

Periodic Table
of Structured
Problem-Solving
Methodologies

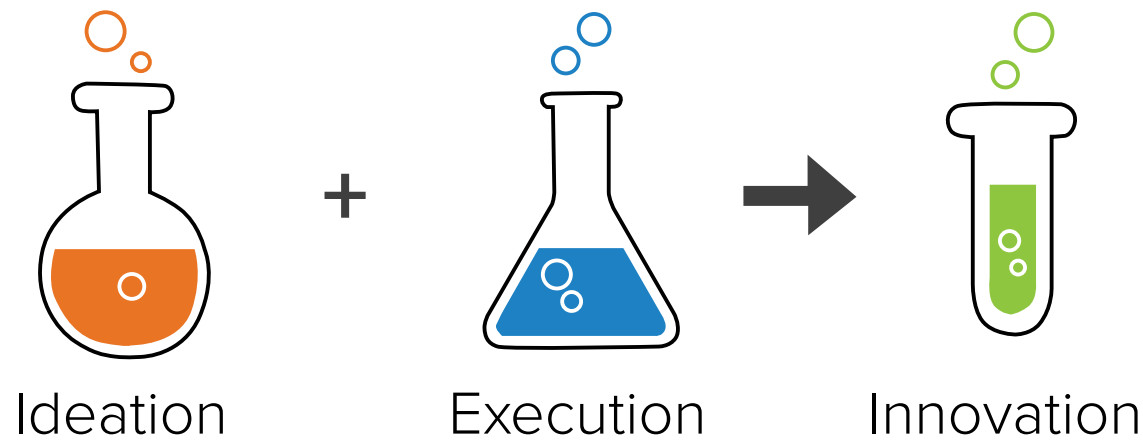


Minitab Engage™

With the latest developments in technology, collecting ideas has become easier than ever. Contrary to popular belief, innovation is not just about ideas. While it is true that you cannot get started without an idea, generating one is only the beginning. Without execution of ideas into actual breakthrough products, services, or improvements, there is no innovation.

Depending on the idea, execution can occur in many different forms. If an idea is implemented properly, it can lead to positive outcomes that transform the entire organization. However, if it's executed poorly, it can lead to a negative "reaction" for the entire organization.

That is why innovation, at its core, is about problem-solving. When it comes to innovation, solving problems, improving processes, and bringing innovation to market requires planning and structure. Fortunately, there are many structured problem-solving methodologies and tools to get you well on your way to innovating, executing, and improving.



Minitab Engage™ was built to help organizations drive innovation and improvement initiatives. What makes this solution unique is that it combines structured problem-solving methodologies with tools and dashboards to help you plan, execute, and measure your innovation initiatives.

At Minitab, we understand that there are different approaches, tools, and resources available for effective problem-solving. That is why we wanted to create a unique way to visualize the resources that our solution provides. To help you prioritize, we have developed the **Periodic Table of Structured Problem-Solving** as a guide to support your organization's innovation needs.

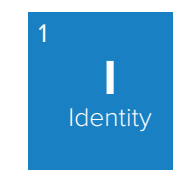
Why is Structured Problem-Solving Important for Innovation?

By implementing a disciplined process, an organization can expedite innovation, avoid common pitfalls of failed experiments, and focus on activities that deliver results. For example, by taking a structured approach of defining a problem, and identifying ways to measure success, a team can assess whether the goal is attainable. By focusing their efforts, innovation teams can solve specific problems and get results quicker. Without focus, teams are likely to find themselves striving to accomplish large, abstract, evolving goals, with "moving targets" that prevent them from ever delivering concrete improvements for their organization.

Performance measurement and data analysis also play a critical role for innovation. Without proper analysis, a problem that appears to be solved, may in fact, just be moving to another area of a process or product. Luckily, Minitab launched the ultimate end-to-end solution to address your program and real-time performance metric needs.

Guide for Reading the Periodic Table

You might be wondering how we picked from the list of many problem-solving methodologies. Our goal was to showcase the methodologies we've identified as the most useful and most popular methodologies that have helped our customers accomplish their goals and accelerate their innovation programs.



Our periodic table is organized around the following three innovation needs: new product development, process improvement, and problem prevention and resolution. Each need is aligned to specific problem-solving methodologies to guide you through the process of selecting the one(s) that best fit(s) your innovation needs.

