Combining Lean, Six Sigma, and the Theory of Constraints to Achieve Breakthrough Performance

A VELOCITY White Paper

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Introduction

As global competition continues to grow, the pressure to improve becomes more and more intense. Executives and managers face many challenges: increase sales, reduce cost, reduce inventory, accurately forecast future demand, find the next market breakthrough, and most of all Survive! Although there are many ways to improve, many organizations have invested in at least one of the three most widespread methods of improvement - Theory of Constraints (TOC), Lean or Six Sigma. In most cases, company experts have spent significant time mastering one of these three and spend time trying to show returns from their investment. As other methodologies came along, pressures to shift to using something else came across as another program of the month. But for many, when the objective for all three is to improve the organization’s performance, why did it come down to an “either-or” mentality? Why did some attempts at integrating the three not show the promised returns or end up being integrated in name only? Some of the reasons appear to be:

1. The methodologies were viewed as “tools in a tool box”, where each tool was perceived as best for particular uses.

2. Expertise in all methodologies was not available making true integration impossible.

3. An effective integration process for the three methodologies was not developed.

Our purpose is to show how to effectively integrate these methodologies, but let’s first provide a short overview of each of them.

Lean

The origin of lean manufacturing in the US can be linked to Henry Ford - the assembly line, Fredrick Taylor - industrial engineering and Dr. Deming- father of quality management. In Japan these concepts were refined and honed by Taiichi Ohno, Eliji Toyoda and Shingeo Shingo to create what is now known as the Toyota Production System (TPS). As shown in Figure 1,
Taiichi Ohno once described the goal of TPS as simply to shrink the timeline from order to cash by removing non-value added waste, muda. (Ohno 1988, 9) Ohno identified 7 types of waste. There are several ways to describe these “7 deadly types of waste” that occur in a system. The most common are:

1. Over production - basically producing more than the customer has ordered. Many times producing to forecast or batching to save setups can lead to over producing.

2. Waiting - time when no value is being added to the product or service. High levels of inventory, people, parts or information, can lead to long non-value added waiting.

3. Transportation - the unnecessary movement of parts, moving multiple times, movement that does not add value. High levels of inventory, the layout of the system, and priority shifting are just a few things that can also lead to non-value added transportation.

4. Inventory - unnecessary raw material, Work in Process (WIP) or finished goods. “Stuff” we have made an investment in that the customer doesn’t currently need. Long cycle times, “just in case” thinking, and flow issues can also add to inventory issues.

5. Motion - Unnecessary movement of people that does not add value. Poor workplace organization and workplace design can lead to waste in motion. These motions at times can lead to serious health and safety issues.

6. Over Processing - adding steps or processes that don’t add value to the customer, thinking that continuing to work on something makes it a higher quality part or service. This is considered waste when the customer doesn’t require that “extra” touch.

7. Defects - Work that requires rework or even worse, work effort that needs to be scraped. Bad processes, equipment issues and lack of in-process control can add to the defect problem. Obviously the more “stuff” in the system, the higher the percentage of defects.

Recently an 8th waste has become very common and that is the waste of not tapping into human creativity.

Logically you can see how over producing can lead to contributing to all the other waste. All wastes can be associated with any environment not just production. Understanding and identifying waste in the system can help target improvement efforts.

The titles, “Lean Manufacturing” and later “Lean Thinking” were coined in the US by James
Womack and Daniel Jones in the 90’s to describe the Toyota Production System (Womack and Jones 1996). Womack and Jones introduced us to the five principles of Lean:

1. Specify value:

   As stated by Womack and Jones “The critical starting point for lean thinking is value. Value can only be defined by the ultimate customer and it's only meaningful when expressed in terms of a specific product (a good or a service, and often both at once), which meets the customer’s needs at a specific price at a specific time.”

   The question we must always strive to answer is, “Do we truly understand Value from our Customer’s Perspective - both Internal and External?”

