

# World Conference on Quality and Improvement

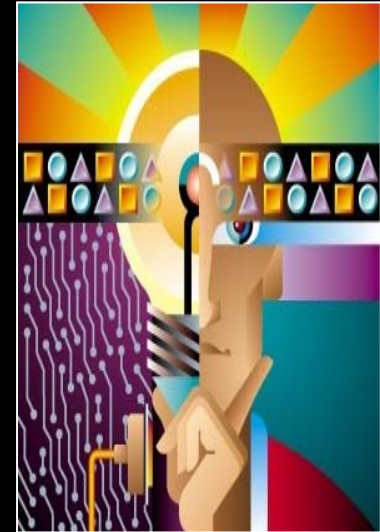
May 24-26, 2010 · St. Louis, MO · America's Center

## Systematic Innovation

( Not an Oxymoron anymore ! )

ASQ Session  
W-11

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and **Innovation**  
differentiates you from the competition!



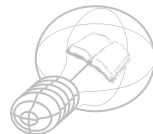
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*Is your company an Innovator, Imitator, or Procrastinator?*

# Key Session Objectives:

- To clearly illustrate a practical process, method, and set of tools for Innovation and Inventive Thinking.
- To take some of the “Mystery” out of Innovation.
- To share specific “How-To’s” that anyone can learn.
- Show why you must go beyond the Voice of the Customer to Innovate better than your competitors!
- Get done on time and under budget!
- Request of YOU:
  - Will go through lots of information, Intentional listening, puzzle will get clearer, interaction, slides updated a little (email), enjoy!



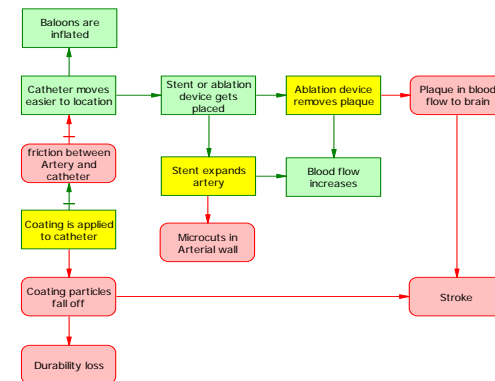
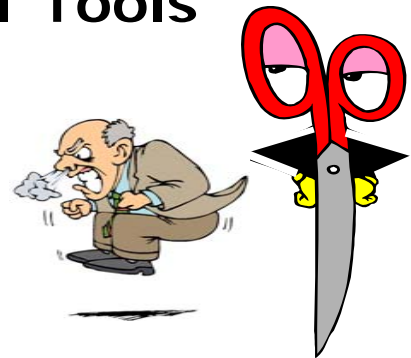
1. Systematic Innovation (SI) Definition
2. The CAGE Model, which shows:
  - Why many new projects fail and how to minimize the risk of failure,
  - How to understanding your Customers' Needs better than they understand them!
  - Why "systematic" innovation is important,
3. An 8 step SI Process
  - VOC, Standard Problems, Tool Selection Matrix, 25+ SI Tools, Concept Selection, Detailed Design, Communicate Value, etc.



Small team Breakouts & Interactive Questions

## 4. Introduction to 3 of the SI Tools

1. PainStorming
2. The Trimming Technique
3. Function Analysis
4. Others if time allows . . .



# ***1. Systematic Innovation Definition***

**WHAT** is  
**Systematic  
Innovation?**

**WHERE** can  
**Systematic  
Innovation be  
used?**

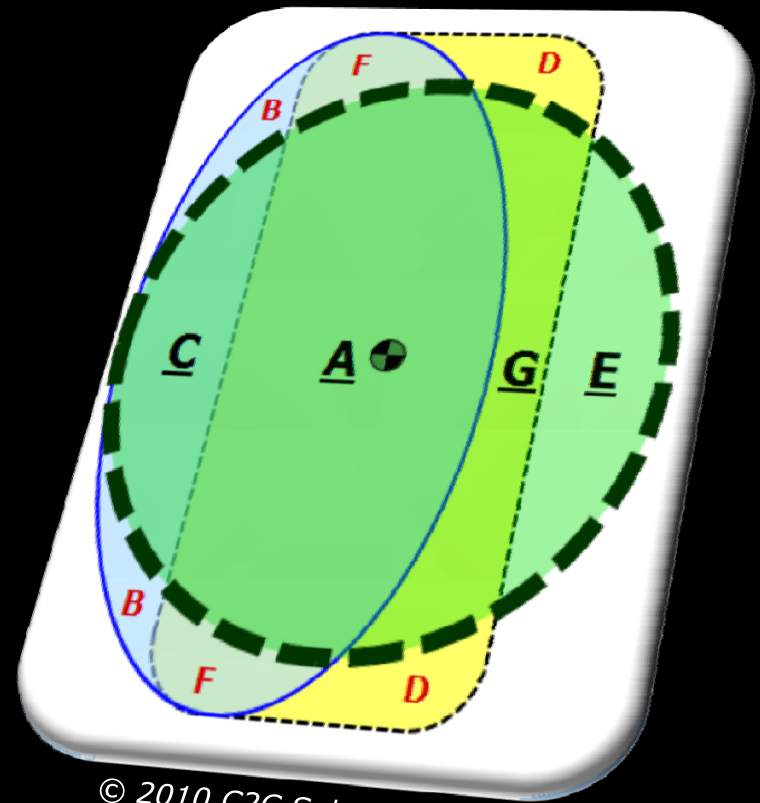
**Systematic Innovation:**  
A structured process and set of practical tools anyone can use to create (or improve) products, processes, and services that will deliver new value to their Customers.

**WHY** is Systematic  
**Innovation necessary?**

**HOW** was Systematic  
**Innovation conceived?**

# 2a. The VOC "CAGE Model"




*Beyond VOC to the  
requirements "Bulls-Eye"*

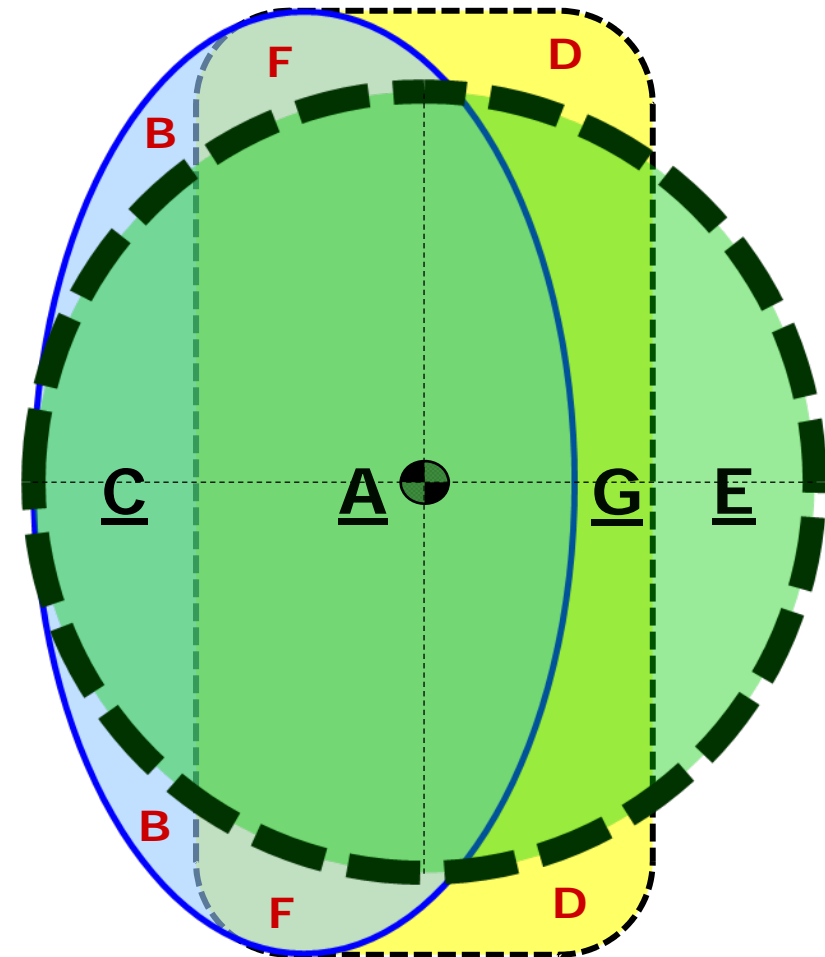


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# The VOC "CAGE Model"

("Capturing" the requirements that will **SELL**)

Key (Regions)	(Sub-regions)
 <p><b>How</b> Project Teams initially understand the VOC and define Success <u>before</u> doing any real Cust. / Mkt. Research.</p>	<p><b>A) All Agree on</b></p> <p><b>B) What Customers got wrong!</b></p>
 <p><b>What</b> Customers tell you about their Needs during <u>typical</u> VOC (Voice of the Customer) Research.</p>	<p><b>C) VOC Customer Insights</b></p> <p><b>D) Development Team got wrong!</b></p>
 <p><b>A Bulls-Eye;</b> What SELLS \$\$; A comprehensive and accurate set of Customer Needs that will win in a competitive marketplace!</p>	<p><b>E) Excitement Quality</b></p> <p><b>F) What both got wrong! (D+B)</b></p> <p><b>G) The Givens</b></p>

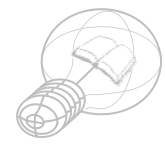
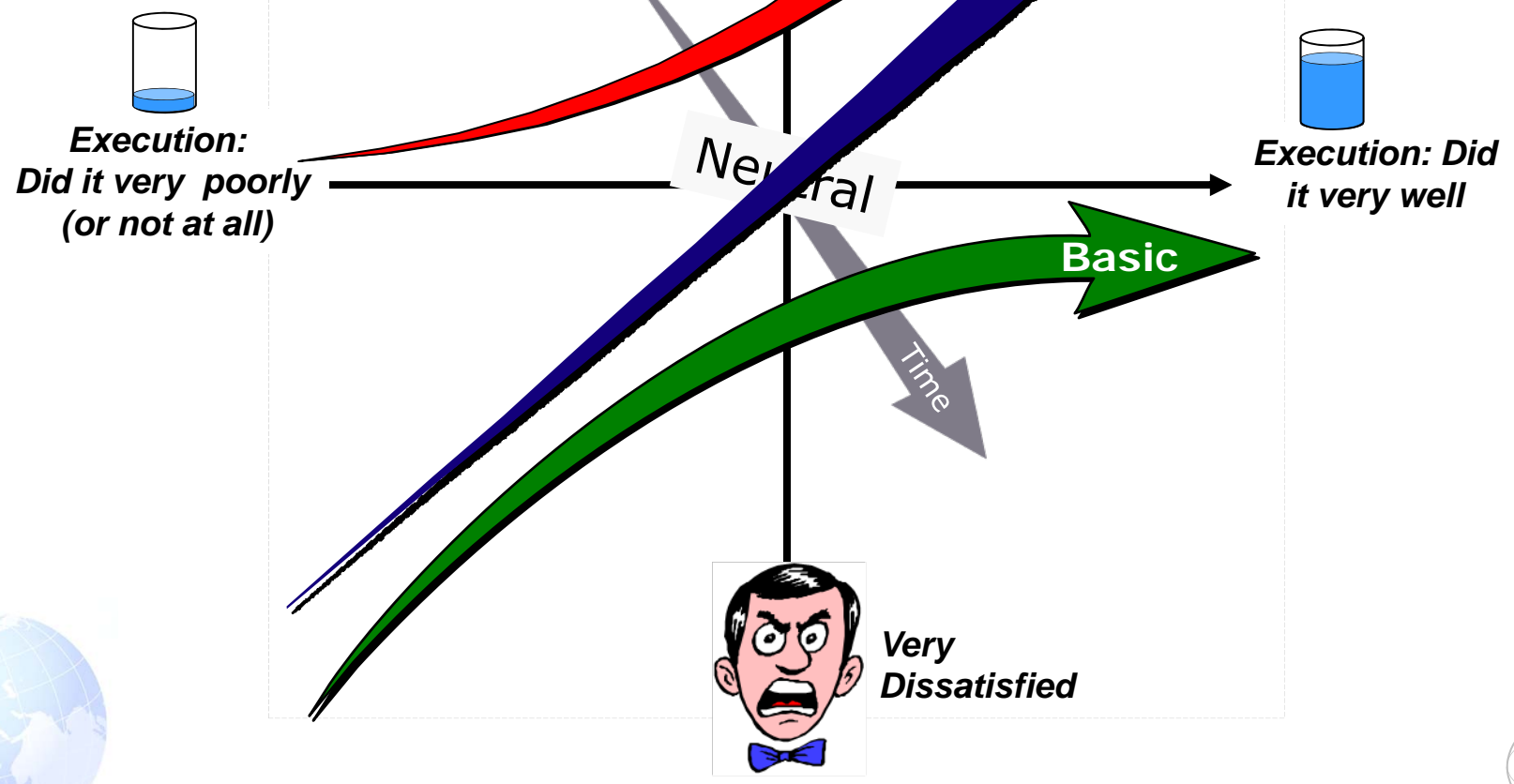


Small team Breakouts & Interactive Questions

Break-out Exercise?

