

WHITE PAPER

Agile in the Federal Government: Scrum and Beyond



ABSTRACT

The trend of increased Agile usage, including within the federal government, is undeniable and ongoing. The private sector has been at the forefront of Agile adoption. Here, competency with Agile has been adopted in a progressive manner, starting with technical teams and flowing down to the business side and eventually the entire organization. For the most part, the federal sector has followed the private sector's pattern of adoption with the primary exception being its bypassing Agile Engineering practices such as XP and relying predominately on SCRUM. The private sector learned that SCRUM by itself would not effectively support scalability to replicate the success of one project across the entire organizational structure and adopted scaling frameworks such as SAFe. Similarly, it realized that Scrum was not necessarily appropriate for all types of work and looked for alternatives, most notably Kanban. We predict the government will follow the private sector's path towards Agile maturity and will be applying both SAFe and Kanban where appropriate. As the private sector continues to gain Agile competencies, new challenges will be uncovered and new techniques and solutions will popularize as a reaction. We anticipate the government will follow suit and benefit from solutions already tested and amended in the private sector using a structured framework for adoption.

INTRODUCTION

In January 2014, Version One released its 8th Annual "State of Agile Development" survey. Among its findings, 57% of surveyed respondents reported working at an organization where 5+ projects are practicing Agile software development methods, up from 33% just two years prior. While the trend toward increased Agile usage, including within the federal government, is undeniable, the pathway towards broad and successful Agile adoption has been less clear.

In this whitepaper, we will:

- Take a deeper look at how Agile developed in the private sector
- Show how the governmental sector is displaying a similar pattern of adoption
- Highlight the one pattern difference between the private and federal sector that we anticipate will soon correct itself
- Provide a framework for how government agencies can take some proactive steps to smooth out the transition into Agile

BACKGROUND

Since the 1970's, the waterfall methodology has been the predominant approach for developing software. The first formal description of this model is often cited as the 1970 article by Winston W. Royce entitled "Managing the Development of Large Software Systems", although Royce did not specifically use the term "waterfall" in this article. Royce describes the methodology as a cascading set of project phases that are performed to develop the software, i.e. system requirements, software requirements, analysis, program design, coding, testing, operations.

Ironically, given its continued use for the past 40+ years, Royce presented this approach as being a flawed methodology. Specifically, he states in the article that "I believe, in this concept, implementation above is risky and invites failure." Waterfall's success rates reflect Royce's concern. Various surveys over the past 20 years have shown that the majority of IT projects using the waterfall methodology are considered to have failed or be challenged.

With abysmal success rates and a deteriorating industry reputation, a group of software development leaders met in Snowbird, Utah in 2001. While some of the methods involved predated this meeting, the end product from this summit, the Agile Manifesto, outlined a new set of values and principles for more successfully developing software.

Since 2001, the use of Agile methods has grown exponentially with the private sector being at the forefront of the adoption. Since transitioning to an Agile method involves a major shift in the software development process, numerous challenges have been encountered, sometimes leading to a bumpy adoption road in the private sector. Nevertheless, Agile methods are now estimated to be in some use in approximately 80% of organizations, with an increasing number of organizations stating that it is now the methodology of preference.

AGILE ADOPTION IN PRIVATE INDUSTRY

With over a decade of data on Agile methodologies, there is substantial information to analyze when looking at how Agile has been adopted in the private sector. Looking at the progression of Agile adoption there is a pattern that is repeated over and over again. Competency with Agile has traditionally been adopted in a progressive manner, starting with technical teams and flowing down to the business side and eventually the entire organization.

Agile first became popular in the technical community, and adoption started with the software engineers. Iteration planning, unit testing, and daily standups were among the first practices to be adopted. These practices are outlined in a framework under the Agile umbrella called Extreme Programming (XP). The technical team is often the most insulated group. While they may work with each other closely, they mostly interact with the wider organization through intermediaries, such as business analysts. Since they are relatively self-contained, they can decide to adopt certain practices without having to get sign-off from other groups. Therefore, private sector Agile practices began with a minimal number of individuals being involved. There was no need for large-scale training and later impediments, such as resistance to change, weren't seen as initial obstacles. In fact, a full adoption of XP practices could happen without the business owners ever being aware that Agile was being used. When problems arose, the small, insular team could quickly adapt and correct themselves without outside interference. As technical teams grew more proficient, they started adopting more and more Agile practices like automated builds and burndowns. For most of the private sector, this was a typical beginning to an organization's long journey of building Agile expertise.

As the technical teams were seeing success with Agile, the processes surrounding software development needed to be upgraded to handle the technical team's development efforts. Although iterative development was possible with just the buy-in of the technical team, the real benefits of Agile couldn't be tapped without iterative requirements gathering. These adjacent processes became the next 'lowest hanging fruit' and the business side started adopting some aspects of Agile as well. The business units understood the concepts of iterative development much more readily than the esoteric concepts like pair programming and refactoring. Thus, large projects were increasingly split up into multiple phases, although each phase (at first) was still run in the waterfall approach. Over time, the business processes were changed to be more iterative.