2. Identify the steps in the value stream

   Value Stream Mapping is a process to detail and analyze the flow of material and information to bring a product or service to the customer. After identifying the entire value stream for each product we can separate actions into value added (VA) and non-value added activities (NVA). Value added activities can be defined as something that the customer would be willing to pay for; an activity that changes the form, fit or function of the product or service and is done correctly the first time. NVA is something that takes time, resources or space and does not add value to the product, and thus adds no value to the customer. Identifying the value stream will expose many non-value added activities (NVA).

3. Create smooth flow

   When the value creating steps are understood the next step is to create continuous flow. Things like producing in small lots versus batching; putting machines in the order of the processes; pacing production to Takt time¹; the application of lean tools. Creating smooth flow can dramatically reduce lead time and waste.

4. Customer pulls value

   Once the first three principles are in place we can now put a system in place that only produces at the rate of customer requirements, a “pull” system. This is the opposite of

¹ The APICS Dictionary (Blackstone 2007, xx) defines takt time as “Sets the pace of production to match the rate of customer demand and becomes the heartbeat of any lean production system. It is computed as the available production time divided by the rate of customer demand. For example, assume demand is 10,000 units per month, or 500 units per day, and planned available capacity is 420 minutes per day. The takt time = 420 minutes per day/ 500 units per day = 0.84 minutes per unit. This takt time means that a unit should be planned to exit the production system on average every 0.84 minutes.”
“push”, releasing work into the system based on a forecast or a schedule. No one up-stream will produce a good or service until the customer downstream is ready for it.

5. Pursue perfection

Lean says we must continually understand value through the eyes of our customer and refine our value streams to increase the flow based on customer demands. We want to move towards perfection. The process of improvement never ends.

Six Sigma

As shown in Figure 2 “Six Sigma Evolution,” Six Sigma has evolved from a metric, to a methodology, to a management system (Motorola University). Motorola is given credit for developing “Six Sigma” but the statistical roots can be traced back to the 1800’s when Carl Frederick Gauss used the normal curve for analysis and around 1924 when Walter Shewhart used control charts and made the distinction of special versus common cause variation and their link to process problems.

The desired output of Six Sigma is to reduce defects, reduce cycle time, increase Throughput and increase customer satisfaction by reducing variation in products and processes, thus giving an organization a competitive advantage.

Six Sigma as a metric equates to 3.4 defects per million opportunities (DPMO). Many companies use this metric to lead their defect reduction effort. Many improvement experts contend that most companies today work at a sigma level between 3 and 4. For example if you are operating at a 3 sigma level, you are producing 66,800 defects per million opportunities; a 4 sigma level is 6,210 DPMO. Reducing defects will obviously lead to higher customer satisfaction, lower cost of quality, increased capacity and most important- increased profits.

Six Sigma has evolved into a business improvement methodology that focuses on how variation is affecting organizational desired results. Six Sigma project teams follow the DMAIC model to drive rapid improvement. DMAIC is an acronym for Define-Measure-Analyze-Improve-Control.

Define: Typically in this stage a team is assembled, a project charter is developed, customer Critical to Quality requirements are defined and a process map is created. The charter will clearly define the business case for doing the project, state the problem, define the
scope, set goals and milestones and spell out the roles and responsibilities of team members. In identifying the Critical to Quality issues (CTQ’s) we must define customer characteristics that have the most impact on quality. The process map, called SIPOC (Suppliers; Inputs; Process; Outputs; Customer), defines a high level process map of the project focus.

Measure: In this step we define what to measure - develop a data collection plan and perform a baseline capability study to calculate the baseline sigma.

Analyze: It is important not to jump to improve before verifying why the problem exists. The main areas to look for causes of defects are Data Analysis; Process Analysis and ultimately Root Cause Analysis.

Improve: This step takes all the data from the D, M and A steps and develops, selects and implements solutions that will reduce the variation in a process.

Control: Sustain the new process through a robust monitoring plan.

Motorola was one of the first companies to realize that a metrics and methodology approach was still not enough to drive “breakthrough” improvement. They continued the Six Sigma evolution into what is called the Six Sigma Management System. A Six Sigma Management System is a structured process to ensure that all improvement efforts are aligned to business strategy. Six Sigma has become a top down approach to execute strategy through the alignment of all improvement activities to assure fast, sustainable growth.

