Systematic Innovation

. . . an oxymoron?

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Version: October 15, 2010

Systematic Innovation: *A structured process and set of practical tools to create (or improve) products and services that deliver new value to your customers.*

Introduction

Are "**Systematic**" and "**Innovation**" two words that can't coexist because they are mutually exclusive? Isn't it true that too much structure stifles Innovation? Can Innovation really be systematic? . . . OK, enough rhetorical questions!

Our assumption in writing this is that anyone reading it develops products, services, or software and has an interest in Innovation. We also assume most will agree that in today's globally competitive market, Innovation is an essential element to thrive, and for some to simply survive. Unfortunately, there are many forces working against Innovation, including the two common misconceptions listed below:

"Innovation and creativity cannot be taught, you either have it or you don't"
"Innovation is only for the R&D group working on new or urgent projects"

The following six sections describe a practical and proven approach for Systematic Innovation used by organizations independent of size, type, location, or culture.

Sect.	Section Title	*What's in it for you?*
I	**Do you really need Innovation?**	• *Learn WHY continuous improvement is not enough,* • *Learn strengths and limits of typical Voice of Customer (VOC) techniques,* • *Learn HOW to get a comprehensive set of customer requirements for your project,* • *Learn HOW to maximize the likelihood of market success.*
II	**HELP! We need some Innovation, and fast!**	• *Reflect on a project situation that your company will likely experience in the future if it hasn't already.*
III	**Sorry, one size never fits all.**	• *Learn WHY there are no single, silver bullet approaches/tools for Innovation,* • *Learn HOW to select the right "Innovation tool" for the job,* • *Learn WHAT Innovation tools are being leveraged by the world's most successful companies.*
IV	**Just because it's a NEW idea doesn't mean it's a GOOD idea!**	• *Learn HOW to increase your "Innovation and Inventive Thinking" capabilities,* • *Learn WHY Innovation alone is not enough and WHAT to do about it,* • *Learn HOW an eight step process for Systematic Innovation can work for you.*
V	**Case Studies: Idea generation & problem solving tools.**	• *For those who like specific examples, see HOW a few Innovation tools work with three brief case studies.*
VI	**Summing it up.**	• *WHAT we hope you took away from this introduction to Systematic Innovation.*

I. Do you really need Innovation? (*The CAGE Model & the Innovation Sweet-Spot*)

Most teams understand that Innovation has two main beneficiaries; the internal and external customers for the product, service, or software being developed. When you dig deep, you find these customers have many needs you must satisfy to earn their business. Some of the needs are obvious and some hidden (blatant and latent). To compound the issue, in every case we have seen, there are multiple customers with these needs.

As an example, consider the development of a new medical instrument used for the treatment of cancer or heart disease. Who are the customers?

The external customers*: The surgeon, technician, lab assistant, nurse, purchaser, insurance carriers, and the patient are all examples of external customers. Each of them has a set of requirements; some of them overlap and some are unique to that customer segment.*

The internal customers*: The manufacturing group that is looking for ease of manufacture and assembly, the logistics planners who are concerned with shipping and distribution issues, the purchasing group who want the lowest costs for maximum profits, the intellectual property department that is concerned with licensing potential and competitive advantages, the development team of a higher level assembly is concerned with interface issues and functional performance, etc. Each of these internal customers has a set of their own requirements; some of them overlap and some of them are unique to that customer segment.*

Without external customers, internal customers are irrelevant because external customers put money into the value chain. On the other hand, if we only focus only on external customers and violate internal requirements we will also fail. It is important to have a comprehensive understanding of both the external and internal customer requirements to win in our increasingly competitive market.

To accomplish this deep understanding, it is first important to understand why many new products and services fail. Three specific reasons (root causes) most new products and services fail are listed below:

1. *Missing value added features or qualities that differentiate your offering from the competition, i.e., Innovation)*
2. *Lack of understanding of your customer needs (i.e. Their top priorities)*
3. *Being "too" customer driven, i.e., believing and incorporating everything your customers tell you)*

The CAGE Model shown in **Figure 1** below illustrates critical elements that must be included and excluded for success in the marketplace. The graphic may look a little confusing at first glance, but is actually quite illuminating of the reality found with most development teams. In the below explanation, we will take you through a clear description of what the three main regions represent as well as a specific description on each of the "A-G" sub-regions that need to be understood for success.