Each column in the periodic table contains a methodology, where each “element” of the periodic table represents a phase or stage in that methodology, and its order in the sequence of phases. We have numbered our periodic table vertically, to make it easy to follow the phases.

Note that the table does not provide a comprehensive list of all the methods that can be used for structured problem-solving. There may be some that are more valuable for your business – and that’s okay. Fortunately, Minitab Engage has numerous methodologies you can reference for all your idea management needs, as well as tools to help you customize your own.

You will notice that some elements exist in multiple categories of the periodic table, and that’s okay as well. Having the same elements across multiple methodologies shows commonality between various categories. For example, the first element across multiple methodologies is “Define.” In this case, your first step would be to define a problem or a process.

To solve your innovation problem in the most efficient way, our recommendation is to fully complete each phase of a methodology before moving on to another methodology.

Which Methodology Should I Pick?

That depends on the problem that you are trying to solve for your initiative. The structure and discipline of completing all the steps in a given methodology is more important than the specific methodology chosen. For example, debating the difference and relative pros and cons of DMEDI vs. DMADV is great, but an organization that commits to either methodology is going to see better outcomes than the organization that never gets around to selecting and executing it. By providing a solution to improve your process, Minitab Engage helps with the discipline, so that you can focus on successful innovation execution for your organization.

Like with any innovation initiative, we understand that things change, and Minitab Engage is customized to support any variation that occurs.

In this eBook, we highlight the top three innovation needs, methodologies to address those needs, and the tools to help you reach innovation success with Minitab Engage.

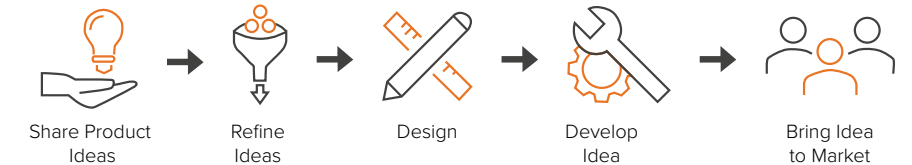
We will begin by diving into our first innovation need.

Engage Tools for successful New Product Development innovation:

- VOC Summary
- House of Quality Matrix
- Monte Carlo Simulation

1. New Product Development

New product development consists of either bringing a new product to the market or re-evaluating an existing product. Developing new products requires a solid understanding of your customers’ wants and needs, as well as a disciplined approach to following the development stages listed below:



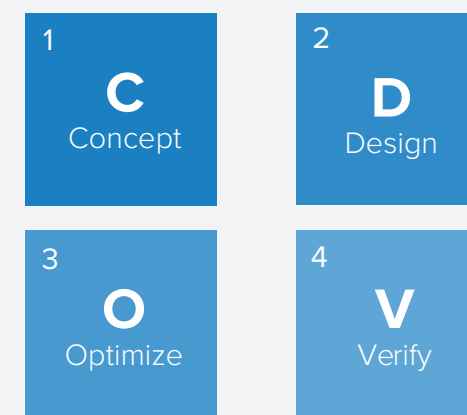
Having a structure to support these stages will result in a successful alignment with the needs of the customer. New product development is completely dependent on customer expectations. Before product design is even implemented, the voice of the customer must first be completely understood.

To help you innovate a new product, below are two methodologies to get you started.

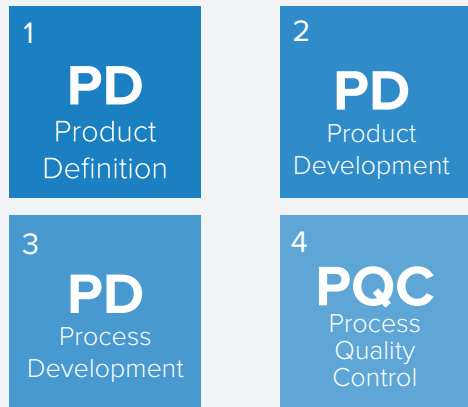
CDOV

[**Concept Development, Design Development, Optimization, Verify Certification**]

This popular problem-solving methodology consists of a 4-phased process used in product and service design. It empowers organizations to evaluate new processes, products, and services to continue to exceed customer expectations. If your organization has a need for new product development, CDOV is a popular methodology for innovation professionals.