Soon, both the technical aspects of software development and the processes surrounding it were meshing. However, there was a new source of friction. Project management had not yet been improved to handle the iterative nature of Agile. Status tracking, reports to management and many other artifacts of project management did not fit neatly into the new Agile world. For example, a "traditional" project management plan would have many months-long testing effort, held once and only once at the end of a project. XP calls for

continuous testing and will not have such a large, one-time effort at the end of a project. This affects resource allocation and timeline and needs to be communicated to relevant stakeholders.

As the combined project team's Agile competency grew, so did the project management principles. For example, engineer-only retrospectives became entire team retrospectives. Business representatives with authority to prioritize and make decisions about the product, called Product Owners, became commonplace. In fact, it was only in 2012 that having a dedicated Product Owner was practiced by more than 50% of Agile practitioners.¹

AGILE ADOPTION IN GOVERNMENT

In private industry, the technical team developed its competencies first, and continued improving them as expertise cascades into other functional areas over time. We can see a similar pattern in the federal space as Agile adoption becomes more widespread. However, one key difference is that the federal sector started with Scrum being the primary Agile framework adopted instead of Extreme Programming. While XP focuses on the technical engineering practices, Scrum has a stronger emphasis on process level Agile practices, such as the concepts of co-location and self-organizing teams. We believe that this difference stems from the later timing of Agile adoption in the government, i.e. most of the interest in Agile within the federal sector began after Scrum had developed a stronghold in the private sector. Moreover, many federal contractors had only a surface knowledge of Agile, and, as a result, contributed to steering the government toward Scrum because they had limited breadth in successful Agile software delivery and little or no knowledge of XP.

The numerous examples of significant cost overruns, or worse, high profile IT projects that spend many millions of dollars and produce no valuable output, catapulted Agile (primarily Scrum) into the government spotlight. The Office of Management and Budget (OMB) recommended the increased use of Agile to produce software in smaller, shorter increments that allow greater transparency on how the government is managing its IT investments.

Following that recommendation, in July, 2012, the GAO produced its report: Software Development: Effective Practices and Federal Challenges in Applying Agile Methods. When we look at the report's 14 challenges to adopting Agile, we see the same symptoms as we saw in the private industry many years ago.

We take these 14 impediments into Agile adoption and classify them into the 4 stages of Agile adoption. Now a clearer picture exists of where the government currently stands in the journey to Agile adoption.

Technical	Process	Project Management	Agile Enterprise
Technical environments were difficult to establish and maintain.	Agencies had trouble committing staff.	Traditional status tracking does not align with Agile.	Timely adoption of new tools was difficult.
	Teams had difficulty managing iterative requirements.	Compliance reviews were difficult to execute within an iteration time frame.	Agile guidance was not clear.
	Teams had difficulty collaborating closely.	Traditional artifact reviews do not align with Agile.	Federal reporting practices do not align with Agile.
		Staff had difficulty committing to more timely and frequent input.	Customers did not trust iterative solutions.
			Teams had difficulty transitioning to self-directed work.
			Procurement practices may not support Agile projects.

¹ Annual State of Agile Development Surveys. VersionOne, Inc. 2005-2014.

As areas gain more experience, fewer challenges remain to be resolved. Only one of the fourteen challenges, 'Technical environments were difficult to establish and maintain', applies to the technical team. However, the reason this technical challenge exists could be due to broader issues unrelated to the competency of the technical team. For example, excessive red tape and an over-burdensome process could easily be the root cause of the issue. If so, this challenge to adopting Agile should really fall into the 'Agile Enterprise' bucket.

Overall, the GAO report paints a picture where the technical team has developed the most Agile competencies first, the processes and project management functions are developing their competencies, and the agencies as a whole have not yet begun developing into an Agile Enterprise. Correspondingly, the Agile Enterprise function sees the most challenges, the project management and processes have less, and the technical team has the least of all.

One significant difference can be seen from the Agile adoption path of the government sector and that of the private sector. While the initial focus of the private sector was on the technical component, it started with the adoption of Agile Engineering practices. The federal sector has bypassed this valuable component for achieving agility and is hindering success which will be the main subject of our next whitepaper on Agile in the Government.

While many think that the government is blazing a brand new path with Agile, upon further analysis it seems that this race has already been run by the private sector. We believe that the past experiences in the private sector can serve as a blueprint and lessons learned for successful adoption in the federal space. Although the overall path of Agile adoption in the federal sector may be similar to the private sector, it does not mean that there are no additional challenges that need to be overcome. The Government has a deeply ingrained culture that proves difficult to change. The Federal Acquisition Regulation makes procurement less straightforward and nimble. Each agency spends time ensuring that all actions are consistent with its charter, political risks are mitigated, and required congressional processes are followed. All of these examples, in addition to many others, add up to create roadblocks that resist widespread changes – which the Agile Enterprise requires.

