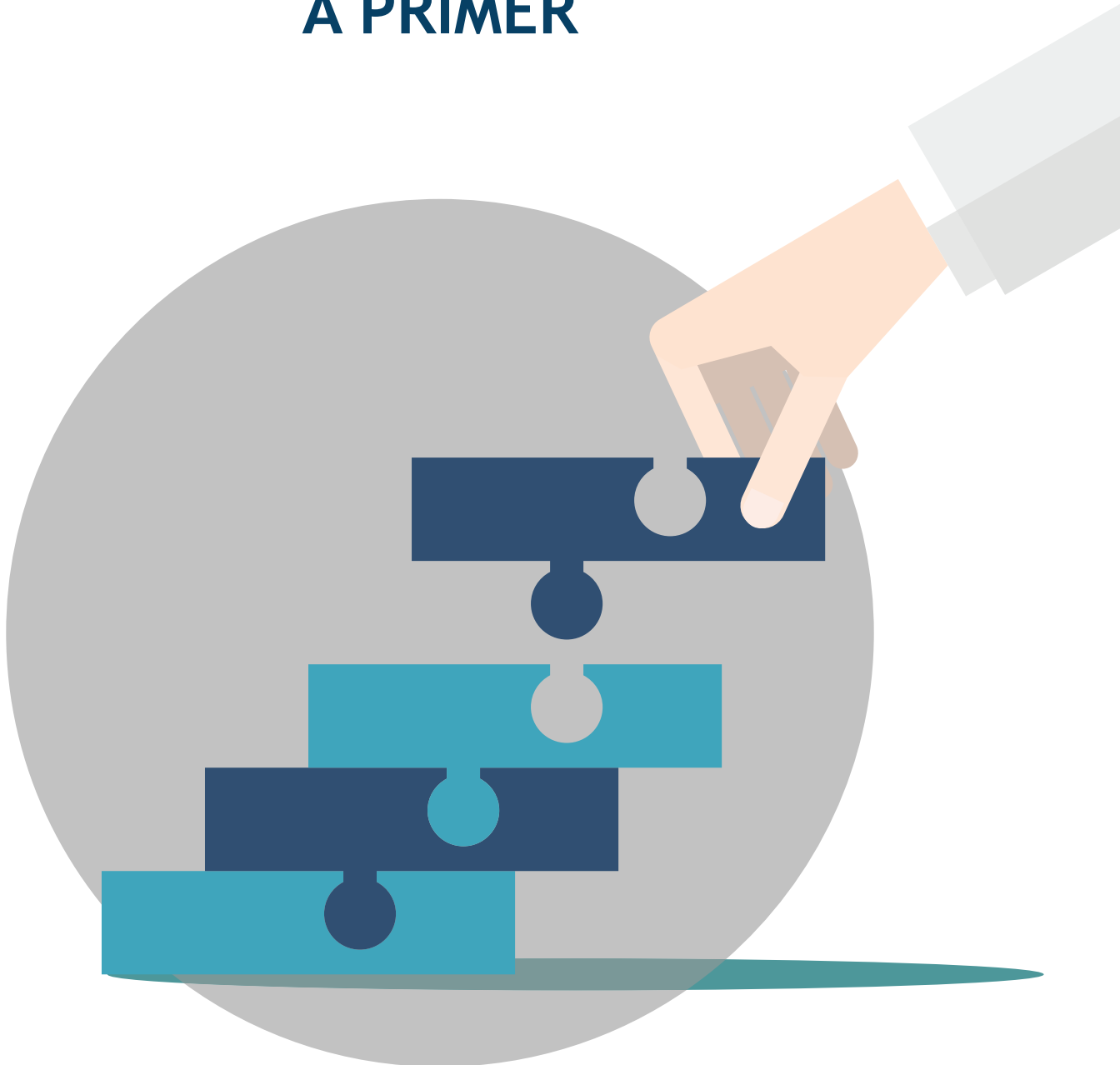# NASPO

National Association of
State Procurement Officials

MODULAR PROCUREMENT

A PRIMER

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Introduction

State procurement officials are often expected to simultaneously achieve both simplicity and sophistication in the face of extensive technical specifications and long-term software development and implementation. Leonardo da Vinci once wrote that "simplicity is the ultimate sophistication." A man of great vision, even da Vinci recognized the need to return to the most basic principles to ensure that complex projects reach a desired end. Modular methods can help achieve simplicity in the most complicated procurements, breaking down the project into manageable stages and helping ensure the end-product is one that solves problems and improves the services provided by state government.