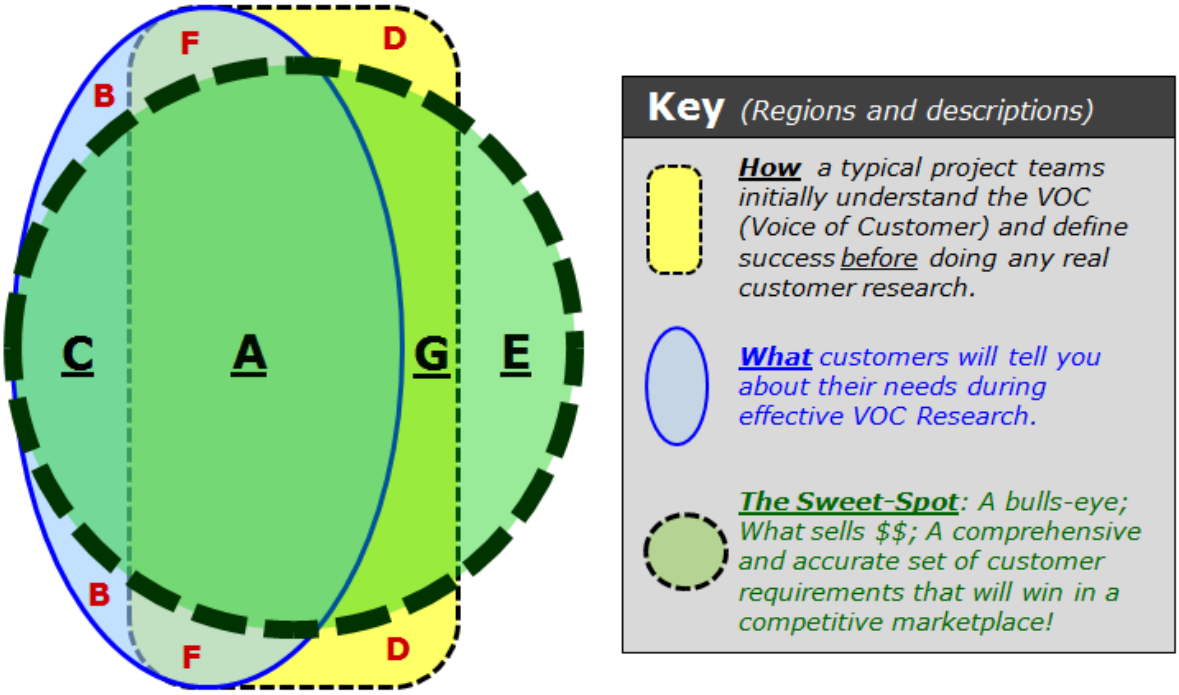

Figure 1 *– The CAGE Model* *CAGE Model Key*

The CAGE Model shows three distinct "knowledge universes" that typically occur in the beginning stages of new product, service, or software development. Below the three universes, or regions, are explained in detail: See a 5 minute CAGE Model video at www.kanomodel.com

- **Region #1** (Yellow: Thin dashed rectangular line) represents how project teams initially understand the customer's requirements and define success before doing any real customer or market research. *Note: Believe it or not, many product development teams stop here. They never formally talk to their customers to better understand their needs.*
- **Region #2** (Blue: Solid thin oval line) represents what customers will tell you about their needs during typical VOC Research. *Note: Customers are generally not very effective at articulating all their needs.*
- **Region #3** (Green: Bold dashed circle) represents the team's ultimate requirements goal. It's the bulls-eye, the Innovation sweet-spot, a comprehensive and accurate set of requirements that will win in a competitive marketplace! *Note: What we are suggesting here is that even classic VOC research techniques (Region #2) are not enough to hit the bulls-eye, the Innovation sweet-spot.*

This model shows why many project teams fail to hit the Innovation sweet-spot. Note there are several distinct and unique areas labeled in (and outside) the sweet-spot bulls eye. Since our goal is Region #3, the bulls-eye, we must understand and document the four elements (C, A, G, and E) and make sure we minimize or eliminate the elements (B, F, and D) outside it. An explanation for each of these regions is described below, starting with the elements outside the bulls-eye, the items you don't want.

- **Area D** is straight forward. It represents what the project team simply got wrong! Customers don't want these. Too much of one thing, not enough of the other, wrong feature or feature set, an engineer's pet project, and so on. We all know this happens and there are many things that cause it, most of them are preventable.
- **Area B** might be a bit surprising to some, but it represents what the customers get wrong! Sometimes they ask for more than they are willing to pay for or they ask for solutions that don't really address their "real needs." We must recognize and eliminate these in advance.
- **Area F** represents requirements the project team **and** customer got wrong! Yes, this is rare, but sometimes they both get it wrong!

Since areas **D**, **B**, and **F** are regions we don't want in our offerings, let's focus on the elements we do want. (i.e. The **C**, **A**, **G**, and **E** elements).

- **Area C** represents important **Customer Insights** the project team will discover during effective VOC research. Through questioning and observational techniques a few golden nuggets often surface.
- **Area A** (in the center) represents requirements that **All** agree upon! The development team was aware of them before customer research, the customer verified them during the research, and they are the things customers will consciously look for when evaluating options and purchasing.
- **Area G** represents the **Givens**, – These are needs or requirements customers won't tell you about because they "go without saying," they are expected, assumed, or obvious – For example, when buying a computer, they don't ask for a power plug. When making reservations at a hotel, no-one will ask for a window in the room or a reliable lock on the door, but if either are missing, customers will likely be quite upset and never come back to that hotel.
- And finally, **Area E** represents the "**Excitement**" Quality, these are the gold nuggets, the Innovations, the "WOWs" customers won't tell you about these because they don't know about them, yet!! These Innovations will differentiate your offering, give you a competitive edge, increasing your market share, and allow for higher profit margins. To get Area E, we leverage the over three dozen idea generation and problem solving tools utilized in step 4 of the 8-Step Systematic Innovation Process.

The main point of the CAGE Model is to clearly illustrate the risk in a weak set of requirements and the importance of going beyond the VOC for truly innovative offerings. Many project teams assume they already know their customers' needs, far better than assuming, is effective VOC research to capture missing insights, and even better than that, especially in a competitive landscape, is combining modern VOC efforts with modern "Systematic Innovation" tools to get as close as possible to the "CAGE bulls-eye" shown in this model.

