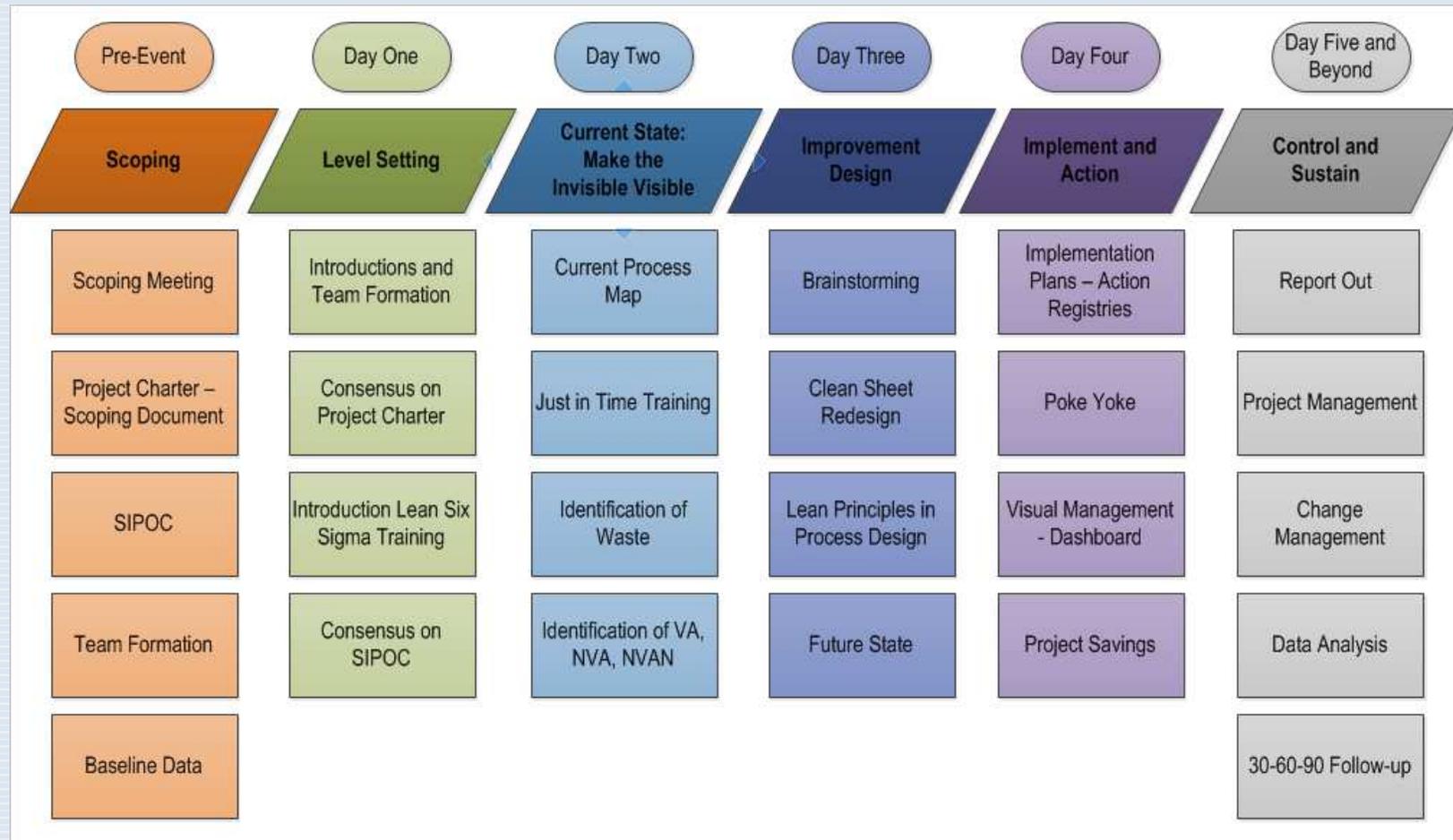


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## Brainstorming Techniques

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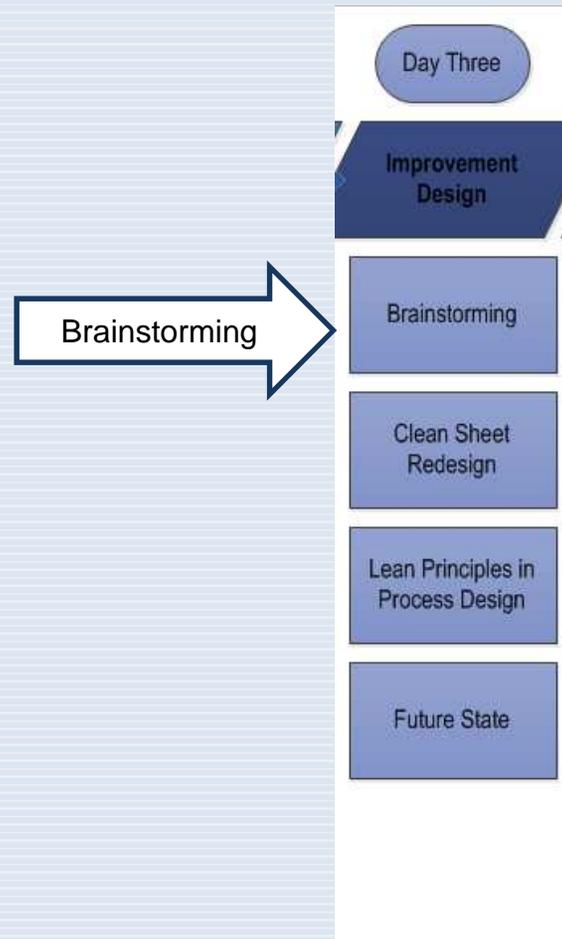
# Lean Kaizen Flow



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# Lean Kaizen Flow: Brainstorming



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# How Creative is your Team?

# Mental blocks to creative thinking & problem solving

–Prejudice



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# Prejudice

