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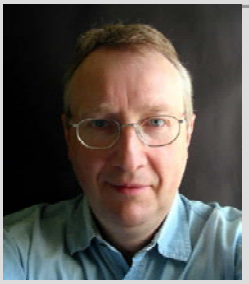

Process Innovation

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P-TRIZ in the History of Business Process

Part 3 in a series on P-TRIZ

The history of BPM is long and rich. It began in the 1920s and was dominated by Frederick Taylor's theories of management science, empowered by Carl Barth's machining slide rule technology. In a second wave, industrial processes were manually reengineered and, through a one-time activity, cast in concrete in the bowels of today's packaged enterprise applications technology. In a third wave of BPM, executable digitized processes are now freed from their castings as engrained software to re-emerge as a flexible new form of process data. An era of process manufacturing has been ushered in. With these new capabilities at hand, attention is turning once again towards *process innovation.*

Each era of BPM has added new capabilities to the last. For example, BPM systems enable process architects to readily deploy creative new process designs, sidestepping time and resource intensive implementation projects of the past that so denuded and distorted reengineering of its creative potential.[1] Now, P-TRIZ is an emerging method that builds on the shoulders of those giants (Figure 1 on page 2).

P-TRIZ is the application of modern TRIZ towards business process improvement, innovation, and transformation. Coupled to BPM methods, it provides the engineering discipline that amplifies the creativity of those who seek to re-design processes.

While not dependent on formalized process modeling – e.g., BPMN – P-TRIZ builds on those notations and tools that structure the way processes are represented in terms of participation, control flow, and data flow. Whether or not a process has been modeled in BPMN, P-TRIZ allows it to be analyzed from an "innovation" viewpoint. This includes

- Development of useful-harmful functional models of process
- Identification of process-contradictions: conflicting function points that link problem-solving knowledge to pain-points
- Generation of solution (BPR) pathways (P-TRIZ formulation)
- Management of a "world" solution knowledge for process re-design patterns
- Opening a path to process "Ideality"

[1] 50 Case Studies of BPM: Smith, H., "From CIO to CPO via BPM: The Next Generation of Enterprise Automation," Computer Sciences Corporation, http://www.csc.com/features/2005/38.shtml

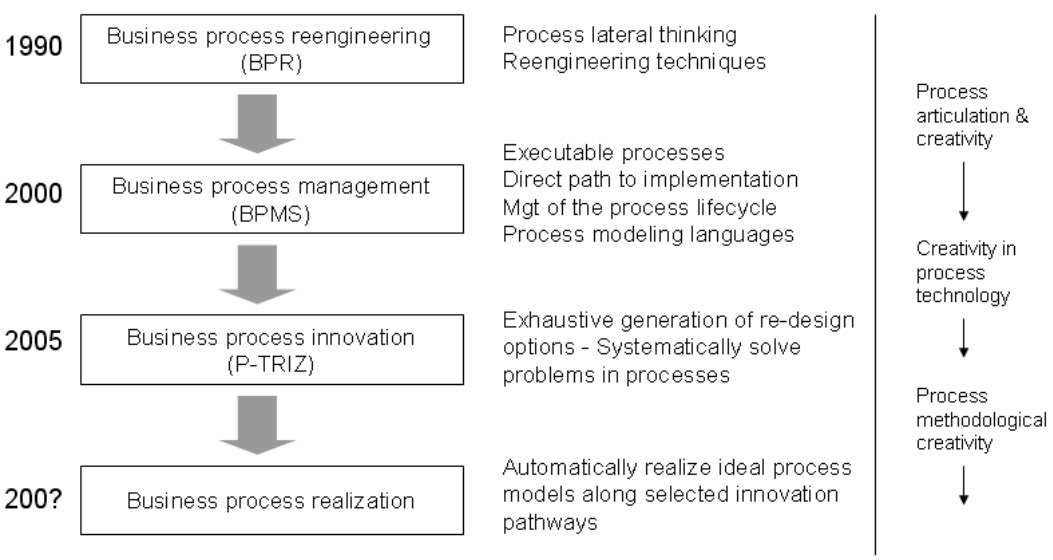

Figure 1. Eras of BPM

TRIZ has proved effective at modeling problems in engineering contexts. The same technique can be used to model problems within business processes, opening directions for process improvement. Inherent contradictions typical in processes –for example between time and risk, cost and resource, quality and time, complexity and management – can be modeled and analyzed, and solution options identified. The approach gives a large advantage for structuring the process re-design activity, avoiding the "blank sheet of paper" problem, opening dialog among team members, and stimulating the flow of ideas.

