PROBLEM SOLVING & DECISION MAKING

KT Kepner-Tregoe

PROBLEM ANALYSIS

Describe Problem
Identify Possible Causes
Evaluate Possible Causes
Confirm True cause

DECISION ANALYSIS

Clarify Purpose
Evaluate Alternatives
Assess Risks
Make Decision

SITUATION APPRAISAL

Identify Concerns
Set Priority
Plan Next Steps
Plan Involvement

POTENTIAL PROBLEM ANALYSIS

Identify Potential Problems
Identify Likely Causes
Take Preventive Actions
Prepare Contingent Actions and Triggers

POTENTIAL OPPORTUNITY ANALYSIS

Identify Potential Opportunities
Identify Likely Causes
Take Promoting Actions
Prepare Capitalizing Actions and Triggers

Problem Solving & Decision Making

KT Kepner-Tregoe

Situation Appraisal

What situations represent deviations, choices, threats, opportunities, or things that need to get done?

Which concerns require clarification or separate actions?

What is their relative priority in terms of current and future impact, and time frame?

For highest priority concerns…
- What process or action is needed?   • Who should be involved?

Problem Analysis

What should be happening? What actually is happening?

What is the complete specification of this deviation?

What are the possible causes?

Which possible cause best explains the specification?

How can true cause be confirmed?

Decision Analysis

What is the fundamental purpose of this decision?

What objectives should be considered? Which are MUSTs and WANTs?

What alternatives should be considered?

What risks are presented by the best performing alternative(s)?

What is the best choice with manageable risk?

Potential Problem Analysis

What could go wrong during implementation?

Which potential problems should we work on first?

What are the likely causes?

What actions should be planned to minimize probability and seriousness of occurrence?

How will the plan be modified to incorporate actions and triggers?

Potential Opportunity Analysis

What could go better than expected during implementation?

Which potential opportunities should we work on first?

What are the likely causes?

What actions should be planned to maximize probability and benefit of occurrence?

How will the plan be modified to incorporate actions and triggers?

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Situation Appraisal

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1 Identify Concerns

Identify the theme
• Set the scope of the appraisal.
What are the primary areas of concern?

List concerns
• Identify concerns related to the theme.
What deviations, decisions, plans, changes, threats, opportunities need our attention?

Separate and clarify concerns
• Ensure each concern is clear and specific.
• Keep a concern 'as is' if already clear.
To separate:
   What issues are a part of this concern?
   Can this concern be resolved by a single analysis or action?
To clarify:
   What exactly do we mean by…?

Create action statements
• List statements that show the action needed.
Is the action about a deviation, choice, threat, opportunity, or just getting something done?

2 Set Priority

Use knowledge and experience OR…
• List the order based on judgment.
• Use ✱ to indicate highest priority.
Which concerns should we work on first?
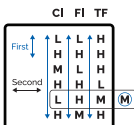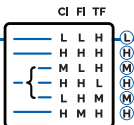*What is the order of the remaining concerns?*

…Use current impact, future impact, and time frame

- Record factual supporting data.
- First, vertically assess relative current impact, then future impact and time frame.
- Mark High, Medium, or Low. Refine using +/-.
- Second, assess combinations horizontally to determine overall priority.
- Mark High, Medium, or Low. Refine using +/-.

What is the current impact on employees, safety, cost, customers, productivity, reputation? What evidence?
What is the future impact? What evidence?
What is the time frame? What evidence?

CI	FI	TF	
L	L	H	Ⓛ
H	H	H	Ⓗ
M	L	H	Ⓜ
H	H	L	Ⓗ
L	H	M	Ⓜ
H	M	H	Ⓗ

	CI	FI	TF	
First ↕	L	L	H	
	H	H	H	
	M	L	H	
	H	H	L	
Second ↔	L	H	M	Ⓜ
	H	M	H	

③ Plan Next Steps

Determine resolution approach

- Identify the steps or actions needed.

What analytic process is required for resolution?

PA = Deviation? Cause unknown? Need to know cause?
DA = Choice?
PPA = Action or plan to protect?
POA = Action or plan to enhance?
SA = Further clarification?
No analysis = Just do it!

How much is needed?

- Record what you will do.

DA
PA
PPA
SA
POA
JDI

④ Plan Involvement

Determine help needed

- Consider who needs to be involved for a superior solution, information, analysis, commitment, implementation, approval.

Who needs to do what and by when?

1 Describe Problem

State the problem

• List the object and the deviation.

