Houston, we have a PROBLEM!

How to apply the 7 steps of Problem Solving

July 2019
What is problem solving?

A cognitive process directed at achieving a goal when no solution method is obvious
- Mayer & Wittrock, 1996

Key characteristics of problem solving
- Impact-driven
- Focused
- Fact-based
Typical reaction to problems is to treat symptoms instead of uncovering root causes.

- **Observed problem**: Leak
- **Temporary solution**: Fix temporary
- **Root cause**: Why?
- **Countermeasure**: Fix the roof!

**Typical reasons for treating symptoms**

- Short-term focus on achieving operational targets
- Inconsistent role modeling from top management
- Inconsistent performance management culture and discipline
- Cultural issues – Fire fighters repeatedly asked to fix fires rather than find root cause
What is the practical approach to effective problem solving?
7-step process is a powerful framework to solve any problem

**Define**
- Debate and agree as a team on definition of core problem
- **Why**: Team is aligned around problem and methodology

**Structure and prioritize**
- Identify the best problem-solving approach
- Prioritize and target key issues
- **Why**: Bring the right approach to the situation and to the end customer

**Plan and analyze**
- Use the most appropriate analytic tools
- Ensure analytic rigor is applied to the process
- **Why**: Improper use of advanced analytic tools can create confidence in incorrect answers

**Communications**

1. **Define problem**
2. **Structure problem**
3. **Prioritize issues**
4. **Plan analysis and work**
5. **Conduct analyses**
6. **Synthesize findings**
7. **Develop recommendations**
Definition of the task or problem should be SMART, which is the key to the right solution.

<table>
<thead>
<tr>
<th>Criteria of a SMART problem</th>
<th>Description</th>
</tr>
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</table>
| **Specific**                | ▪ Is it specific for the business?  
                                ▪ Is it clear and simply defined? |
| **Measurable**              | ▪ Is it easy to determine (easy to get data, no complex calculations required)?  
                                ▪ Is the measurement simple to define? |
| **Actionable**              | ▪ Can the team influence the outcome?  
                                ▪ Do we understand the drivers behind the problem?  
                                ▪ Can we lessen the impact of the drivers that we cannot influence? |
| **Relevant**                | ▪ Is it relevant for the business as a whole?  
                                ▪ Does it support the top-down objectives?  
                                ▪ Is it in agreement with the business strategy and goals? |
| **Timely**                  | ▪ Can it be promptly determined for a useful period?  
                                ▪ Does it have a specific deadline / timeframe? |
Today’s case study: selecting a ski resort for a vacation trip with friends

- You are thinking to go to a ski resort with six other friends for the January holidays.
- Your group consists of people of different affluence, but it would be better to find an option which all of them could afford.
- All participants agree that an optimal duration of the trip would be 5–7 days.
- One of the participants has had a vacation in Italy a few times, so this year, he would like to go elsewhere.
- Selection of a right resort to go to is important for all group members except Alex who is ready to go anywhere for company’s sake.
- The group includes a young couple with a child, and they would like to have a good selection of slopes suitable for entry-level skiers and families with children.
- The choice has to be made within the next 2 weeks, otherwise Serge, Chris, and Kate will change their minds and will go to Bali, which will cancel the entire trip.
Problem definition

Where could we go for vacation?

Where can we go skiing in January?

My friends and I plan to go skiing together and need to organize the trip.

Which ski resort to select for a 5–7 days vacation trip during the January holidays based on the requirements of six friends out of seven?
### Problem definition

<table>
<thead>
<tr>
<th>Question</th>
<th>Comments</th>
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<tr>
<td>Where could we go for vacation?</td>
<td>Too general</td>
</tr>
<tr>
<td>Where can we go skiing in January?</td>
<td>Simple, but not measurable</td>
</tr>
<tr>
<td>My friends and I plan to go skiing together and need to organize the trip</td>
<td>Statement of fact</td>
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<td>Which ski resort to select for a 5–7 days vacation trip during the January holidays based on the requirements of six friends out of seven?</td>
<td>Good wording</td>
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It is easy to build the correct structure by using a special method – the MECE principle.

The MECE principle helps to:
- better understand the task
- break it down into components
- avoid leaving out essential things

As a result, we get a lean and logical structure which comprises all required components without any “frills”.

MECE: Mutually Exclusive, Collectively Exhaustive
Meeting the MECE principle assures complete coverage of the subject matter without duplicating its elements.

