# Get Out of Your Box!

## Can There Be a Process for Innovation?

By Drew Locher

People have accused those of us in the Lean and Operational Excellence (OpEx) community of thinking that there is a process for *everything*. It is true that process and system thinking are a big part of Lean and OpEx, but is there really a process for innovation? Innovation and creativity come naturally for some people. For us mere mortals, well, we need some help. Can Lean provide such help?

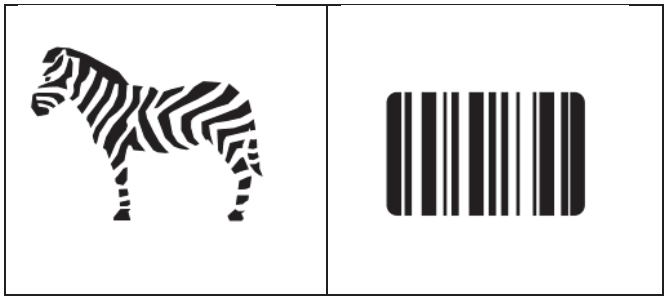
In the Lean toolbox is a methodology called 3P. It has been referred to as Production Preparation Process and Product and Process Planning. Regardless of the name, underlying this methodology is a set of techniques that can, indeed, help spark creativity. 3P was developed by Chihiro Nakao, an ex-Toyota employee and consultant. It has been effectively used to design and re-design products, processes, and facility layouts. It is a highly collaborative process, best practiced when engaging many members of the organization. While not necessarily following the 3P process that is part of the methodology, the "spirit" of 3P can be applied to challenges of varying nature, even to organizational strategies.

For example, I am currently facilitating an organization through the 3P process (remotely, of course, in this day and age). It is a custom make-to-order business that is experiencing significant change in the various marketplaces it has traditionally served. In its 70+ year history, it has had to reinvent itself multiple times due to technological innovations. Presently, it finds itself in need of significant and strategic change once again. The organization is using 3P to help develop a roadmap for transitioning its entire business over the next three to five years. Yes, new equipment for an entire new business will be required, and existing equipment for its traditional business is being considered for decommissioning. In addition, financial analyses are being completed on current and potential product variations to justify being offered. The organization is also reconsidering its historic approach to knowledge workers in the office. Teleworking for individuals or entire groups is being considered for the first time. This is not just because of the COVID-19 pandemic, but to be more attractive to existing and future employees who prefer such an option. Let's just say, the effort involves a lot more than developing a new facility layout.

### How it Works

The principles upon which 3P is based include: "7-ways," biomimicry, rapid prototyping and simulation, and creativity before capital. The practice of 7-ways involves a team of people developing seven different proposals for possible solutions. It can be seven different ways a product might perform a function that customers are looking for. It can be seven different ways to transform materials as part of a production process. It can be seven different ways to lay out a department or an entire facility. It is relatively easy to come up with two or three ways, but seven? This will require the team to *really* stretch its creative thinking process. The team will systematically assess each solution and ultimately narrow to one. Often, practicing 7-ways results in some truly innovative ideas. For example, one company that applied the concept came up with an entirely new proprietary technology for plating metal. Instead of a series of chemical processes performed in tanks, usually in batches, a tabletop process capable of doing one piece at a time was developed. It was a real breakthrough.

Biomimicry involves the team of people identifying the manner by which nature performs the function or transformation process. While not so applicable to layout design, this practice can most certainly help with product and process design. Of course, 7-ways can apply here as well, as the team will identify seven examples from nature. Why nature? Observations of nature have resulted in the invention of Velcro®and bar coding, just to name a few. Talk about getting out of your box!