II. HELP! We need some Innovation, and Fast!

Back in 1993, while researching product development best practices, we were fortunate to discover a small group of professionals in California preaching a new and structured approach to invention and innovation. Back then, this was a relatively new concept and we were naturally skeptical, but very curious. Since then, our passion, interest, and belief has

grown exponentially through researching, discovering, and developing further "Innovation Best Practices." Many of these best practices have been adopted by or adapted from industry leaders like 3M, Procter & Gamble, Intel, W.L. Gore, Dell Computer, Johnson & Johnson, HP, Samsung, Ford, Motorola, as well as countless others.

Seven years ago, in 2003, we were asked by one of the top three American automobile manufacturers to help them create a few unique selling propositions (USPs) for a current vehicle that was beginning to lose market share. USPs are essentially new Innovations or significantly improved features that give the customer a distinct reason to buy one product over the competition. Examples of USPs include; the first fold away seats in a car, a vacuum cleaner that never loses suction, a computer screen that works in direct sunlight, or offering a free pizza if its delivery takes more than 30 minutes.

For our automotive client, as it so often occurs, the timeline for the needed USPs was extremely tight. They wanted conceptual ideas as soon as possible, preferably yesterday. Wanting to be efficient, they asked us to teach them only the best Innovation methods. Having well over three dozen "Systematic Innovation" tools in our toolbox, it was clear we needed to determine which techniques were the best to focus on for their particular situation.

Rewinding a little bit . . . since 1993, through our research on Innovation and work in many diverse industries, we discovered several common and reoccurring situations that called for inventive thinking. Most of these situations were independent of the industry or project we were working on. Below are a few of the situations we encountered.

1. *We have a tough technical or customer problem to solve.*
2. *We want to "WOW the customer" by differentiating our offering from our competitors.*
3. *We must reduce cost or complexity of our product or service.*
4. *We need to resolve a conflict (improving one thing degrades another).*
5. *Our competitor has patented a great idea - We need to circumvent it.*
6. *We want to increase the top line revenues by offering new products or services.*
7. *We need to reduce the risk of failure in our product or service.*
8. *We need to make sure we are solving the "right problems."*
9. *We need to understand "future" customer and market needs.*
10. *We must break routine thought patterns for more sustainable Innovation.*

Although there were a several more situations that called for inventive thinking, most of them were subsets of the ten categories listed above. These situations have been experienced by many organizations in their pursuit to succeed in their markets. The good news is that over the past 20 years, several uniquely effective Innovation tools, methods, and tactics have emerged to address each of the concerns listed above.

III. Sorry, One Size Never Fits All

When fixing household problems, we don't always grab a hammer, we try to select the most appropriate tool for the job; a screw driver to remove batteries from a toy, a wrench to

tighten your daughter's kick stand, silicone to repair a small leak, and yes, duct tape for almost everything else.

Most people have heard of Maslow's "if the only tool you have is a hammer, everything looks like a nail." Just as we should select the right household tool to get the job done well, we must do the same for Innovation tools. For product and service development, there are well over three dozen Innovation tools we recommend; each with their own strengths and weaknesses. Knowing this, the trick becomes twofold;

1) Knowing which tool(s) are best for your specific "inventive situation"
2) Learning how to use the tools properly that apply to your situation

For reason #1 above, we have created a "Systematic Innovation Tool Selection Matrix" partially shown in **Figure 2** below. It is extremely rare to need or use all the Systematic Innovation tools, but common to use more than one at a time. This Tool Selection Matrix aids a team or individual in determining which Innovation tool(s) are best to use for their "inventive thinking" situations.