P-TRIZ lets practitioners capture the "why" aspects of solution design in addition to the "what/how" inherent to today's BPM modeling paradigm. P-TRIZ will be of interest to process and org-change practitioners who have never modeled a business process formally in their life.

What Process Innovation Is

While the term "process innovation" has been bandied about for decades, I define it differently from other process experts. A decade ago, Thomas Davenport wrote eloquently about what he called "process innovation."[2] In that important work, the word *innovation* was used in two distinct modes:

1. *Innovation = Adding in technology to drive process change.* For example, in Figure 3-2 on page 47 in his book, Davenport gives the example of how a product database can be used to enable the movement of product information in the firm, giving raise to enhanced product management in terms of economic outcomes. New technology fosters process change.
2. *Innovation = Human creativity during "reengineering."* The reengineering literature is littered with creative ideas for new processes. Here's a small one: Instead of requiring managers to pre-approve low value travel requests, why not simply trust staff and let

[2] *Process Innovation: Reengineering Work through Information Technology,* Thomas Davenport, HBS Press, 1993

them manage their own ad-hoc travel needs out of salary? This simple innovation saves time and hassle for all.

What Davenport and others were writing about at the time was process *invention,* not innovation. *Invention* is a creative act. By contrast, *innovation* is the end-to-end process by which improved, renewed, or replacement products, solutions, and services are delivered in practice, generating new "top line" business value. P-TRIZ is part of the journey towards a comprehensive process engineering that is less reliant on unreliable, sporadic, and ad-hoc creativity (Table 1).

Business Process Reengineering (Invention) ▪ Decades old technique for re-inventing business processes ▪ Based on management wisdom, creativity, common sense change management and rules of thumb ▪ Example: Introduce a case worker; Create a parallel activity; Introduce a new system; Perform an activity in advance ▪ Landmark books: *Reengineering the Corporation*, Hammer & Champy, *Process Innovation*, Davenport	**Business Process Innovation** ▪ Use of modern innovation methods (P-TRIZ) to accelerate and systematize the generation of reengineering options ▪ Amplifies the creativity of practitioners to exhaustively explore re-design alternatives ▪ Knowledge management (problem-solution) of process patterns ▪ A reliable and guided process to resolve contradictions in process design
Business Process Management (Systems) ▪ The discipline of using process models as a direct basis for the implementation of IT systems in support of those processes ▪ The use of IT solutions (BPMS) to govern the lifecycle of process improvement: discovery, design, deployment, execution, operation, change and optimization ▪ A digital representation for business process ("process as data") opening the door to manipulation, generation, transformation, not just automation ▪ Obliterating a business-IT divide – empowering the business user ▪ Landmark: Business Process Management: The Third Wave, Smith & Fingar	**Business Process Realization (Transformation)** ▪ Future vision: An automated "To be" process generator ▪ P-TRIZ directions, linked to P-TRIZ operators, traverse an "As is" process model to generate a future process (increased Ideality)

Table 1. Four steps towards comprehensive process engineering

Everyone has his or her own definition of innovation.[3] It is now generally agreed that innovation is distinct from creativity and invention, and that it is an end-to-end process whose objective is the generation of value. Far from a sporadic inventive act, leading organizations treat **innovation** as a systemic and systematic activity. That process can, within limits, be codified and improved. P-TRIZ is making its contribution in the domain of process design.

Companies sorely need *creativity and talent,* but they also need more than bright ideas when reengineering. Dreaming up a process on a whiteboard is one thing, making it happen quite

[3] Smith, H., "What Innovation Is – How Companies Develop Operating Systems For Innovation," Computer Sciences Corporation, http://www.csc.com/features/2004/57.shtml

another. Making effective progress requires more than inspiration, it requires a method. For too long, BPM has been an art. If results from BPM projects are overly dependent on expensive consultants or rare insightful managers, BPM will never cross-the-chasm and take its place among side more established business practice.