"Modular procurement does two things that make it easier to manage development; it segments risk and increases transparency."[1]

This research brief explores the different philosophies and implementation methods of modular procurement, including the advantages and disadvantages of each method, and the cultural and structural changes a procurement office should consider when making the switch to modular procurement.

What is Modular Procurement?

The term "modular procurement" encompasses several different specific strategies for the practice of breaking up large and complex procurements into small, "tightly-scoped projects to implement technology systems in successive, interoperable increments."[2] Also known as "iterative project delivery," many of the philosophies and techniques being used in procurement began in the manufacturing or construction sectors. The same ideas that helped streamline assembly lines and the construction of skyscrapers can also lead to greater success rates for information technology procurements.

Modular procurement methods certainly do segment risks and increase transparency, but can go even further to also result in better solutions, faster delivery, and happier

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1 18F, U.S. Government Services Administration's Modular Procurement online guide, 2017. Retrieved from   https://modularcontracting.18f.gov/modular-procurement/
2 Id.

customers. These methods may also allow the recognition of partial return on investment (ROI) at each deliverable stage, which generates momentum for executive-level support and funding for the future components of a given project. While most publications and discussions around modular methods tend to focus on the application of these methods for IT procurement, specifically software development, the basic concepts and principles have many different applications.

It All Started with a "Waterfall"

To know where we are going, it is important to take note of where we have been. Waterfall is a non-modular methodology that originated in the construction and manufacturing arenas, and became popular as a method for software development and procurement. The term "waterfall" helps to understand the way this method ultimately works – the process of development literally "flows" from one stage to the next."[3] The typical progression of Waterfall is:

Conception → Requirements & Analysis → Design → Implementation → Testing → Maintenance
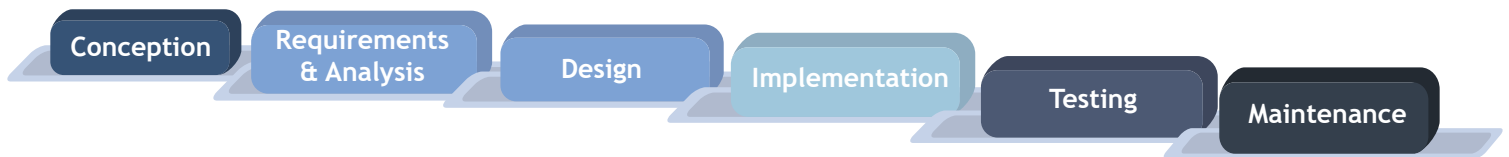
These stages must take place in sequential order, and phases cannot be revisited once the process has moved on. This rigidity of process is what limits Waterfall when it comes to dealing with change. During the initial conception and analysis phases, the entire plan for the project must be completed and put into place. Once that is done, change cannot be made without starting the process all over again from the beginning.

The Waterfall method is still a viable option for projects that are simple and unlikely to experience changes along the way. The method is not difficult to implement or follow, and has clear expectations and delivery items for each stage, making it easy to document, control, and track. Communication with end-users and customers becomes simply a matter of allowing them to "follow along" with the stages as they occur.

On the other hand, Waterfall does not adapt well to change. Due to this major disadvantage, it may not be the best choice when it comes to complex software development. Another major issue is the time it takes to deliver a complete and finished product. Because each stage must be completed before moving on to the next, delivery times can stretch out beyond customer expectations, resulting in a longer wait for useful software. There is also the risk that once the software purchase is completed, it will no longer be the best available technology. Finally, it can be a challenge to ensure after all the stages are complete, the finished product meets all the needs of the customer. If the correct specifications are not known at the beginning of the project, as is often the case, needs identified later or after the completion of the initial phases will not be met by the product.

