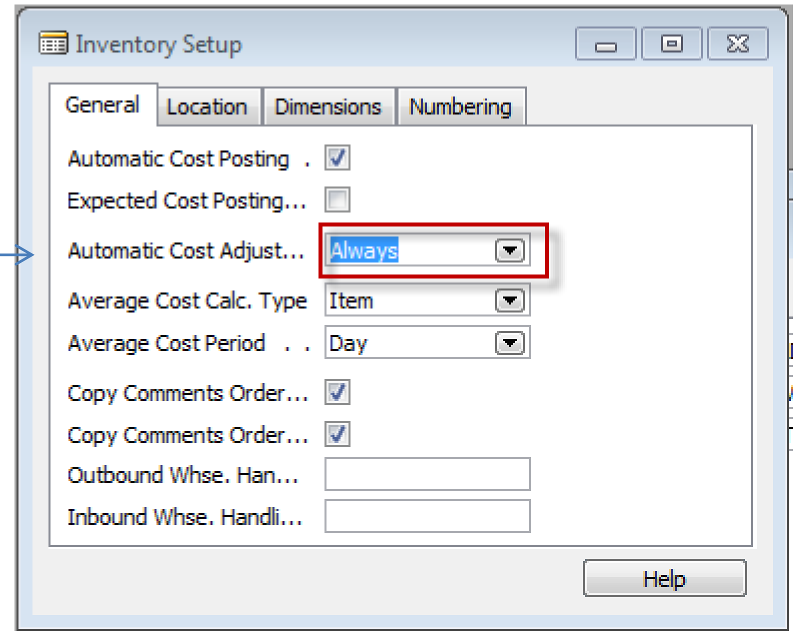
Example for **Is Not :**

1. What specific **object** **IS NOT** related to the defect?
   Inventory Valuation Objects in **database B**
2. What specifically is not the defect (deviation)?
   Adjustment is working – good setup in **database B**

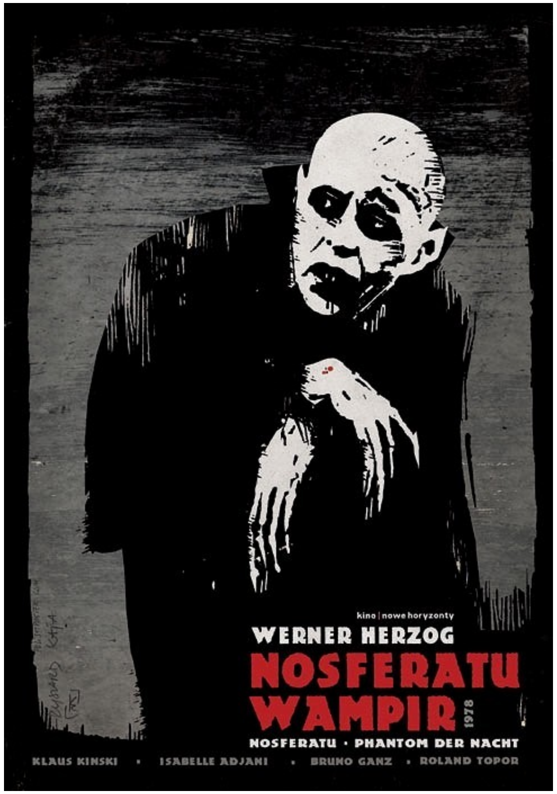
1 -> Setup has another parameter **ON**
2-> Algorithm is also used for production where not error occurs

# See two MS Dynamics NAV setup screens (related to the problem specified recently)



# Apology- we go back to strange individual habits of vampires




To keep this very unusual economic comparisons in mind

# Back to vampires: Problem Analysis - What

## Is

- What specific object(s) has the deviation?

