

PROBLEM SOLVING TOOLS



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PROBLEM SOLVING POSSIBILITIES

Problem Solving Possibilities Diagram

What is it?

The problems you face can be large or small, simple or complex, and easy or difficult to solve. Regardless of the nature of the problems, a fundamental part of every employee's role is finding ways to solve them. Having tools to solve problems and being a confident problem solver is important to your success.

When it is used?

Problem solving tools are determined by the requirements of the problem and the amount of time to solve the problem. There are four basic steps in problem solving regardless of size or complexity:

1. Defining the problem
2. Generating alternatives
3. Evaluating and selecting alternatives
4. Implementing solutions

The Problem Solving Possibilities Diagram can be used as a guideline to determine what problem solving tools would be best to use.

How is it used?

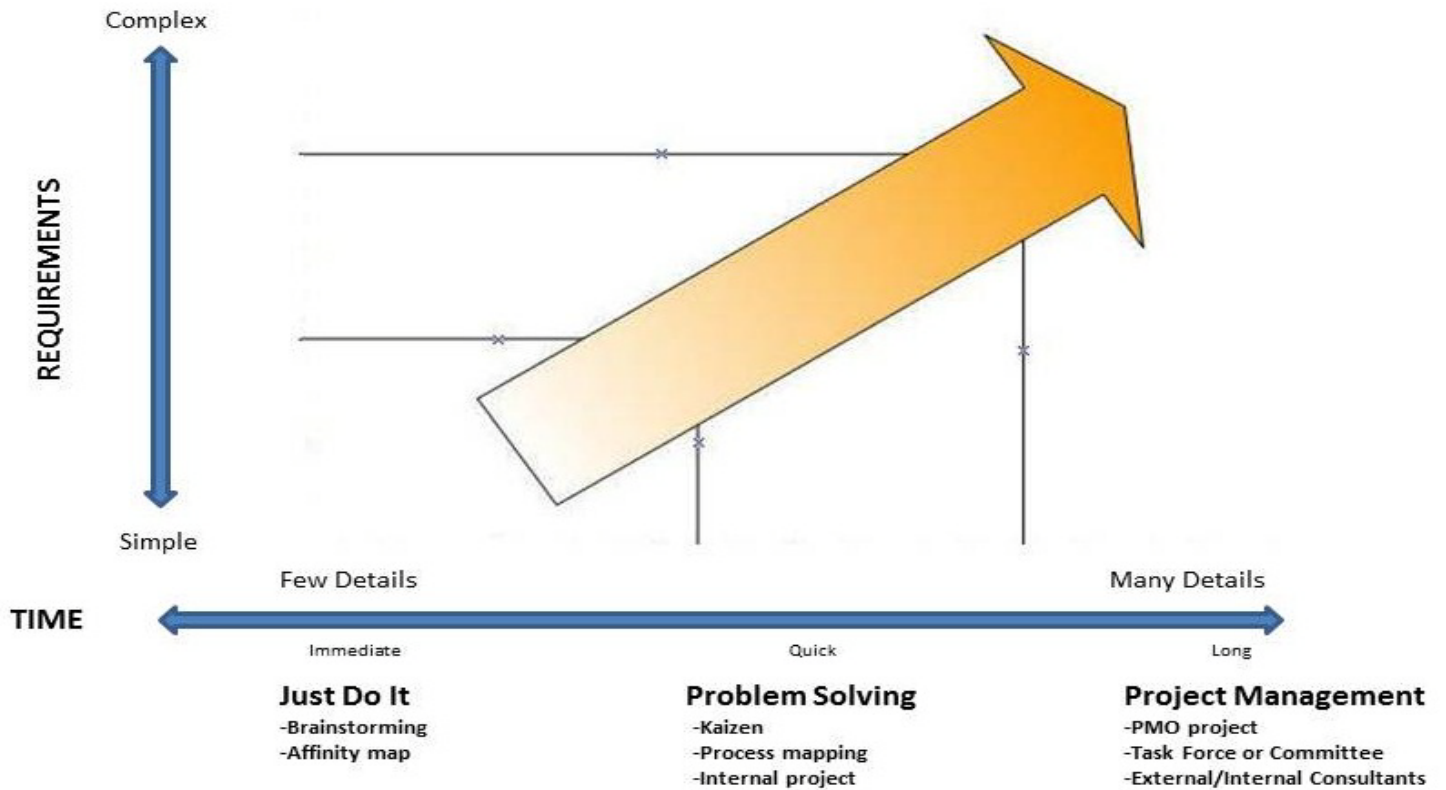
Step 1 - Understanding the Problem. The key to a good problem statement is ensuring that you deal with the real problem – not its symptoms. Use tools to help you ask the right questions, and work through the layers of a problem to uncover what's really going on.