Agile

Agile is a framework, or philosophy, for modular procurement. It focuses on flexibility, continuous improvement, an embrace of change, speed and satisfied customers. The major tenets of Agile can be found in the Agile Manifesto, a list of 12 principles developed in early 2001 by 17 software engineers with the shared goal of creating an improved method for software development. In many ways, Agile was a reaction to the rigidity of the Waterfall method.

The typical stages of Agile include:

1. Plan
2. Design
3. Develop
4. Release
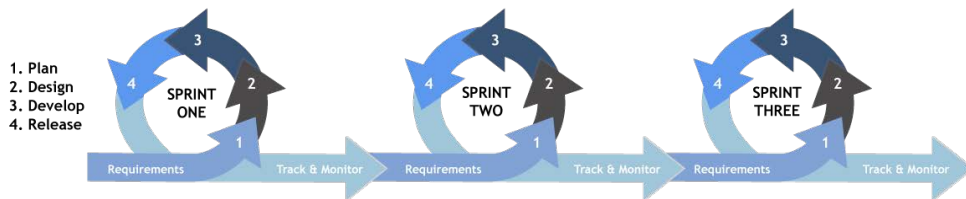
At first glance, this progression doesn't seem to deviate much from the Waterfall method, but the key difference lies in the concept of "sprints." A sprint is a set period during which a specific phase of the overall procurement or project is completed and made ready for implementation and review. One Agile project will have many sprints, designed to make sure there are actual deliverable items completed at the end of each sprint. Sprints are monitored by the procurement team's leader, or "Scrum Master," and can last anywhere from a week to 30 days each. The deliverables completed at the end of the sprint are delivered to the end-user or customer to be evaluated, and changes can always be made.

The Agile method provides many advantages, including the ability to embrace change at any point during the project by utilizing the sprint process. Agile can also lead to a higher quality overall product, because testing and improvement can occur during each sprint. Unlike the Waterfall approach, problems are identified before the end of the process, eliminating the need to wait until the end of the project to see issues and potentially fatal problems. Agile can, essentially, help pull from the proverbial cliff a project that would have failed and breathe new life into it.

As can be seen by reviewing the principles of the Agile Manifesto, customer involvement and satisfaction are key goals for Agile procurements. Customers are involved early and often during the sprints. They can see progress being made, suggest changes and improvements, and ultimately, feel a sense of ownership and greater satisfaction with the procurement process as a whole. Agile can lead to partnerships where everyone is working toward an end goal, and everyone takes responsibility for the end-product being the best it can be.

With all of these advantages to Agile procurement, potential pitfalls of this process must also be carefully considered. Agile necessitates a certain team mentality that may require procurement professionals to rethink and relearn processes that have become ingrained in their day-to-day work. If documentation is important to the team, it must remain a priority if it is to be regularly created as the Agile method focuses more on discussion rather than documentation. Finally, both the completion date and the final product are constantly in flux. This will require both the customer and the procurement team to work closely together to ensure expectations are met and everyone understands that the purposefully flexible nature of Agile can sometimes seem like uncertainty.

Key Concepts: Traditional Procurement

- Software functionality defined in scope
- Fixed price submissions from vendors are all-inclusive and final
- Success is measured against the contract
- Vendor builds to a set of specifications, without consideration of problem(s) being addressed
- Deliverables often meet the requirements, but not the needs of the end user

Key Concepts: Agile Procurement

- Scope can change through the development
- Solicitation lays out what the software deliverables are, not the architecture
- Testing and design can be iterative
- Final product is more effective at achieving the purpose of the procurement
- Deliverables focused on meeting the needs of end-users and solving problems

The Agile Manifesto

01 ➤ Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

02 ➤ Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.

03 ➤ Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

04 ➤ Business people and developers must work together daily throughout the project.

05 ➤ Build motivated projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

06 ➤ Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

07 ➤ Working software is the primary measure of progress.