“So we went to Atari and said, ‘Hey, we've got this amazing thing, even built with some of your parts, and what do you think about funding us? Or we'll give it to you. We just want to do it. Pay our salary, we'll come work for you.’ And they said, ‘No.’

“So then we went to Hewlett-Packard, and they said, ‘Hey, we don't need you. You haven't got through college yet.’”

*-Steve Jobs, Founder, Apple Computer Inc.*

# Mental blocks to creative thinking & problem solving

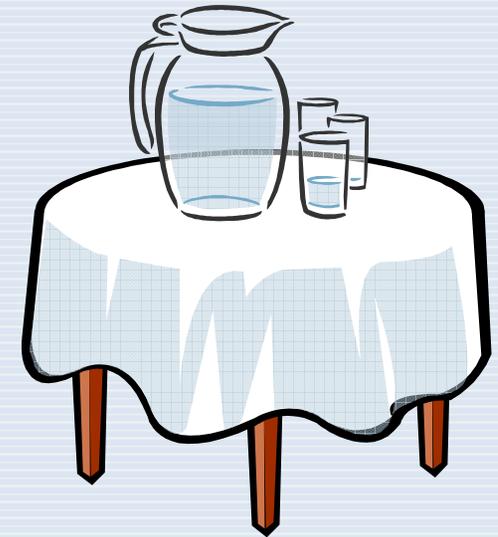
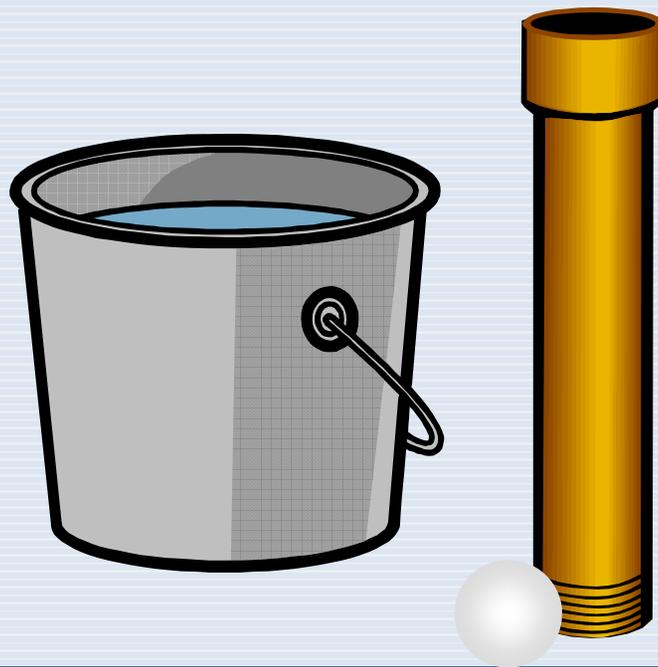
- Prejudice
- Functional fixation