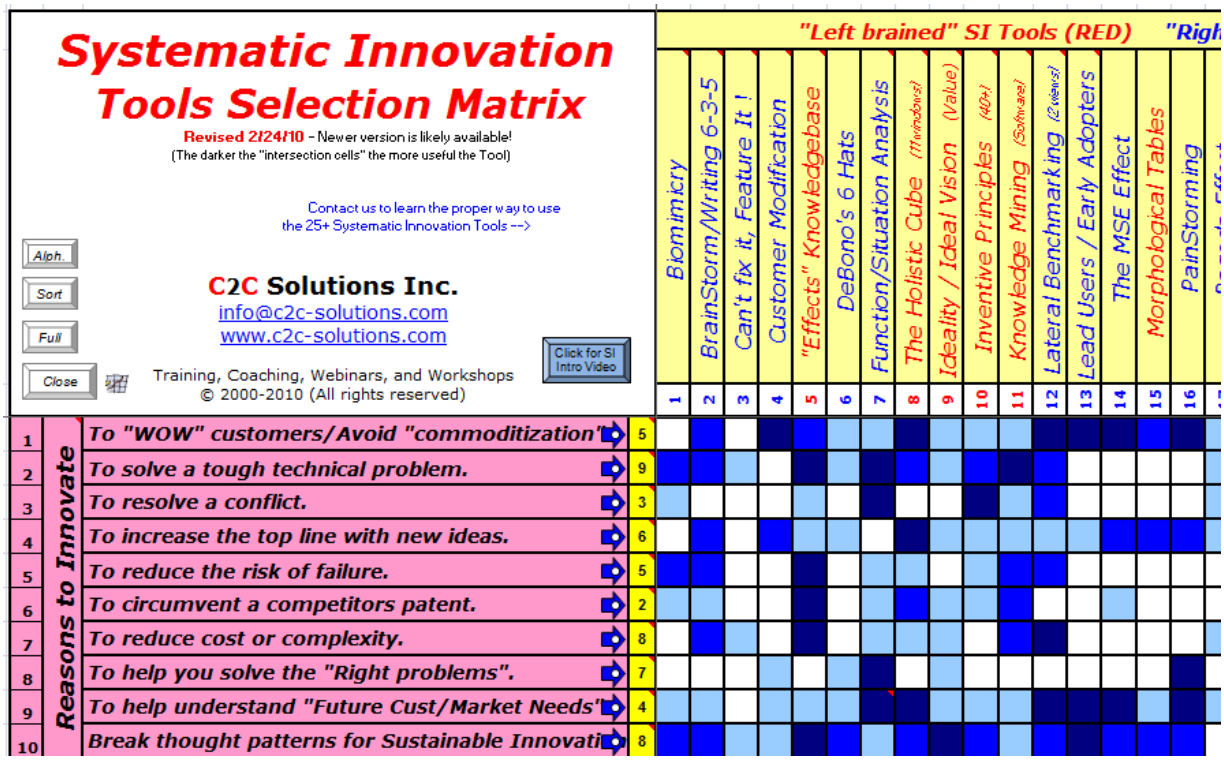

Figure 2 *– SI Tool Selection Matrix (top portion, partial list)*

On the left side of the matrix, we placed several universal "Reasons to Innovate." Across the top is an extensive set of the "Systematic Innovation Tools" we recommend. We designed the intersections to show the usefulness of each of the Innovation Tools. The intersections simply show how well each of the tools address the 10 "Reasons to Innovate." The darker the cells, the better the tools are at addressing that particular reason to innovate. The most common way you can use this matrix is to first determine why you need inventive thinking, and then look horizontally across the intersections for the best tools for your particular situation. For example, if you needed to reduce cost or complexity,

reason #7, you would use Brainwriting 6-3-5, The Effects Knowledgebase, Knowledge Mining, Lateral Benchmarking, the Trimming Technique, and so on.

Back to our automotive client example: As you remember, they were in desperate need of some new features (USPs) for one of their next generation vehicles to maintain market share in a crowded segment. Looking at the "Reasons to Innovate," their request best matched reason #1; To "WOW a Customer." The intersections with the darkest cells were the ones we used with that project team (Brainwriting, Customer Modifications, Effects, The Holistic Cube, Lateral Benchmarking, Lead Users, The MSE Effect, Painstorming, etc). As a result, over 240 ideas were generated and about a dozen finalists went on to a more detailed design phase with concept reviews. Three ended up in the vehicle, including the first vehicle integrated heated or cooled cup holder with no moving parts.

Systematic Innovation Tools Selection Matrix

Revised 2/24/10 - Newer version is likely available!
(The darker the "intersection cells" the more useful the Tool)

Contact us to learn the proper way to use the 25+ Systematic Innovation Tools -->

Alph. Sort Full Close

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Click for SI Intro Video

"Left brained" SI Tools (RED) "Righ

		Biomimicry	BrainStorm/Writing 6-3-5	Can't fix it, Feature It !	Customer Modification	"Effects" Knowledgebase	DeBono's 6 Hats	Function/Situation Analysis	The Holistic Cube (11 windows)	Ideality / Ideal Vision (Value)	Inventive Principles (40+)	Knowledge Mining (Software)	Lateral Benchmarking (2 views)	Lead Users / Early Adopters	The MSE Effect	Morphological Tables	PainStorming
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Extra info on the SI Tools	Is Software Needed? (**Y**-Yes, **N**-No, **A**-Available)	A	N	N	N	Y	N	A	N	N	A	Y	A	N	N	A	N
	Applicable for Products/Mfg. Processes? (**S**)trong, (**W**)eak, (**N**)o	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	Applicable for Software Development? (**S**)trong, (**W**)eak, (**N**)o	N	S	W	W	N	S	S	W	S	W	W	S	S	S	W	S
	Applicable for Service/Business Processes? (**S**)trong, (**W**)eak, (**N**)o	W	S	S	S	N	S	S	S	S	W	W	S	S	S	S	S
	Overall Difficulty to "Master" the Tool. (**1**-Low, **5** High)	3	1	3	2	1	3	4	2	3	3	2	2	2	2	2	2
	Idea "Abstraction Level" (**1**-Very General, **5**-Very Specific)	2	3	1	5	4	2	3	4	2	2	5	5	3	3	4	3
	Customer Input Needed? (**Y**- Yes, it is helpful, **N** - No)	N	N	N	Y	N	N	N	Y	Y	N	N	N	Y	N	N	Y
	Tool Impact Rating (Importance Weight x Impact)	140	190	80	140	270	120	260	240	150	180	200	250	160	170	120	200

"Priority Weighting" --->

***Figure 2b**– SI Tool Selection Matrix (bottom portion, partial list)*

As shown in **Figure 2b** above, the SI Tool Selection Matrix also has a section with additional information about each of the Systematic Innovation Tools:

- Is software needed to use the tool? The bad news: Two of the 30+ Innovation Tools on the matrix need third party software. The good news: The rest of the tools do not need software!
- Applicability of each tool This line item clearly shows which tools are applicable for product, services, software, or business processes development. (Not all tools work for all types of projects; remember, no silver bullets!)

- Overall difficulty to master the tool. Just like any handyman tool, some can be learned in minutes (a screw driver) with a high degree of competence while others (a four axis drill press) take much more time and practice to master.
- Abstraction level of suggestions that will come from using the tools. Some tools will give you very specific suggestions; others will give you high level generic directions to ponder.
- Is customer input needed for the tool? Some tools require input from customers; others are completely independent from customer input. Imagine that!