- What is the specific deviation? - bites on the neck

Example for **Is** :

1. Nice young girl´s neck and strange look of anemic person

## Is Not

- What similar object(s) could have the deviation, but does not? (It did not happen)

What could the specific deviation? but does not? (It did not happen) – bites, anemia

Example of **Is Not** :

1. Girl with garlic in her hands
2. No bites
3. Healthy

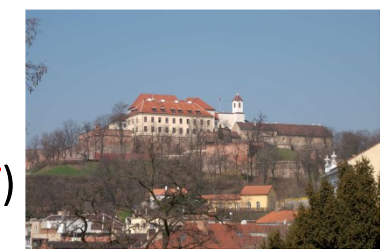
# Another example for What IS and What IS NOT as well as Where IS and Where IS NOT

**IS** girl Sarah visited Dracula lower castle without a bunch of garlic, but **IS NOT** not the one (Emily) having a bunch of garlic and visiting Špilberk castle in Brno

Dracula Castle
(Where IS)

Transylvanian Alps in Romania
(castle of Count Dracula)

Špilberk Brno
(Where IS NOT)



Sarah
(What IS)

Emily
(What IS NOT)

**garlic**

# Problem Analysis - **Where**

## Is

- Where is the object when the deviation is observed? (geographically)
- Where is the deviation on the object?

## Is Not

- Where else could the object be when the deviation is observed, but is not?
- Where else could the deviation be located on the object, but is not?

Example for **IS**:

1. The old castle in the mountains (Romania)

**Where IS**: Romanian Carpathian mountains where **it is** very easy to meet many vampires there

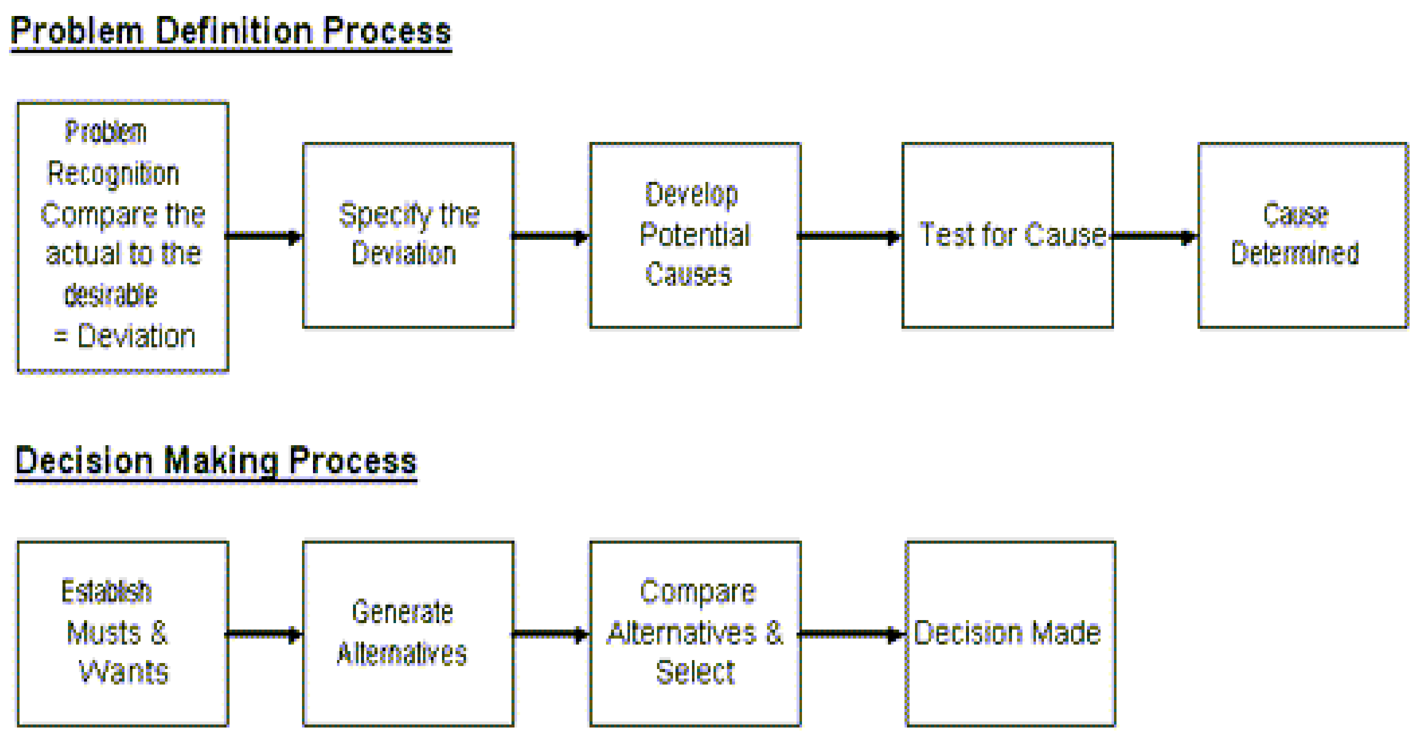
Example for **IS NOT**:

1. Brno Špilberk Castle

Where **IS NOT** possible to meet vampires (only lovers and children and seniors)

# Let’s Look At Some Problems!

# Systematic Problem Solving and Decision making Overview



# Planning the Next Steps

- Problem Analysis
  - Do we have a deviation?
  - Is the cause unknown?
  - Is it important to know the cause to take effective action?

- If the answer is **YES** to **ALL** three listed problems above, than you have a big problem, Huston!

# Problem analysis table template

## (Home study ->the most important issue)

| | | IS | IS NOT | Distinction | Cause |
|---|---|---|---|---|---|
| What | Identify: | What is problem? | What is not problem? | What difference between is and is not? | What is possible cause? |
| Where | Locate: | Where is problem found? | Where is problem not found? | What difference in locations? | What cause? |
| When | Timing: | When does problem occur? | When does problem not occur? | What difference in timing? | What cause? |
| | | When was it first observed? | When was it last observed? | What difference between $1^{st}$, last? | What cause? |
| Extent | Magnitude: | How far does problem extend? | How localized is problem? | What is the distinction? | What cause? |
| | | How many units are affected? | How many not affected? | What is the distinction? | What cause? |
| | | How much of any one unit is affected? | How much of any one unit is not affected? | What is the distinction? | What cause? |

# Problem description (example)

On a new model of airplane, flight attendants develop rash on arms, hands, face (only those places). It only occurs on flights over water.

Usually disappears after 24 hours. No problems on old planes over those routes.

Does not affect all attendants on these flights, but same number of attendants get it on each flight. Those who get rash have no other ill effects.

No measurable chemicals, etc., in cabin air.

Rash arm ->

# Problem analysis real table

| | IS | IS NOT | DISTINCTION |
|---|---|---|---|
| WHAT: | Rash | Other illness | External contact |
| WHEN: | New planes used | Old planes used | Different materials |
| WHERE: | Flights over water | Flights over land | Different crew procedures |
| EXTENT: | Face, hands, arms | Other parts | Something contacting face, hands and arms |
| | Only some attendants | All attendants | Crew duties |

**Distinction=Difference**

**Comment: specification is very simplified-> all aircraft use life jackets regardless Of the type of fly (over water or over land )**

# Results

Only a part of the cabin crew shows how a life jacket is worn over their heads.
In new airplanes, the life jackets were treated with powder chemicals
that cause a rash on contact with the skin.

Moreover, the deployment of life jackets is not presented
on-air routes outside the oceans and seas.

# WORLD CUP & QUALITY MANAGEMENT

SAMUEL K. M. HO

**Keywords:** Quality Management, World Cup, problem solving

**Abstract:** In the semi-final World Cup 1990, England lost to West Germany in the penalty knockout. The Italian team had similar experience when they lost to Brazil in the World Cup final 1994. History repeats itself -- in WC'98, England lost to Argentina and Italy lost to France by the same mistakes. In an attempt to audit the defeats, the author developed the S-H Method of managerial auditing and used the World Cup match examples to illustrate the significance of the S-H Method in auditing managerial processes.