The main purpose of the DMAIC process is for process improvement. When a process is at its “optimum” and still doesn’t meet expectations, a redesign or a new design is needed. This is called Design For Six Sigma (DFSS). DMADV (Define-Measure-Analyze-Design-Verify) is a common acronym used today for DFSS.

**Theory of Constraints (TOC)**

The basic concept of TOC is often introduced through the chain analogy. A chain is only as strong as its weakest link. Improvement that does not improve the performance of the weakest link most likely does not improve the system and can be considered waste. Many claim TOC is just common sense, but it is surely not common practice.

Introduced by Eli Goldratt in the mid 80’s, a wide awareness and understanding of parts of the TOC methodology was first accomplished through people reading the book, THE GOAL. (Goldratt and Cox 1984) Although many of the TOC basic concepts were discussed in THE GOAL, the complete body of knowledge was not.
Some people think of TOC as simply finding and speeding up HERBIE (the fictional Boy Scout in THE GOAL), the bottleneck. Then they find the next Herbie and the next Herbie, etc. TOC is NOT about chasing Herbies. More accurately, TOC is about how to improve and manage how the system constraint (Herbie) performs in the context of the total system. This is quite different. It is about managing the total system, which is comprised of interdependencies, variability and constraints, to ensure maximum bottom line results for the organization. **TOC is about FOCUSING first on the system’s leverage points and then on how all parts of the system impact the operation of the leverage points.** This is the way to achieve total system improvement, not just localized improvements.

The Theory of Constraints (TOC) applies the logical thinking processes used in the hard sciences – cause-and-effect – to understand and improve systems of all types, but particularly, organizations. The process a doctor would follow if you went to him with an illness, *first Diagnosis, then Design of a treatment plan, and then Execution of the treatment plan*, is the same process followed by TOC with the use of three questions, What to Change- What to Change To - and How to Cause the Change.

One of the core beliefs of the hard sciences is that for many effects there are very few causes. Using the construct of “Cause and Effect” becomes increasingly important as we perform scientific analysis. All too often we see organizations treating many “symptoms” instead of addressing the root causes. TOC looks for the core conflict that holds the root causes in place.

Think of an organization as a “money making box” (Figure 3). It is first primed with investments in equipment and Inventory (I). Money is continually poured in as Operating Expense (OE) to pay for people and other ongoing expenses. The people process the Inventory and sell their products to make a larger amount of money called Throughput (T) (money generated by the system through sales).

![Figure 3. “Money Making Box”](image)

The TOC systems approach requires that you first understand the system, its goal and measurements. Then you can apply the five focusing steps:
1. Identify the constraint(s).
2. Decide how to exploit the constraint(s).
3. Subordinate/synchronize everything else to the constraint(s).
4. If needed elevate the system’s constraint.
5. If the constraint has been broken go back to step one. Don’t let inertia become the constraint.

The application of these steps in a situation where the system constraint is physical is usually obvious and straightforward. But often it’s not a physical constraint. The nature of many constraints in organizations is policy constraints. In that case, the Five Focusing Steps break down into the three questions:

1. What to Change.
2. What to Change to.
3. How to Cause the Change.

The TOC methodology looks at the world through the eyes of cause-and-effect logic and focuses on managing system constraints, interdependencies, and variability.

Discords that can Block the Effective Integration of TOC and Lean Six Sigma (LSS)

There are many synergies between the methodologies. They are all customer focused and want to provide the best value for the customer. Lean and TOC focus on creating a pull system to increase flow through the process and shorten the lead time to market. However, there are several discords between the methodologies that if not handled carefully will diminish the gains the organization can achieve from their improvement efforts.

In the early stages of the “design” of a system there is a difference in approach between Lean and TOC.