# The Kano Model

[www.kanomodel.com](http://www.kanomodel.com)

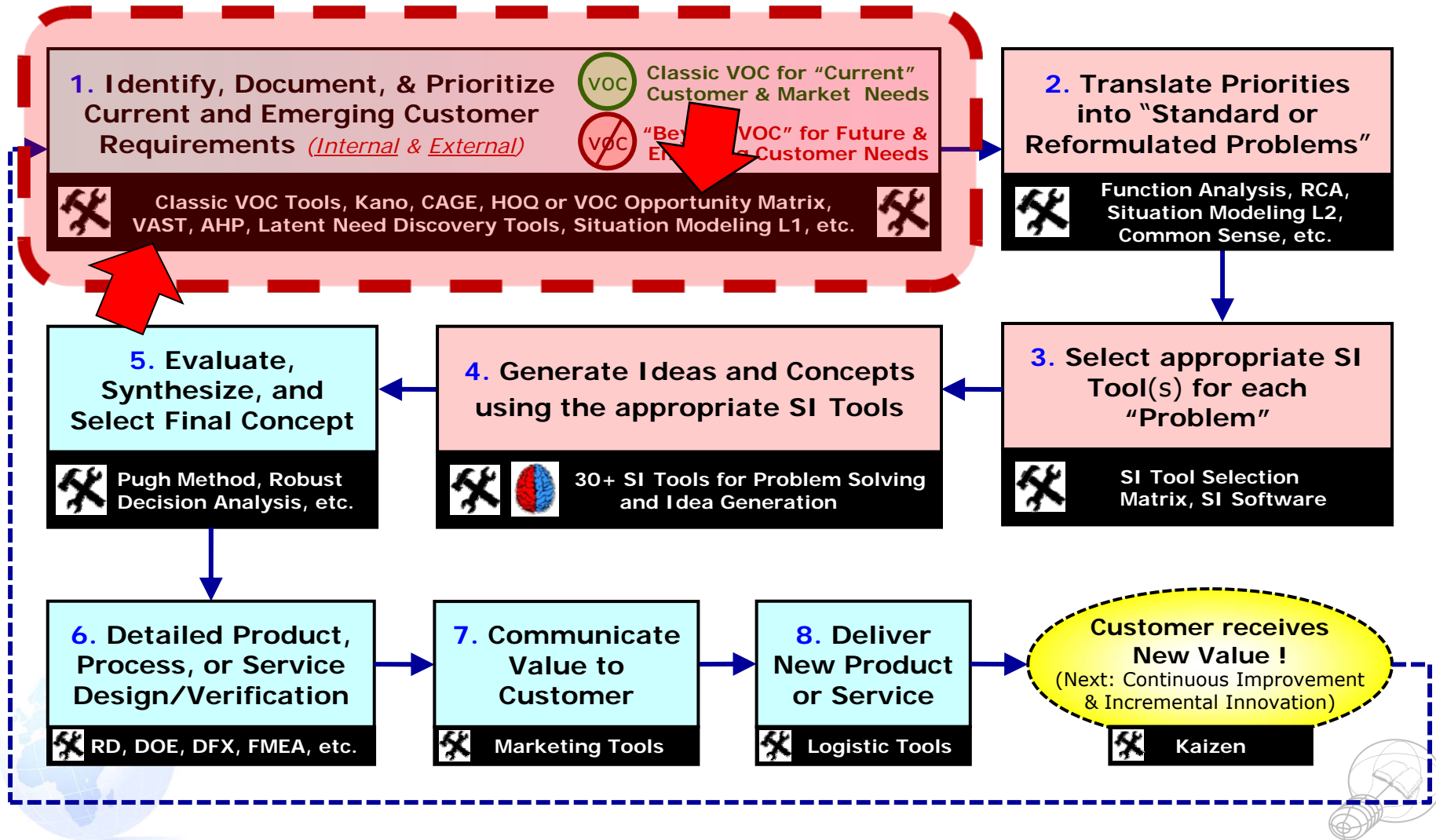


# *3. The 8 Step SI Process*

# Key Steps for Systematic Innovation (SI)

*(A birds eye view of the 8 step SI Process)*

**Systematic Innovation (SI)** - A structured process and set of practical tools used to create (or improve) products and services that deliver New Value to customers.



# ID, Prioritize, & Manage Opportunities

(For resource allocation)

## SI/VOC Opportunity Matrix (Version July 2009)

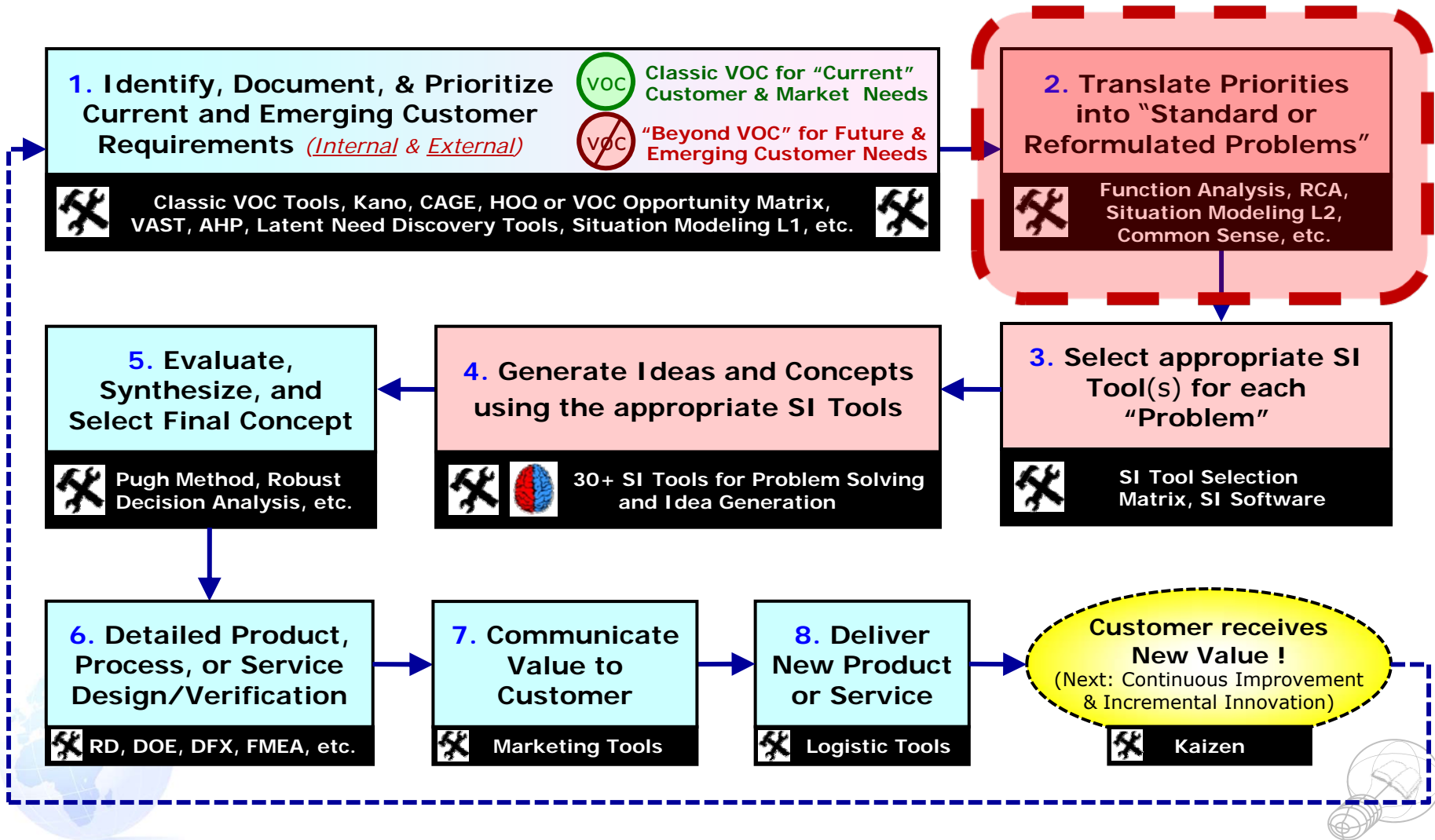
Output: Top Priorities/Opportunities and Global Action Plan.

Customer Needs Data				Comp. Data		Data Analysis					Action Planning			
A) Customers	B) Customer Needs	C) Row #	D) Customer Centered Metrics	E) Importance Rating (AHP or Outcome Algorithm)	F) Satisfaction Level (Your Offering)	G) Satisfaction Level (Biggest Competitor 1)	H) Satisfaction Level (Biggest Competitor 2)	I) Kano Category (Basic, Performance, Excitem.)	J) Priority 1: (Importance & Satisfaction - Main parameters of Value MPV's that will "move the market")	K) Priority 2: (Competitive Position)	L) Cost Reduction? (Are we Over Delivering?)	M) Hidden Opportunity?	N) Deployment Strategy	O) Lead Responsibility
Cust. A	Ease of Use	1	Time to Program	7.0	3	9	2	P	11	42			SI Tools	Dean Chambos
		2	Time to set-up	5.0	9	5	2	P	5	-20	Maybe		NBP	Ken Brotz
		3	Time to connect	9.0	3	6	10	P	15	63			NBP	Ramesh Guptar
		4	Time to repack	5.0	10	3	2	E	5	-35	Maybe		SI Tools	Dean Chambos
		5	Effort to carry	4.0	9.4	4	4	P	4	-22	Maybe		NBP	Ken Brotz
		6	Time to clean	3.0	3	4	3	B	3	3		Maybe	SI Tools	Paul Daniels
		7	etc.	10.0	1	7	10	B	19	90			VA/VE	Paul Daniels
	Quality	8	MTBSS	3.5	8.5	4	4	P	3.5	-16	Maybe		FMEA	Carol Smith
		9	MTBF	5.0	8.3	3	2	P	1.7	-27	Maybe		FMEA	Renea Loftis
		10	Percieved Durability	3.0	3	3	5	B	4	6		Maybe	Tiger Team	Daniel Sack
		11	% people like aesthetics	4.5	9.2	7	5	B	4.5	-10	Maybe		SI Tools	Chan Yadimonski

# Key Steps for Systematic Innovation (SI)

*(A birds eye view of the 8 step SI Process)*

**Systematic Innovation (SI)** - A structured process and set of practical tools used to create (or improve) products and services that deliver New Value to customers.



