# Synopsis of Problem-Solving Tools and Techniques

The following methods and techniques can be useful for Maturity Model assessment teams in identifying targets for supply-chain improvement projects; determining and examining root causes of performance problems and issues; and implementing supply-chain solutions.

**A3 Report** — The A3 (so named because it is typically created on an A3-sized sheet of paper) offers a way for individuals or teams to identify a problem, explore and implement solutions, and communicate actions and results. An A3 establishes the thinking patterns with which to address a problem or opportunity. The process for completing an A3 encourages users to go to those directly associated with the problem or opportunity for information and assistance. The A3 Report format guides users through seven elements, which can take hours, days, weeks, or even months to complete:

* *Background:* Communicates the problem or opportunity being considered.
* *Current conditions*: Presents data (charts and tables) associated with the current state.
* *Goals/targets:* Sets well-defined outcomes that addressing the problem or opportunity will deliver.
* *Analysis:* Describes the root-cause analysis of the current condition vs. the goals/targets (i.e., the cause-and-effect relationship that currently prevents reaching the goal).
* *Proposed countermeasures:* Recommends actions to close the gap between the current condition and the goals/targets.
* *Plan:* Defines activities, roles, and dates for implementing countermeasures, and usually includes a timeline or Gantt chart.
* *Follow-up:* Reviews progress and if countermeasures have worked.[[1]](#endnote-1)

**DMAIC** — This process-improvement methodology is associated with Six Sigma. DMAIC (Define, Measure, Analyze, Improve, and Control) helps users identify the root causes of problems and apply lasting solutions. Based on the scientific method, it requires that teams:

1. *Define the problem*, including the end user, end-user requirements, and the primary process to meet requirements.
2. *Measure and collect data* related to the process, such as time and quality metrics.
3. *Analyze the data* using root-cause analysis to identify gaps between end-user requirements and current performance.
4. *Improve the process* by developing a plan to fix root causes and then implementing a solution according to plan.
5. *Control the improved state* by monitoring and standardizing procedures in the process.

**Gemba Walk:** This simple but powerful technique involves going to where the work occurs. “Gemba” means “place where value is created” in Japanese. To understand what occurs on the frontline of facilities and warehouses, individuals and teams must go to the gemba. While there, they talk with operators and ask open-ended questions in order to better comprehend the work, the nature of the value being created, and any problems. Gemba walks enable an organization to develop staff by helping them understand end-to-end processes, identify wastes, and solve problems. Organization leaders use gemba walks to build relationships with frontline workers, establish mutual trust, and help people expand upon current skills and capabilities by offering support and assistance. Gemba walks require appropriate behaviors by those selected to participate in them (individuals are entering someone’s workspace *while* the work is taking place) and should be structured with well-defined physical scopes; purposes; goals; and expectations.[[2]](#endnote-2) Gemba walks are a key component of other problem-solving tools, such as A3 reports and value-stream mapping.

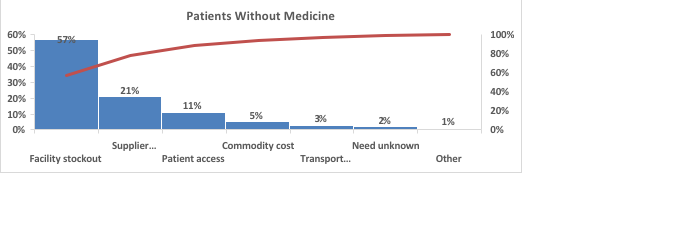
**Fishbone Diagram** — This cause-analysis tool (also called the “Ishikawa Diagram”) helps to identify and sort into categories the many possible causes for a problem. A fishbone diagram forces users to look deeper for root causes of a problem.[[3]](#endnote-3) Each branch represents a cause and is similar to the Five Whys technique (see below), asking “Why” a branch of the diagram happens, with subsequent answers to the question forming sub-branches (sub-causes).



**Five Whys** — This interview technique is used to drill down to the root cause of a problem. It is not intended to be interrogative, but rather enlightening to both the individual asking the questions and the person answering them. It’s human nature to identify the perfunctory, near-term cause for a problem and then fix it at that level. Five Whys promotes deeper analysis and investigation for a root cause, which when addressed can prevent a problem from recurring. For example, consider the following Five Why conversation:

1. *Q. Why did the patient leave the facility angry?* A. We did not have the medicine she needed.
2. *Q. Why didn’t we have the medicine?* A. We had a stockout of that medicine.
3. *Q. Why was there a stockout?* A. We didn’t reorder the medicine.
4. *Q. Why didn’t we reorder?* A. We didn’t recognize that its container was empty.
5. *Q. Why didn’t we recognize the container was empty?* A. We can’t see the volume remaining in the container and don’t regularly open the containers to count medicines. (Use of transparent containers, a visual replenishment system, and/or periodic counts of inventory could prevent this root cause from occurring.)

**Histogram** — This data-analysis technique is used to summarize large amounts of data collected over a period of time, and it is used to show the frequency of occurrences at various data values. A histogram quickly illustrates the underlying distribution of data and helps to predict future process outcomes. To develop a histogram, users will identify the process measure they want to track, gather a large number of data values, prepare a frequency table of the data, draw the histogram from the frequency table with group data, and then interpret the histogram.[[4]](#endnote-4)

**Pareto Analysis** — This problem-analysis technique charts the factor(s) that are contributing to an outcome or problem. It is based on the work of Vilfredo Pareto, who in the early 1900s recognized that 80 percent of the land in Italy was owned by 20 percent of the population. When applied to problem solving, the Pareto Principle (80/20 Rule) assumes that 20 percent of causes lead to 80 percent of problems.

