Problem Solving
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Aim and objectives

- The aim of this presentation is to address the concept and principles of problem solving.

- Through this presentation, you will know problem solving methods and techniques.

Learning outcomes

At the end of this presentation, you will be able to:

- Describe principles and concepts of problem solving;

- Identify different methods and tools that could be used to problem solving;

- Explain the different problem solving methods and techniques;

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PROBLEM SOLVING

- **Problem**

  - a problem is understood as a difficulty of theoretical or practical nature that causes an inquiring attitude of a subject and leads him/her to the enrichment of his/her knowledge.

- **Problem Solving**

  - Problem solving is a cognitive process of the brain that searches a solution for a given problem or finds a path to reach a given goal.

  - When a problem object is identified, problem solving can be perceived as a search process in the memory space for finding a relationship between a set of solution goals and a set of alternative paths.

Mu.SA Skills

- Somo relevant (and generic) problem solving skills:

    - Curiosity;

    - Openness;

    - Willingness to embrace ambiguity;

    - Openness;

    - Idea Generation;

- There are different approaches to problem solving. Examples

  - Root Cause Analysis;

  - PDCA (Plan-Do-Check-Act);

  - CATWOE (Customers, Actors, Transformation Process, World View, Owners, Environmental Constrains);

  - TRIZ;

  - …

Root Cause Analysis

- **Root Cause Analysis**
  - The identification of root causes in any system is fundamental to problem solving and continues improving.
  - These causes can be identified using:
    - 1) unstructured problem-solving techniques, which include intuition, networking and experience;
    - 2) structured techniques, which include the systematic tools used in root-cause analysis;
  - Root cause analysis (RCA) is defined as a collective term that describes a wide range of approaches, tools, and techniques used to uncover causes of problems.

- **Root Cause Analysis**

  - There are several approaches to RCA, but it can be represented by the following steps:

    - Identify the problem;

    - Define the problem;

    - Understand the problem;

    - Identify the root cause;

    - Corrective action;

    - Monitor the system;

- **Root Cause Analysis Tools & Techniques**

    - The five whys (5Y)

        - Was developed and fine-tuned within the Toyota Motor Corporation as a critical component of its problem-solving training.

        - Helps to determine the root cause or the relationship between different root causes of a problem. It is a simple tool and can be completed without statistical analysis.

        - Relies on a sequence to five whys to get to the cause of a specific problem.

Root Cause Analysis

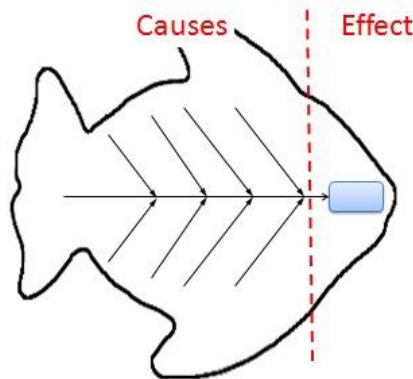- **Root Cause Analysis Tools & Techniques**
  - 5Ys Example
    - Problem: an interactive LCD doesn't work;
    - Why: the image is black;
    - Why: the content is not running;
    - Why: the software (interactive player) is not working properly;
    - Why: software client has no content;
    - Why (root cause): because de database has no content entry;

- **Root Cause Analysis Tools & Techniques**

  - Fishbone Diagram

    - Also called cause-and-effect diagram, Ishikawa diagram.

    - Helps to perform a cause and effect analysis for a problem you are trying to solveRelies on a sequence to five whys to get to the cause of a specific problem.

    - The left side of the diagram is where the causes are listed. The causes are broken out into major cause categories. The causes you identify will be placed in the appropriate cause categories as you build the diagram.

    - The right side of the diagram lists the effect. The effect is written as the problem statement for which you are trying to identify the causes.

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Root Cause Analysis

- **Root Cause Analysis Tools & Techniques**
 - Other tools & techniques
    - Pareto Charts - A Pareto chart is a histogram or bar chart combined with a line graph that groups the frequency of different problems to show their relative significance.
    - Scatter Plot Diagram - A scatter plot or scatter diagram uses pairs of data points to help uncover relationships between variables. A scatter plot is a quantitative method for determining whether two variables are correlated, such as testing potential causes identified in your fishbone diagram..
    - Failure Mode And Effect Analysis - Failure mode and effects analysis (FMEA) is a method used during product or process design to explore potential defects or failures. An FMEA chart outlines:
      - Potential failures, consequences and causes.
      - Current controls to prevent each type of failure.
      - Severity (S), occurrence (O) and detection (D) ratings that allow you to calculate a risk priority number (RPN) for determining further action.