# Translate to "Standard Problems"

- **Generic** "Standard Problems":

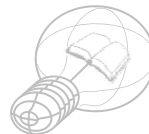
- Differentiate yourself from competition (Wow's),
- Reduce cost or complexity,
- Resolve a conflict,
- Circumvent a patent,
- Solve a technical problem,
- Reduce risk of failure,
- Make Innovation more consistent,
- Improve a Useful Function,
- Reduce or eliminate a Harmful Effect,



*When possible leverage existing knowledge (Solutions, effective Tools and Strategies) that already exists to deal with "Standard Problems"*

- **Specific** "Standard Problems":

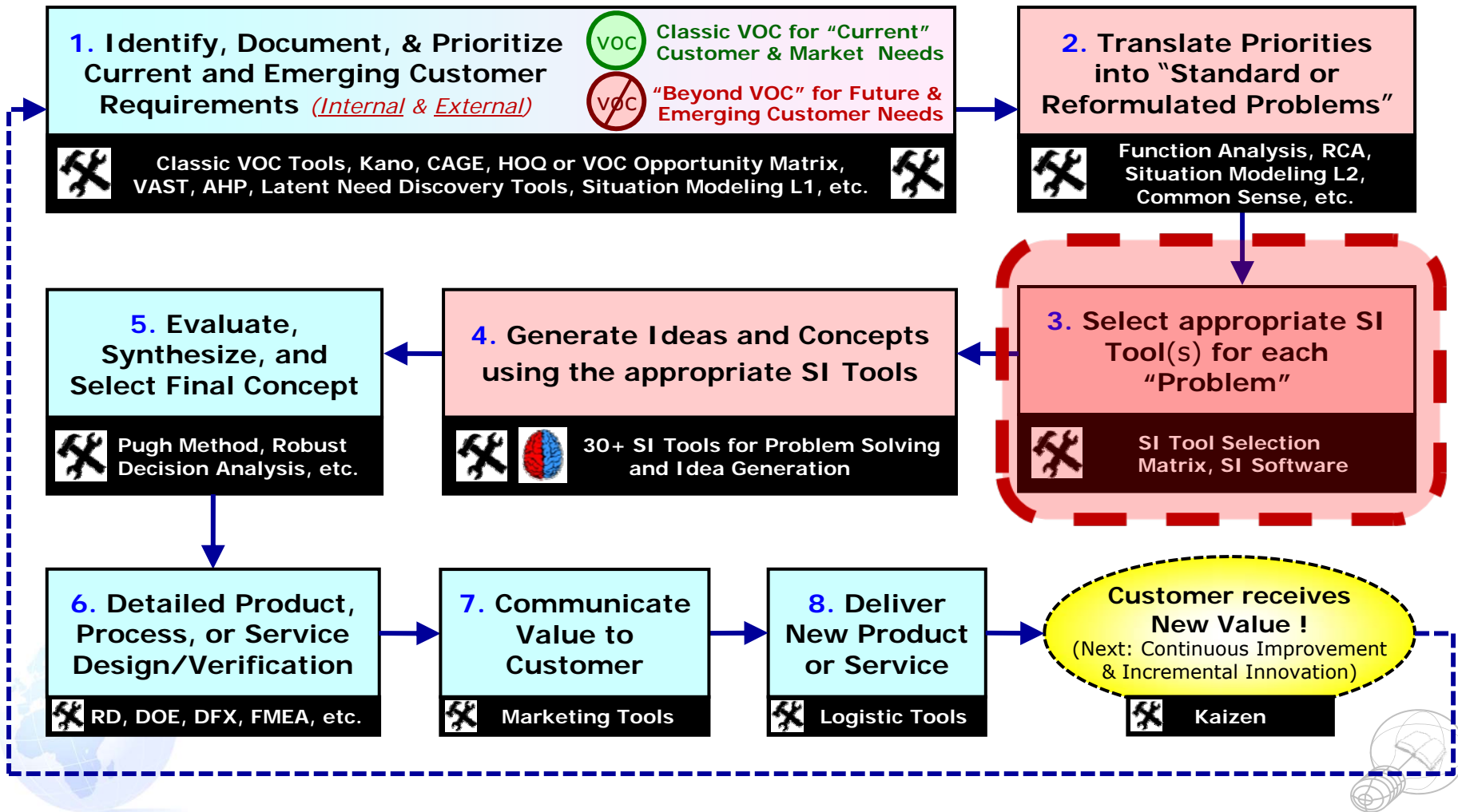
- Reduce weight, Minimize corrosion, Increase tensile strength, Move a liquid, Improve measurement accuracy, Reduce noise, Save time, Increase the accuracy of a shipment, Produce a small magnetic field, Absorb thermal energy, Separate a liquid, Measure fluid flow, Absorb a gas, Move solid particles, Synthesize hydrogen, Measure ultrasound velocity, Reduce time, etc, etc.



# Key Steps for Systematic Innovation (SI)

*(A birds eye view of the 8 step SI Process)*

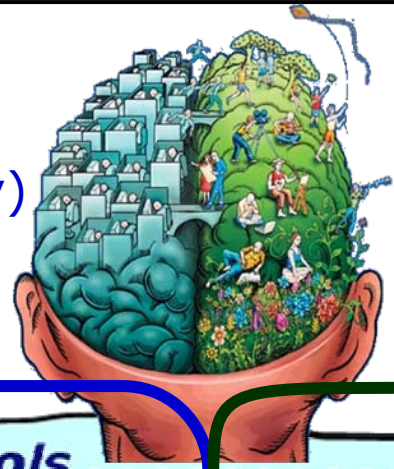
**Systematic Innovation (SI)** - A structured process and set of practical tools used to create (or improve) products and services that deliver New Value to customers.



# 25+ Tools for "Systematic Innovation" (What "Innovation Tools do you use?")

**"Left" Brained Approaches**  
(Science & Technology)

**"Right" Brained Approaches**  
(Psychological Processes)



**"Left Brained" Tools** . . . . .

- 1) Knowledge base of 9,000 Scientific Effects \*\*
- 2) Separation Principles for Physical Conflicts \*\*
- 3) Inventive Principles for Engineering Conflicts \*\*
- 4) Patterns of System Evolution \*\*
- 5) The "Ideal" System and the Use of Resources \*
- 6) Strategic Patent Analysis
- 7) Semantic "Knowledge" Mining

*Design Concepts*

**"Right Brained Techniques"**

- 8) Product & Society Trends
- 9) Lateral Benchmarking
- 10) The Holistic Cube
- 11) Customer Modifications
- 12) The Trimming Technique \*\*
- 13) Morphological Tables
- 14) Blue Ocean Strategy
- 15) Brainwriting 6-3-5
- 16) Have the "Right" People
- 17) "Painstorming"
- 18) Unintended Uses/Applications
- 19) The MSE Effect
- 20) Super Lateral Benchmarking
- 21) Biomimicry
- 22) DeBono's 6 Hats
- 23) Simplified Synectics
- 24) Time Savers
- 25) Can't Fix it?, Feature it!
- 26) The "Pagoda" Effect
- 27) Future-Mapping
- 28) And several more . . .

*Process Concepts*

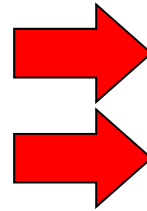


**"We're in a big rush, can you just teach us the best ones?"**

# *SI Tool Selection Matrix*

# The SI Tool Selection Matrix

**"Innovation Tools"** (Pattern Breakers)



**Generic Reasons to Innovate**



**"Left brained" SI Tools (RED)**

1	Biomimicry
2	BrainStorm/Writing 6-3-5
3	Can't fix it, Feature It!
4	Customer Modification
5	"Effects" Knowledgebase
6	DeBono's 6 Hats
7	Function/Situation Analysis
8	The Holistic Cube (11 windows)
9	Ideality / Ideal Vision
10	Inventive Principles (40+)
11	Knowledge Mining (Software)
12	Lateral Benchmarking (3 views)
13	Lead Users / Early Adopters
14	The MSE Effect
15	Morphological Tables
16	Painstorming

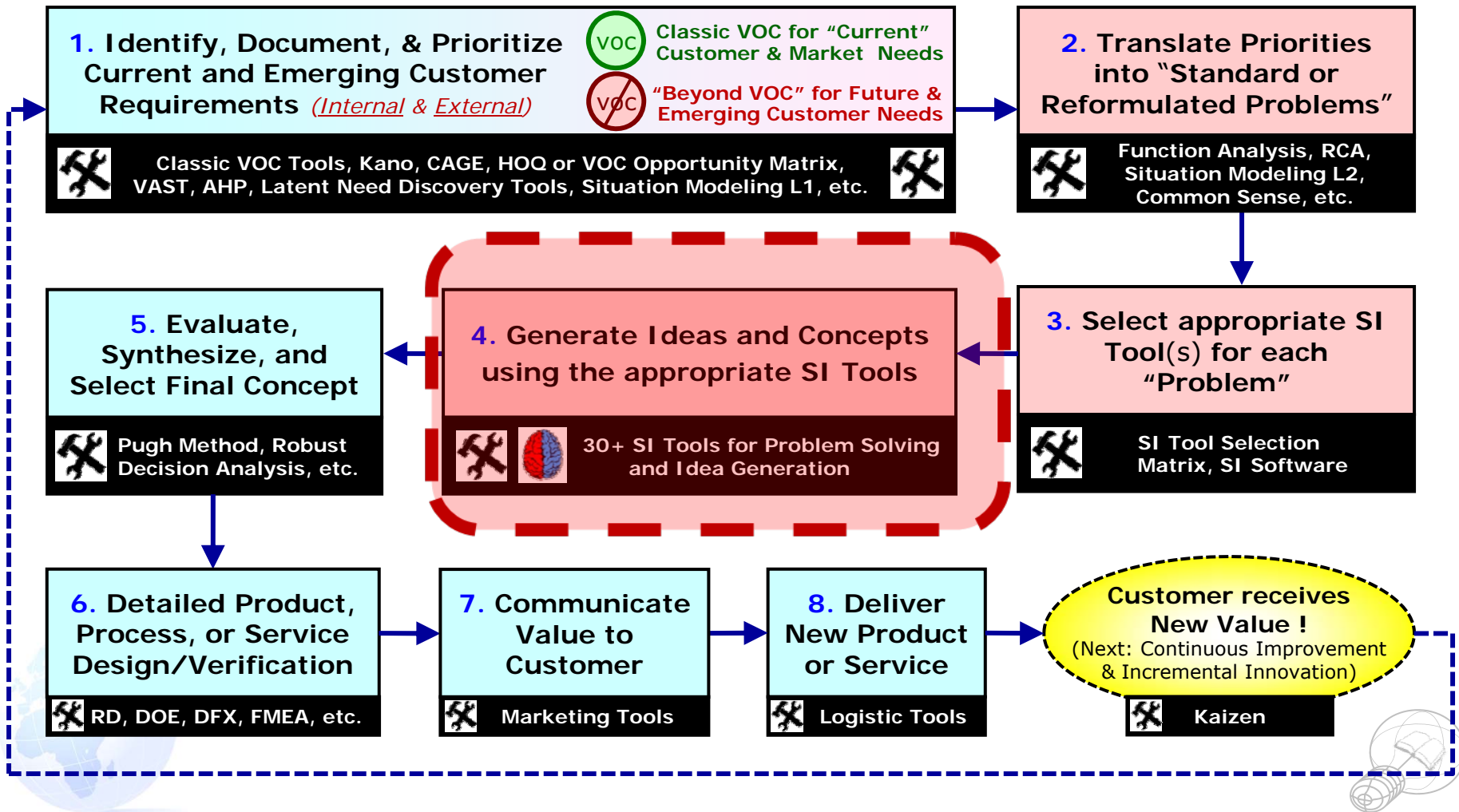
1	To avoid "commodity" status ("Wow's")	8
2	To solve a tough technical problem.	10
3	To resolve a conflict.	8
4	To increase the top line with new ideas.	3
5	To reduce the risk of failure.	6
6	To circumvent a competitors patent.	2
7	To reduce cost or complexity.	10
8	To help us solve the "right problems".	9