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# Functional fixation



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# Mental blocks to creative thinking & problem solving

- Prejudice
- Functional fixation
- Learned helplessness

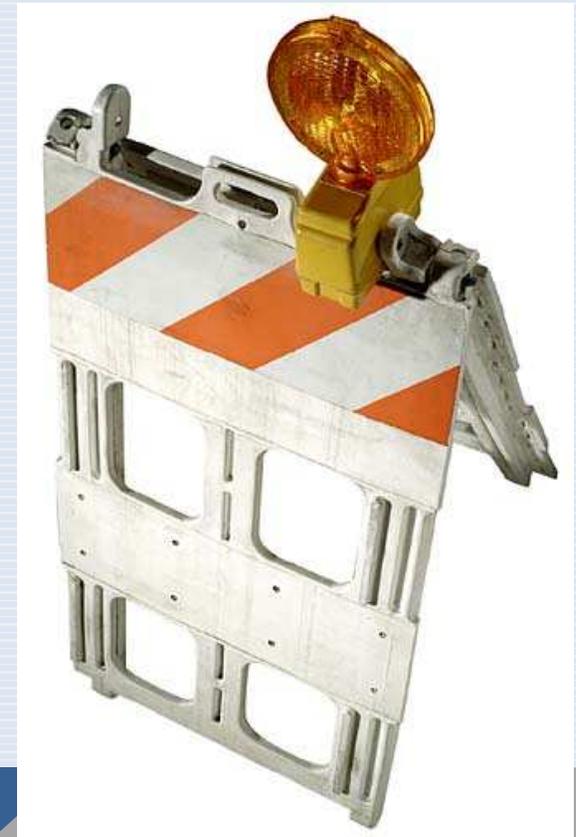


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# Mental blocks to creative thinking & problem solving

- Prejudice
- Functional fixation
- Learned helplessness
- Psychological blocks



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# Psychological blocks

“Computers in the future may weigh no more than 1.5 tons.”

-Popular Mechanics, 1949

"There is no reason anyone would want a computer in their home."

- Ken Olson, founder of Digital Equipment Corp, 1977

“If I had thought about it, I wouldn't have done the experiment. The literature was full of examples that said you can't do this.”

-Spencer Silver, 3-M, 1968

“[Television] won't be able to hold on to any market it captures after the first six months. People will soon get tired of staring at a plywood box every night.”

-Darryl Zanuck, 1946

“There will never be a bigger plane built.”

-Boeing, after the first flight of the 247

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# Mental Blocks: Thank Your Left Brain!

- Analytical
- Logical/Pragmatic
- **Narrow Focus**
  
- Brainstorming and creative thinking are right brain functions.

# Left vs Right

**Left**  
brain

I am the left brain.  
I am a scientist. A mathematician.  
I love the familiar. I categorize. I am accurate. Linear.  
Analytical. Strategic. I am practical.  
Always in control. A master of words and language.  
Realistic. I calculate equations and play with numbers.  
I am order. I am logic.  
I know exactly who I am.

**Right**  
brain

I am the right brain.  
I am creativity. A free spirit. I am passion.  
Yearning. Sensuality. I am the sound of roaring laughter.  
I am taste. The feeling of sand beneath bare feet.  
I am movement. Vivid colors.  
I am the urge to paint on an empty canvas.  
I am boundless imagination. Art. Poetry. I sense. I feel.  
I am everything I wanted to be.