My belief is that the next frontier for those wishing to advance the field of BPM is where they will put themselves out of a job to turn BPM into a science, and deliver it in a form that can be used by everyman. Where BPM put the engineering back into the IT-side of reengineering, P-TRIZ seeks to inject engineering into the creativity side of BPR.

My vision for P-TRIZ is this: Where a BPMS can free business users from dependence on technicians for the IT change around process, P-TRIZ will free them from dependence on specialists for the process re-imagining around change.

What's An Ideal Process?

If business leaders are to have full confidence in BPM methods and tools, process *innovation,* not just process *invention,* must guarantee a progression towards more *ideal* processes. This is what P-TRIZ seeks to achieve.

Research of the world-wide patent base and other sources of mankind's inventive achievements by TRIZ specialists have revealed the following general pattern: Technological systems tend to evolve in the direction of increasing *ideality.* In other words, systems become smaller, less costly, more energy efficient, pollute less, and so on. Here is an example: The first oil tanker was 50% by weight of oil and 50% by weight of vessel. Today's super-tankers have a ratio of 98% oil to 2% vessel. In this respect today's super-tankers are more ideal.

Processes are also technological systems. They comprise many participants – people, systems, and machines – and they operate much like a complex machine with many concurrently executing parts. They too will tend towards ideality. If your competitors offer more ideal processes, your company is at a disadvantage. All companies should be on the look out for more ideal processes: That is what *process innovation* means.

In part two of this series I showed how to model a process in terms of its useful and harmful elements and their interactions. To get a measure of ideality, it is helpful to think of the ratio of a system's useful *functions* to its harmful *functions.*

$$\text{Ideality} = \frac{\text{Sum of (Useful functions)}}{\text{Sum of (Harmful functions)}}$$

As useful functions are added or enhanced, and harmful functions are removed or reduced, ideality tends to infinity.

For processes, functions (useful or harmful) are their outputs, activities, actions, steps, resources, tasks, or any other factors inherent to the execution of the process. The useful functions can be classified as follows:

- Primary useful function – the purpose for which the process was designed

- Secondary functions – other useful functions that the process provides in addition to the primary useful function
- Auxiliary functions – functions that support or contribute to the execution of the primary function, such as corrective functions, control functions, compliance functions, etc.

The harmful functions of a process include all of the baggage associated with the delivery of its primary or secondary functions. Examples include the cost to design, implement, or operate the process, the resources it consumes to provide is output, the organizational "space" it occupies, the "noise" or "distraction" it creates, the "human energy" it consumes, the "resources" needed to maintain it, and so on.

I*deality* is clearly a qualitative assessment rather than a quantifiable number. Nonetheless, the concept of ideality is important, as it helps us understand what reengineering must achieve – a more ideal system or process. It drives us to think about the process of process re-design so as to achieve ideality.

"Vanish ye Process"

Given the definition of ideality as the ratio between a system's useful functions and its harmful functions, we can imagine the most ideal system of all. It would be a system in which there are no harmful functions at all – in other words, it would cost nothing to design, implement, or maintain, use no energy, take up no space, would emit no harmful byproducts, and so on. Stated another way: An ideal system is one whose functions are performed without the system existing; no "system" at all, just all the benefits.

Taking this TRIZ principle and applying it processes, we have this: The objective of reengineering is to **get rid of processes altogether!**

Wouldn't we like all processes to be this way? Wouldn't it be great if product availability could be achieved without inventory? Wouldn't you like to consume services at zero cost to you? Shouldn't a supply chain operate without a supply chain process?

We never actually need a process; what we really need is a *function.* While this statement may sound strange coming from someone like me who advocates process-thinking, it is undoubtedly true. The objective of reengineering is to turn processes into functions, and to remove activity, leaving benefit.