Most Lean designs calculate Takt time, the rate at which you need to produce to meet customer demand, and then attempt to balance resources and equipment to that rate. Capacity in any operation that is greater than the amount needed to satisfy Demand is considered waste. Improvement initiatives then focus on how to eliminate the waste in order to “balance” out the capacity and be equal to the demand. Due to variation, most Lean designs today will make sure that the cycle time of each operation is some percentage below Takt time, but the goal for the design of the “ideal” system is to have a balanced line with little or no “excess” or waste. In this “ideal” system, the capacity of each operation in the system would be balanced to support a
cycle time just slightly shorter than the Takt time. Note that in this case, every operation in this ideal system could become the system’s constraint if there is any variation in demand, products or processes.

The TOC approach believes that there is a constraint in every system, and the constraint dictates the output of the organization. An hour lost on the constraint is an hour lost for the entire organization, thus we don’t want to “starve” the constraint. A TOC design would have some sprint or protective capacity on non-constraints to ensure that the constraint can be exploited to the fullest extent possible. This “unbalanced” capacity allows all operations to focus on how they are impacting the operations of the constraint and thus how their actions are impacting the Throughput of the total system. Figure 4 shows the difference in how a balanced line and unbalanced lines are set up. When integrating TOC and Lean the correct choice must be made.

![Balanced Line vs Unbalanced Line](image)

If there is no variation, in either process times or demand, a balanced line can work. This is obviously not very likely and Dr. Deming suggests there will always be variation. An unbalanced line enables one to protect Throughput from that variation. Variation anywhere in a balanced line can immediately have a negative effect on the Throughput of the organization. Continued variation at different operations in a balanced line will dictate that you eliminate variation in the entire line in a very quick manner which would often be a very huge and costly task. “Focus on everything, and you have not actually focused on anything.”- Eli Goldratt. (Goldratt 1990, 58)

The unbalanced line approach focuses on the constraint and ensures that non constraints have enough protective capacity to catch up to the constraint when “Murphy” strikes. Eliminating variation is still a priority in an unbalanced line. The difference is that the focus of the improvements are directed on what will rapidly improve and protect Throughput while reducing inventories (or other investments) or Operating Expenses.

In summary both designs are set up to meet customer demand. The balanced line works well
when there is little or no variation in product mix, process times or demand. The unbalanced line works well in the presence of variation in product mix, process times and demand. While variation reduction is a priority in both designs, the difference is where and how many places one must focus and what the impact will be on the Throughput of the total organization. The constraint in the unbalanced line is managed very tightly. Efficiency and predictability at the constraint are important metrics. The non constraints are measured on their effectiveness in keeping the constraint supplied - this is called time buffer management. The output of the total system is the overall top metric.

**Work Behaviors**

The balanced – unbalanced design decision dictates how resources will be measured and ultimately how they will behave. Lines with balanced capacity expect workers to work to Takt; unbalanced lines would have workers working to the “Relay Runner” work ethic. Figure 5 depicts the discord between working to Takt or working to the Relay Runner ethic.

![Figure 5. TAKT or Relay Runner work ethic](image)

Once Takt is determined and the line is balanced, the operator is to work to Takt. This works well when there is little or no variation in product mix, process times or demand. However, if you have negative variation in the actual versus planned processing time of an operation, the work is blocked from moving to the next operation at Takt time. This results in a negative impact on Throughput and typically calls for inserting coping mechanisms on the shop floor. When there is positive variation, the worker has no incentive to pass the work on quickly so there is little opportunity to do other value-added work.

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2 The APICS Dictionary (Blackstone 2007, 41) defines relay runner as “The process of applying a focused effort to complete a task and hand it off immediately to a resource waiting and prepared to take the hand-off in critical chain project management.

Usage: Some people use relay runner interchangeably with road runner in an operations environment.
Behaviors common in a work to Takt time environment are the student syndrome and Parkinson’s Law. With the student syndrome you think you have ample time to finish the task and therefore hold off starting the work until the last minute. If variation occurs after the last minute start, the work is finished late. Parkinson’s Law states that, “Each task will expand to fill the allotted time available.”