 Mercedes-Benz  
The best or nothing.

SIMP

LANCIRIO

# Brainstorming: What is it?

- Brainstorming is a technique, generally used in a group setting to quickly generate a large number of ideas about a specific problem or topic.
- It can help encourage creative thinking and generate enthusiasm and avoid the "paralysis of analysis" by not evaluating ideas.

# Brainstorming: Goal!

- The goal of brainstorming is to generate ideas!
- Make sure everyone in your group understands the importance of postponing judgments until after the brainstorming session is completed.
- Have fun and use your creativity!

# Factors needed before brainstorming session begins

- A well-defined and clearly stated problem that needs to be addressed during the session
- A group member assigned to act as recorder and write down all the ideas as they are shared
- The right number of people
- Keep ideas clear
- Ground rules for the session (that can easily be referred to if issues arise)

# What is the “right” group size?

## Clues for determining the "right" group size

- You don't have trouble scheduling the brainstorming session
- You don't have individuals or factions of the group at war with each other
- Work is divided equitably among group members
- You are able to reach consensus
- You are able to generate new and creative ideas to think about

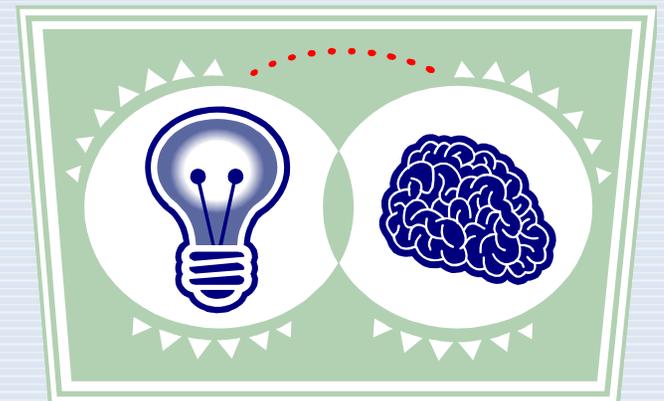
# Does this make sense?

Questions to keep in mind in order to make sure ideas are clear:

- How similar or diverse are the backgrounds of people in the group?
- How wide is the range of technical skills and subject knowledge in the group?
- Is there background information that needs to be presented to make the idea clear?

# Brainstorming Techniques

- Silent Brainstorming
- Impact Control Matrix
- Nominal Group Technique
- Random Brainstorming
- Mind Mapping
- Carousel Brainstorming
- Pugh Matrix
- Affinity Diagram



# Silent Brainstorming

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## **Silent Brainstorming: Definition/Benefits**

- In Silent Brainstorming participants write ideas down individually
- Allows everyone to participate
- No pressure
- More potential solutions
- Buy-in to solution
- Helps determine feasible solutions which are the biggest “bang for the buck”

# Silent Brainstorming: Procedures

- Have participants write ideas individually on Post-it notes or small slips of paper.
- Collect the papers and post them for all to see.
- Review all ideas (eliminate duplications)
- Rank ideas (Impact Control Matrix)

# Impact Control Matrix

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# Impact Control Matrix: Background