<table>
<thead>
<tr>
<th>Mutually exclusive elements: the structure must have no repetitions</th>
<th>Collectively exhaustive elements: no element must be left out</th>
</tr>
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<tbody>
<tr>
<td><img src="image1" alt="Tree in winter" /></td>
<td><img src="image2" alt="Tree in summer" /></td>
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<td><img src="image4" alt="Tree in autumn" /></td>
</tr>
<tr>
<td><img src="image5" alt="Tree in fall" /></td>
<td><img src="image6" alt="Tree in winter" /></td>
</tr>
<tr>
<td><img src="image7" alt="Tree in snow" /></td>
<td><img src="image8" alt="Tree in summer" /></td>
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<td><img src="image10" alt="Tree in autumn" /></td>
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<td><img src="image11" alt="Tree in fall" /></td>
<td><img src="image12" alt="Tree in winter" /></td>
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Some MECE-based structuring methods

**Examples**

| Mathematical formula | \- Profit = income items – expense items  
| \- Profit = market volume x market share x profitability  
| \- Profit = profit from region 1 + profit from region 2 + ...  
| \- Profit = profit from product 1 + profit from product 2 + ... |

| Generally accepted structure | \- Profit and loss statement  
| \- Organizational structure of a company  
| \- Budget of an organization  
| \- Product mix |

| Logical statement | \- Efficiency of an employee depends on whether he or she has requisite knowledge and skills, on degree of his or her motivation, and on the incentives system implemented by the organization  
| \- Personal tasks need to be prioritized based on their importance and urgency |
Decision tree example – is it MECE?

Do we like that ski resort?

- How much will the trip cost?
  - How much is the airfare?
  - How much is the ski pass and equipment rental?
  - How much is lodging?
  - How much will meals cost?
  - Are airline tickets available?
  - Is it still possible to book hotel rooms?
  - Is it easy to get to the resort from the airport?
  - Will there be snow on the slopes during our stay?
  - Are there enough pistes of various degree of difficulty on the slopes?
  - Is there a convenient skier transportation infrastructure on the slopes?
  - How extensive are the options for spending leisure time after skiing?

- Will we be able to make it to the resort?
  - Are airline tickets available?
  - Is it still possible to book hotel rooms?
  - Is it easy to get to the resort from the airport?
  - Will there be snow on the slopes during our stay?
  - Are there enough pistes of various degree of difficulty on the slopes?

- Does the resort have a good infrastructure?
  - Are there enough pistes of various degree of difficulty on the slopes?
  - Is there a convenient skier transportation infrastructure on the slopes?
  - How extensive are the options for spending leisure time after skiing?

- How interesting and comfortable will be our time at that resort?
  - How attractive is the town in which we will be staying?
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3 Prioritize issues: Which issues are most important?

Start pruning your issue tree…

- Issue 1
- Issue 2
- Issue 3
- Issue 4

… and prioritize by effort and impact

- Effort
  - High
  - Medium
  - Low
- Impact
  - High
  - Medium
  - Low

- Use judgment/intuition and be practicable
- Do back-of-the-envelope calculations
- Take risks
- Don't 'boil the ocean'

80% of the problem can often be addressed by 20% of the issue tree
Prioritization of focus areas for the analysis

- Are we going to like that ski resort?
  - How much will the trip cost?
  - Will we be able to make it to the resort?
  - Does the resort have a good infrastructure?
  - How interesting and comfortable will be our time at that resort?
- How much is the ski pass and equipment rental?
- How much is lodging?
- How much will meals cost?
- Are airline tickets available?
- Is it still possible to book hotel rooms?
- Is it easy to get to the resort from the airport?
- How much is the airfare?
- Will there be snow on the slopes during our stay?
- Are there enough pistes of various degree of difficulty on the slopes?
- Is there a convenient skier transportation infrastructure on the slopes?
- How extensive are the options for spending leisure time after skiing?
- How attractive is the town in which we will be staying?
- How much is a hotel room per night?
- How much does it cost to eat out?
- Is it possible to find affordable lodging?
- Is there an option to buy food in supermarkets?
- What bars and clubs are available at the resort?
- Are there any entertainment facilities at the resort (e.g., waterparks)?
- Are there facilities with interesting after-ski programs on the slopes?
- Are there interesting sights or cultural landmarks in town?
- Are there beautiful places in town to take a walk around?
Prioritization of focus areas for the analysis

- **Are we going to like that ski resort?**
- **How much will the trip cost?**
- **Will we be able to make it to the resort?**
- **Does the resort have a good infrastructure?**
- **How interesting and comfortable will be our time at that resort?**

**Why:**
- The ability to make it to the resort is the decisive factor, and if it is not secured, then the rest of the questions are irrelevant.
- The cost of the trip is important for your friends.
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4 Plan analyses and work: Where and how should the team spend its time?

**Best-practice work planning**

<table>
<thead>
<tr>
<th>Early</th>
<th>Do not wait for data, critical mass, or anything else</th>
</tr>
</thead>
<tbody>
<tr>
<td>Often</td>
<td>Revise, update, and improve the hypotheses as you work through the data</td>
</tr>
<tr>
<td>Specific</td>
<td>Be specific on analysis and sources</td>
</tr>
<tr>
<td>Syndicate</td>
<td>Test with team members, try alternative hypotheses</td>
</tr>
<tr>
<td>Milestones</td>
<td>Be disciplined – deliver on time using 80/20</td>
</tr>
<tr>
<td>Simple</td>
<td>Push detailed workplans out only 2-4 weeks ahead. Don’t write an encyclopedia. Keep it simple. Take it piece by piece</td>
</tr>
<tr>
<td>Realistic</td>
<td>Make it manageable and realistic, otherwise it will not be used</td>
</tr>
</tbody>
</table>

“Plans are worthless, but planning is everything.”