A simple example: We need transportation rather than a car. All harmful effects of cars are associated with the car-process (the engine, combustion, manufacturing, etc.), rather than with the car's useful function – personal freedom.

So is an ideal process a non-existent system – no process at all? Clearly, this definition is not something that can be used as a design specification, but the implication is important: Do we need, for example, a system called "steering wheel"? No, what we need is a method of controlling the car. Do we need a system called "computer keyboard"? No, we need a means by which information can be input to a computer.

Ideality – sometimes called the Ideal Final Result in TRIZ – is part of a collective wisdom. How often has it been said that business processes are best designed to provide their benefits in the *simplest* possible manner? Now we know what that means. We aspire to take the process out of the process. P-TRIZ is bringing a science and approach to that common sense wisdom.

The P-TRIZ Method

In part 2 of this series[4], a notation for innovation was described. That article then went on to explain how such diagrams can be used to generate process re-design alternatives. Figure 2 illustrates this primary role of P-TRIZ in BPM.

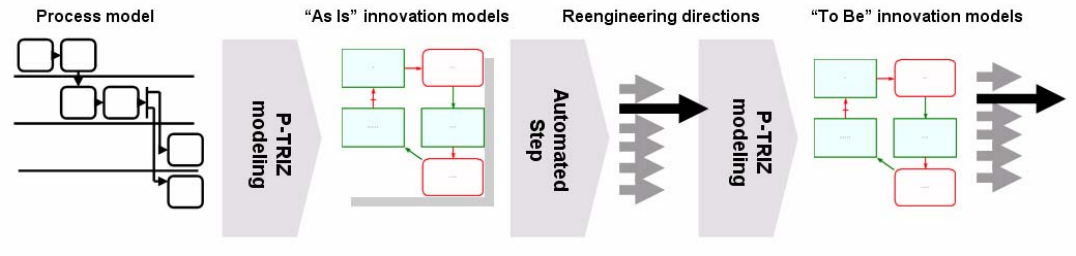

Figure 2. A P-TRIZ method

Any "As Is" process model, whether formally documented or not, can be modeled using P-TRIZ. These innovation models show the causes and effects between useful and harmful functions of the process. A tool is then able to generate re-design alternatives. Alternatives can be reviewed, and, for chosen directions, further P-TRIZ modeling can reveal problems that would hinder or enable (harmful, useful) the implementation of a more ideal "To Be" model alternative. These models generate more output from P-TRIZ, potentially allowing a recursive analysis leading to a chosen solution.

Is Anything Ever Completely Useful Or Harmful?

Do this little experiment: Try to find something in the world or within the realm of ideas for which there is only an upside, or a downside. You will fail. Everything is both useful and harmful. Yin-Yang!

All real-world processes contain at least one harmful function. As process engineers, we work to reveal, and then eradicate, the harmful functions. We convert "As Is" process designs toward "To Be" process designs by transforming the cause-effect links between useful and harmful elements, and by finding solutions (new functions) that convert harm into useful output. We also limit or counter-act the effect of harmful functions by exploiting many kinds of available resources within or surrounding the domain of the process and its environment – including relationships, time, finance, and many other types of *resources.* As we shall indicate in future articles, resource analysis plays a great role in P-TRIZ.

Processes Can Be Analyzed For Innovation, Even If Never Modeled For Execution

There is a wealth of writing about how best to model a business process. It's overwhelming for most mortals. Many of us were introduced to "swimlanes" via the work of Rummler and Brache[5]. Today, businesses are being encouraged to use workflow or BPM tools, and to embrace modern process development standards such as BPEL 2.0 and BPMN. There has also been a healthy

[4] "P-TRIZ Formulation", Smith, H., #2 in a series, BPTrends.com March 2006
[5] *Improving Performance: How to manage the White Space on the Organization Chart,* Rummler, G. A., Brache A., P., Jossey-Bass, 1990

track of research, advocacy, and practice in the area of Role Activity Diagrams. The BPM field is littered with terminology and diverse methods. This is its Achilles heel.