The darker the intersections in the center, the better the Innovation Tool is at addressing that "Reason to Innovate"

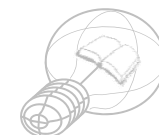
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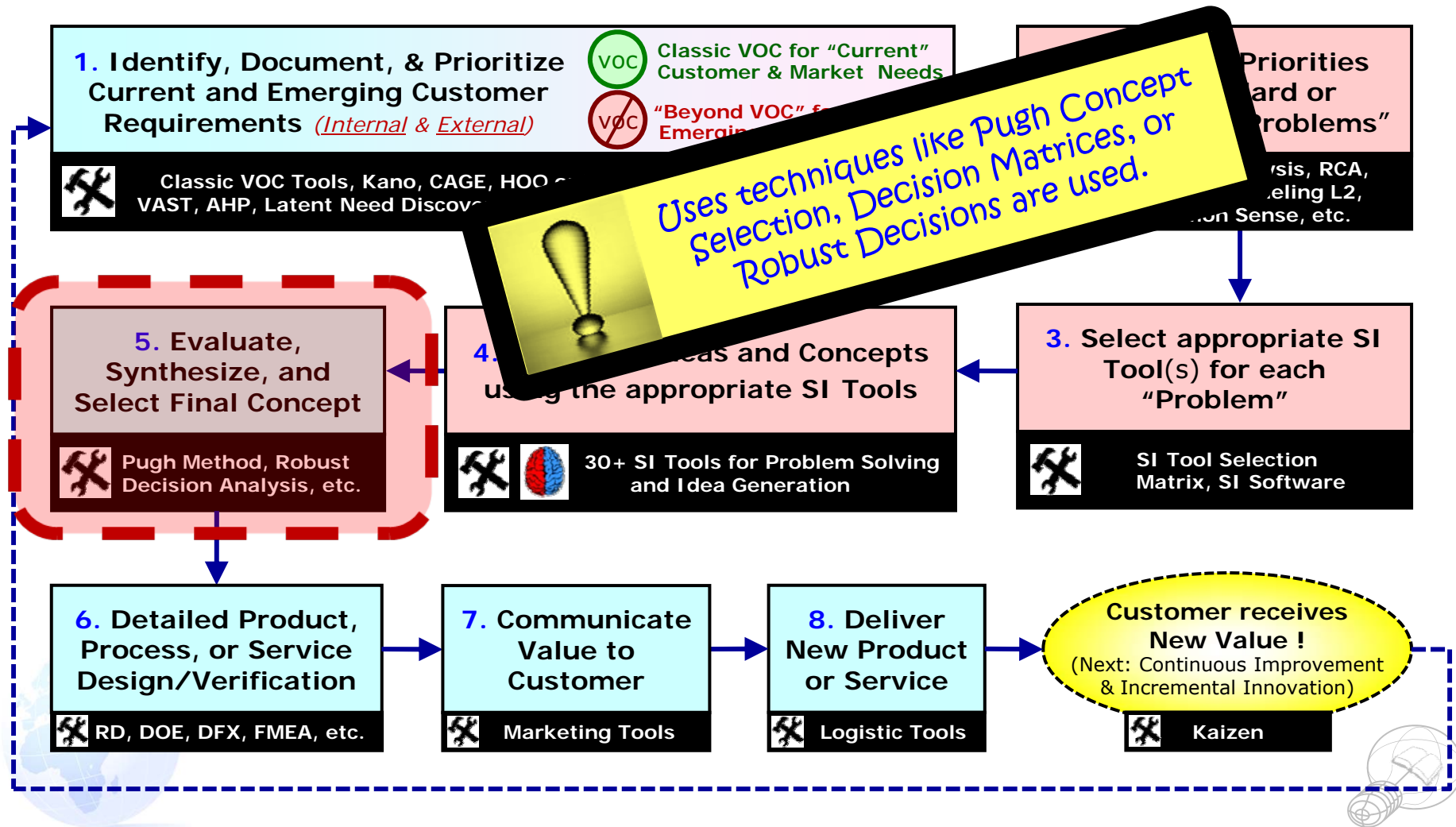
- **The SI tools do 3 main things for us:**
  1. Some help us come up with new and novel ideas,
  2. Some help us solve problems at any phase in Product, Process, or Service Development,
  3. Some help us understand “emerging needs”.
- **A variety of tools/methods exist**
  - Simple, complex, applicable, non-applicable, etc.
- **Are most effective in cultures that:**
  - Realize that Innovation takes some effort.
  - Recognize the need to take risks.
  - Value and encourage creative thinking.
  - Have Customers that appreciate new and improved products.
- **These tools enhance the “Natural Creativity” of Teams and Individuals.**
  - But certainly don’t replace anyone’s brain!



# Key Steps for Systematic Innovation (SI)

*(A birds eye view of the 8 step SI Process)*

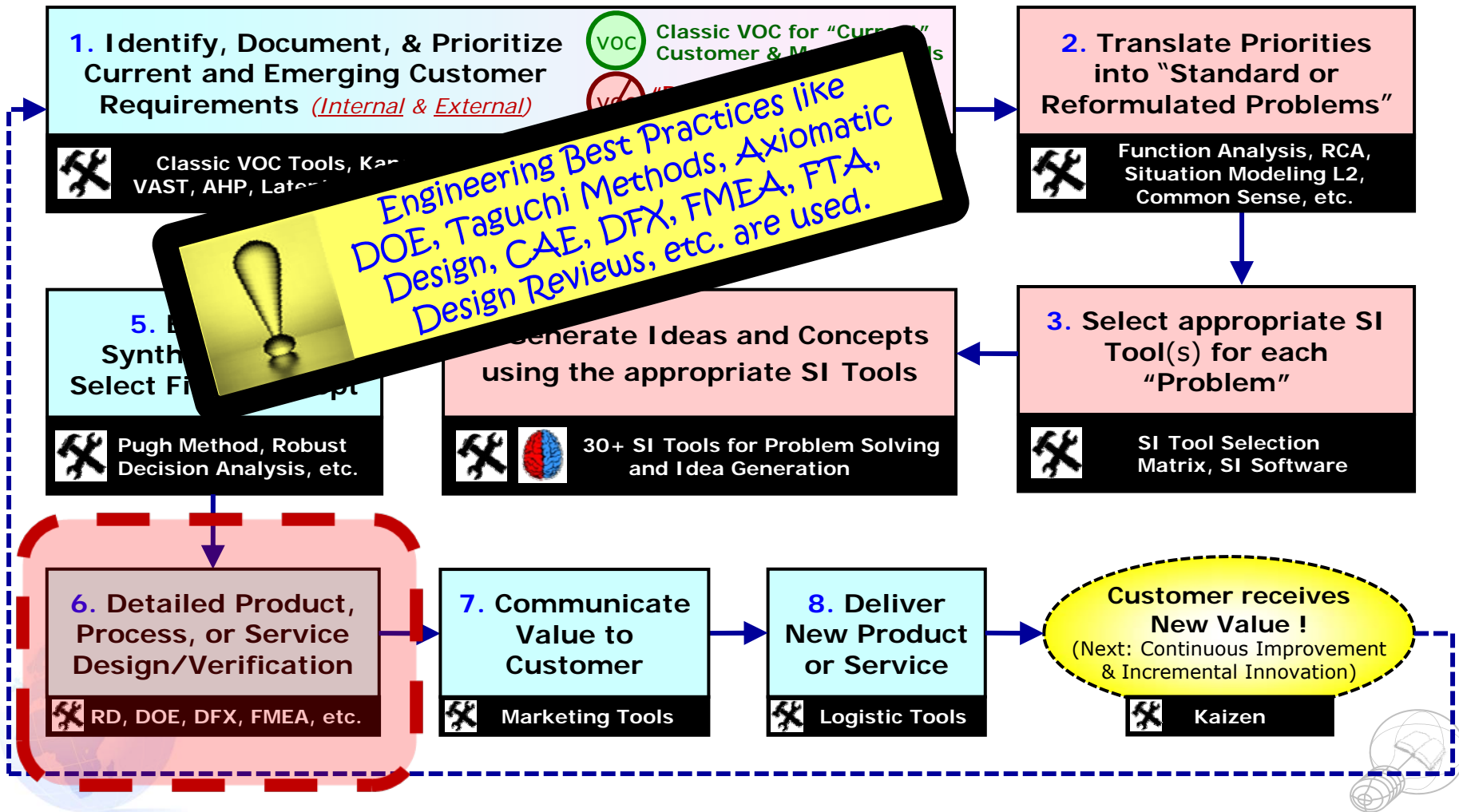
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# Key Steps for Systematic Innovation (SI)

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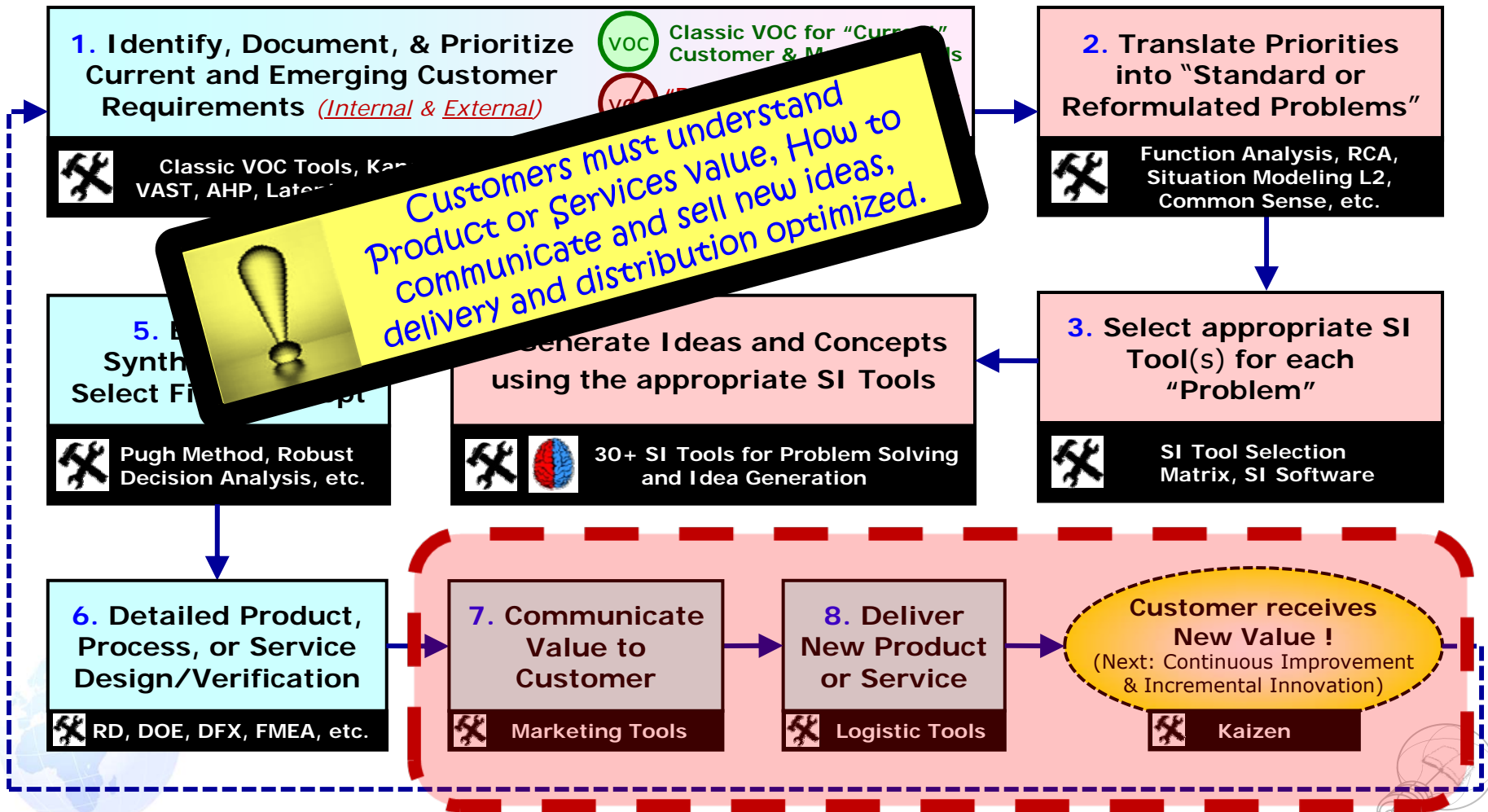
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# Key Steps for Systematic Innovation (SI)

*(A birds eye view of the 8 step SI Process)*

**Systematic Innovation (SI)** - A structured process and set of practical tools used to create (or improve) products and services that deliver New Value to customers.