IV. Just because it's a NEW idea doesn't mean it's a GOOD idea!

As you have seen above, there is a diverse set of "Idea Generation & Problem Solving Methods" available, but we all know, not all ideas & concepts are good ideas. For this reason, Idea Generation must be complimented with additional best practices to reduce the likelihood of "bad ideas," that is, ideas that will not succeed in the market. This is done to make product development efficient while ensuring value for the ultimate beneficiary, your internal and external customers.

Figure 3 shows a bird's eye view of C2C's 8-Step process we use for Systematic Innovation. The SI Tool Selection Matrix discussed earlier is used in Step 3. There are two very important steps before that that should be considered.

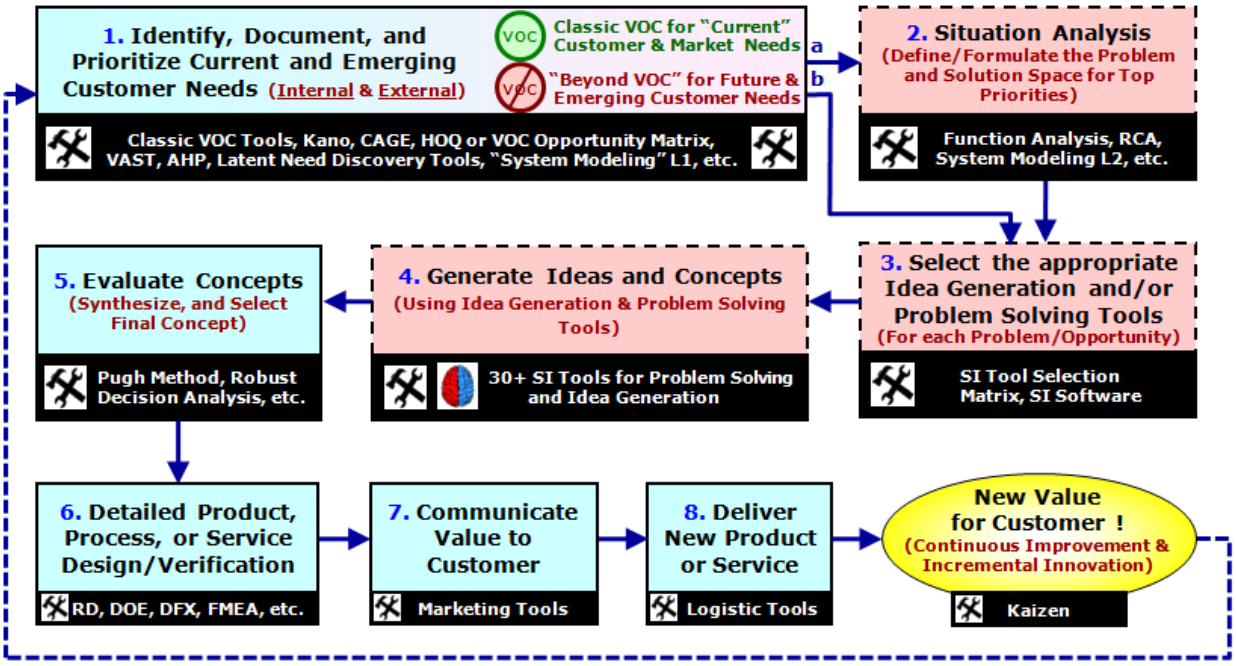


Figure 3 – *8-Step Process for Systematic Innovation*

There is considerable detail and explanation behind each of the eight steps shown above. This detail is beyond the scope of this introduction, but certainly available upon request.

An important and essential step in any project is the "Project Charter" in which the team

and management identify the stakeholders, targeted customer and market segments, project global goals, scope, constraints, team membership, etc. You can consider the project charter to be a prerequisite to this 8-Step process. Below is a very brief description for each of the eight steps in the Systematic Innovation process shown above.

- **Step 1 – Identify, Document, and Prioritize Current and Emerging Customer Requirements** – In this critical step we begin to understand requirements by not only using conventional Voice of the Customer (VOC) methods, but also by recognizing the fact that customers, especially external, are simply not effective at articulating all their requirements that will win their future business. There is a lot of truth in a quote heard from a 30 year marketing executive:

  "Customers don't know what they want, they want what they know."

  The point here is that most customers know what they want today, but have a hard time articulating what they will want tomorrow. Knowing this, we must expand on what customers have articulated with Latent Need Discovery Tools to better understand emerging requirements. These emerging requirements often come in the form of "current and future problems" that need to be understood and solved. The solution to these problems will likely separate the leaders from the pack in a competitive landscape.

- **Step 2 – Situation Analysis** – In this step, when necessary, we analyze our highest priority requirements (whether external or internal) to deeply understand the situation and potential solution space. One of the several outputs of this step is to discover "standard" or potentially "reformulated" problems. Standard problems are problems that are generalized or abstracted into a form that has been seen or solved before. This way, we can more easily leverage a vast amount of existing knowledge from a cross industry and discipline database and "best practices" to address these standard problems. Reformulated problems are problems that have been elaborated to the point that allows for a completely different solution path than the original problem statement. The newly reformulated problem statement may be much easier to solve than the original problem statement. Situation Analysis and Function Modeling tools assist here.

- **Step 3 – Select the appropriate Idea Generation and/or Problem Solving Tools** – This step was described in detail earlier in the "Sorry, One Size Never Fits All" section. In this step we use the Tool Selection Matrix shown in **Figure 2**. Note: When the problems or challenges are well understood in advance, it is not uncommon for a project team to start here in Step 3. In this case, the assumption is that Steps 1 and 2 have been adequately completed. In other words, the internal and external customer requirements are well understood and the problems or challenges the team needs to solve are clear and truly reflect the top project priorities.