In this environment, improvements are masked due to these policies and behaviors. Early finishes of each operation are not passed on and late finishes by any operation can disrupt meeting the Takt time of the total system. This is the result of having protection that by policy is isolated within each operation and therefore cannot be aggregated to protect the total flow time. When Takt time is violated in one operation, the entire line suffers the consequences.

The Relay Runner ethic emulates a finely tuned relay race team. When work is present the operator works heads down at a fast pace that is consistent with quality and safety until the work is completed or he is blocked. Should the operator become blocked, he works on the next sequenced job until the previous work becomes unblocked. This eliminates the Student Syndrome and Parkinson’s Law effects while exposing improvement opportunities. In the Relay Runner environment, early finishes are passed on immediately and are aggregated to form time buffers that protect the constraint and the delivery to the customer from variation in process time or demand. Thus the on-time delivery and Throughput of the system are protected even in the presence of significant variation.

In summary, note that how you designed your line - balanced to Takt or unbalanced - will dictate if the system works to Takt or applies the Relay Runner work ethic. In recent years there has been many “workarounds” offered to try and make a balanced line work to Takt time in the presence of variation. These “workarounds” often re-design the line to an unbalanced state.

**Material Release**

Another subtle difference in applying TOC or LSS to a system is how material is released into a system. Both systems are pull systems based on responding to customer demand. The main difference is that the TOC signaling method is based on time while the LSS method is based on inventory.

As shown in Figure 6 below, when there is demand on the time-based system (known as Drum-Buffer-Rope) there is a signal sent to the constraint for scheduling purposes to meet a shipping request, and a signal is sent from the constraint to the beginning of the line (production control) for timing the release of material. As discussed earlier this is an unbalanced line. The non-constraint resources have “catch-up” capacity to assure orders get to the constraint on time and to the customer on time even in the presence of variation. Buffer times are calculated from
the constraint to the shipping point, called the shipping time buffer, and from material release to the constraint, called the constraint time buffer. These buffers will absorb variation in getting to the constraint and to the customer, thus protecting Throughput. Material is released based on the time buffers and the actual run time of the constraint. Material is only released into the system when there is a pull from the customer; therefore the work-in-process (WIP) in the system is based on customer need and what the constraint can produce. There is no standard number of units of WIP, but the WIP is based on the amount of processing time that it will take on the constraint resource.

In the time-based system, high variation in demand, product mix and process times are accommodated through adjustments to the two time buffers. These time buffers act as shock absorbers to all of the operations preceding them. Instead of providing large buffers to accommodate variation at each individual operation, the Relay Runner work ethic allows the buffering to be aggregated just in front of the constraint and in front of the customer. The protective capacity of non-constraint resources coupled with the Relay Runner work ethic allows them to catch up when there are disruptions any place in the system. Some protective capacity is usually available at the constraint resource as well. This allows it to catch up when it is the cause of disruptions.

As shown in Figure 6 above, an Inventory-based release system (Kanban Manufacturing System) is activated when there is a customer demand. A signal to produce, called “kanban” is sent upstream link by link as material is pulled to satisfy and protect customer requirements. This process is continued until all supermarkets needing replenishment are filled. The Kanban system is a system of visual signals that triggers or controls material flow. The Kanban in each supermarket is set to restock each part to its “Standard Level” once the signal is sent to reorder. Kanbans synchronize work processes across a system. In this system nothing is produced unless there is a signal to produce.

In systems with high variation in demand, product mix or process times, the inventory-based
system will not work effectively. In the inventory-based system, high variation in demand, product mix or process times can lead to high variation in the Takt time which can require frequent rebalancing of a balanced line. Variation can create wandering bottlenecks which can disrupt the flow through the line and have a negative impact on the Throughput of the system.