08 ➤ The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

09 ➤ Continuous attention to technical excellence and good design enhances agility.

10 ➤ Simplicity—the art of maximizing the amount of work not done—is essential.

11 ➤ The best architectures, requirements, and designs emerge from self-organizing learns.

12 ➤ At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Implementation Methods

Modular procurement can be implemented in many ways. Here, we will focus on three of those implementation methods: Scrum, Kanban and Lean/Kaizen.

Scrum

Scrum is the most popular implementation methodology for Agile development. The most basic principles of Scrum are transparency, inspection and adaptation – often called the "three pillars" of Scrum. Transparency is achieved by holding daily meetings so that everyone on the team can hear what others are working on, key in on potential issues, and discuss and resolve problems together. Inspection is the responsibility of all team members. While individuals are always accountable to the team, the accountability for the procurement deliverables lies with the entire Scrum team. Adaptation can often represent the biggest challenge to Scrum teams, especially when first moving to an Agile methodology. Sprints are completed in short time periods, and there is regular and constant feedback on each sprint completed. This makes change easier to accommodate overall.

Within Scrum, there are three major roles to be filled: product owner, Scrum master and Scrum team. The "product owner" represents the input from executives, stakeholders, customers and end-users. He or she is focused on ensuring that there is effective communication between the customer(s), Scrum master and Scrum team while prioritizing the work that needs to be completed, and always returning attention to the goal of the entire project. The "Scrum master" should be certified in Scrum methodologies, and provides coaching, organization, and helps the team to overcome challenges. It would be a misnomer to say the Scrum master is "in charge." He or she is not the ultimate authority over the process, but should be a guiding force toward the end goal of the project. Finally, the "Scrum team" is composed of highly qualified individuals, typically 5-7 people, who come together to work on the procurement and completion of each sprint. The Scrum team is tasked with developing a plan for each sprint, identifying roles for each individual based on their skills and strengths, and ultimately, sharing the responsibility for delivery of a valuable procurement.

Scrum Roles
A different way of thinking; a better way to drive success

Product Owner

The Holder of Product Value

Determines what needs to be done and sets priorities to deliver the highest value