- **Step 4 – Concept Generation using appropriate SI Tools -** In this step we select a handful of appropriate Idea Generation and Problem Solving tools from the SI Tool Selection Matrix to generate conceptual ideas. Over 36 distinct tools exist. More detail and examples of these tools in this step are discussed later in this introduction.

- **<u>Step 5</u> – Evaluate, Synthesize, and Select the Final Concept –** Here we use a comprehensive set of objective criteria to evaluate, synthesize, and select a final concept. The output of this step is the one or two "best concepts" that we need to further develop.

- **<u>Step 6</u> – Detailed Product, Process, or Service Design & Verification -** Once concepts are generated, detailed design, engineering, optimization, and verification must be executed. Several design and development best practices are used here.

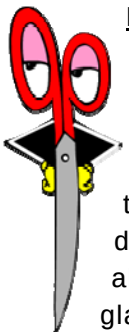
- **<u>Step 7</u> – Communicate Value to the Customer –** The best ideas won't survive if the value of the offering isn't understood or communicated well to the customers. Strategies on how to improve the acceptance of new ideas are understood and executed here.

- **<u>Step 8</u> – Deliver New Product or Service –** In this step typical logistical planning tools to ensure a prompt and problem free delivery and distribution.

V. Case Studies: Idea Generation & Problem Solving Tools

This section was written for those people who like to see some examples and specifics of how the tools actually work. In our training, workshops, and webinars we go into great depth with step-by-step algorithms for each of the tools as well as many examples. This section will scratch the surface on three of the roughly 30 methods, but give a flavor for their applications.

As you remember, in Step 4 of our Systematic Innovation Process (**Figure 3**), there exists well over three dozen specific tools for problem solving and idea generation. As mentioned earlier, since there are many of these tools, the SI Tool Selection Matrix (**Figure 2**) is used to select the most appropriate tool or set of tools for your situation. It is very common for a given situation to use several tools simultaneously or in sequence to generate ideas. Below, we are going to show you brief examples of three of the tools in action. We will introduce three of the 30+ techniques. (The Trimming Technique, Memorable Sensory Experience, and the Separation Principles)



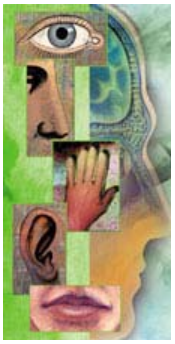
<u>EXAMPLE 1: The Trimming Technique</u> – This is one of the more versatile Idea Generation and Problem Solving tools because it is applicable for many situations that call for inventive thinking. The Trimming Technique challenges and questions your current assumptions. Doing this often leads to very interesting and innovative ideas. Trimming's underlying assumption is the theoretical ability to eliminate (trim) ANY part of ANY system or ANY step in ANY process. It clearly describes six thought provoking "rules or directions" that force your mind to think along directions that are a bit uncomfortable and may seem ineffective at first glance, but often lead to new ideas.

Let's take a simple product example where a team proposes the following question: Could we trim the fan in a computer or a video projector? The obvious answer is "No, if we do that it will overheat!" We have found that one of the hardest aspects of the Trimming

Technique is to give yourself permission to explore the possibilities of trimming anything. Common psychological inertia or existing paradigms cause these questions to be uncomfortable. When there is a call for inventive thinking, comfort is something you should temporarily throw out the window. Having said that, to keep things in perspective, the opposite is also true, that is, relaxation and comfort, in a stress free atmosphere, helps the sub-conscious creative juices flow. While this is another fascinating topic to explore, it is also a separate discussion.

Trimming is a proactive and conscious activity that has your mind consider six problem solving directions. These directions are somewhat uncomfortable and unconventional. **Trimming Rule #1 of 6** asks you to consider using other elements of the system or environment to provide the function the trimmed element used to perform. For a projector or computer, these are the elements that make up the product or other elements in the surrounding environment, which are called "the supersystem." The elements of a projector are the motor, bracket, power supply, housing, lens, etc. The supersystem elements are the table it sits on, the air it interacts with, the user that sets it up, etc. One theoretical concept is to have a system element, the bracket that holds a motor, act as a heat sink for the bulb. This way, through conduction, heat could theoretically be dissipated. If that sounds impossible consider the Apple Mac G4 Cube. When introduced in late 2000, Apple trimmed the fan and had a central heat sink that used the simple fact that heat rises. It continually moved the heated air through the hollowed heat sinked center of the computer, no fan at all.

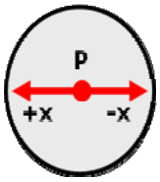
Trimming Rule #4 of 6 challenges the actual function of the object you want to trim. Sometimes you can get by without that function. The function of the fan in a projector is to cool the projector bulb. We now contemplate the question; do we have to cool the bulb? This question poses a completely different direction to consider. Is it possible to simply select an alternative bulb that operates reliably at hot temperatures? Worth thinking about! If those two rules don't foster ideas, the Trimming has a total of six thought provoking rules.



EXAMPLE 2: The Memorable Sensory Experience (MSE) capitalizes on the importance of "the experience" for the end users. This is exactly why people will pay a 300% premium for a cup of coffee at specialty coffee shops or meal at a high end restaurant. It is the whole experience that contributes to value, not just the product or service alone. The idea behind the MSE effect is to incorporate multiple "senses" into the product or services to create a poly-sensual experience. To do this, we should consider the five classic senses (Touch, Taste, Smell, Sight, and Sound) as well as the sense of "humor / entertainment / enjoyment" and "extra intelligence", totaling seven senses to consider incorporating into your customers' experience. Of the seven senses, the one that is most difficult and simply not appropriate in most cases is taste. Unless you have a product that you eat or will go in the mouth, taste will not apply. An example of this is a dental floss and tooth paste manufacturer who came out with mint and cinnamon flavors. They both enjoyed a significant market share increase for a period of time until the competitors copied the idea.