What shape is this?

# *4. Intro to 3 of the 25+ SI Tools:*

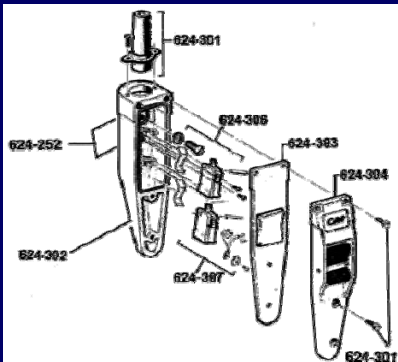
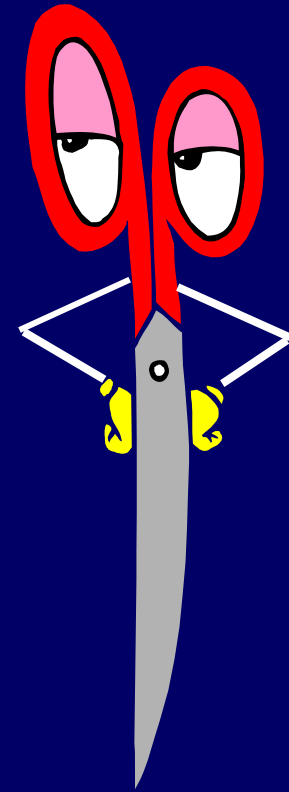
*#27 The Trimming Technique*

*#16 Painstorming*

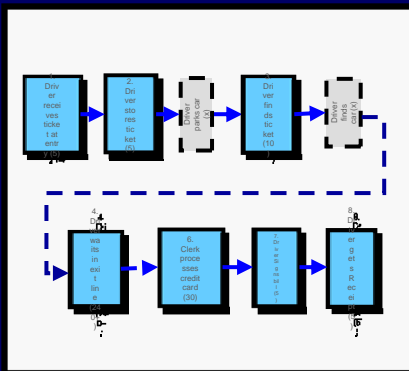
*#07 Function Modeling*



# #27 The Trimming Technique



Trim any part in any System, or . . .



Any step in any Process.

Break-out Exercise?

And do this, . . .

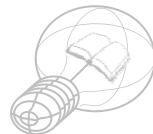
- A) Without impacting Customer Needs, or
- B) By creating a new paradigm of operation



# Why Trim?

Done for 5 typical reasons, 3 obvious and 2 “not-so obvious”. **Can you guess them?**

- 1.To reducing costs. (*Obvious reason*)
- 2.To eliminate “problematic” part/step. (*Obvious Reason*)
- 3.To reducing complexity. (*Obvious reason*)
- 4.To finding New Niche Markets. (*Not so obvious reason*)
- 5.To circumvent a patent (*Non-obvious*)





# The 6 Design Trimming Rules

*(You can trim any element if any of the following 6 rules can apply)*

## Rule #1

- The function can be performed or delivered by other elements of the system or super system.

## Rule #2

- The recipient of the function can deliver the function itself.

## Rule #3

- The recipient of the function does not need to exist.

## Rule #4

- The function does not need to exist.

## Rule #5

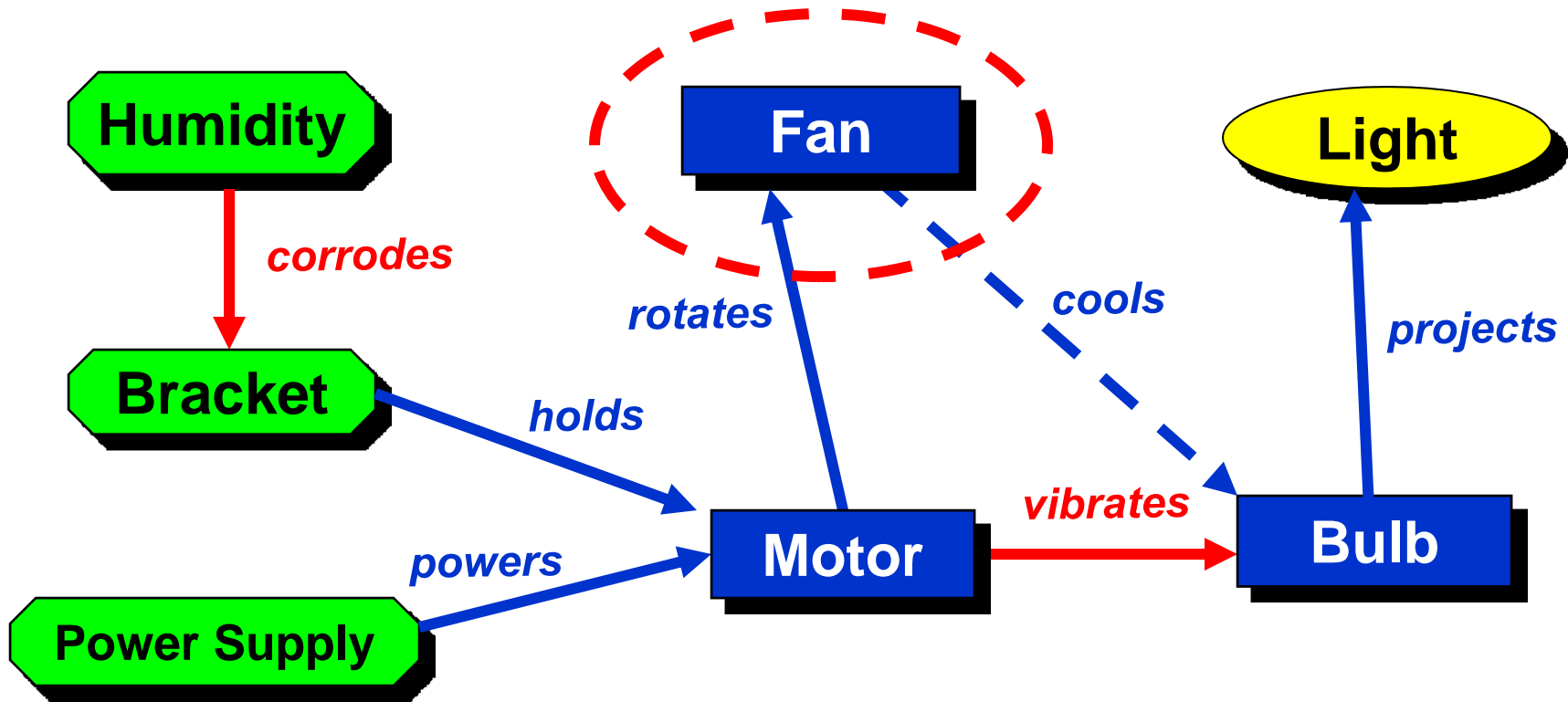
- The function is performed by a “new system/part” that has distinct advantages over the current system or part.

## Rule #6

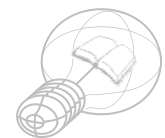
- A Niche Market can be identified for the “Trimmed Product”.



# The Trimming Technique (Product Example - projector)



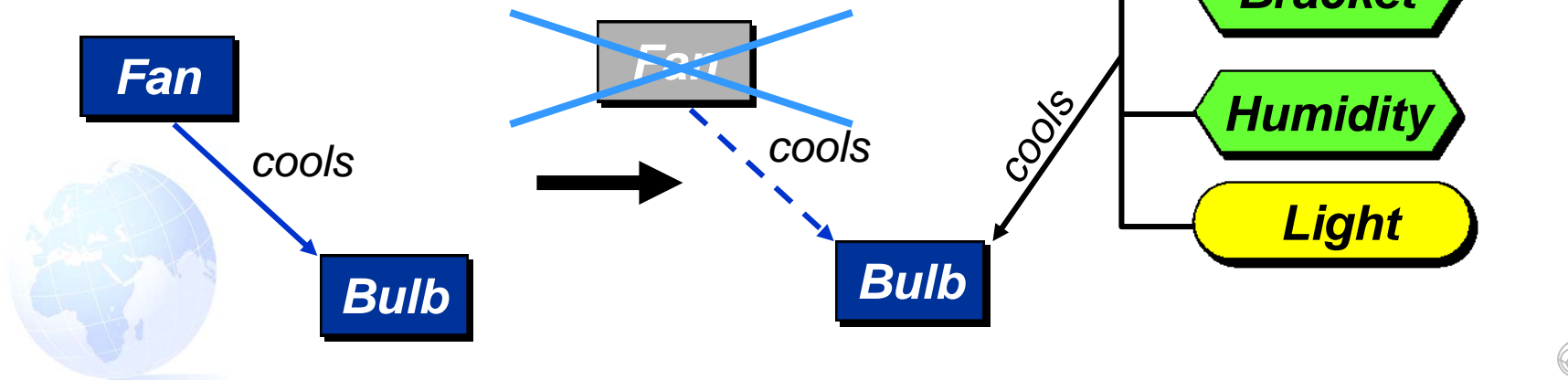
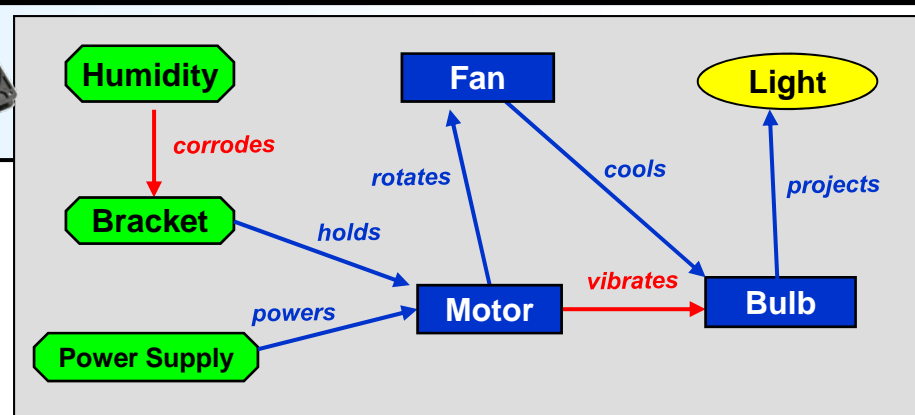
**Can we “trim” the Fan?**