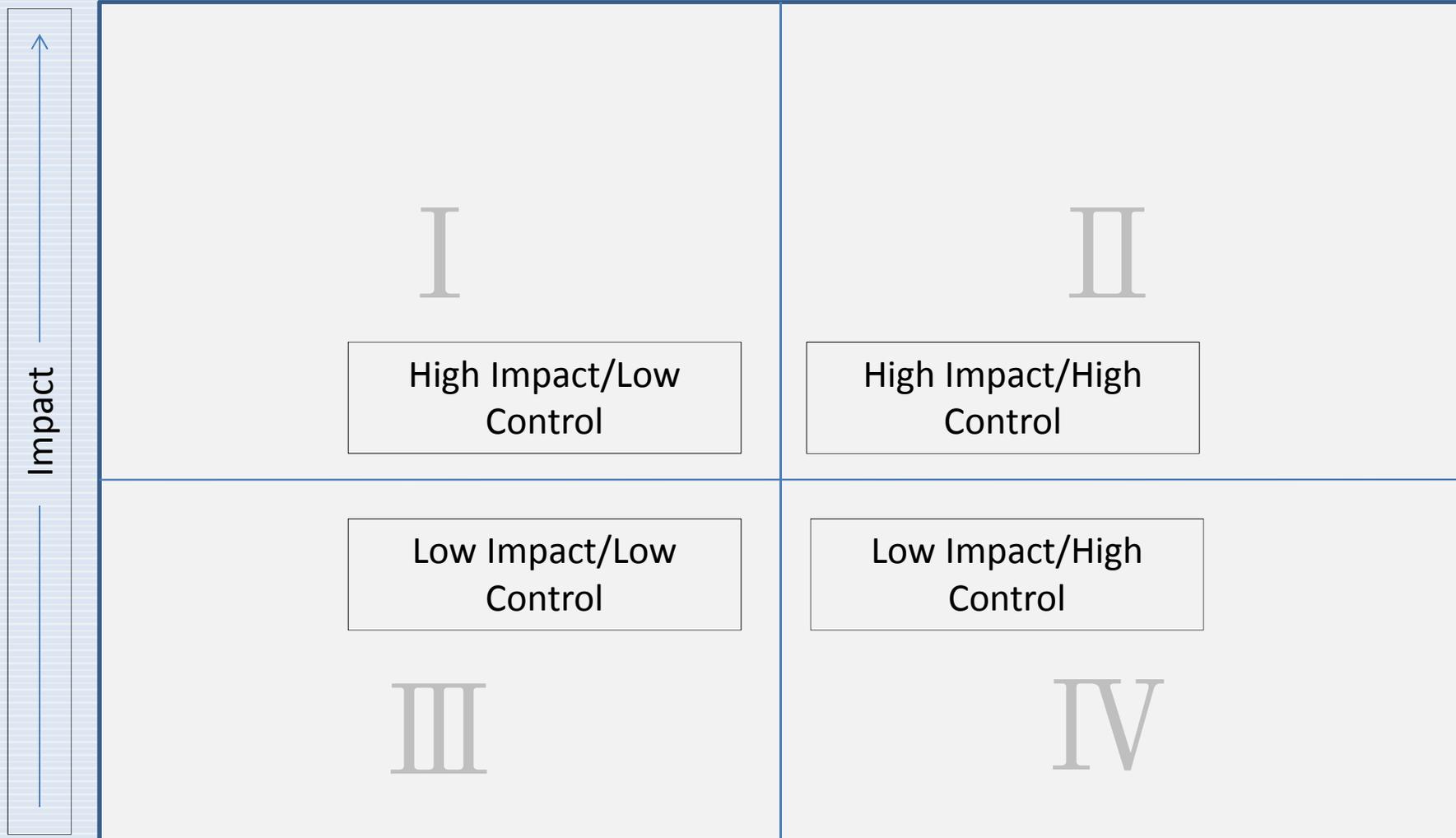
- An **Impact Control Matrix** is used for organizing ideas and categorizing them
- When faced with multiple improvement ideas a the matrix can be used to determine solutions that are within the group's control and would have the most impact

# Impact Control Matrix: Procedure

By deciding where an idea falls on the Impact Control Matrix four proposed project actions are used:

- High Impact/Low Control-Quadrant I
- High Impact/High Control Quadrant II
- Low Impact/Low Control-Quadrant III
- Low Impact/High Control-Quadrant IV