**Author:** prof. Samuel K.M Ho, School of Business, Hong Kong Baptist University, Hong Kong

| ENGLAND | | | WEST GERMANY | | |
|---|---|---|---|---|---|
| **Goal** | **Player** | **Result & Analysis** | **Goal** | **Player** | **Result** |
| E1 | Lineker | In | W1 | Brehme | In |
| E2 | Beardsley | In | W2 | Matthaeus | In |
| E3 | Platt | In -- despite being touched by the goal-keeper | W3 | Riedle | In |
| E4 | Pearce | Ball caught by the goal-keeper (violating Rule #1) | W4 | Thon | In |
| E5 | Waddle | Ball flew above the goal (violating Rule #2) | **WON** | | |

*Table 1 Score Table of Penalty-shoot Knock-out -- World Cup Semi-final 1990: England vs. West Germany*

**Rule #1:** In a successful penalty-shoot, the ball ends up in the goal away from the goal-keeper's reach. The most likely positions are those along the inside edges of the goal-posts, the higher the better, provided that the ball does not go over the bar. The football player must target these points.

**Rule #2:** The shooter should assume that there is nobody at all in the field, and concentrate on shooting the ball into the positions defined as the best.

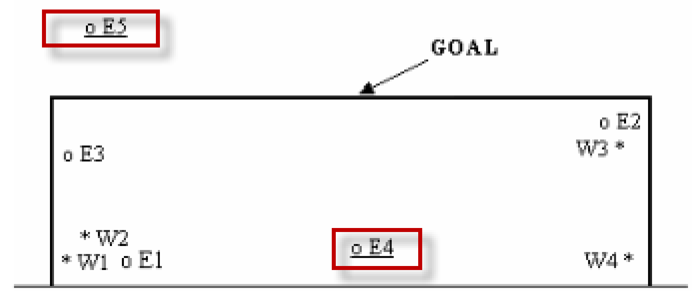



*Figure 3*

*Approximate Positions of Penalty-shoot Goals -- World Cup Semi-final 1990: England (E) vs. West Germany (W) (Underlined balls indicate missing shoots)*

# Example of analysis (only as an interesting example)

**Table III**
Problem-solving worksheet applied to analyse World Cup match problem

| | Is the problem? | Is as expected? | The point of change |
|---|---|---|---|
| **What** | Weak penalty shooting | Performance during the match | Difference in penalty shoot-out tactics |
| **Who** | Two out of the five England players | German players | The way some players struck the ball |
| **When** | After 120 minutes of football | During the match | Penalty shoot-out took place after a long and tiring match |
| **Where** | At the points easily reached by the goal-keeper<br>Above the bar | At the positions near the posts, inside the goal (E2 and E3) | Ball easily caught by the goalkeeper or ended up outside the goal |
| **How significant** | Two failures out of five attempts | The German team did not miss out of four attempts | Very significant |
| **Possible causes** | 1 Some players not following rule 1<br>2 Certain players are incapable of shooting the ball at the right spot<br>3 Some players are affected psychologically by the presence of the goalkeeper and have forgotten about rule 2<br>4 Lack of proper training based on rules 1 and 2 | | |

- WHAT -- Lack of proper training led to the weak penalty-shooting, mostly due to players not adhering to Rule #1 (see).
- WHO -- A significant number of players were making the mistake as a result of insufficient training.
- WHEN -- When players are tired, the physical condition may affect their decision making. This is why training is important.
- WHERE -- More stringent training on correct shooting (Rule #1).
- HOW SIGNIFICANT -- The importance of the match makes the problem very significant. Therefore training must be thorough.

# Example of K-T problem analysis

| | Is | Is Not | Differences | Changes |
|---|---|---|---|---|
| What | Remote access running slowly | Local access | Use of WAN | |
| Where | In Germany | In other countries | Different WAN links and routers | |
| When | All the time<br><br>Since 20-Jan | At particular times or days.<br><br>Before 20-Jan | | Firmware on German routers had a security patch on 20-Jan |
| Extent | All transactions take about twice normal time | More than twice normal time.<br><br>Complete failure. | | |

https://www.youtube.com/watch?v=dUtoOUWnJY0

https://www.youtube.com/watch?v=TEc_FZhRoro https://www.youtube.com/watch?v=S5fQrE0-kGg

In the Ishikawa presentation, I briefly mentioned the 5 Whys methodology.
Here is an excellent example of how to analyze a selected process using this method.

[(103) Problem Solving Techniques: 5-Why-Method, Flowchart, Mind-Map - YouTube]()

# Thanks for Your attention