ScrumMaster

The Servant Leader

Protecting the Scrum process and preventing distractions
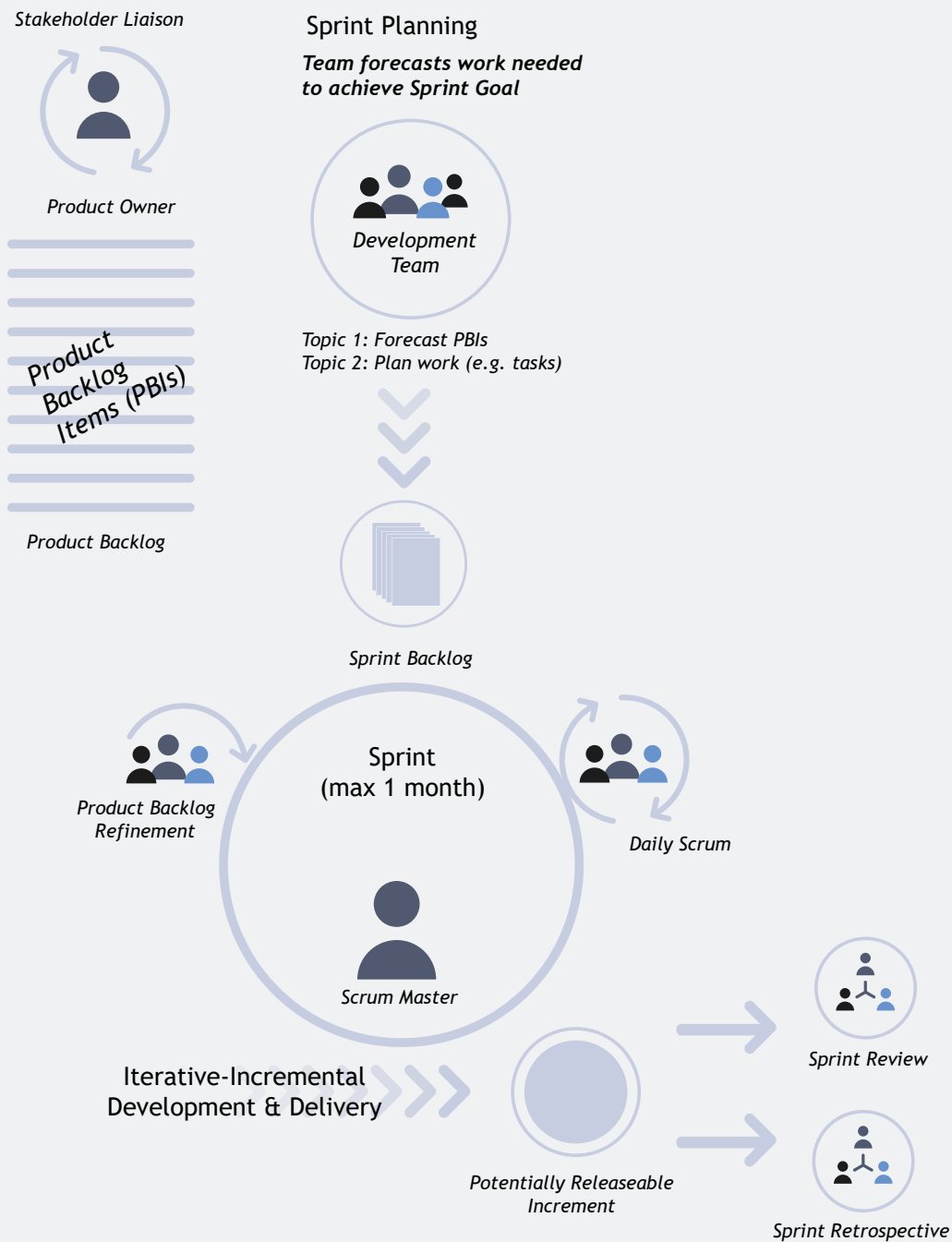
Development Team

The Self-Organizing Group

Takes on and determines how to deliver chunks of work in frequent increments

Each Scrum sprint is comprised of several steps. First, there is a product backlog – a ranked list of what is required for each sprint. This list is the responsibility of the product owner. Next, there is a sprint planning meeting, held by the Scrum team. Starting at the top, the team selects, based on the priorities identified by the product owner, as much as it can commit to delivering at the end of each sprint. Then, each team member assigns themselves a task to complete. The completed task is then evaluated by each team member in the daily Scrum meeting. Once all tasks in the sprint are completed, there is an overall review and retrospective taken by all members of the team regarding what went right, what went wrong, and how the process can be improved next time. All of this is monitored by the Scrum master, who is brought in at various stages, including during the daily Scrum meeting, to discuss the challenges and successes of the team. The team may want to consider engaging an Agile Scrum mentor to help modify processes.

Agile Scrum Framework at a Glance

Stakeholder Liaison

Product Owner

Product Backlog Items (PBIs)

Product Backlog

Sprint Planning

Team forecasts work needed to achieve Sprint Goal

Development Team

Topic 1: Forecast PBIs
Topic 2: Plan work (e.g. tasks)

Sprint Backlog

Product Backlog Refinement

Sprint
(max 1 month)

Daily Scrum

Scrum Master

Iterative-Incremental
Development & Delivery

Potentially Releaseable Increment

Sprint Review

Sprint Retrospective

Kanban, sometimes referred to as "the pull method," was first developed by Toyota in the 1940s. Toyota called this system, which they ultimately implemented on their factory floors, "just-in-time." The concept is that the amount of work in progress should precisely match the team's capacity, thus improving flexibility, transparency, and output. This is, of course, one of the major concepts behind Agile and modular procurement methods; and the methodologies behind Kanban can be applied to teams working in an iterative and modular way.