# Impact Control Matrix

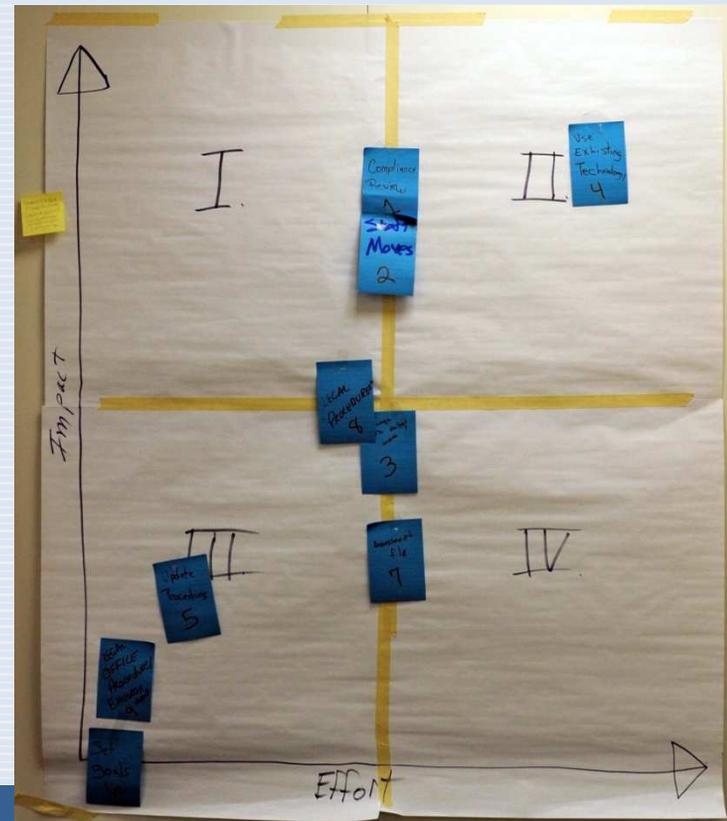


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# Silent Brainstorm & Impact Control Matrix



# Nominal Group Technique

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## Nominal Group Technique: Definition/Benefits

- The Nominal Group Technique (NGT) is a structured method for working toward consensus.
- There are two phases involved in Nominal Group Technique:
  - Putting it to Work
  - Priority Setting

## **Nominal Group Technique: Phase One**

- **Phase One: and Phase Two**
  - Same as Silent Brainstorming.
- **Phase Two:**
  - Go over the list and ask for clarifications
  - Number each of the items starting at the top
  - Participants rank Top Five
  - Determine top ranked projects

# Carousel Brainstorming

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## Carousel Brainstorming: Definition/Benefits

- Participants will rotate around the classroom in small groups, stopping at various stations for a designated amount of time.
- While at each station, members will activate their prior knowledge through conversation with peers.

Through movement and conversation, prior knowledge will be activated, providing scaffolding for new information.

# Carousel Brainstorming: Procedure

- Generate X number of questions for your topic and write each question on a separate piece of poster board or chart paper. (Note: The number of questions should equal the number of groups.)
- Post questions sheets around your classroom.
- Divide team into groups of 5 or less.
- Direct each group to stand in front of a question station. Give each group a colored marker for writing their ideas at the question stations (use a different color for each group).

# Carousel Brainstorming: Procedure

- Inform groups that they will have 2-3 minutes to brainstorm and write ideas at each question station.
- When time is called, groups will rotate to the next station in clockwise order.
- Using a stopwatch or other timer, begin the group rotation. Continue until each group reaches their last question station.
- Before leaving the final question station, have each group select the top 3 ideas from their station to share with the entire class.

# Pugh Matrix

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# Pugh Matrix: Background

The Pugh Matrix goes by many other names, here are just a few:

- Decision matrix/grid
- Selection matrix/grid
- Problem matrix
- Opportunity analysis
- Criteria rating form
- Criteria-based matrix

# Pugh Matrix: Background

- Several concepts are evaluated according to their strengths and weaknesses against a reference concept called the datum (base concept).
- The Pugh matrix allows you to:
  1. Compare different concepts
  2. Create strong alternative concepts from weaker concepts
  3. Arrive at an optimum concept that may be a hybrid or variant of the best of other concepts

# Pugh Matrix: Procedure

- List options
- List the criteria that is important to the customer or management
- Create your Pugh Matrix

	Option 1	Option 2	Option 3	Option 4
Criteria 1				
Criteria 2				
Criteria 3				
Criteria 4				
Criteria 5				

# Pugh Matrix: Procedure

Now rate options in relation to criteria

- Do we consider that it is better, the same as, or worse than the baseline?
- If it's better we give it a +1, if it's the same we give it a 0, and if it's worse we give it a -1.