- Dwight D. Eisenhower
## Analyses list example

<table>
<thead>
<tr>
<th>How much will the trip cost?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Check the cost of airline tickets for the selected dates</td>
</tr>
<tr>
<td>You</td>
</tr>
<tr>
<td>- Check the cost of lodging at a hotel or a rental property for the selected dates</td>
</tr>
<tr>
<td>- Check the cost of equipment rental on websites of large rental companies (e.g., Intersport)</td>
</tr>
<tr>
<td>- Check the ski pass cost on the resort’s official website</td>
</tr>
<tr>
<td>- Look through travelers’ reviews to understand the cost of meals (e.g., at Tripadvisor.com)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Will we be able to make it to the resort?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Review historical precipitation data, by the month</td>
</tr>
<tr>
<td>- Check availability of hotel rooms on booking websites (e.g., booking.com) for the selected dates</td>
</tr>
<tr>
<td>- Check availability of airline tickets for the selected dates</td>
</tr>
<tr>
<td>- Research options and schedules for transfers from the airport to the selected resort and back</td>
</tr>
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The analyses have to be run for every resort that meets the group’s criteria.
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Conduct analyses
During deep dive, learn to come up for air and remember the big picture.

When conducting deep dive, remember to:
- Step back occasionally to check that your answers are meaningful to the problem trying to be solved.
- Transition frequently between your hypotheses and data.
<table>
<thead>
<tr>
<th>Resort</th>
<th>Hotel rooms availability</th>
<th>Airline tickets availability</th>
<th>Airline tickets costs, return trip, thousand rubles</th>
<th>Average price level at the resort</th>
<th>Slopes operation in January over the last 3 years</th>
<th>Transfer from airport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan (Okudaisen)</td>
<td>Yes</td>
<td>Yes, connecting flights only</td>
<td>60–80</td>
<td>Low</td>
<td>1 out of 3</td>
<td>Railroad, more than 3 times a day</td>
</tr>
<tr>
<td>Austria (Sölden)</td>
<td>Yes</td>
<td>Yes, non-stop flight</td>
<td>30–40</td>
<td>Low</td>
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<tr>
<td>France (Les Trois Vallées)</td>
<td>Only expensive options</td>
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<td>Bus, once every 2 days</td>
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<tr>
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The pyramid principle in business communications

Pyramids in the deserts are built from stones

Pyramids in business communications are built from ideas

- There is only one stone at the top
- Each stone rests on three (minimum two) other stones
- Robust structure makes the pyramid stable
Following the pyramid principle helps synthesize the meaning of all discovered facts AND communicate them to the audience.
Two types of communication: top-down and bottom-up

Grouping of arguments

- Main idea
  - Reason
  - Reason
  - Reason

Different reasons all supporting the main idea
All reasons answer the “so what” question

Sequence of arguments

- Main idea
  - Message 1
  - Message 2
  - Consequences

String of messages all together leading to the main idea
Preparing the presentation – the story you are trying to tell should drive the structure of your presentation, not the other way around.

### Common approach
- Putting all analyses done by team on slides
- Sorting all slides into sections / topics
- Fixing slide titles to fit the story

### Suggested approach
- Developing a logical story based on outputs of key analyses
- Writing slide titles telling the story
- Selecting analyses that best support the story
- Developing simple and clear visuals / charts / graphs

**Presentations that are built on the pyramid principle are easier to follow**
It is good practice to make slide titles make sense as a story and support each title message with an output of an analysis.

If the slide titles are done right, ...

...you can easily put the slides together as a logical sequence...

...according to the pyramid principle...

...and make the story easy to follow...

...even without...

...the need to read the content of every slide

If the slide titles are telling a story, you need to make sure the content of each slide supports the titles.
An example of synthesis and message structure

It’s better to choose Sölden as ski resort for joint trip

The resort is easy to get to and operating
- Non-stop flights are available
- Scheduled railroad transfer is available
- Two Januaries out of three the slopes at Sölden were open

Prices at Sölden are affordable
- Air tickets to the resort are at a medium level
- Groceries are available for sale at inexpensive supermarkets
- Affordable hotels under 150 euros per night are still available

Ski resort has good infrastructure
- Tracks for entry-level skiers and families with children are available
- There are number of bars & night clubs in city
- Aquapark in Sölden can be visited with children from 4 years
CASE INTRODUCTION
Case study

Your team has received a proposal to develop a design for a group of Russian investors who want to build Hyperloop in Russia.

We need to substantiate whether this project is feasible.

Requirements

- No more than 6 slides besides the title slide and team introduction
- All additional analytics and calculations can be backed up in the presentation
- You will have 10 min for presentation and 10 min for Q&A