**Replenishment System**

Another subtle difference between TOC and LSS is determining the size of raw material and finished parts inventories and the difference in the mechanism for triggering the need to resupply them. Figure 7 illustrates a traditional replenishment system and a TOC replenishment system. In a traditional replenishment system the size of the parts inventory is based on a min max type of system with the reorder point to resupply based on a pre-determined physical quantity remaining often known as the reorder point. **TOC sizes the buffers based on demand patterns during the time to reliably replenish (TRR). The TRR includes a fixed reorder time interval (e.g. once a day, once a week, etc.) and that time interval is the signal to resupply the parts inventory with what has been consumed.**

![Figure 7. Replenishment System - “Time or Inventory”](image)

This is a *time-based* replenishment system versus an inventory-based replenishment system. The batch size is variable based on the demand during the fixed reorder interval. The inventory-based system has a fixed minimum batch size (the maximum level minus the reorder point) and the time interval to trigger resupply varies. The “time” based system handles variability much better than the “inventory” based system due to the fact that the time-based sys-

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3 The APICS Dictionary (Blackstone 2007, 93) defines order point system as “The inventory method that places an order for a lot whenever the quantity on hand is reduced to a predetermined level known as the order point." Two order point systems are used: the min-max system and economic order quantity system (EOQ). The min-max system (83) is “A type of order point replenishment system where the “min” (minimum) is the order point, and the “max” (maximum) is the “order up to” inventory level. The order quantity is variable and is the result of the max minus available and on-order inventory. An order is recommended when the sum of the available and on-order inventory is at or below the min.” The EOQ (43) system is defined as “A type of fixed order quantity model that determines the amount of an item to be purchased or manufactured at one time.”
tem’s replenishment time is bounded. In the inventory-based system, the time to trigger the replenishment is unpredictable and can be very long.

The time-based system will work effectively in any environment. The focus is on managing the flow of parts in time versus managing levels of material. It really comes down to what makes you pull the replenishment trigger,—time or parts.

Figure 8, “Design Choices,” reveals the design differences that you must be aware of when integrating TOC and Lean.

The design choice between a balanced or unbalanced line will lead to different resource behaviors and replenishment systems. Despite what some say, the designs are NOT “the same just different;” the design intent is different and you will get different results depending on the environment. The “balanced” design works very well in the absence of demand, process time, and product mix variation. The unbalanced line, typically thought of as the best way to go in low volume high variability environments, actually works best in all environments.
How effectively we integrate the three methodologies depends on the design choice path that is taken. If the Lean design path is taken (balanced line, work to Takt, inventory release and replenishment) then only two of the TOC Five Focusing Steps can be applied – Step one Identify and Step four Elevate. These two steps will need to be applied continuously to identify and eliminate each new constraint. During this effort the process will not be stable or in control. If the organization wants to experience the full power of the TOC Five Focusing Steps, the other design path (unbalanced line, Relay Runner work ethic, and time-based release and replenishment systems) must be followed. This path provides early system stability and focused system improvement.

**TOCLSS – Fully Integrated TOC, Lean, and Six Sigma**

The most powerful way to integrate TOC, Lean, and Six Sigma begins with Strategy. The strategy provides the strategic roadmap to improve business results. The strategic roadmap provides the direction for the areas of the organization that can most benefit the total system by applying improvements first. The system design of the first area provides predictable and stable system performance by focusing on protecting and managing the constraint(s) of the total system. Once this is achieved, process improvement efforts can be applied in a focused way to provide even more bottom line results for the organization. Finally the improvements must be
sustained in order for the organization to achieve real bottom line results over time.

In Figure 9 the “SDAIS Model” illustrates the proven TOCLSS integration model.

The Velocity Roadmap to continuous business success has two major parts: the Constraint-based System Architecture and the TOCLSS Improvement Architecture. In order to have a solid system architecture you need an understood direction and an aligned stable platform that delivers reliable, consistent Throughput, in any environment.

**Strategy** - the output of a good strategy session is a clear, agreed upon, roadmap to improve business results. The TOC strategy process involves using cause-and-effect logic to understand the core conflict of an organization, validate the conflict, and then develop the future reality which breaks the conflict and also adds other “injections” needed to improve the system. Roadblocks are removed and the result is a strategic roadmap to the future. This is done using rigorous cause-and-effect logic which not only shows the sequence but also the interdependencies in the plan. This is much different than most strategic plans that end up being no more than an isolated list of actions from each department. The focus is on optimizing the performance of the total system versus improving the individual departmental functions in isolation.