It is also important to ensure that you look at the issue from a variety of perspectives. If you commit yourself too early, you can end up with a problem statement that's really a solution instead.

Step 2 - Understanding Complex. When your problem is simple, the solution is usually obvious, and you don't need to follow the four steps we outlined above. A complex problem is likely to be complex when it is difficult to understand due to the web of interrelated issues. On a more complex problem you will typically take a more formal approach to solve your problem.

The good news is that there are numerous tools you can use to make sense of a complex problem. The Problem Solving Possibilities Diagram will help to assist you in determining what tools would work best.

Problem Solving Possibilities Diagram



INFORMATION GATHERING & DECISION-MAKING TOOLS

Brainstorming

What is it?

Brainstorming is a group process that involves the spontaneous contribution of ideas from all members of the group. This is one of the most widely used decision making strategies.

When it is used?

This tool is used to by teams to identify solutions to problems. Brainstorming has a tendency to produce old and familiar ideas so it is important that the facilitator encourage creative thinking.

How is it used?

The best approach to brainstorming combines individual and group brainstorming. Group brainstorming needs formal rules for it to work smoothly. Where possible, participants in the brainstorming process should come from as wide a range of disciplines as possible. This brings a broad range of experience to the session and helps to make it more creative. However, don't make the group too big – as with other types of teamwork, groups of between 5 and 7 people are often most effective.

Generating ideas in a brainstorming session

- Find a comfortable meeting environment, and set it up ready for the session.
- Appoint one person to record the ideas that come from the session. These should be noted in a format than everyone can see and refer to. Depending on the approach you want to use, you may want to record ideas on flip charts, whiteboards, or computers with data projectors.
- If people aren't already used to working together, consider using an appropriate warm-up exercise or an icebreaker.
- Define the problem you want solved clearly, and lay out any criteria to be met. **Make it clear that the objective of the meeting is to generate as many ideas as possible.**
- Give people plenty of time *on their own* at the start of the session to generate as many ideas as possible.
- Ask people to give their ideas, making sure that you give everyone a fair opportunity to contribute.
- Encourage people to develop other people's ideas, or to use other ideas to create new ones.
- Encourage an enthusiastic, uncritical attitude among members of the group. Try to get everyone to contribute and develop ideas, including the quietest members of the group.

- Ensure that no one criticizes or evaluates ideas during the session. Criticism introduces an element of risk for group members when putting forward an idea. This stifles creativity and cripples the free running nature of a good brainstorming session.
- Let people have fun brainstorming. Encourage them to come up with as many ideas as possible, from solidly practical ones to wildly impractical ones. **Encourage creativity!**
- Ensure that no train of thought is followed for too long. Make sure that you generate a sufficient number of different ideas, as well as exploring individual ideas in detail.
- In a long session, take plenty of breaks so that people can continue to concentrate.

Brainstorming Approach Alternatives:

- If you have several topics to brainstorm, write each topic on a piece of flip-chart paper and ask each participant to record their ideas on the sheets of paper.
- Divide the group into two or more teams and have each team brainstorm on the same topic.

Prioritize or rank the ideas/options

- Participants vote for the 3 ideas/options they think are the most viable;
- Participants rate the ideas/options from one to ten (ten is high and one is low). The three ideas with the highest combined score will be discussed further.