Kanban relies on visualizations of work in progress, called the "Kanban Board." This board can be physically present in an office, or online, and is traditionally divided into three columns labeled, respectively; "to do," "in progress," and "done." Cards, often sticky notes, contain each item of work that needs to be completed, and are placed on the Board and moved from column to column as work is done.

The column titles can be changed, depending on the field in which Kanban is being used. Cards may also be color-coded based on the urgency of the work or other classifications.

What sets the Kanban Board apart from other visualization management methods is the ability to limit the amount of work in progress to prevent bottlenecking. The board makes clear where tasks are piling up, and everyone can visualize where issues are before they become major obstacles.

The Kanban Board system is easy to understand and implement. One major advantage is that it does not require a huge upfront change in the methods of a procurement office. Kanban methods can be implemented and used to the advantage of whatever procurement methodology is being utilized. There are many virtual Kanban Boards online that can be utilized for virtual team planning.
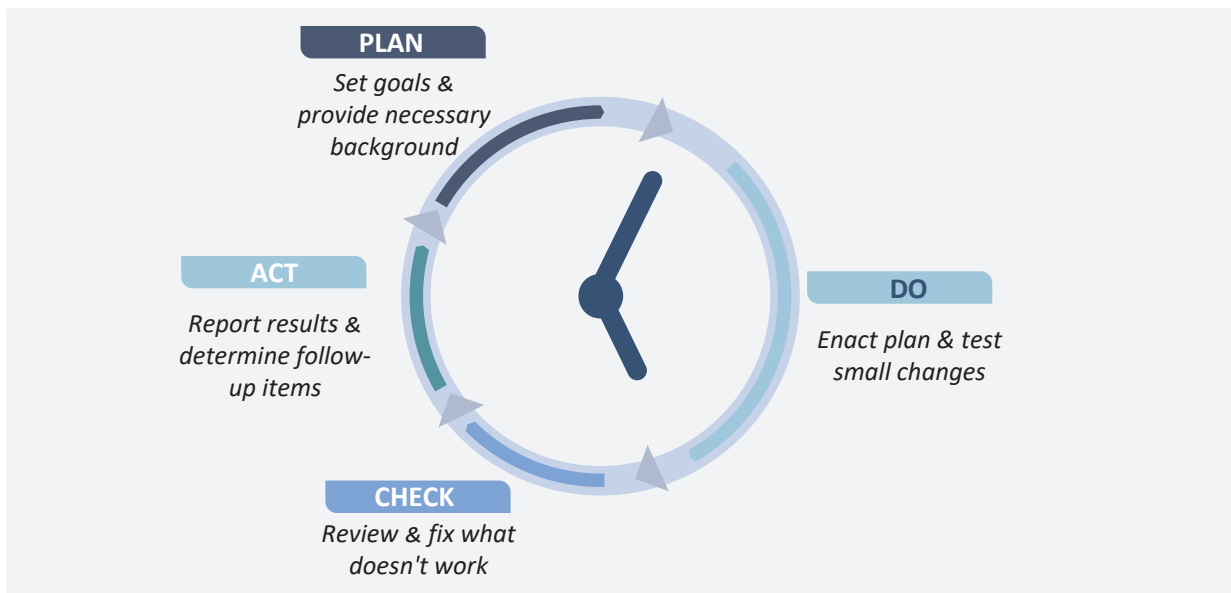
Kanban Board Layout
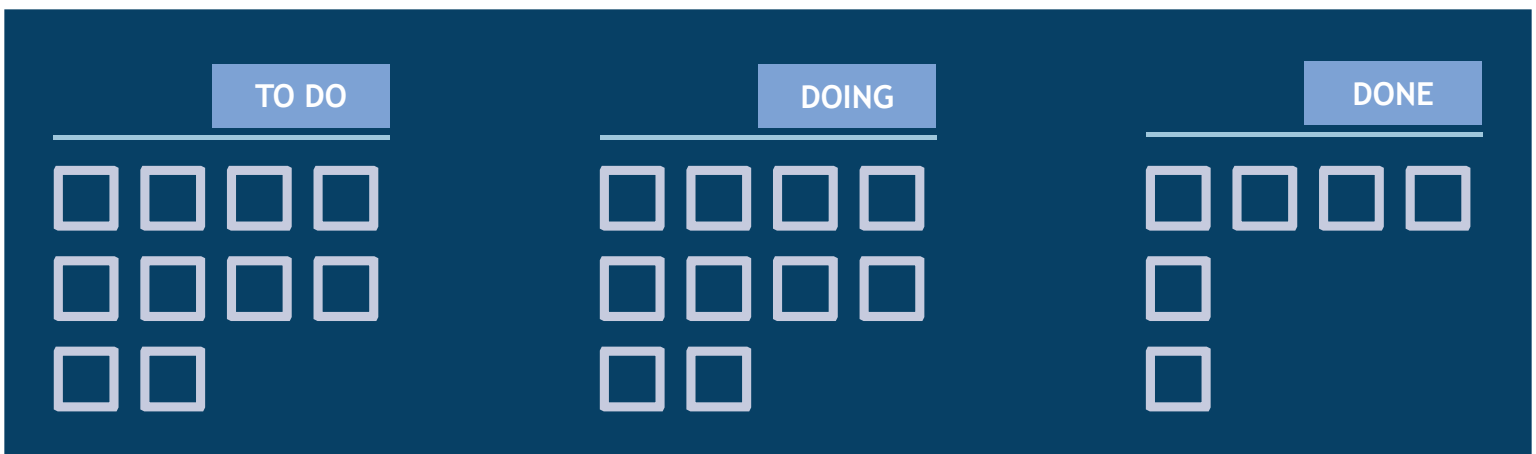
Lean/Kaizen

