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HOW TO SOLVE PROBLEMS ANALYTICALLY

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WHAT THIS ARTICLE IS ABOUT

Managers at different organizational levels face different types of problems. In a manufacturing firm, for instance:

- Top managers face decisions of allocating financial resources, building or expanding facilities, determining product mix, and strategically sourcing production.
- Middle managers in operations develop distribution plans, production and inventory schedules, and staffing plans.
- Finance managers analyze risks, determine investment strategies, and make pricing decisions.
- Marketing managers develop advertising plans and make sales force allocation decisions.

Whatever the problem, the first step is to realize that it exists. Problem solving is the activity of defining, analyzing, and selecting an appropriate solution (Evans, 2014). Problem solving consists of several phases:

1. Recognizing the Problem
2. Defining the Problem
3. Structuring the Problem
4. Analyzing the Problem
5. Interpreting results and Making a Decision
6. Implementing the Solution

** Much of the material used in this article has been adapted from Professor James R. Evan's Textbook "Business Analytics".*

STEP I

RECOGNIZING THE PROBLEM

How are problems recognized? Problems exist when there is a gap between what is happening and what we think should be happening. The fundamental purpose of analytics is to help managers solve problems and make decisions. The techniques of analytics represent only a portion of the overall problem-solving and decision-making process. Before creating an analytical decision tool, managers should ask three questions (Evans, 2014):