The dot prioritization (multi-voting) method:

1. Distribute colored dot stickers to each of the participants. These stickers will be used to vote on the ideas/options.
2. Have participants “lobby” the group for any ideas/options that they think are the best before voting begins. This will ensure that when the participants vote, they truly understand what they are voting for or against. Allow a set amount of time for this activity.
3. Instruct the participants to vote on the ideas. Have one color be for the most important ideas and another color for the less important ideas. Determine how many dots in total can be placed on ideas/options for voting (i.e., you can’t vote for every idea).

Brainwriting

What is it?

Brainwriting is an idea generating technique that is similar to brainstorming except that instead each participant thinks and records ideas individually and it is done in silence. This technique often creates some breakthrough ideas as people build on the ideas of others.

When it is used?

This approach can be used to generate ideas from everyone in the group, not just people who are willing to speak up. Each person has to contribute.

How is it used?

Participants write down ideas, and then share with group members to stimulate new ideas. It works best with small groups of five to nine people. Just like in traditional brainstorming, you also need a moderator for the session.

Brainwriting rules:

1. All evaluations and criticism of ideas is forbidden.
2. Wild and offbeat ideas are encouraged.
3. Quantity, not quality, of ideas is the goal.
4. New combinations of ideas are sought.

Brainwriting session steps:

1. The participants each get a sheet of paper with the problem statement written at the top.
2. The participants have 3 minutes to write down 3 ideas on the sheet of paper. Just like in traditional brainstorming, the ideas should always go unedited. When time is up (or when everybody's done), **each participant passes the sheet of paper to the participant to the left.**
3. The participants now read the ideas that were previously written and a new three-minute round starts. Each participant must again come up with three new ideas. Participants are free to use the ideas already on the sheet as triggers — or to ignore them altogether.
4. The participants can stop after a fixed number of rounds or when participants feel that contributions have been exhausted.
5. The moderator works with the group to review and consolidate the list of ideas.

Affinity Diagram

What is it?

An Affinity Diagram is a tool that gathers large amounts of ideas, opinions and issues and sorts them into categories based on their natural relationships.

When it is used?

The Affinity process is often used to group ideas generated by brainstorming. It may be used in chaotic situations when broad issues or themes need to be identified. It may be used in situations that are unknown or unexplored by a team, or in circumstances that seem confusing or disorganized, such as when people with diverse experiences form a new team, or when members have incomplete knowledge of the area of analysis. Use this tool to help sift through large volumes of data or to encourage new patterns of thinking.

How is it used?

Step 1 - Generate ideas. Brainstorm to get a list of ideas and have a recorder write them on flip-chart paper or have each person individually write their own ideas on post-it notes or note cards.

Step 2 - Display the ideas. If ideas were written on flip-chart paper, transfer them to post it notes. Place post-it notes randomly on a wall or on blank pieces of flip-chart paper.

Step 3 - Sort the ideas into related groups. Team members sort the Post-it notes or note cards into groupings using the following process (this can be done as a group or team members can do this individually):

- Start by looking for two ideas that seem related in some way. Place them together in a column off to one side.
- Look for ideas that are related to those already set aside and add them to that group.
- Look for other ideas that are related to each other and establish new groups.
- This process is repeated until the team has placed all of the ideas in groups.

NOTE: Ideally, all of the ideas can be sorted into related groups. If there are some ideas that don't fit any of the groups: don't force them into groupings where they don't really belong. Let them stand alone under their own category headings.

Step 4 - Create category headings for the groups. A heading or major category is an idea that captures the essential link among the ideas contained in the grouping of ideas. This idea is written on a single card or post-it and must consist of a phrase or sentence that clearly conveys the meaning, even to people who are not on the team. The team develops headers for the groups by:

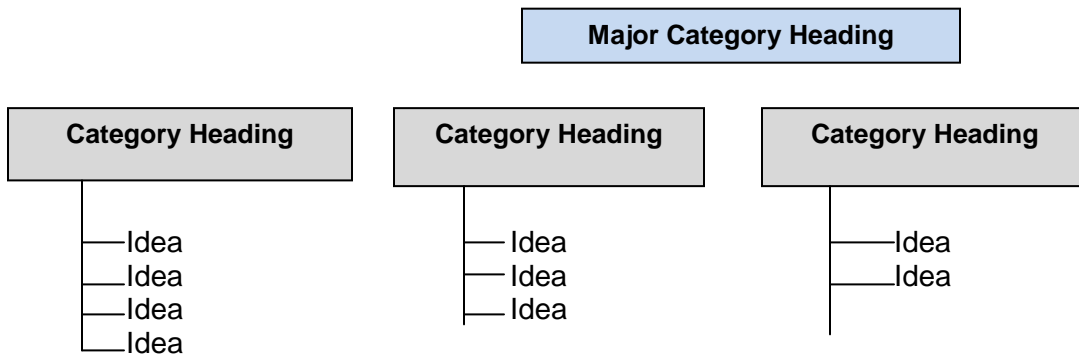
- Finding already existing cards within the groups that will serve well as category headings and placing them at the top of the group of related cards.
- Alternatively, discussing and agreeing on the wording of cards created specifically to be headers.

- Discovering a relationship among **two or more groups** and arranging them in columns under a major category heading. The same rules apply for major category headings as for regular header cards.

Step 5 - Draw the finished Affinity Diagram.

- Write the problem statement at the top of the diagram.
- Place category headings and major category heading cards above the groups of ideas.
- Review with the team and clarify the ideas and groupings.
- Document the finished Affinity Diagram.

Example Affinity Diagram



Decision Matrix

What is it?

A Decision Matrix evaluates and prioritizes a list of options. The team first establishes a list of weighted criteria and then evaluates each option against those criteria. A Decision Matrix may also be called: Pugh matrix, decision grid, selection matrix or grid, problem matrix, problem selection matrix, opportunity analysis, solution matrix, criteria rating form, criteria-based matrix.

When it is used?

The Decision Matrix is often used when a list of options must be narrowed to one choice. It can also be used when a decision must be made on the basis of several criteria or after the list of options has been reduced to a manageable number by list reduction.

Typical situations to use a Decision Matrix are when one improvement opportunity or problem must be selected to work on, when only one solution or problem-solving approach can be implemented, or when only one new product can be developed.

How is it used?

Step 1 - Generate ideas. Brainstorm the evaluation criteria appropriate to the situation.

Step 2 - Discuss and refine the list of criteria. Identify any criteria that must be included and any that must not be included. Reduce the list of criteria to those that the team believes are most important.

Step 3 - Draw an L-shaped matrix. Write the criteria along one edge and the other criteria along the other edge.

Step 4 - Evaluate each choice against the criteria. Writing each choice on a Post-It will help the team to discuss each choice and move it within the matrix if necessary.

Example Decision Matrix (Impact vs. Difficulty)

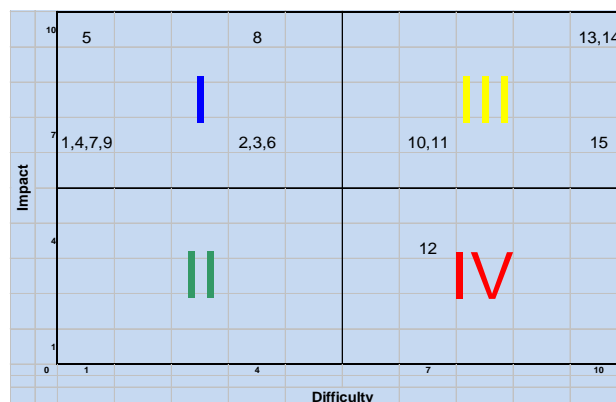


DIAGRAM BASED TOOLS

Process Maps

What is it?

Process mapping is the graphic display of steps, events and operations that constitute a process. Process maps use basic symbols and arrows to show the order and flow of interaction. This makes them useful tools for communicating how processes work, and for clearly documenting how a particular job is done.


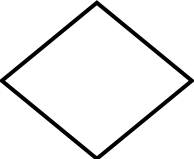


When it is used?