While Lean is a methodology rooted in production and first utilized by Toyota Manufacturing, its focus on eliminating waste and boosting efficiency has many applications for improvement in the procurement process. In all aspects, Lean focuses first on a high customer service standard. Lean offers a myriad of tools, all geared toward streamlining processes. While this brief does not discuss all available tools, Kaizen is one that has unique applicability to the procurement process.

Kaizen, the Japanese word for "continual improvement," is combined with Lean methodology to enhance all functions of every member of the procurement team.

When utilizing the Kaizen philosophy, stages include:

PLAN
Set goals & provide necessary background

DO
Enact plan & test small changes

CHECK
Review & fix what doesn't work

ACT
Report results & determine follow-up items

Combining the Lean ideology with the principles of Kaizen creates an engine that propels the team to continually re-evaluate the procurement process to determine weaknesses, and potentials for incremental improvements, and identify where waste can be eliminated.

Auditing is an important component of Lean and Kaizen thinking, requiring a team to constantly evaluate their processes and look for ways to improve. No one knows the procurement process better than those who are actually living it day-to-day, and those are the people best suited to determine where there is wasted time, and what unproductive or repetitive steps can be eliminated. The role of the supervisors is to listen, learn, motivate and encourage the team to new heights.

Lean and Kaizen can help procurement teams change behaviors for more efficient output. For example, something as simple as the order in which something is done or processed can make a huge difference in the time a task or procurement can be completed. Over time, constantly re-evaluating internal processes and procedures can often lead to dramatic improvement of delivery time and efficiency of team members. Acknowledging that there is always room for improvement is a key to success with Lean and Kaizen.

Humans are creatures of habit, and change is often difficult to implement. Team members may tend to drift back into their old habits. Ongoing dialogue with team members to find out what they are doing daily, and what is needed to help them become more efficient, is an important practice to develop. One way to articulate this is to always "keep the surgeons at the table." Every time you "leave the table" for something not necessary to, or a diversion from the work, the work sits idle. Considering what can be done to keep the procurement team "at the table" more often than not can mean the difference between a successful or struggling procurement project.