**PDCA (Plan, Do, Check, Act/Adjust) Cycle** — This method for continuous improvement is also known as the Deming Cycle, after the management guru who introduced it, as well as PDSA (Plan, Do, Study, Act). The four iterative steps of PDCA instruct individuals or teams to:

1. Plan an improvement and set goals/targets for the outcomes.
2. Do/implement changes according to the plan.
3. Check the results of the changes. Did the changes achieve the desired goals/targets or were the changes inadequate or the implementation flawed?
4. Act in response to the findings (e.g., standardize, implement again, seek alternative solutions).

**Plan for Every Part (PFEP)** — A PFEP is a database or spread sheet that contains all relevant information about a certain product, part, or commodity, such as its description, order frequency, supplier, supplier location, transit time, lead time, supplier reliability/performance, usage, shipment size, container size, and storage location. The PFEP should be accessible to anyone who requires information about the product/part/commodity, but it’s best to assign one individual to regularly updating the PFEP. Development of a PFEP can be instrumental in establishing efficient delivery routes and schedules, organizing storage areas, and developing methods (e.g., one-piece flow, pull signals) to minimize waste and ensure timely access to products/parts/commodities.[[5]](#endnote-5)

**Prioritization Matrix** — A prioritization matrix allows individuals or teams to plot key characteristics of an event vs. extremes along an x axis and y axis. For example, when identifying improvement projects, ASCM recommends using a 2X2 matrix that plots problem difficulty (x axis) by performance impact   
(y axis) (*see below*). A matrix helps individuals and teams concurrently visualize multiple factors. A third and even fourth level of information can be added to a matrix by incorporating size differences for the plotting points and/or color differences of the plotting points that represent additional characteristics.

**Rapid Improvement Event (RIE)/Kaizen Event** — RIEs are usually short-term (three- to five-day) group problem-solving sessions intended to improve an existing process. Typically a cross-functional team:

* *Meets at the location of the process* being addressed;
* *Studies and maps the process* (e.g., metrics, steps, roles);
* *Identifies process problems*;
* *Establishes objectives/goals for a redesigned process*; and then
* *Develops and implements standardized changes to the process* with those on the frontline who operate the process.
* *Measures outcomes.*

The event concludes with the development of a follow-up plan and a report on outcomes (e.g., degree of effectiveness, application to other processes in the organization or supply chain).

**Theory of Constraints —**The Theory of Constrains methodology focuses on removing constraints from a process, system, or supply chain. A constraint is anything that limits a process, system, or supply chain from achieving higher performance, since it cannot perform better than its worst-performing component or constraint (the weakest link). The Global Health Supply Chain Maturity Model (GHSC MM) highlights the weakest links that prevent a supply chain from achieving its goals. Focusing improvement efforts on the weakest link can speed progress toward improved supply-chain performance. Note that as supply chains improve performance, the weakest link may change. Regular assessments with the GHSC MM can help to identify current constraints.

**Value-Stream Mapping** — This method is used to identify all factors that contribute to the performance of a process, whether it's a single, isolated process; a process that runs across a facility; or a process that extends across a supply chain. Also known as material- and information-flow mapping, it’s typically undertaken by a team that:

* *Observes the process or value stream* (from customer demand back to material origin);
* *Records the movement of material and information* from step to step along the value stream; and
* *Measures performances* at each step, between steps, and overall (e.g., value-added time, non-value-added time, and overall lead time).

On the “current-state value-stream” diagram or illustration, the team identifies existing problems, such as movements and steps with major delays or excessive non-value-added time. If solutions to the problems are obvious, the team pursues a “just do it” approach and implements a standardized practice to immediately fix the problem. Typically, however, large or complex values streams require the development of a “future-state value-stream map,” which redesigns the process in ways that resolve problems and issues. Both current- and future-state maps consist of multiple icons indicating types of processes (e.g., truck shipment, assembly), types of material movement (e.g., first-in first-out, pull system), and types of information flow (e.g., electronic, manual).

**Zero-Loss Analysis** — This technique helps individuals or teams to identify the ramifications of poor performance — anything less than zero defects, delays, or problems (i.e., perfect performance). All daily work processes are examined, and all major and minor problems are identified. For each problem, a loss is calculated. In business, losses are typically recorded as monetary/financial losses; in healthcare, losses can be defined in other meaningful ways (e.g., the likelihood that stockout of a life-critical medicine will prolong illness or result in harm, illness, or death). Daily losses are summed for each process, which identifies areas of greatest need for improvement. Losses also are aggregated into an annual total of losses, which can spur buy-in for improvement efforts. Although difficult or impossible to achieve perfect performance, zero-loss analysis, when performed routinely, can guide organizations to their most damaging problems.

1. John Shook, *Managing to Learn*, Lean Enterprise Institute, Cambridge, MA, 2008. [↑](#endnote-ref-1)
2. Peter J. Sherman, “Take Great Strides with Gemba Walks,” *SCM NOW Magazine*, 2018, ASCM. [↑](#endnote-ref-2)
3. “Fishbone Diagram,” American Society for Quality. [↑](#endnote-ref-3)
4. Michael Brassard et al, *The Memory Jogger*, Goal/QPC, Metheun, MA, 2016. [↑](#endnote-ref-4)
5. Rick Harris, Chris Harris, and Earl Wilson, *Making Materials Flow*, Lean Enterprise Institute, Brookline, MA, 2003. [↑](#endnote-ref-5)