A flow chart can be used to:

- Document an existing process (As Is)
- Design an ideal process (To Be)
- Build a step-by-step picture of the process for analysis, discussion, or communication
- Define, standardize or find areas for improvement in a process
- Identify opportunities to improve the process

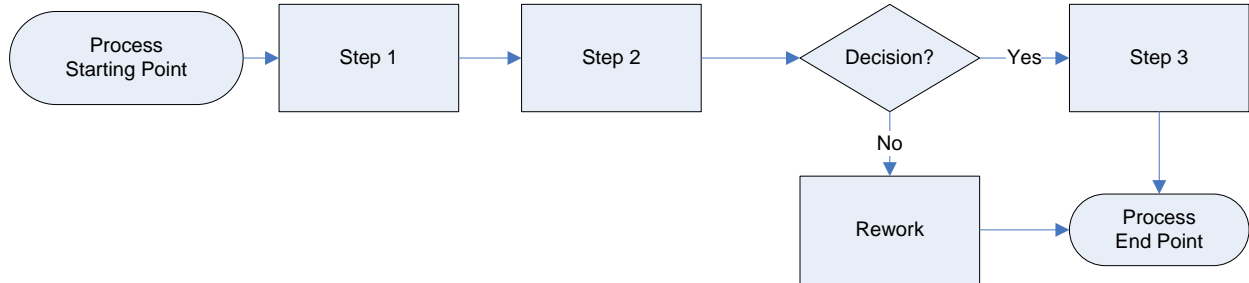
How is it used?

Commonly used flowchart symbols

Steps in a process	Decision	Process path/flow	Start or End Point
			

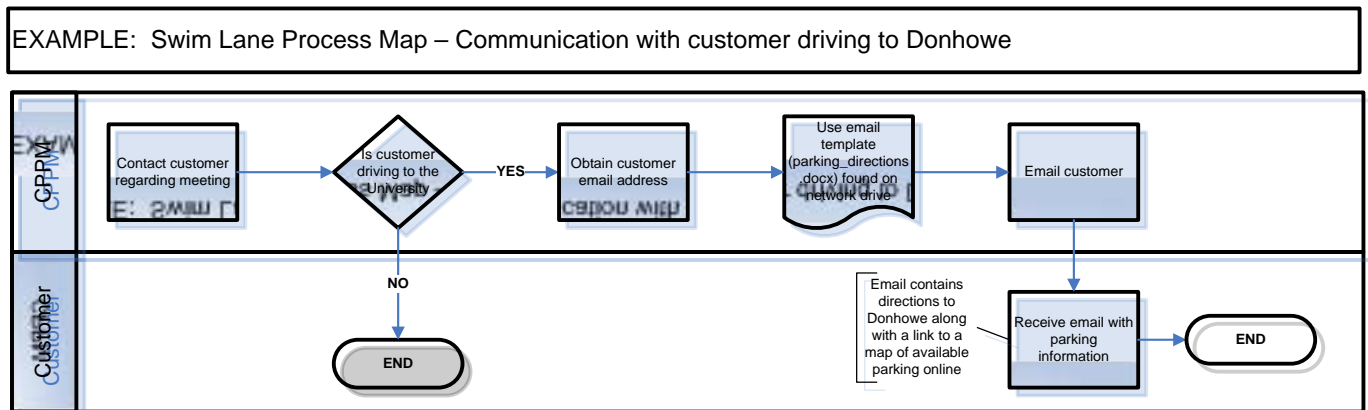
Sequential Process Map

The most commonly-used flowchart identifies steps or activities and decision points and the inputs and outputs of the process, arranged in the order they are completed.



Swim Lane Process Map

A swim lane process map identifies how a process moves across departments or functions. This helps to clarify roles, responsibilities and dependencies in the process.



PROCESS IMPROVEMENT TOOL

Kaizen Event

What is it?

kai = "to break apart"
zen = "to continuously improve"

Kaizen is a process improvement methodology in which process owners, driven by need, work together to quickly and collectively break apart and improve their process, with a concentrated effort on efficiency.

When it is used?

The goal of a Kaizen event is a results-driven improvement that can be implemented quickly. The result is not always a perfect process but it will be an improved process that can be built on by other incremental continuous improvement events.

How is it used?

During a Kaizen event, a facilitator will lead the process team through a series of phases such as:

- Seeing the process
- Identifying problems or gaps
- Generating solutions
- Taking action - just do it!
- Documenting results and best practices
- Conducting a report-out presentation

PROBLEM SOLVING ASSESSMENT

How Good Are You at Solving Problems?