Global2000 organizations are almost universally embarking on multiple process improvement exercises in order to increase organizational efficiency and effectiveness. In many cases, this requires the creation of entirely new processes. These efforts go by many names, including industrial engineering, ISO certification, Six Sigma, Sarbanes Oxley, enterprise architecture (EA), enterprise business architecture (EBA), business process improvement (BPI), business performance management (the other BPM), BPR, Audit and Compliance, Integrated Definition Function Modeling (IDFM), and Lean Thinking, to name but a few.

The diverse BPM methods are littered with diverse notation and syntax, including, Entity Relationship Diagrams (ERD), ANSI standard flowcharts, Data flow diagrams, Unified Modeling Language (UML), Catalyst, LOVEM, CRUD (create, read, update, delete) matrices, IDEF charts (0 through 9), and EPCs (event chains). I'm sure you will add many others. Yet it's all process work underneath – work with processes, and work in processes.

A simple unification of BPM methods and tools is both possible, and desirable. Yet this will take time. So no matter where you are in your process journey and no matter which notations and methods you currently use, you will find P-TRIZ useful. It is not linked to any specific method and can be used with all. Indeed, many who are starting to use P-TRIZ don't have a formal process model in mind at all! However, to illustrate how P-TRIZ can be used, I will often bind it to a swimlane model, just to show the principles.

P-TRIZ "Innovation" Models Accompany Discovery Or Execution-Oriented Process Models

When setting out to create a P-TRIZ model, cause-effect functions will often have a correspondence (or binding) to some participant in the process, or to some other attribute or activity within the process, its environment and its business context. Figure 3 illustrates the point.

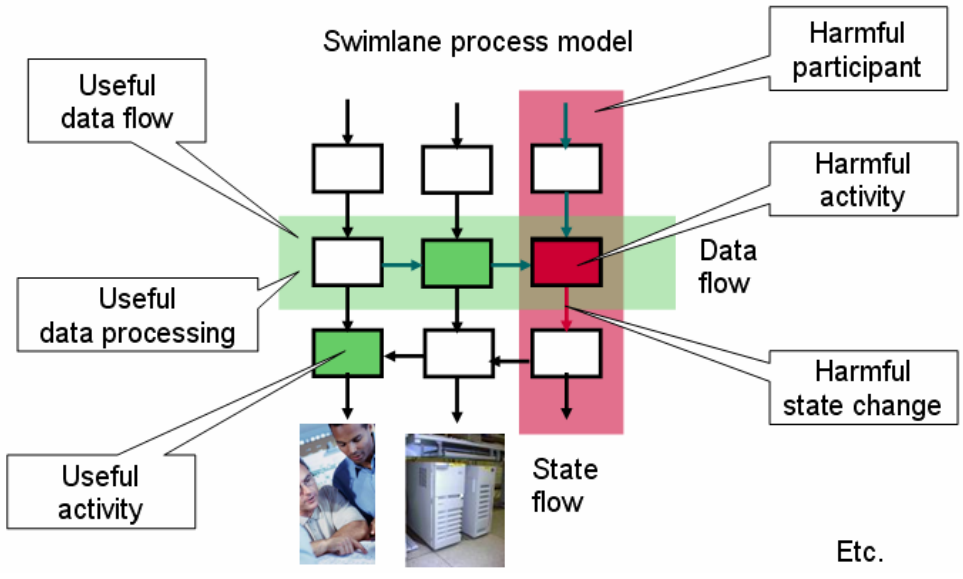

Figure 3. A typical process swimlane model (vertical lanes) marked-up with P-TRIZ

As you can see, P-TRIZ (use=green, harm=red) can be used to mark-up any aspect of a process. In this example, P-TRIZ is being used at quite a low level. For example, one P-TRIZ function corresponds to a specific data flow. One can easily imagine higher forms of P-TRIZ modeling. For example, a complete process (or subprocess) may be considered harmful in relation to another process (or subprocess). Many will use P-TRIZ at even higher levels of abstraction. For example, a process providing a service may be considered harmful by a customer, based on very subjective measures of service-levels. P-TRIZ can help reveal, analyze, and resolve even subjective, perspective-based, harmful situations.

No matter what form of process modeling you use, or even if you never model processes formally in your enterprise, P-TRIZ models can be used to open the door to innovations (Figure 4).