The Sense of "Extra Intelligence" can be found on many innovative offerings from vehicles that tell you how "green" you are driving, to grocery store packaging that tells you how ripe your purchase is, to sacrificial sensors on heavy equipment that tell you when a part is about to wear out so preventive maintenance can be performed, to a sports car that tells you your 0 to 60 time and lateral g-forces.

In the US, Southwest Airlines enjoys very high customer ratings, partially due to the sense of humor, friendliness, and entertainment of the staff on and off the plane. The iPhone is an undeniable and overwhelming success in the market. Apple didn't accidently excel in five of the seven MSE categories! (Exceptions are taste and smell). Another interesting example is a wine manufacturer that proactively incorporated all five classic senses into the wine and bottle. Four of them are obvious inclusions; taste, smell, sight, and the feel of the bottle. The not so obvious one was sound. How is sound brought into a bottle of wine? The manufacturer went out of its way to change the geometry of the bottle to make an elegant and distinct "glurp, glurp, glurp" sound when poured from the bottle into a wine glass. These small and subconscious cues add to the overall "experience" of the product.



<u>EXAMPLE 3: The Separation Principles</u> contains four thought provoking strategies to deal with a specific type of problem, namely a Physical Conflict or Contradiction (PC). A PC is a situation where you have a parameter or characteristic you want to have in two mutually exclusive states. This happens far more often than you may think, but people typically discount or ignore these types of problems because they believe they are impossible to solve.

Examples of Physical Conflicts are:

- A knife that you want "sharp" to cut, but "dull" so it doesn't injure anyone,
- A television that is "big" for parties, and "small" so it doesn't take up much space,
- A bike tire that is "thin" for rolling resistance, but "thick" for traction,
- When manufacturing a particular type of fabric material, you want to run "hot" to improve material strength, but "cold" to improve material durability,
- An procedure you "want" for safety, but "don't want" because it is time consuming,
- A speed bump you "want" to control fast drivers, but you "don't want" because they are annoying to drive over.

In the late 1990s, Palm and many other keyboard manufacturers in the world struggled with the conflict (physical contradiction) of "big keys" for large hands and comfort and "small keys" for portability and desk space. In this case, the Separation Principles were the key (no pun intended) to solving the Physical Conflict. Palm eliminated this age old problem when they introduced a brilliant foldable keyboard for their line of PDAs. It was the world's first full size small keyboard.

The first eyeglasses for far-sightedness were invented in the 13th century and approximately 50 years later, eyeglasses for near-sightedness were invented. It wasn't until the year 1760 that Benjamin Franklin solved the 500 year old problem of "I want prescription A for

distance and prescription B for reading" without having to buy two separate pair of glasses. Franklin's brilliant idea was the revolutionary bifocals. Without knowing it, Franklin may have been the first to use a now common "Inventive Principle" called "**Separation in Space**" which is used for "separating" a physical conflict, which in this case is a convex lens and concave lens. He separated the lens characteristics on the same lens but in different "spaces," namely the top and bottom of the lens. The foldable keyboard separates the conflict "big keys" for big fingers and "small keys" for portability by using the Inventive Principle **Separation in Time**. They make the keys big only when we need them, then small by folding them all other times.

If separating the Physical Conflict in Time or Space does not lead to ideas, there are two other Separation Principles, namely, **Separation upon Condition** and **Separation between the Parts and the Whole**. These four Separation Principle techniques come from an Innovation methodology called TRIZ, a Russian technique that began its development in the 1950s and continues today. TRIZ is a Russian method that translates into The Theory of Inventive Problem Solving. TRIZ has several other methods and tools under its own umbrella that aids the problem solver to unique thinking paths to help solve problems quick and more elegantly.

VI. Summing it all up

The Trimming Technique, MSE Effect, and Separation Principles described above are only three of well over three dozen Systematic Innovation methods for Problem Solving and Idea Generation. These three examples just begin to scratch the surface on the breadth and depth of Innovation and Inventive Thinking tools and catalysts that are available. Below, **(Figure 4)** shows a partial list of the "Right and Left Brained" tools available in Step 4 of the 8-Step Systematic Innovation process shown in (**Figure 3**).