What object (or group of objects) has the deviation?
What deviation does it have?
What tells us a deviation exists? (senses, measures)

Specify the problem

• Describe as completely, factually as possible.

	IS	**IS NOT**
WHAT	• What specific object(s) has the deviation? • What is the specific deviation?	• What similar object(s) could have the deviation, but does not? • What other deviations could be observed, but are not?
WHERE	• Where is the object when the deviation is observed (geographically)? • Where is the deviation on the object?	• 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?
WHEN	• When was the deviation observed first (in clock and calendar time)? • When since that time has the deviation been observed? What pattern?* • When, in the object's history or life cycle, was the deviation observed first?	• When else could the deviation have been observed first, but was not? • When since that time could the deviation have been observed, but was not? What could be the pattern?* • When else, in the object's history or life cycle, could the deviation have been observed first, but was not?
EXTENT	• How many objects have the deviation? • What is the trend* in the number of objects with the deviation? • What is the size of a single deviation? • What is the trend* in the size? • How many instances of the deviation are on each object? • What is the trend* in the number of instances?	• How many objects could have the deviation, but do not? • What could be the trend* in the number of objects, but is not? • What could be the size, but is not? • What could be the trend,* but is not? • How many instances could be on each object, but are not? • What could be the trend* in the number of instances, but is not?

*Pattern = continuous, periodic, sporadic, single occurrence
*Trend = increasing, decreasing, stable

2 Identify Possible Causes

Use knowledge and experience OR...

- Explain how the cause creates the deviation.
- Use object + deviation format.
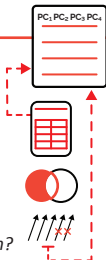
What could have caused this deviation?

...Use distinctions and changes

- Record data, new and true, only of the IS.

What is different, odd, special, or unique about each IS compared to its IS NOT?

What changed in, on, around, or about each distinction? When?

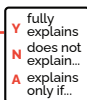*How could the distinctions and changes cause the deviation?*

| PC₁ PC₂ PC₃ PC₄ |

3 Evaluate Possible Causes

Test possible causes against the IS/IS NOT

- Eliminate causes that cannot be explained.

If (possible cause) is the cause of (problem), then how does it explain both IS and IS NOT?

What assumptions must be made?

Y	fully explains
N	does not explain...
A	explains only if...

Determine most probable cause

- Pick the one with the fewest assumptions.

Which possible cause best explains the IS and IS NOT information?

PC₁ PC₂ PC₃ PC₄
Y Y Y Y
Y N Y Y
A A Y Y
A A A A

4 Confirm True Cause

Verify assumptions, observe, experiment, or try a fix and monitor

- Pick the safest, easiest, quickest, cheapest, surest way to prove true cause.

What can be done to confirm true cause?

PC₄ CONFIRMED

Decision Analysis

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1 Clarify Purpose

State the decision
- Write, in one sentence, the decision to be made.
- Include a "choice" word, result and key modifier(s).
What is the fundamental purpose of this choice?

Develop objectives
- Identify specific, measurable criteria.
What short- and long-term benefits do we want?
What restrictions influence this choice?
What minimums or maximums must we meet?

Classify objectives into MUSTs and WANTs
- Determine which objectives are MUSTs.
Is this objective mandatory, measurable (with limit), and realistic?
- Label all others as WANTs.
Which MUST objectives should be reflected in the WANTs?

Weigh the WANTs
- Weigh the most important WANT as 10.
- Weigh all other WANTs in relation to it.
What is the relative importance of each WANT?

2 Evaluate Alternatives

Generate alternatives
- Create or identify options. Use the objectives, stakeholders, experts, and other resources.
What different alternatives are available?

Screen alternatives through the MUSTs
- Record how options meet the criteria. Facts only.
- Eliminate options that fail.
Does this alternative meet each MUST objective?

Use knowledge and experience OR...

- Evaluate options based on judgment.
- Use ✳ for best options.

Which alternative best satisfies each WANT objective?

A	B	C	D
			✳ –
10			

...Compare alternatives against the WANTs

- Determine which alternative best meets each WANT objective and score it as 10.
- Score all other alternatives in relation to it.
- Multiply objective weights x alternative scores and total them.

How well does each alternative perform against each WANT objective?

A	B	C	D
3	8	10	–
10			

10	x3 / 30		
138	217	229	–

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3 Assess Risks

Identify adverse consequences

- Identify future threats for the best performing alternatives.

What are the risks for this alternative, short and long term?

> If...,
> then....