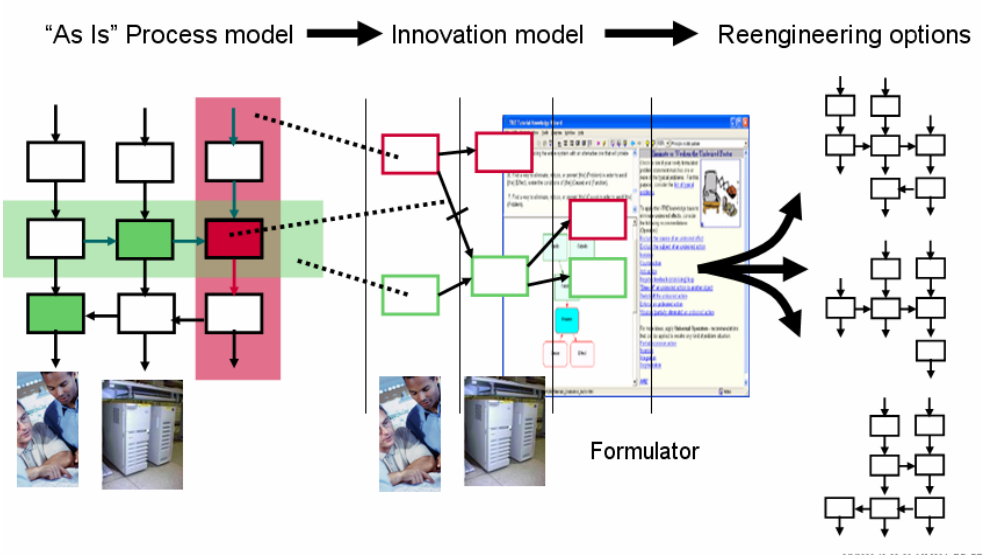

Figure 4. P-TRIZ mark-up is formulated generating BPR options

To make this clearer, consider Figure 5. This is an image from a BPML-based executable process design modeling toolset. Note how P-TRIZ creates cause-effect links between parts of the model. In this case, Order Management is considered harmful because missing parts can occur downstream in production. An activity in Inventory, Item check, is considered useful because it counteracts missing parts during Production.

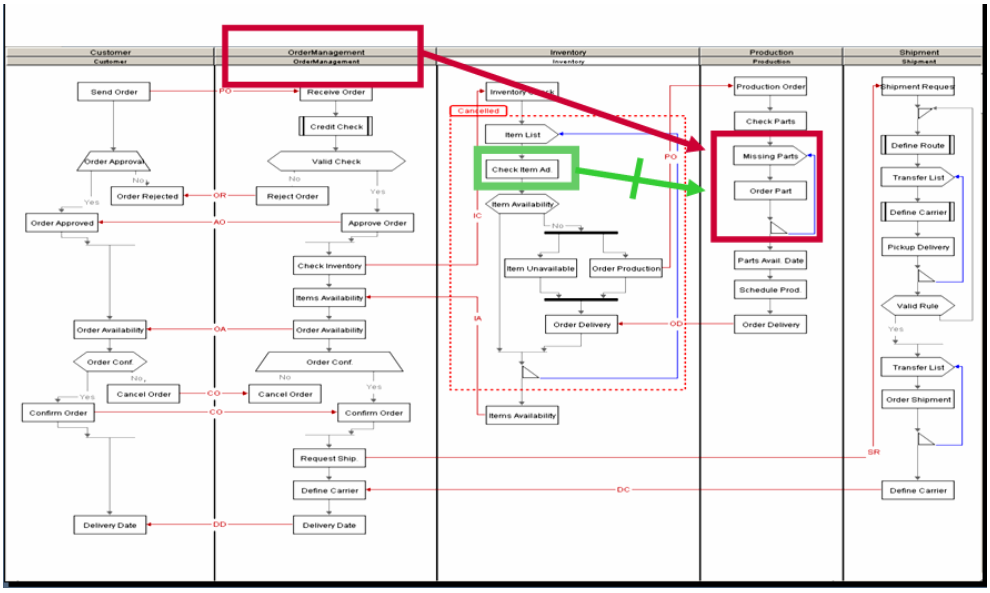

Figure 4. BPML model marked up with P-TRIZ

Is P-TRIZ Different from TRIZ?