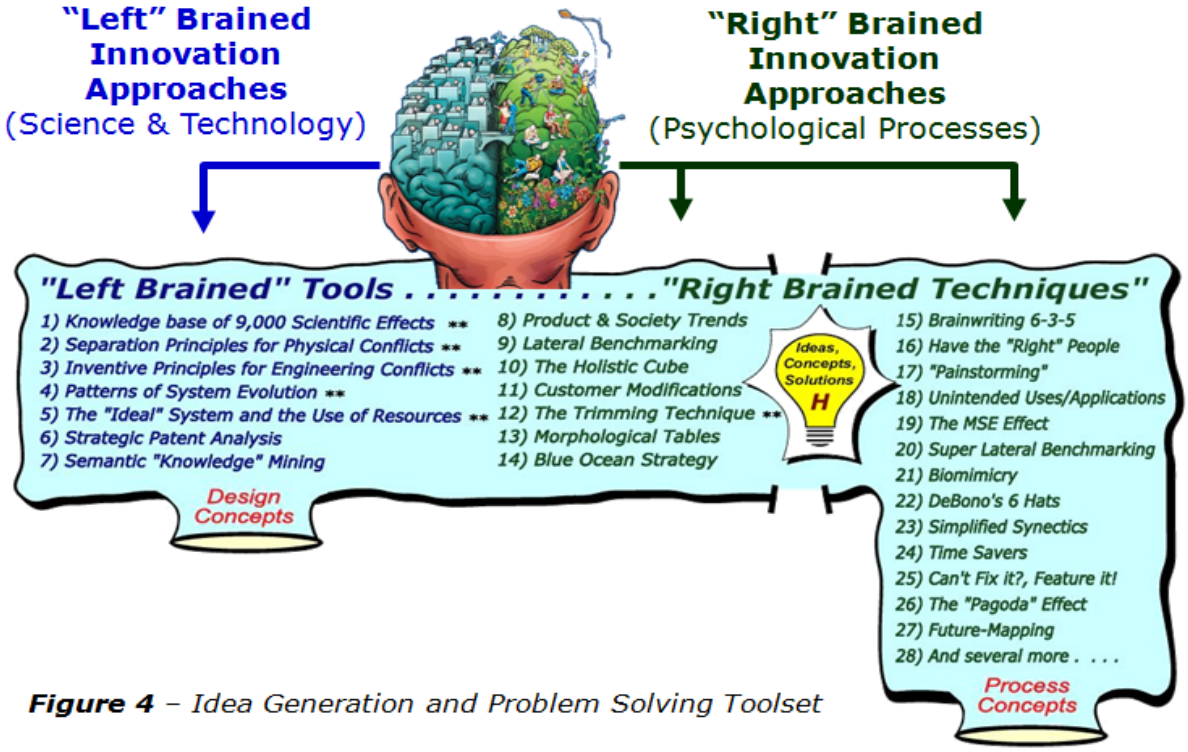


Figure 4 *– Idea Generation and Problem Solving Toolset*

It is well known that many believe structure is the enemy of Innovation. We believe in most situations, too little or too much of anything is harmful and/or counter-productive. For those who seek to improve Innovation and inventive thinking skills, it is clear that the right amount of structure and best practices can dramatically improve your Innovation IQ and Success Rate. The 8-Step Systematic Innovation process described combines just the right amount of proven and practical structure with the flexibility to customize, bypass, or add your own best practices to fit any project's situation.

The key insights we hope you took away reading this white paper are:

- *Innovation tools are not one size fits all. The tools you select depend on the Innovation job or situation you are trying to accomplish.*
- *Customers can only tell you part of the success formula. You must go beyond what the customers can articulate to obtain a comprehensive set of requirements.*
- *Everyone can significantly enhance their Idea Generation and Problem Solving skills.*
- *Innovation applies to much more than just products.*
- *Several "Innovation Best Practices" have been created, refined, and optimized over the last 20 years and are being leveraged by industry leaders all over the world.*
- *Innovation can be effectively learned and integrated in any organization.*
- *The right type and amount of structure are the friend's of Innovation.*

Misconceptions	Truths
Innovation and creativity cannot be taught, you either have it or you don't.	• *Everyone is born with creative abilities.* • *Creativity and inventive thinking skills slowly erode while growing up, being educated, and adapting to your environment.* • *This erosion can be stopped and even reversed.* • *Systematic Innovation is being taught and used by many of the world's most successful companies.*
Innovation is only for the R&D group working on new or urgent projects.	• *Innovation can and should be present in all aspects of your business including human resources, logistics, accounts payable, manufacturing, business processes, product design, engineering, and manufacturing.* • *Innovation can be incremental for small evolutionary changes and/or radical for paradigm shifting results.*

Additional Resources

a) To download or view additional material on Systematic Innovation, visit our web site at www.c2c-solutions.com. There you will find videos, white papers, flowcharts, workshops on the Innovation tools, training outlines, and in the future, an updated version of this paper.

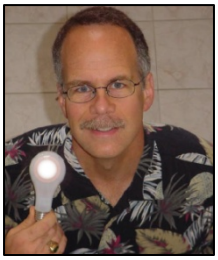
b) Contact us about our training, workshops, facilitation and modular webinars on Systematic Innovation topics. Ask us about our custom built workshops. You choose the topics, length of time and we will design a custom workshop around your specific needs. info@c2c-solutions.com

c) Check out a few video tutorials on understanding your customers' needs better than they understand their own needs, visit: www.kanomodel.com See Kano and CAGE Model videos.

d) Contact me directly with ANY questions: verduyn@c2c-solutions.com

About the Author

David Verduyn is a principal of C2C Solutions Inc., (www.c2c-solutions.com) a company that specializes in best practices for the front end of Product Development. Dave has over 20 years



industry experience in design and systems engineering, technical instruction, product development consulting & technical course development. Since 1985 he has worked with over 150 fortune 500 companies in the US, Europe, Asia, Australia, Mexico, and Canada and has trained thousands of engineers & product developers in product development methods including Systematic Innovation, TRIZ (Theory of Inventive Problem Solving), VOC (Voice of Customer), FMEA (Failure Modes & Effects Analysis), QFD (Quality Function Deployment), Value Analysis, and other Lean Design for Six Sigma (LDFSS) Methods. Dave has a broad range of practical experience including Automotive, Consumer and Industrial Products, Medical Systems, Defense and Service Industries.