Rapid prototyping and simulation involve the team *making the fuzzy tangible*. More can be learned by prototyping a potential solution. It allows team members to engage all their senses in assessing the potential solutions. Instead of relying solely on 2D or 3D computer models, physical, actual-sized or scaled models are created. Team members can then touch, feel, and manipulate the models. The team members can also simulate the "7-flows" when designing processes. The 7-flows (not to be confused with the 7-ways) include: raw, work-in-process and finished goods material flows, the movement of people (e.g., operators), information flow, the flow of ancillary equipment (e.g., tooling, fixtures), and engineering flow (e.g., maintenance). Simulating the 7-flows allows the team to identify potential issues while still in the prototype stage. Many problems that are usually discovered much later can be avoided.

The 3P process is also very data driven. It is the data that allows the team to move beyond emotional opinions and to narrow from multiple possible solutions to one that is agreed on. Clear criteria are identified, against which each alternative will be assessed. Data provides a level of objectivity that can result in a consensus on the solution selected and the path forward. Obtaining total organizational acceptance is a critical success factor when rolling out any significant change effort, whether it be a new product, process technology, or strategy.

During one 3P effort, a company in the automotive industry was considering different materials for use in a radically different product design. Team members had strong and varying opinions going into the process. Technical data (e.g., material specifications) and cost related data were gathered. Through the process, the team members were able to come to an agreement on the material that met all the pre-defined criteria, including performance, process capability, and target cost. Interestingly, it was *not* the material that the more senior product development folks thought in the beginning of the process. As the Vice President of Business Development confided in me, "In the past, we would have deferred to the senior engineers, went to market with the new design, and then later wonder why we weren't making any money on the product. 3P saved us millions." I do like happy endings.

"Creativity before capital" is a mantra of 3P. Since 3P is used for significant design or redesign efforts, capital investment will almost always be required. Nonetheless, we want to be wise in how those investments are made. For example, instead of investing in the highest capacity process technology possible (and hoping that the projected demand ultimately arrives), 3P suggests "right sizing" equipment and technology to the need more in the short term "4-¼-4x" is a concept that we use. Perhaps it is better to plan on smaller machines or cells and then purchase additional ones (up to 4), if and when increased demand occurs. The investment in smaller machines will be a fraction of that for larger, more complex equipment (¼ or less the cost). Contrary to traditional thought, productivity tends to *improve* dramatically (up to 4 times) with this approach. Simpler equipment, easier to operate, more uptime.

For example, many companies pursue the automation path with the belief that this will provide desired labor cost reductions. In reality, the cost benefits envisioned often never come to fruition. At a food packaging company, automation was always the first solution considered. In a short time, more and more people were needed to "babysit" the multimillion dollar lines to keep them running quality product. On one line, the number of operators required went from two to eleven. 3P takes a different approach to automation. Use it where it makes sense (e.g., unsafe operations), but don't just automate because you can. The aforementioned simulations and the data gathered through them can help organizations make better decisions on where to invest in automation.

Even if some amount of automation does make sense, 3P can help assure that it is designed with the best results possible. For example, a 3P effort at an automotive part supplier resulted in a very different design concept for an automated machining and assembly cell. It was while simulating the 7-flows using full sized mock-ups that it was discovered that the orientation of its traditional lines was *increasing* downtime. It took much more time and effort to address minor stoppages of the lines. This was confirmed through actual observation of existing lines. It was an important oversight on the part of the engineering firm designing and building the equipment. This was corrected in the design of the new line for a new product, and over time the company revised existing lines where it could.

## What 3P Can Mean to You

Participants in the 3P process are asked to think like a 12-year old. Children tend to have a natural wonderment about the world around them and are not burdened with pre-conceived biases. It allows them to be more open to possibility. Unfortunately, we tend to lose this ability with age, particularly in work environments. Therefore, people tend to talk themselves out of possible new business opportunities before they have really given them adequate consideration. 3P can help rediscover that spirit of the possible, whether it be new product or material offerings, new process technologies, or new strategies for a business.

Do you feel that your organization is lacking in creativity to meet the formidable market challenges that you face? Is it from a lack of willingness to change, or is it from the lack of a process to engage members of the organization and spark innovation? If it is the latter, then you will want to consider the 3P process to help you *get out of your box*.

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