# Pugh Matrix Example: Mowing your Lawn – Rating against Gas Mower

	Riding Mower	Reel Mower	Goats	Hire landscapers
Cost	-	+	+	-
Availability	0	-	-	0
Physical ease	+	-	+	+
Maintenance	0	+	-	+
Dependability	0	+	-	+
Time	+	-	-	+
Quality	0	-	-	+
	1	-1	-3	4

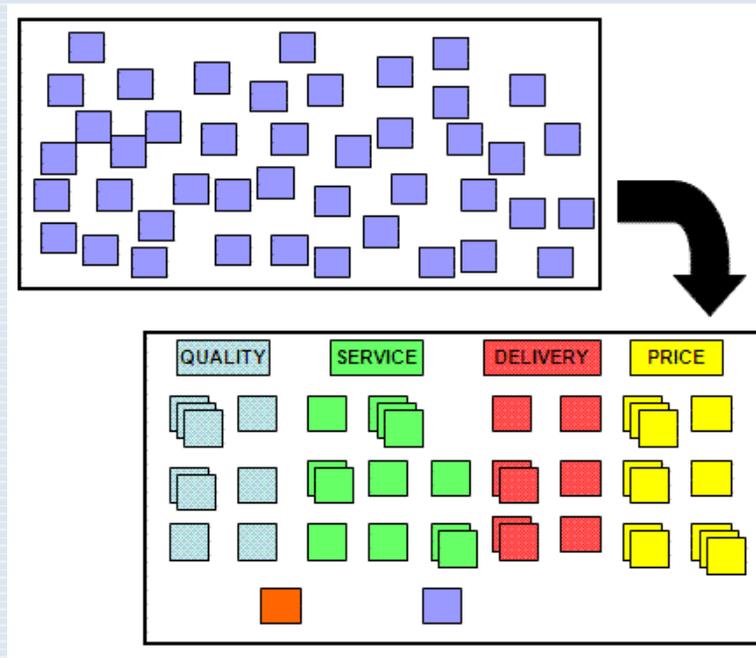
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# Pugh Matrix Your Turn: Shaving!

	Option 1	Option 2	Option 3	Option 4
Criteria 1				
Criteria 2				
Criteria 3				
Criteria 4				
Criteria 5				

# Affinity Diagram



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# Affinity Diagram: Background

- Use an Affinity Diagram to organize large groups of information into meaningful categories.
- The Affinity Diagram helps break old patterns of thought, reveal new patterns, and generate more creative ways of thinking.
- Used to gather, correlate, and relate huge quantities of information (especially written or verbal comments).

# Affinity Diagram: Background

- Group the team ideas or your customer's valid requirements and show the relationships between items and groups.
- The Affinity Diagram helps you gather and group large amounts of "language" (e.g., needs, wants, wishes, ideas, and opinions) into natural relationships.

# Affinity Diagram: When to Use

- When the issues seem too large and complex to grasp
- You need some way to break out of old and traditional ways of thinking
- Facts or thoughts are chaotic
- You need to quickly uncover your customer's requirements

# Affinity Diagram: Process

- State the issue to be examined in broad terms
- Generate and record ideas using Post-it notes
- Begin sticking them on a wall or large sheet of easel paper where everyone can see them.
- Ensure that everyone is included. Ask for a "headline" to describe each thought.
- Arrange the cards in related groupings.
- Complete the groupings.

# Affinity Diagram: Process

- Involve the group in clustering the notes into 6-10 related groupings.
- Have everyone stand and do this silently.
- Be prepared for some "loner" ideas; avoid forcing them into a group.
- Some notes may need to be duplicated for different groupings.
- Choose a word or phrase that captures the intent of each group and place it at the top as a header card.

## The Green Belt Should Now Be Able To:

- Ways to make their project teams more creative
- Have a working knowledge of different brainstorming techniques
- How to create a Pugh Matrix, an Impact Control Matrix, and an Affinity Diagram

# Questions?