Assess the threat

- Determine probability, seriousness for each risk.
- Mark High, Medium, or Low. Refine using +/-.

How likely is each adverse consequence? (probability)
What level of impact will it have? (seriousness)

> If...,   (P) L
> then.... (S) H

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4 Make Decision

Make the choice

- Pick the alternative that best meets the criteria with acceptable risks.

Are we willing to accept the risk(s) to gain the benefit of this choice?

Potential Problem Analysis

1 Identify Potential Problems

State the action
• Write, in one sentence, the action or plan to be protected. Include action, end result, modifiers.
What decision, action, plan, or end result do we need to protect? What might be at risk?

List potential problems
• Identify future undesirable deviations.
When we take this action, what could go wrong? (object + deviation)

Use knowledge and experience OR...
• Use ✱ to indicate high priority.
Which potential problem should we work on first?
Which potential problem is likely to cause the greatest damage?

...Assess the threat to set priority
• Determine the degree of risk.
• Record probability and seriousness of each potential problem.
How likely is this potential problem? (probability)
How damaging is it likely to be? (seriousness)
• Mark High, Medium, or Low. Refine using +/-.
• Pick the highest combinations to work on first.

2 Identify Likely Causes

Consider causes for the potential problem   LC → PP
• Identify causes that could create the potential problem.
• Explain how they could create the potential problem.
What could cause this potential problem? What else...?

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3   Take Preventive Actions

Take actions to address likely causes

LC → PP
↑
PA

- List actions to discourage the likely causes.
- Pick feasible, practical, cost-effective actions.
- Assign responsibility, resources, and time frame for completion.

What can we do to prevent or reduce the chances of this likely cause?

How can we keep this likely cause from creating the problem?

4   Prepare Contingent Actions and Triggers

Prepare actions to reduce likely impact

PP → LI
CA

- Prepare actions in advance.
- Assign responsibility, resources, and time frame for each action.
- Determine who will disable them when the risk has passed.

What actions will we take if the potential problem happens?

What actions will minimize the impact?

What can we do to recover as quickly, cheaply, and effectively as possible?

Set triggers for contingent actions

PP → LI
↓
CA

- Identify the system or person that will initiate each contingent action.
- The trigger can be automatic (preferable) or manual.

How will we know the potential problem has occurred?

What will cause the contingent action to start?

1 Identify Potential Opportunities

State the action
- Write, in one sentence, the action or plan to be leveraged. Include action, end result, modifiers.

What decision, action, plan, or end result do we want to leverage? What might offer unexpected benefits?

List potential opportunities
- Identify future positive deviations.

When we take this action, what could go better than expected? (object + positive deviation)

Use knowledge and experience OR...
- Use ❄ to indicate high priority.

Which potential opportunity should we work on first?
Which potential opportunity is likely to offer the greatest benefit?

...Assess the benefit to set priority
- Determine the degree of benefit.
- Record probability and benefit of each potential opportunity.

P	B	
L	H	Ⓜ
H	M	Ⓜ
L	L	Ⓛ
H	H	Ⓗ

How likely is this potential opportunity? (probability)
How beneficial is it likely to be? (benefit)
- Mark High, Medium, or Low. Refine using +/-.
- Pick the highest combinations to work on first.

2 Identify Likely Causes

Consider causes for the potential opportunity

LC → PO

- Identify causes that could create the potential opportunity.
- Explain how they could create the potential opportunity.

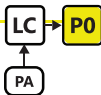*What could cause this potential opportunity? What else...?*

3 Take Promoting Actions

Take actions to encourage likely causes

LC → P0
PA

- List actions to encourage the likely causes.
- Pick feasible, practical, cost-effective actions.
- Assign responsibility, resources, and time frame for completion.

What can we do to promote or increase the chances of this likely cause?

How can we ensure this likely cause will create the opportunity?

4 Prepare Capitalizing Actions and Triggers

Prepare actions to enhance likely impact

P0 → LI
CA

- Prepare actions in advance.
- Assign responsibility, resources, and time frame for each.
- Determine who will disable them when the opportunity has passed.
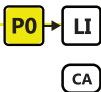
What actions will we take if the potential opportunity happens?

What actions will maximize the benefit?

What can we do to respond as quickly, cheaply, and effectively as possible?

Set triggers for capitalizing actions

P0 → LI
   → CA

- Identify the system or person that will initiate each capitalizing action.
- The trigger can be automatic (preferable) or manual.
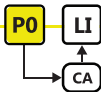
How will we know the potential opportunity has occurred?

What will cause the capitalizing action to start?