# Can we trim the fan?

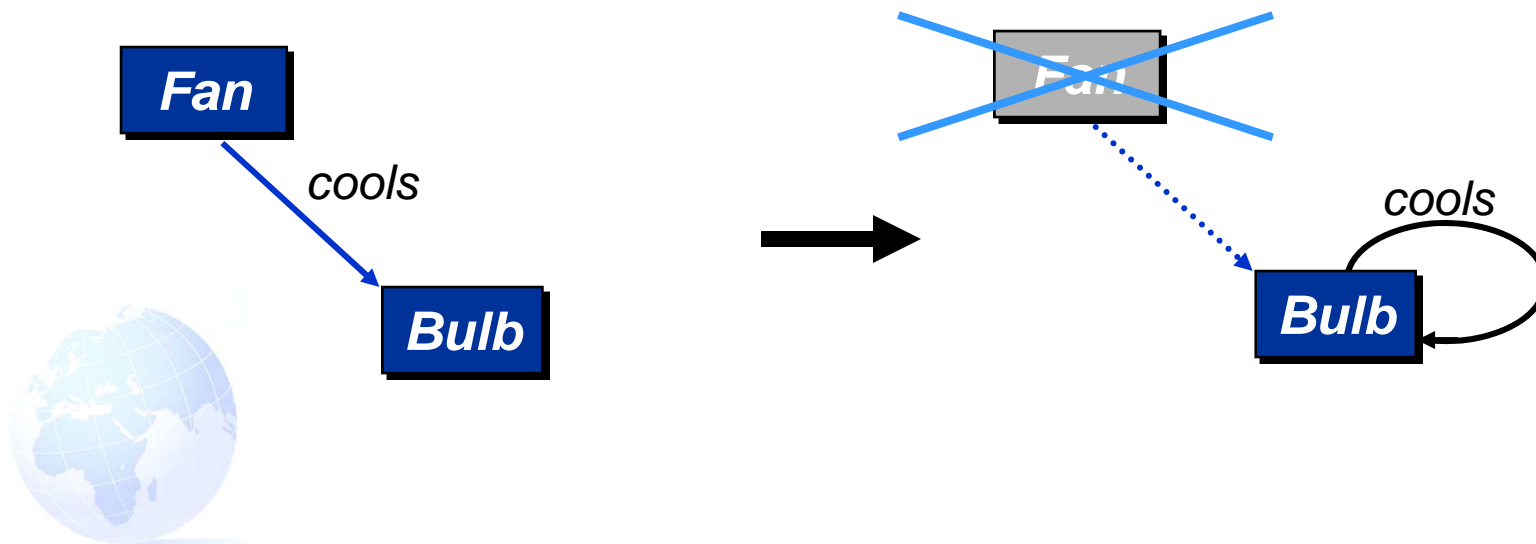


**Rule # 1)** The function can be performed or delivered by other elements of the System or Super-system.



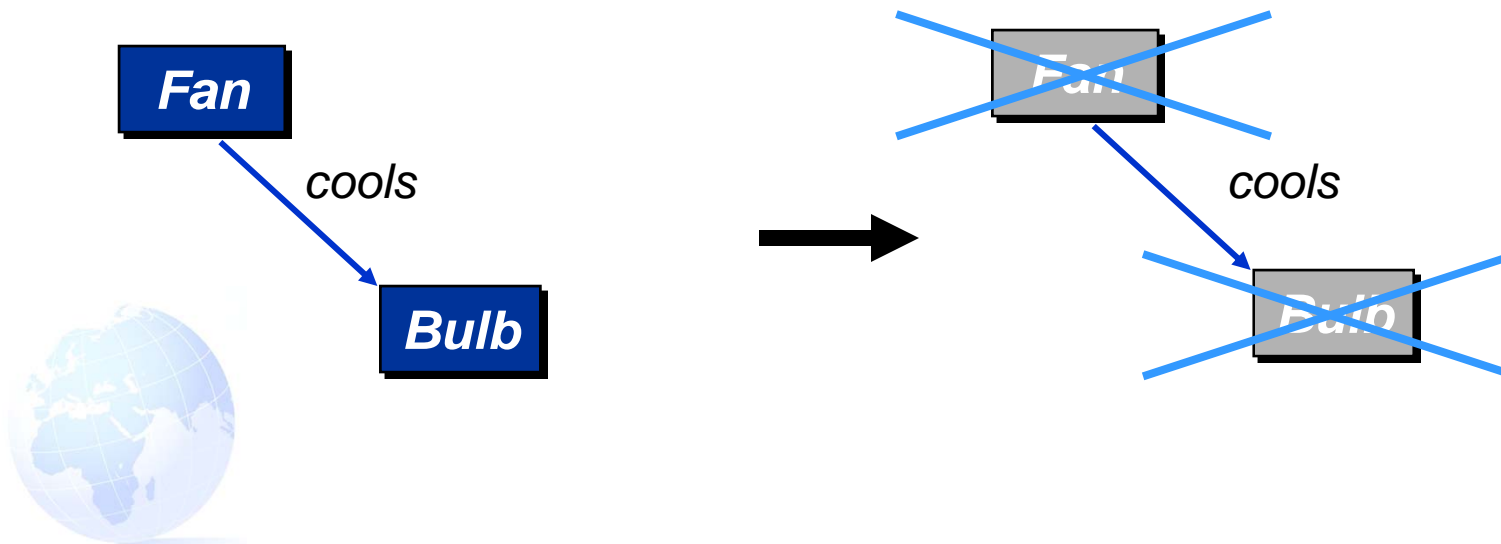
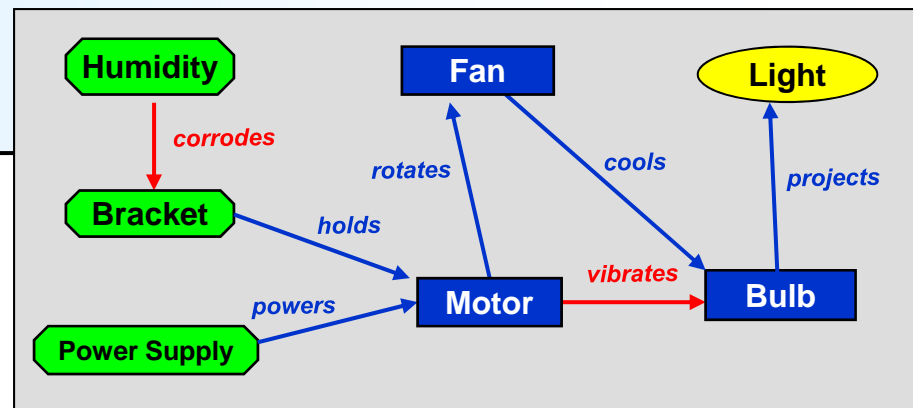
# Can we trim the fan?

**Rule # 2)** The recipient of the function can deliver the function itself. *(S-A-O) The object of the function delivers the function)*



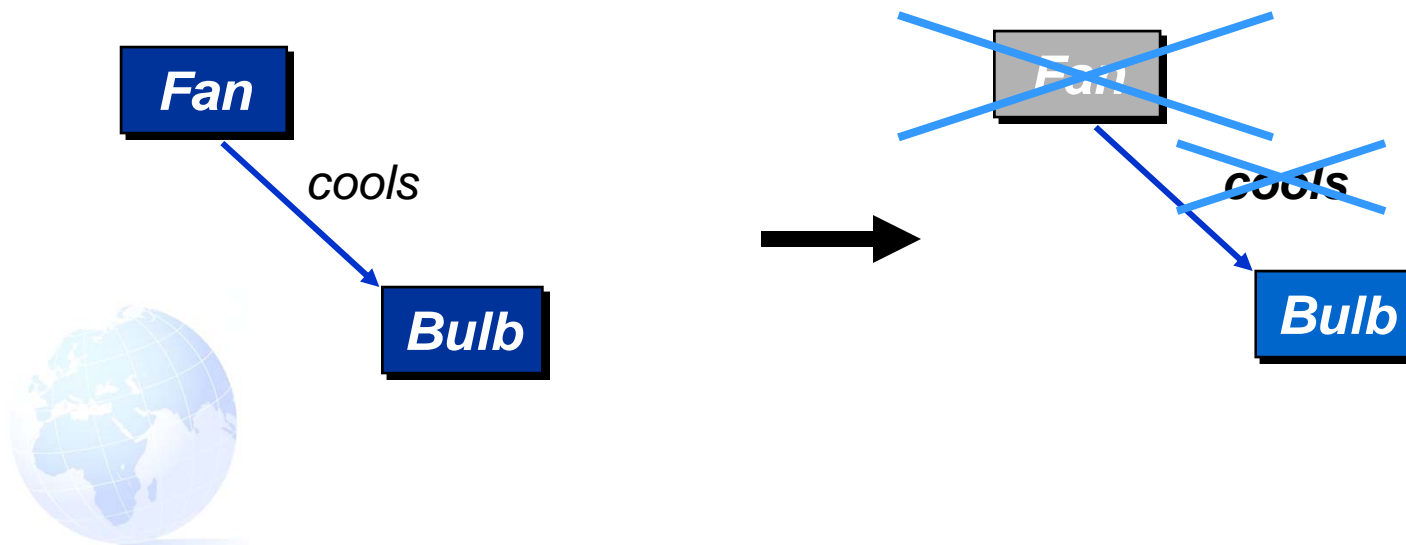
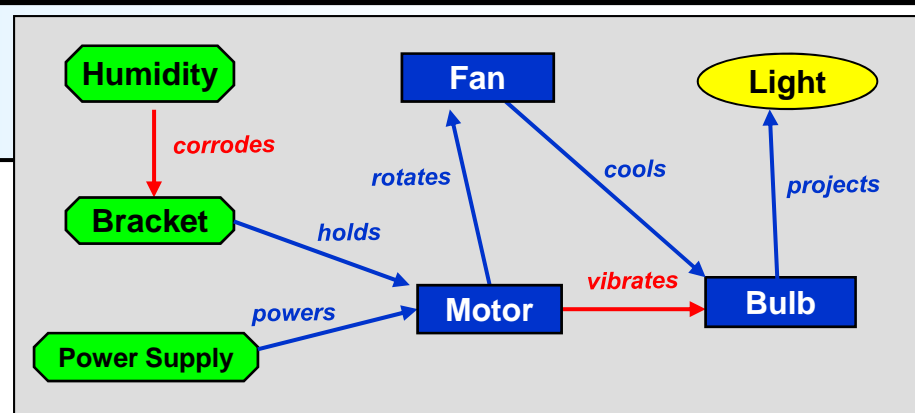
# Can we trim the fan?

**Rule # 3) The recipient of the function does not need to exist.**  
(There is no need for the object of the function)



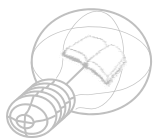
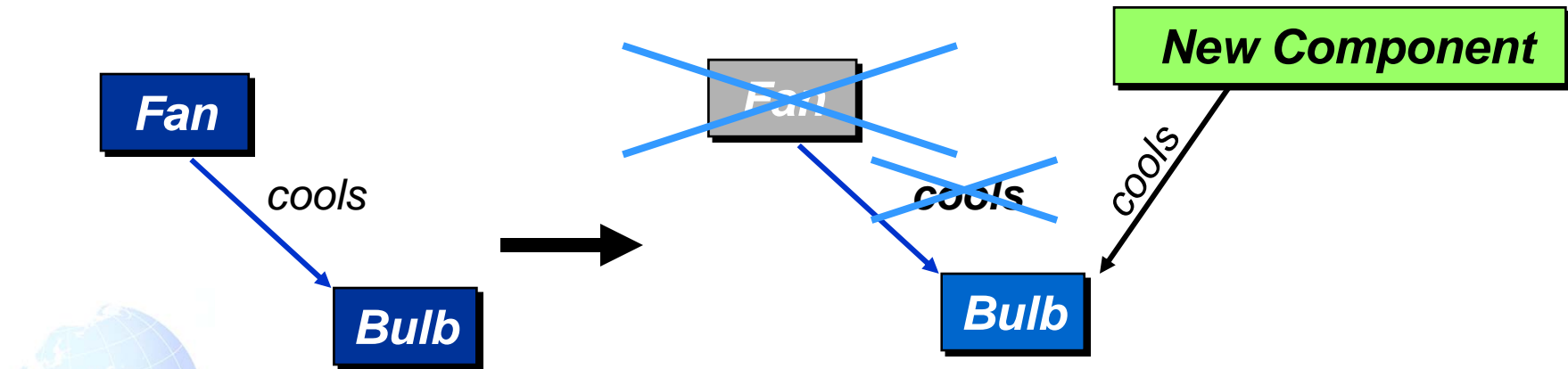
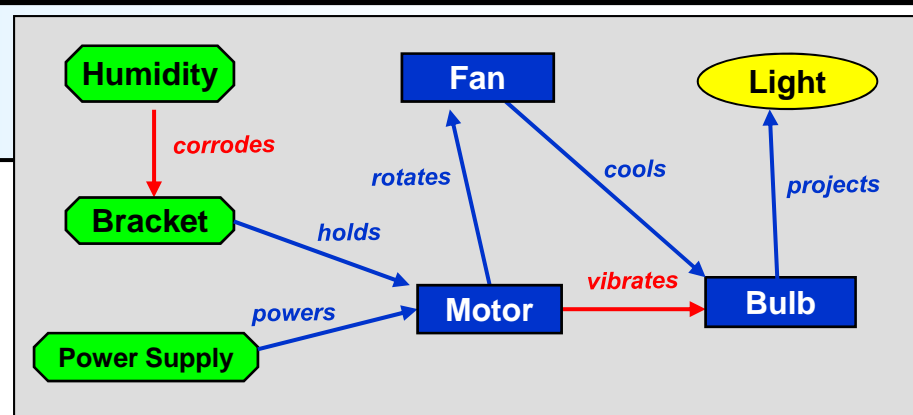
# Can we trim the fan?