**Design** - Operational/Functional leaders and subject matter experts design their operations to align their business processes to achieve strategic bottom-line results. During the design process, they reconfigure policies, measurements, roles and responsibilities, and information systems within the context of proven TOC solutions and execution management tools.

**Activate** - During the activation process, the newly defined policies, measurements, roles and responsibilities, information systems and execution management tools are implemented to make the design operational.

This Constraint-based system architecture will produce a system where business processes are designed, aligned and operated in a stable, predictable manner.

Once a system is stabilized and is delivering stable predictable results, ongoing focused system improvements are applied that result in increased sustainable bottom-line results. TOCLSS uses the synergy of TOC, Lean, and Six Sigma to coherently achieve *Focused System Improvement* beyond what might be accomplished by applying each method individually with a traditional Continuous Process Improvement (CPI) approach.

**Improve** - Once a more stable operational system exists, the energy is turned to focused improvement efforts to drive the operational system to achieve the desired effects and
strategic objectives identified in the organization's strategy session. Improvement efforts are evaluated based on their ability to increase Throughput, and to reduce Inventory and Operating Expense and advance overall system performance. (Jacob, Bergland, and Cox 2009). Key performance indicators (KPI’s) are examined to identify gaps between present and desired performance levels. The gaps are further analyzed and opportunities are assessed to focus improvement efforts at the business process level to achieve the desired outcomes. Improvement experts determine which improvement technique(s) are needed and then identify improvement project priorities. Some useful improve techniques include 5S System, Standard Work, Rapid Setup Reduction (SMED), Elimination of non value added waste, Total Preventive Maintenance (TPM), Point of Use Storage (POUS), Mistake Proofing (Poke Yoka), Visual Tactics, Control Charts (SPC), Capability Studies, Design of Experiments, etc.

Sustain- Organizational Memory is created and supported by establishing the documentation of the Strategy, Design, Activate, Improve and Sustain details. The organization continually reviews key measurement results to assess, address and institutionalize the policies, measurements and behaviors to guarantee that the results are sustained and do not degrade. The organization ensures that they have continued capability to achieve buy-in and maintain expertise.

Following the SDAIS process eliminates the need for an organization to have to “choose” a methodology, or to randomly use the “toolbox” approach. The organization can utilize the full integration of TOC, Lean and Six Sigma in order to obtain Focused System Improvement that achieves real, sustainable breakthrough performance.
References


Who We Are

Since 1986, AGI-Goldratt Institute has enabled organizations to better align the way they operate with what they are trying to achieve – strategic bottom line results. AGI is the birthplace of constraint-based techniques and solutions for business success. The Theory of Constraints (TOC) provides the system architecture and the integration of TOC-Lean-Six Sigma (TOCLSS) provides the focused improvement process. Many organizations and consultants trace their roots back to AGI not only for TOC, but also for how TOC integrates with other improvement methods.

What We Do

AGI provides its clients with rapid, bottom line results with what it calls VELOCITY – a powerful business approach combining speed with direction. VELOCITY consists of three pillars: TOC, the system architecture; TOCLSS, the focused improvement process; and SDAIS, the deployment framework. SDAIS (Strategy-Design-Activate-Improve-Sustain) begins with creating and then executing the strategic roadmap to ensure business processes are designed and aligned to achieve the strategy. Once designed, the business processes are activated to allow the organization to operate in a stable, predictable manner with less investment and organizational churn.

Once stable, focused system improvements are applied to increase sustainable bottom line results. Execution Management tools and transfer of knowledge enable each aspect of SDAIS and serve as the foundation for self-sufficiency and sustainment.

Why AGI

AGI has expertise in TOC, TOCLSS, and SDAIS, with years of experience adapting each of these elements to meet the unique needs of its clients, regardless of size or industry.

AGI excels at leading organizations through successful business transformations by providing business assessment, implementation support, execution management tools, training, and mentoring. We are motivated by making the complex manageable and enabling our clients’ self-sustaining success.