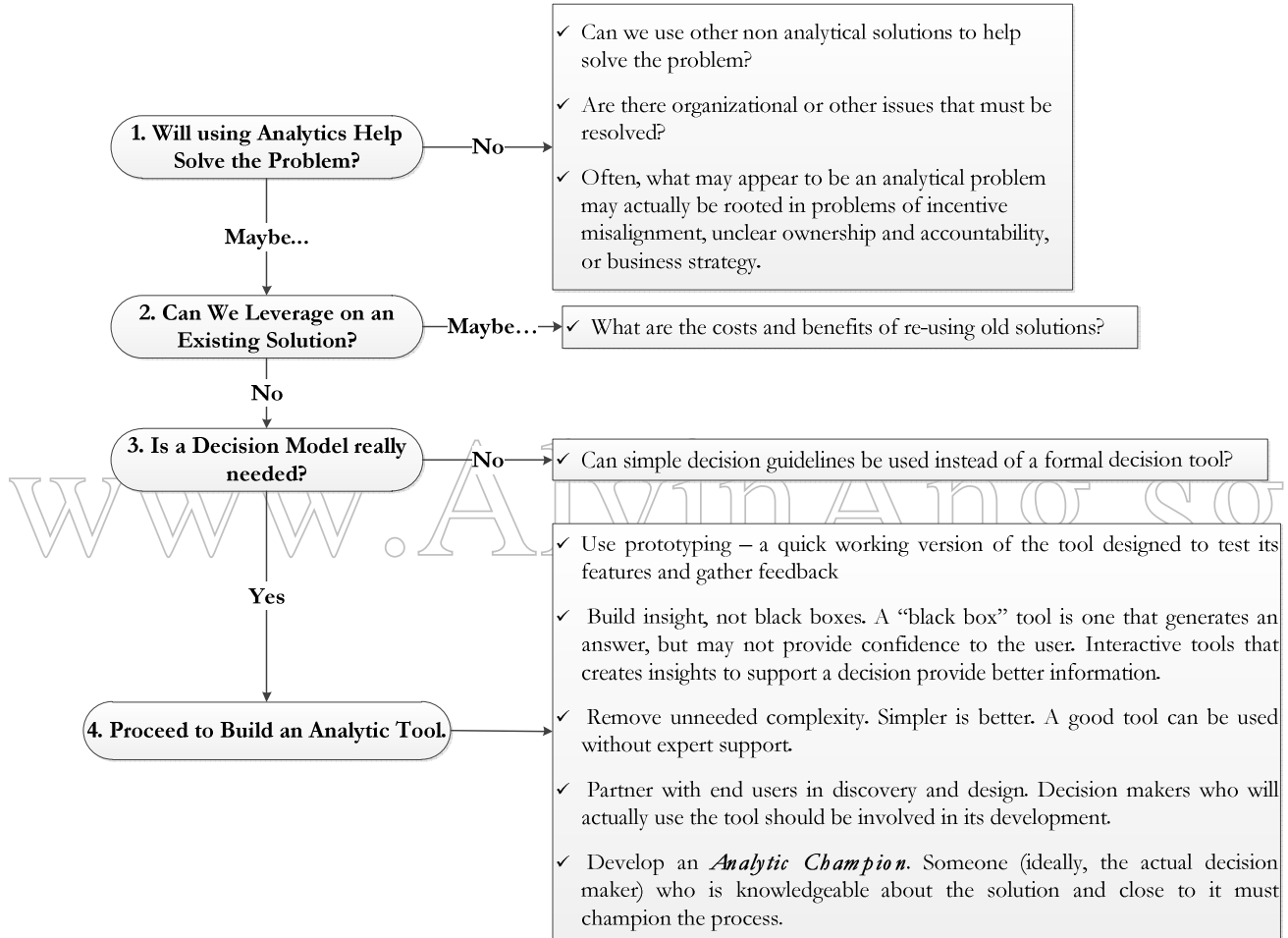


Figure 1: Before using Analytics to Solve Problems...(Evans, 2014)

Only after the above steps are verified does the *Analytic Champion* proceed with the Problem Solving Process.

STEP II

DEFINING THE PROBLEM

Defining problems is not a trivial task. It involves finding the root problem and distinguishing it from the symptoms that are observed.

A problem gets more complex when:

- Time is limited.
- The problem belongs to a group rather than an individual.
- The problem solver has several competing objectives.
- External individuals are affected by the problem.
- The courses of action are many.
- The problem solver and the true owner of the problem (the person who experiences the problem and is responsible for getting it solved) are not the same.

These factors make it difficult to develop meaningful objectives. In defining problems, it is important to involve all people who make the decisions or who may be affected by them.

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STEP III

STRUCTURING THE PROBLEM

Structuring a problem often involves developing a formal model.

This usually involves:

- ✓ Stating Goals and Objectives,
- ✓ Characterizing Possible Decisions,
- ✓ Identifying constraints.

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STEP IV

ANALYZING THE PROBLEM

Analysis involves:

- ✓ Experimentation
- ✓ Evaluating Different Scenarios,
- ✓ Analyzing Risks
- ✓ Analyzing Various Decision Alternatives,
- ✓ Determining an optimal solution.

Analytics professionals have spent decades developing and refining a variety of approaches to address different types of problems.

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STEP V

INTERPRETING RESULTS AND MAKING A DECISION

Interpreting Results from the Analysis Step is crucial in making good decisions.

Models cannot capture every detail of the real problem.

Managers must understand the limitations of models and their underlying assumptions.

They often need to incorporate judgment into making a decision.

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STEP VI

IMPLEMENTING THE SOLUTION

In order to “make the results of the model work” in the real world:

- ✓ Adequate Resources should be Provided For
- ✓ Employees should be Motivated
- ✓ Resistance to Change should be Eliminated
- ✓ Organizational Policies need to be Modified
- ✓ Trust should be Developed

Managers and Analytical Professionals need to be sensitive to Political and Organizational Issues because their solutions will affect different groups of people: Customers, Suppliers, and Employees.

They need to:

- ✓ Possess Good Communication Skills
- ✓ Understand the Business Context of the Problem
- ✓ Explain Results Clearly and Effectively.

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CONCLUSION

Analytical Problem Solving consists of six steps, as defined by Evans (2014):

1. Recognizing the Problem
2. Defining the Problem
3. Structuring the Problem
4. Analyzing the Problem
5. Interpreting Results and Making a Decision
6. Implementing the Solution

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James R. Evans is a professor in the Department of Operations, Business Analytics, and Information Systems in the College of Business at the University of Cincinnati. He holds BSIE and MSIE degrees from Purdue and a PhD in Industrial and Systems Engineering from Georgia Tech. He has also served on numerous journal editorial boards and is a past-president and Fellow of the Decision Sciences Institute. A recognized international expert on quality management, he served on the Board of Examiners and the Panel of Judges for the Malcolm Baldrige National Quality Award. Much of his current research focuses on organizational performance excellence and measurement practices.

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Dr. Alvin Ang earned his Ph.D., Masters and Bachelor degrees from NTU, Singapore. He is a scientist, entrepreneur, as well as a personal/business advisor. More about him at www.AlvinAng.sg.

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