Instructions: For each statement, mark the circle in the column that best describes you. Please answer questions as you actually are, rather than how you think you should be.

Statement	Not at all	Rarely	Some times	Often	Very Often
1 Once I choose a solution, I develop an implementation plan with the sequence of events necessary for completion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2 After a solution has been implemented, I immediately look for ways to improve the idea and avoid future problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3 To avoid asking the wrong question, I take care to define each problem carefully before trying to solve it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4 I strive to look at problems from different perspectives and generate multiple solutions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5 I try to address the political issues and other consequences of the change I'm proposing so that others will understand and support my solution.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6 I evaluate potential solutions carefully and thoroughly against a predefined standard.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7 I systematically search for issues that may become problems in the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8 When I decide on a solution, I make it happen – no matter what opposition I may face.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9 I find that small problems often become much bigger in scope, and thus very difficult to solve.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10 I ask myself lots of different questions about the nature of the problem.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 After my solution is implemented, I relax and focus again on my regular duties.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12 I focus on keeping current operations running smoothly and hope that problems don't appear.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13	I evaluate potential solutions as I think of them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	When I need to find a solution to a problem, I usually have all of the information I need to solve it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	When evaluating solutions, I take time to think about how I should choose between options.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Making a decision is the end of my problem-solving process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Total = _____
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Scoring

You will need to score each question based on the scoring scale below. For example, if you answered a question with “not at all”, the question will have a score of 1 point. Once you have scored each question you will be able to total your points and place your total score on the bottom of the assessment.

Not at all	Rarely	Some times	Often	Very Often
1 point	2 points	3 points	4 points	5 points

Score Interpretation

Score	Comment
16-36	You probably tend to view problems as negatives, instead of seeing them as opportunities to make exciting and necessary change. Your approach to problem solving is more intuitive than systematic, and this may have led to some poor experiences in the past. With more practice, and by following a more structured approach, you'll be able to develop this important skill and start solving problems more effectively right away.
37-58	Your approach to problem solving is a little "hit-and-miss." Sometimes your solutions work really well and other times they don't. You understand what you should do, and you recognize that having a structured problem-solving process is important. However, you don't always follow that process. By working on your consistency and committing to the process, you'll see significant improvements.
59-80	You are a confident problem solver. You take time to understand the problem, understand the criteria for a good decision, and generate some good options. Because you approach problems systematically, you cover the essentials each time – and your decisions are well thought out, well planned, and well executed. You can continue to perfect your problem-solving skills and use them for continuous improvement initiatives within your organization.

APPENDIX

Additional Resources

Problem Solving Tools

U of M Organizational Effectiveness

Enhancing Individual and Group Creativity – U of M Organizational Effectiveness

June 23, 2011
9:00 to 12:00
Room 210 Donhowe

This course will provide simple and highly effective tools to enhance your creative thinking. Participants will apply methods that assist in ordering, evaluating, and selecting the best ideas to be implemented.

Participants will:

- Explore how different thinking styles impact creativity and innovation
- Apply five divergence methods to increase idea generation
- Use four convergence tools to evaluate and select the best idea

For more information and to register, go to:

<http://www1.umn.edu/ohr/profdev/interpersonal/>

Mindtools .com

Problem solving tools

<http://www.mindtools.com/>

Writing a Problem Statement

Thinkinghow.com:

<http://thinkinghow.com/writing-a-problem-statement/>

Litemind.com:

<http://litemind.com/problem-definition/>

Project & Change Management

University Services Program Management Office (PMO)

Project management templates and best practices are available at:

<http://www.uservices.umn.edu/pmo/>

OIT Project & Portfolio Management

<http://www.oit.umn.edu/project-management/>

Project & Change Management Collaborators

Project & Change Management Collaborators (PCMC) is a professional peer network at the U of M whose mission is to advance knowledge and foster exceptional results in project and change management. All staff who are interested in furthering their practical knowledge in project and change management are welcome to attend their events <http://pcmc.umn.edu/>

<http://pcmc.umn.edu/>