**Rule # 4)** *The function does not need to exist. (Challenge the function, find a way to eliminate or get by without the function)*



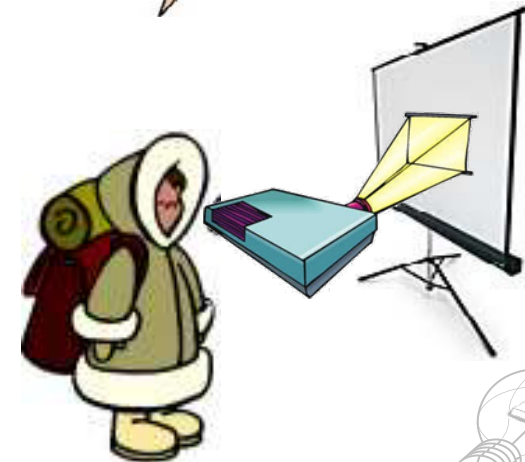
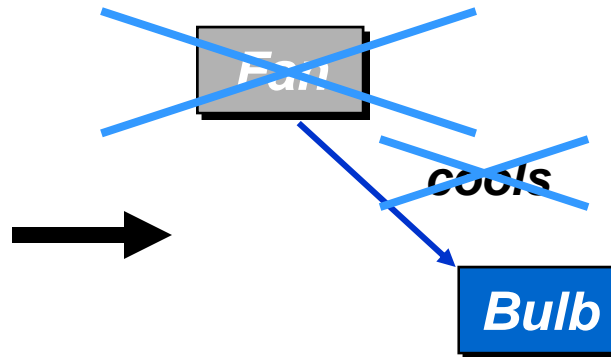
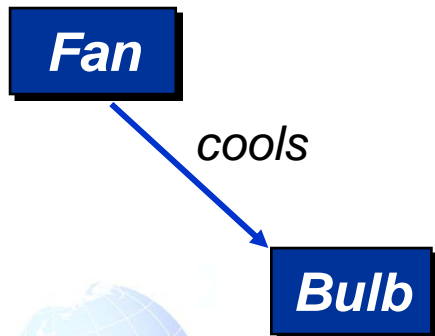
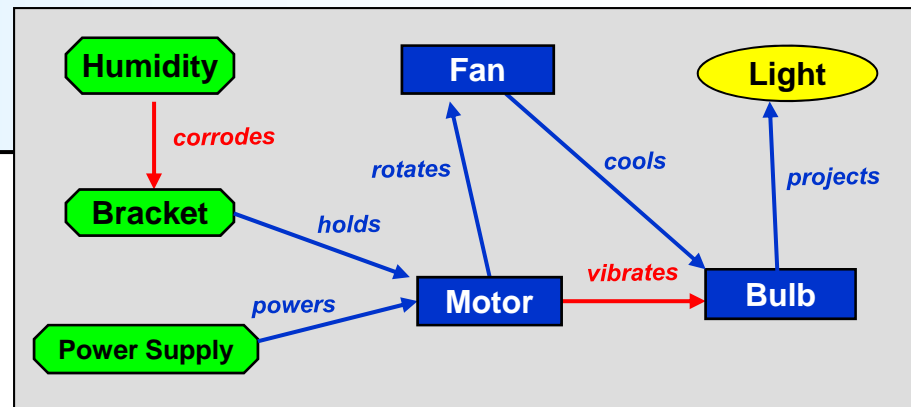
# Can we trim the fan?

**Rule # 5)** The function is performed by a "new system or part" that has distinct advantages over the current system or part.



# Can we trim the fan?

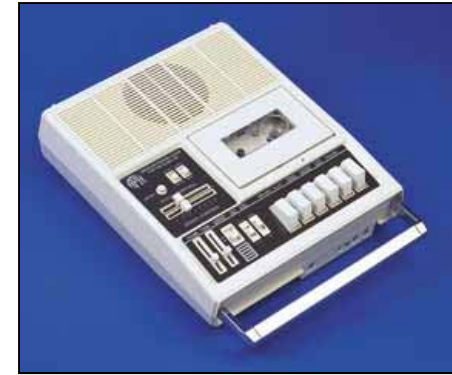
**Rule # 6) A Niche Market can be identified for the "Trimmed Product".** (Find a way to benefit from the deficiency).



Other Industry Examples for **Rule #6**

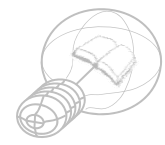
**Trimming Rule #6)** A Niche market can be identified for the "Trimmed Product". Find a way to benefit from the deficiency.

- List the main parts of a Tape Recorder:
  - Speaker, Recording Device, case, buttons, tape door, handle, etc.
  - Which 2 components would be the most "crazy" to attempt to trim?
  - **KEY QUESTION:** Who might benefit from having a *Tape Recorder that doesn't record?*
  - "This is crazy!"



### The Sony Walkman: A multi billion dollar market in the 1980's

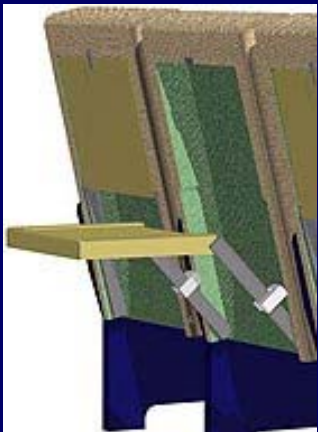
- Using the Trimming Technique may have given a "less brilliant" inventor this idea too.



# #16 "Painstorming"



(" If Necessity is the Mother of Invention, it is Frustration that is the Father")



What's annoying about the seat  
in front of you in an airplane?



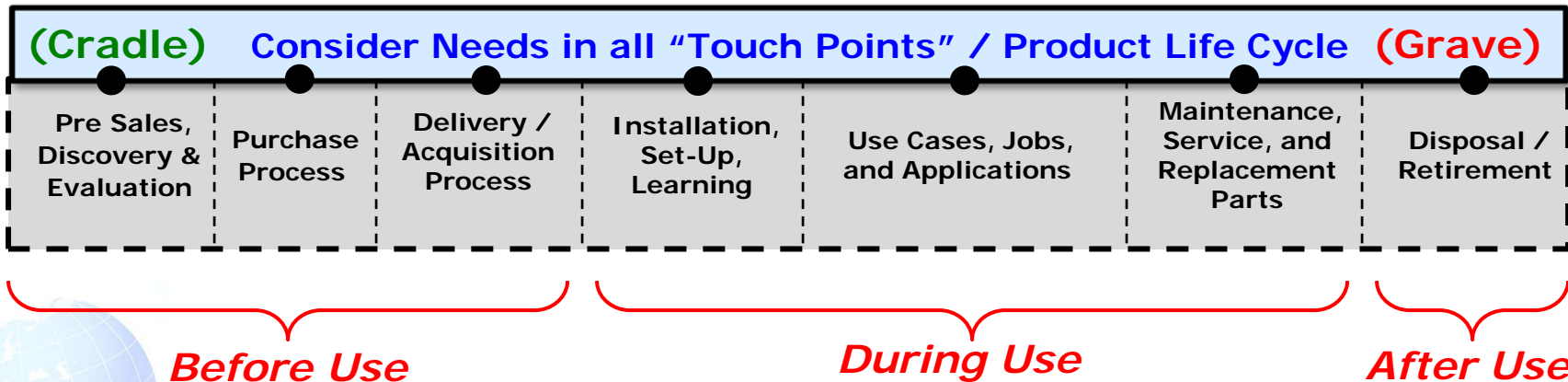
The  
"Knee defender"



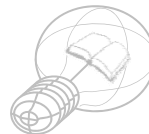


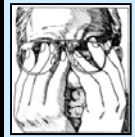
# "Painstorming"

- Through interviews and observational research, identify and document a comprehensive list of "Pains"
- Consider the following "Trigger Words"
  - *Frustrations, Annoyances, Work-arounds, Difficulties, Disappointments, Inefficiencies, Fears, Aggravations, Confusions, Stress, Hassles, Limitations, etc.*
  - Consider all of your "Customer types", the main categories of needs, and the lifecycle of the product.

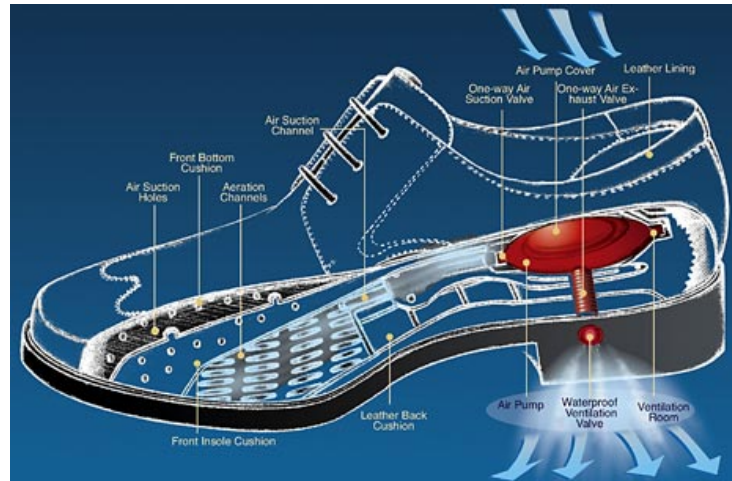


- Prioritize the list for opportunity to solve the "pains"

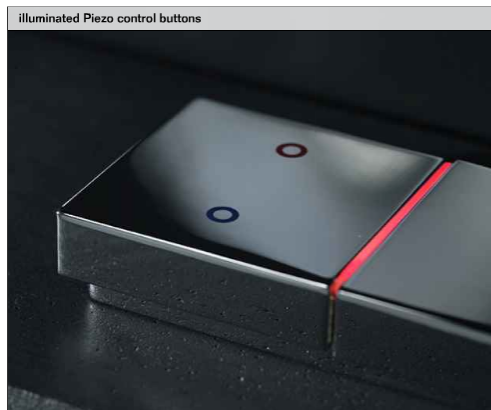




# "Painstorming"



1. What is annoying about every spray bottle?  
2. What is the "Root Cause"?  
How could you overcome that?



illuminated Piezo control buttons



illuminated stream



clean, clear lines

presentation product film ambience film assortment

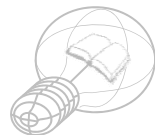
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What's a pain relating to this popular brands of Mouthwash?



What is the #1 reason for downtime on a circular saw?