1. Develop product using customer input
2. Assess concepts and evaluate competence
3. Analyze routine output
4. Test and validate design



1. Interpret customer expectation for product specifications
2. Assemble and identify critical parts
3. Design processes based on specifications
4. Determine process parameters and implement controls

Engage tools for successful process improvement innovation:

- Process Map
- Value Stream Map
- Standard Work Chart
- DOE Planning Tool
- Quality Control Plan

QFD

[Product Definition, Product Development, Process Development, Process Quality Control]

Quality Function Deployment helps you effectively communicate customer needs throughout your entire organization including design, product, quality and manufacturing teams. It is used to translate the Voice of the Customer (VOC) to meet and exceed design requirements.

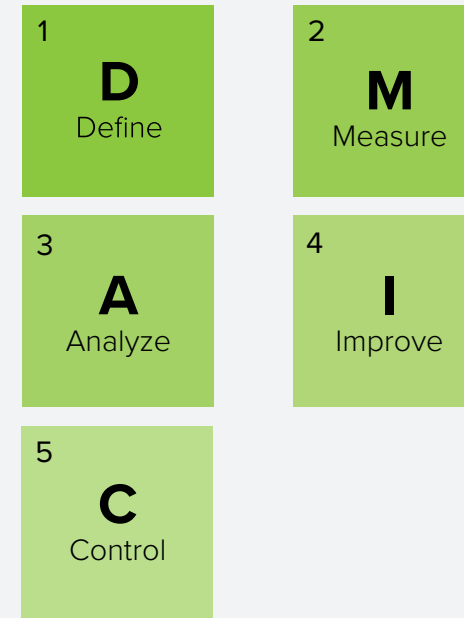
While all new product development initiatives require input, QFD places extra emphasis on customer input and tying those vital requirements to the final process of creating a product. Every decision you make is based on what the product does and how you build it based on that customer requirement.

Next, we'll highlight the second common need for innovation.

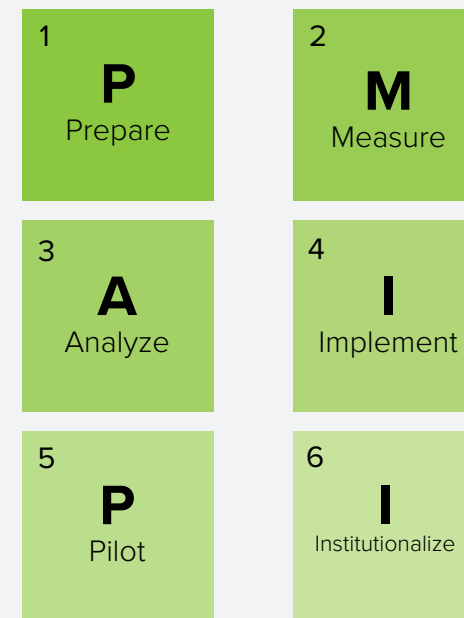
2. Process Improvement

Improving processes helps organizations tackle limitations in a process and analyze successes or failures resulting from those changes. This need is all about identifying, analyzing, and developing existing business processes within an organization. Process improvement is an ongoing practice and should always be followed up with analysis and evaluation.

To help you innovate for process improvement, we have highlighted two methodologies to get you started.



1. Define problem with product or process
2. Measure current process and collect data
3. Analyze data to determine root cause
4. Improve process based on analysis
5. Control new process and monitor defects



1. Define problem with product or process
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DMAIC [Define, Measure, Analyze, Improve, Control]

DMAIC is a methodology that focuses on improving an existing process, rather than creating a new product or process.

If the problem you are trying to solve is complex, or if the risk is high, DMAIC is the most prominent and well-established process improvement methodology.

Kaizen

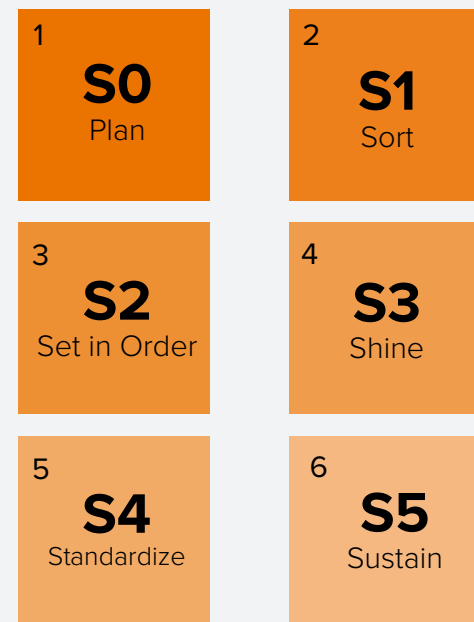
The Kaizen methodology ensures that all employees collaborate to improve the organization. By developing a culture dedicated to effective improvement, this methodology supports continuous, incremental process changes that sustain a high level of efficiency and involves employee participation across the entire organization.