- **Problem Tree Analysis**
  - A problem tree analysis is a pictorial representation of a problem (trunk), its causes (roots) and its consequences (branches and leaves). This analysis helps to find solutions by mapping out causes and effects around a problem, in a similar way to a Mind map.
  - Also called situational analysis or just problem analysis.

- **Problem Tree Analysis**
  - Step by step procedure:
    - Identify existing problems.
    - Define the core problem.
    - Formulate the causes.
    - Formulate the effects.
    - Draw a diagram.

Problem Tree Analysis

- **Problem Tree Analysis**
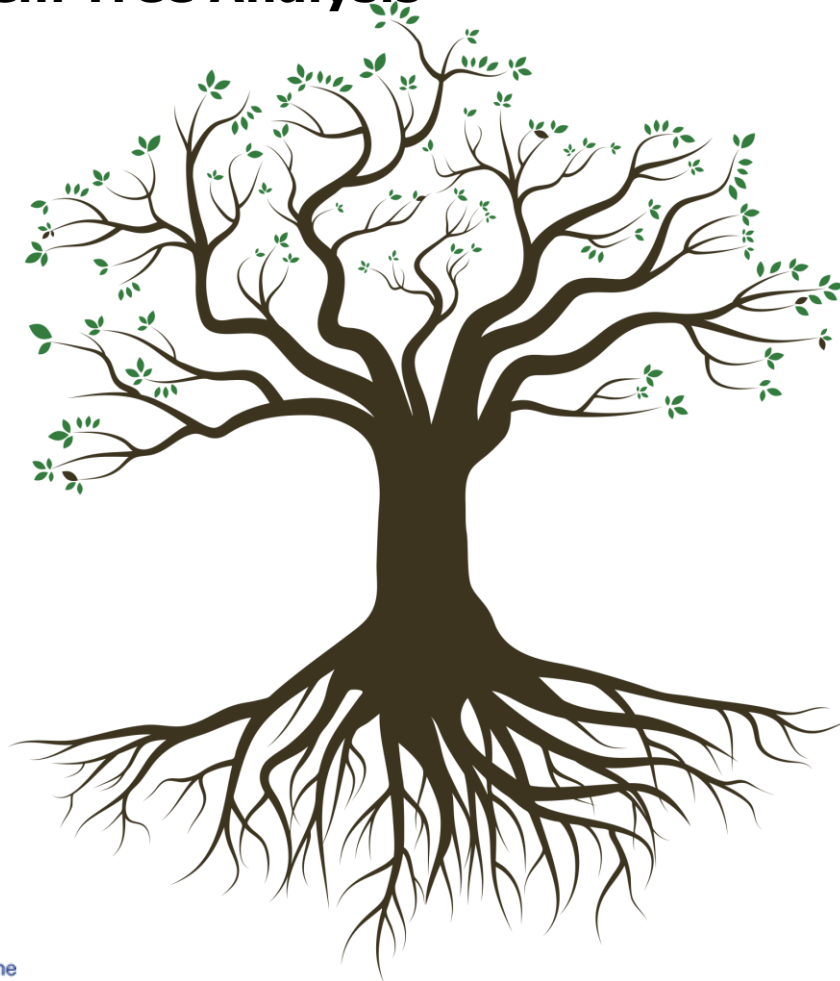
Consequences

Problem

Causes

- **Problem Tree Analysis**
  - The Problem Tree has several advantages:
    - Simplicity.
    - The problem can be broken down into manageable chunks.
    - Emphasis on visualisation (easy to understand and relate).
    - Focus on the causes.
    - The process of analysis often helps build a shared sense of understanding, purpose and action.

Best Practices

- Some relevant (and generic) problem solving best practices:

    - Use a systematic approach;

    - View Problems as opportunities;

    - Change perspective;

    - Break down in silos;

    - Dig deep;

    - Challenge the status quo;

    - Think broadly about and visualize the problem;

- This presentation was about problem solving and some methods and tools.

- Now that you finished watching it, you should be able to:

    - Identify different approaches to problem solving;

    - Use the problem tree analysis tool to solve the problem;

- Dostál, Jiří. (2014). Theory of problem solving.

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Thank you for your attention!

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MAPA DAS IDEIAS