With all three of these methodologies, it is important to remember that the solicitation and resulting contract language must be written so as to encourage and support modular product delivery. This means that everything from pricing, to terms and conditions, to the scope, must simultaneously meet the requirements of state procurement code and statute, while being flexible enough to allow a modular development process. This is no simple feat, but using modular methodologies to develop solicitations can be helpful to achieve that end. Using a question and answer process with vendors, and allowing a dialogue with vendors can avoid the pitfalls of overly rigid scopes and specifications. A modular methodology that includes end-users and vendors during the scope and specification design process can help avoid major downstream issues with the resulting contract and deliverable(s).

Five Ways to Make Modular Methods Work with the Procurement Process

01 Culture Changes are Critical

No matter what methodology, philosophy, or tools are used, transitioning from traditional procurement methods to a modular or Agile approach will require some up-front changes to the processes and culture of the procurement office. Eventually, making these changes can lead to a more balanced workload on each procurement officer, so the beginning investment has a great return value. The importance of recognizing that a culture-shift is required for successful implementation of modular procurement cannot be overstated.

02 Focus on the Team

All modular and Agile procurements require a team mentality. It is unrealistic to expect that any one team member can have all the myriad skills needed to make a successful procurement. With modular and Agile procurement, the focus is on determining what expertise each team member has, and using those strengths to the betterment of the team as a whole.

A lot of the methods discussed in this primer use team-driven task assignment. Team members take on tasks based on their workload, and self-pace themselves through each step of the process. Trusting team members to be able to manage their own workload, and empowering them to do so, are key elements to success with modular methodology.

Responsibility for a procurement is placed on the team, not on the individual. This can often be a great shift for a team that has worked together using traditional procurement methods in the past. Teams must relearn how to work together and share the responsibility of decisions, timelines, successes and challenges.

03 Change is Good!

Change must be embraced and encouraged, not merely tolerated. Constant communication among team members is essential, and daily team meetings will keep everyone working toward the same goal.

Visual management is always one tool that can increase productivity and communication among teams working on modular procurements. Team members can see all tasks that must be completed in one

place, and can take on tasks based upon their current workload and capacity. This visual management style allows ownership by the team over each task, and keeps the flow moving toward completion of each segment of the procurement.

One of the main benefits to modular procurement methods is that a change order does not slow down the process, or cause everyone to have to go back to the drawing board. Change is accepted, expected and merely worked into the next sprint or step. Teams must shift from viewing a change as a hindrance to seeing it as an opportunity for new and better things!

04 Emphasize Critical Thinking

Critical thinking skills are essential for teams tackling modular procurement methods. While traditional methods of procurement have no shortage of paperwork and processes, modular procurement requires problem solving, delivering business solutions, and an appreciation for fair, open, and transparent competition.

These innovative procurement methods are the definition of "thinking outside the box." Only by challenging the status quo and the willingness to try something new can modular procurement really work the way it should.

05 Evaluate, Evaluate, Evaluate

The value of revisiting steps, decisions, processes and outcomes is crucial to success with modular procurement. If the team is not talking about successes and challenges, the successes are not going to continue, and the challenges will only become more difficult to face. Most of the modular implementation methods described in this brief require a keen eye inward, and for good reason. The team cannot grow without constant care and monitoring from within and without. Making incremental improvements to processes and methods every time a procurement is completed, or a sprint is over, can mean the procurement team will eventually reach great heights.

Conclusion

The concept of modular procurement is in its infancy and evolving. No matter which modular procurement method an office decides to employ, keeping the procurement team focused, engaged, and motivated to work together toward the common goal of more successful procurements can lead to excellence. Simplification of the procurement process may seem impossible, but by strategically employing modular procurement methods and forward-thinking, team-focused project management tools, it can be achieved. A procurement team can produce timely procurements that are true works of art.

Further Reading:

- The Agile Manifesto

- NASCIO - Agile IT Delivery: Imperatives for Government Success

- 18f: Modular Contracting Toolkit

- Smartsheet: Agile v Scrum v Waterfall v Kanban

- Agile Alliance - Agile Glossary

Acknowledgements

About NASPO

NASPO is the National Association of State Procurement Officials and represents the directors of the central purchasing offices in all 50 states, the District of Columbia, and the territories of the United States. For more information on NASPO, please visit www.naspo.org.

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