Kaizen helps to improve the quality, productivity, and efficiency through small shifts to prevent future errors in a process. It heavily relies on employee feedback and teamwork. Kaizen is a great methodology for organizations looking to accelerate improvement solutions immediately.

Lastly, we'll highlight our third need for successful innovation.

Engage tools for successful Problem Prevention and Resolution:

- Gemba Interview Sheet
- Fishbone
- 5 Whys
- DOE
- FMEA
- Process Maps



1. Develop a plan
2. Eliminate waste
3. Organize
4. Clean the work area
5. Schedule regular cleaning maintenance
6. Form a habit

3. Problem Prevention & Resolution

It is inevitable that something will go wrong with a process or a product over time. What happens next sets the tone for your organization’s long-term success. By implementing a problem-solving approach, you can focus on the root cause and identify solutions more efficiently.

Applying innovation, analysis, and creativity to fix a problem will help you uncover impactful opportunities for improvement. To help you implement this need efficiently throughout your organization, we have highlighted two common methodologies to help you get started.

5S

5S is a team-based set of tools that systematically and methodically organize the workplace. Implementing this methodology results in a workplace that is clean, safe, and organized to reduce waste and optimize productivity within an organization.

5S is ideal for organizations seeking a clean, well-ordered workplace that improves efficiency and eliminates waste. It is intended to prevent problems from occurring in the first place.



1. Develop experienced cross-functional team to gather data related to that problem.
2. Quantify the problem with data.
3. Define and implement containment to isolate the problem.
4. Identify and verify causes and sources of variation to understand the problem.
5. Collect data to confirm solutions to resolve the problem; pilot
6. Discuss and renew results to develop a plan
7. Modify systems to prevent similar problems.
8. Congratulate team.
9. Standardize the solution

8D

8D consists of problem-solving tools to help you identify, correct, and eliminate the source of problems within your organization. This methodology consists of eight steps to solve difficult, recurring, or critical problems.

If the problem you’re trying to solve is complex and dependent on participation from a team of experts, 8D might be the right methodology to implement.

The 8D methodology is ideal for organizations that need to resolve an urgent problem quickly. It is dependent on participation from a team of experts to ensure they determine the root cause and react to the problem appropriately.

As mentioned earlier, there are many problem-solving methodologies and tools to help you get started. Minitab Engage is the ultimate end-to-end improvement solution to help you reach innovation success.

Conclusion

Nearly every industry and type of organization can benefit from implementing problem-solving methodologies. By doing so systematically, they can expedite innovation and deliver results. Innovation occurs as a result of hard work, cross-team collaboration, strategic planning and structure around that work. When executed properly, innovation can easily be replicable and repeatable for future idea management initiatives. We hope you find our periodic table practical and that you will continue to reference it, as you go on your innovation journey.

Sources

[iSixSigma Methodology Categories](#)

[DMAIC vs. DMADV](#)

[Lean Six Sigma Resources](#)

Get Started Now


Now that you're familiar with some of the most common proven problem-solving methodologies, you're ready to start applying them to your innovation projects with the help of Minitab Engage.

About Minitab

Minitab has spent the past 50 years helping companies and organizations drive cost containment, enhance product and service quality and boost customer satisfaction with our comprehensive, easy-to-use, best-in-class suite of data analysis and process improvement tools. Thousands of businesses and institutions worldwide work with Minitab because of our unique and integrated approach of solutions analytics, empowering you to make better decisions that drive business excellence. Interested in accessing additional guidance with your innovation projects? Contact us to get help from our expert statisticians, consultants, and world-class technical support today.

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 SPM[®]

Machine learning and predictive analytics software

Model Deployment and Monitoring

 Minitab Model Ops[®]

Model lifecycle management on a simple yet powerful platform

Visual Business Tools

 Minitab Workspace[®]

Visual tools to ensure process and product excellence

Project Ideation & Execution


 Minitab Engage[™]

Start, track, manage, and execute innovation and improvement initiatives

 Quality Trainer[®]

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Quality Solutions

Real-Time SPC
Powered by Minitab 

Monitor, respond, and deliver immediate quality and process monitoring

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