# "Painstorming"



What is frustrating for 2 to 5 year old kids (and parents) when watching kids put on their shoes?  
**How could you overcome that?**

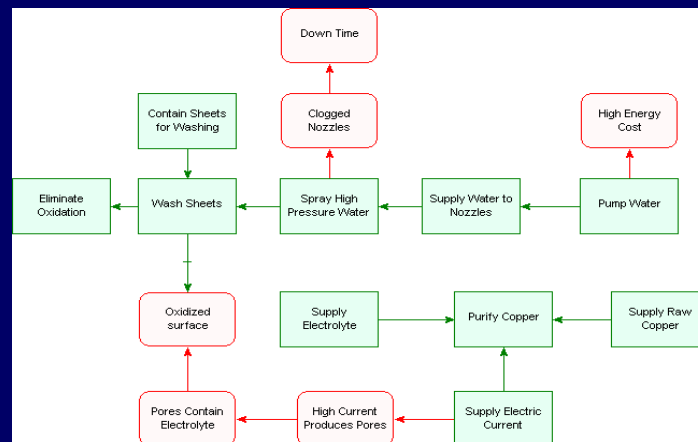
What is annoying with the new R.S. Innovation? Let's keep innovating!  
**How could you overcome that?**

What's annoying about those plastic cups at a party with lots of people? **How could you overcome that?**



# #7 Function

# Analysis & Modeling



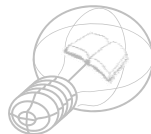
# What is “Functional” Analysis?

**Function Analysis (FA) is a “Problem Definition” task that separates the “intent or purpose” of something from its physical description.**

- Customers buy Function, not parts or steps, they care more about what it does over what it is!
- Team gains a clear and more creative focus because it no longer focuses on the mechanical explanation, but instead on the functional benefit (or jobs) the product performs for the Customer!

*“If I were given an hour to solve a problem which my life depended, I’d spend:*

- 55 minutes studying it*
- And 5 minutes solving it”*



# Why "Functional" Analysis (FA)?

## (3 Main Reasons to consider FA)

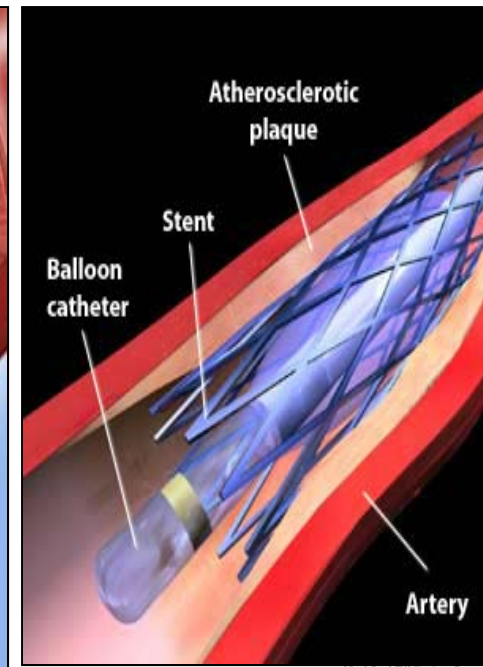
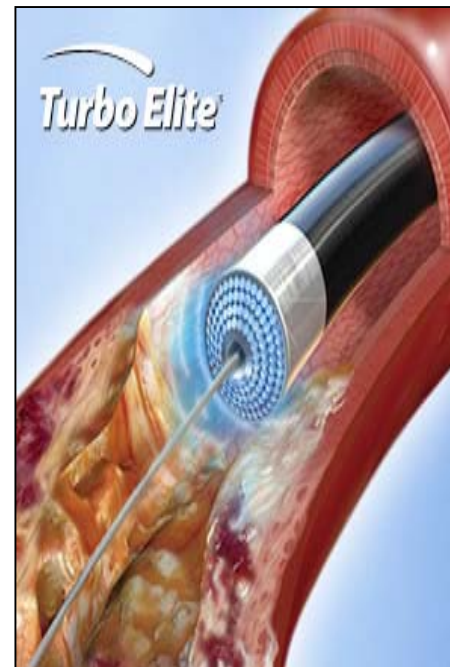
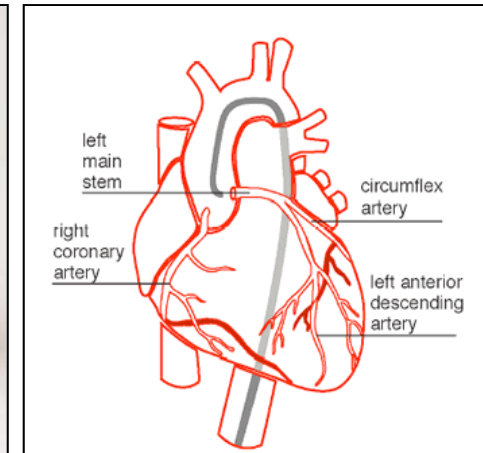
1. FA minimize "Psychological Inertia" of the problem solvers.  
(Only 1 way to solve a problem)
2. FA breaks complex situation into "smaller" functional problems to address.
3. FA can help to "reformulate" and create "alternative" Problem Statements.



# Example: Angioplasty Procedure

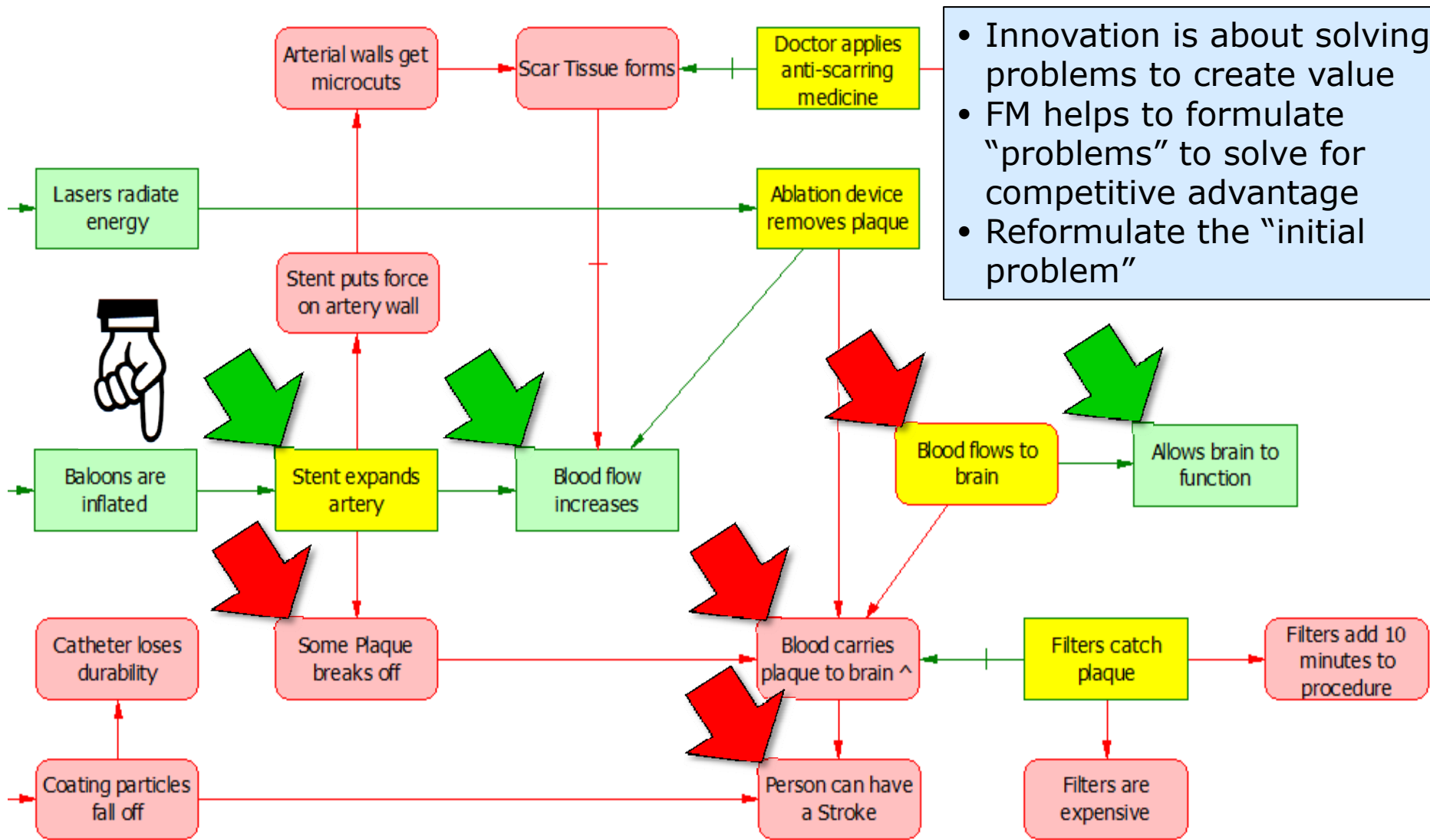
## Situation Facts:

- Eating fatty foods produces bad LDL cholesterol in the blood.
- Before it's "TOO LATE", catheters can bring "tools" to the problem area.
  1. Ablation devices "laser" the plaque on the walls of the artery.
  2. Balloons and Stents expand the artery and increase blood flow by compressing plaque against the arterial wall.
- Friction exists between the catheter and femoral and coronary artery wall.
- Coatings are applied to catheters to reduce friction.
- Loose Plaque during procedures can flow to brain and cause a stroke.
- Catheter coating can "flake off" and travel through the bloodstream and cause a stroke.
- Metal Stents can make micro-cuts artery walls, etc.



# Catheter Function Model

(Innovation is all about identifying and solving problems)



# 25+ Tools for "Systematic Innovation" (Pattern Breakers)

"Left" Brained Approaches  
(Science & Technology)

"Right" Brained Approaches  
(Psychological Processes)



## "Left Brained" Tools

- 1) Knowledge base of 9,000 Scientific Effects \*\*
- 2) Separation Principles for Physical Conflicts \*\*
- 3) Inventive Principles for Engineering Conflicts \*\*
- 4) Patterns of System Evolution \*\*
- 5) The "Ideal" System and the Use of Resources \*
- 6) Strategic Patent Analysis
- 7) Semantic "Knowledge" Mining

*Design Concepts*

## "Right Brained Techniques"

- 8) Product & Society Trends
- 9) Lateral Benchmarking
- 10) The Holistic Cube
- 11) Customer Modifications
- 12) The Trimming Technique \*\*
- 13) Morphological Tables
- 14) Blue Ocean Strategy
- 15) Brainwriting 6-3-5
- 16) Have the "Right" People
- 17) Painstorming
- 18) Unintended Uses/Applications
- 19) The MSE Effect
- 20) Super Lateral Benchmarking
- 21) Biomimicry
- 22) DeBono's 6 Hats
- 23) Simplified Synectics
- 24) Time Savers
- 25) Can't Fix it?, Feature it!
- 26) The "Pagoda" Effect
- 27) Future-Mapping
- 28) and several more . . .

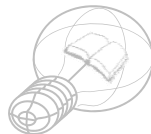


*Process Concepts*



## Key Take-Away's

- *Innovation Tools are not one size fits all. The tools depend on the situation you are trying to accomplish.*
  - *Customers can only tell you part of the success formula, the CAGE Model.*
  - *You must listen to and go beyond VOC to Innovate and obtain a comprehensive set of requirements.*
  - *Everyone can significantly enhance their Idea Generation and Problem Solving skills.*
  - *Innovation and creativity can be learned and integrated in any organization.*
- **Additional resources: Videos on YouTube or Google Videos, search:**
- *"Systematic Innovation" or "CAGE Model"*
  - *Kano Model at [www.kanomodel.com](http://www.kanomodel.com)*
  - *White Paper on SI (available upon e-mail request)*



# *END*

# *Thank-You!!*

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