TRIZ is the Russian acronym for the "Theory of Inventive Problem Solving" now being developed in North America, Europe, and Asia. TRIZ is a systematic and structured approach to thinking, supported by numerous tools. TRIZ is also a rather deep science based on patterns of invention and systems evolution.

Companies using TRIZ find that it focuses their knowledge and talents on the problem-solving process. Specifically, TRIZ focuses on problems preventing progress in innovation, the process by which new commercial concepts – solutions, services, processes – are brought into being in order to generate business. In this idea-to-cash process, a complex cocktail of obstacles limits a company's ability to innovate right across the value chain, from mind-to-market, and covering every conceivable technical and managerial discipline. Other forms of TRIZ are likely to appear: TRIZ for marketing; TRIZ for operations; TRIZ for organizational design; etc.

Examining the details of many TRIZ stories, Computer Sciences Corporation concluded that TRIZ principles could be used in any field, not just engineering. For example, separation in time has been used by a school child to resolve a conflict in the choice of school subjects and by a professional process engineer to reduce resource utilization. TRIZ is simple enough to be used in response to an email enquiry and sophisticated enough to guide an entire program of activities. TRIZ is for school children as well as postgraduate scientists.

TRIZ is a large methodology being developed on multiple fronts. No single resource will fully inform you about TRIZ. TRIZ is a lifelong learning. A useful overview of the entire TRIZ stack was published by Computer Sciences Corporation's Leading Edge Forum Executive Program.[6] Looks daunting? At the same time, someone solved a problem with TRIZ after only two hours of initial

[6] "Do You Have Problems?," Smith, H., Burnett, M., The CSC Leading Edge Forum Executive Program, http://lef.csc.com/foundation/library/journal/06_05/433D6B413A68404C52484D575442.pdf

training. Perhaps unique among structured methods, TRIZ is useful for everyday thinking as well as understanding a company's most complex problem, that of directing its future.

P-TRIZ can be considered an application of modern TRIZ. P-TRIZ will add to the body of worldwide TRIZ knowledge, including

- Specific vocabularies for a consistent modeling of processes using TRIZ
- TRIZ solution patterns that apply specifically to processes
- Bindings between TRIZ modeling constructs and accepted process modeling in languages and notations
- Evolutionary trends observed as processes tend towards Ideality
- Workshop and project practices that facilitate the practical and efficient use of TRIZ in a "commerce time" reengineering context
- A small number of extensions to the standard modern TRIZ notation. The objective is to enrich TRIZ formulation in support of Business Process and Enterprise Architecture Innovation[7]
- Unexpected or unusual process designs may be generated by P-TRIZ

P-TRIZ is an exciting area of innovation in its own right.

TRIZ Ain't "Made Up": It Is Observed From The Real World

Distant echoes of how TRIZ works can be found in many famous business stories.

Henry Ford's revolutionary car assembly line came from an unlikely blend of observations from Singer sewing machines, meatpacking, and Campbell's Soup. The engineering innovation firm *Design Continuum* pulled together ideas from various medical devices to develop the Reebok Pump shoe.

Very often, innovation results from the planned and deliberate recombination of thoughts, people, and objects from the past that spark new technological revolutions, sought-after service concepts, and effective business models. It is no different in the field of BPM. P-TRIZ will automate the generation of such insights in the field of business process reengineering (BPR) and business process management (BPM).

We have been doing BPR for years. Most – but, likely, not all – of the possible solution patterns are known. Now, with the advent of a BPMS that can speed new processes to implementation, it would be foolish indeed to wait for the right process expert to come along and help our improvement project. Companies need a "just in time" process knowledge. It's high time we encoded reengineering wisdom and set out to create actionable insights for BPM practitioners. I know of no better approach than TRIZ.

[7] A future article will describe this extension. Dubbed "South Beach Notation," it was conceived and first drawn in the sand, June 2005, South Beach, Miami, FL.