GOING BEYOND SCRUM

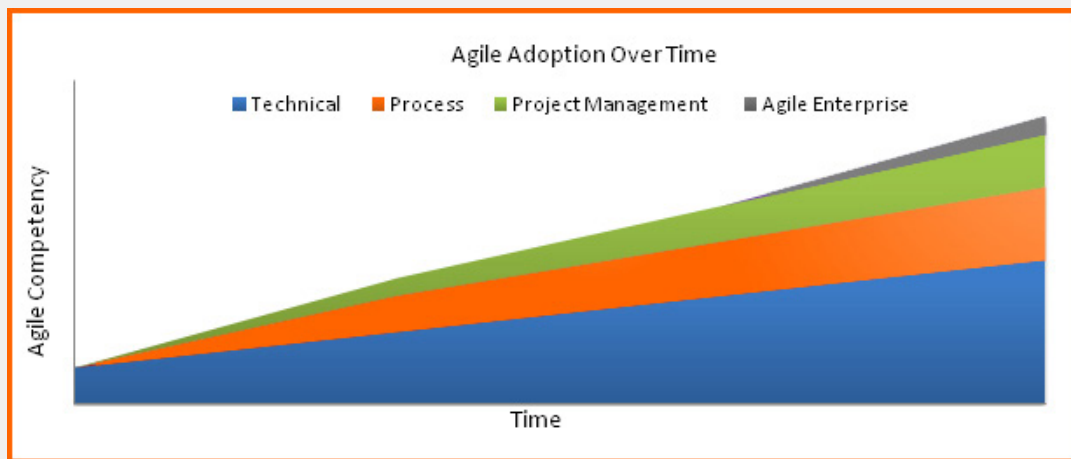
As the private sector matures in their Agile capabilities, they look to improve and resolve challenges that pose limitations to the level of success an organization can reach. We believe the government will soon be embracing these next steps following the initial phase of Agile adoption. There are two major trends in Agile that are taking the private sector by storm: Dean Leffingwell's Scaled Agile Framework (SAFe) and Kanban. Both of these frameworks address unique problems the private sector has identified and struggled with for years.

After several years of Agile being practiced at the project level, it became recognized that there were many enterprise-level issues that needed to be tackled in order to build the Agile Enterprise. The Agile Enterprise would support Agile projects through non-technical support structures and decision making. Organizations began rethinking structures and processes that spanned across multiple projects, such as the budgeting process, or the program management office. Overall, these can be split into two components: 1) Culture 2) Scalability.

The culture of an organization has a massive impact on the broader success of Agile within an organization. Opaque IT, resistance to change, and other cultural issues could prevent the organization from realizing the full scale of benefits. Scalability is the ability of an organization to replicate the success of one project across the entire organizational structure. With the size of many organizations, having one high-performing project team was often considered not enough. The organization needed to be able to replicate this success, and ensure that the organizational process could constantly produce high performing teams, while not relying on any one individual.

The most well-known scaling framework is the aforementioned SAFe. At the portfolio level, there is a team of Agile teams whose responsibility it is to align around common enterprise goals. This 'team of teams' will define "epics", which are large development efforts that span releases. These need to align with the enterprise value streams. In the legacy view of portfolio management, there is centralized project planning and control over operations. There are many projects, each with detailed project plans and centralized project-based budgets. In essence, management is highly involved in the day-to-day planning and execution. In the SAFe framework, management decides the investment streams and decision-making is decentralized. The 'team of teams' is aligned with management's goals and autonomously delivers continuous value flow. The key difference is that instead of management being engaged in projects, you have a self-managing 'team of teams' continuously implementing in alignment with corporate goals.

The diagram below shows how Agile competency typically grows over time in an organization. At the very early stages of Agile, only the technical team has competency. Then Agile spreads to the directly adjacent processes and business units, and finally grows to encompass the entire project. The challenges surrounding the technical team are more bounded and able to be solved with adopting Agile practices. At each step of the way in Agile adoption, the difficulty in implementing Agile increases. There are more moving parts and the problems are more unbounded. Processes involve more than one business unit, and project management involves even more divisions and personalities. People with no direct interest in the project are required to learn new things and change behaviors. When we get to the enterprise level, personalities, culture, and bureaucracy all start playing a major role. At this enterprise stage of adoption, the issues to be overcome are complex, sophisticated, and are only solvable with significant dedication and resources from all levels of the organization.



Also, the private sector eventually realized that Scrum was not necessarily appropriate for all types of work and looked for alternatives. As a result, Kanban emerged from a term commonly used in the manufacturing industry to a buzzword in IT almost overnight. Kanban provided a relatively simple solution for some of the challenges prevalent in areas where Scrum's iterative delivery model has struggled in the past, such as: maintenance and support, portfolio management, non-IT services and more.

By nature, Kanban is a process improvement approach for organizations that want to improve business results by improving service delivery from their creative knowledge workers. Another attribute of Kanban is the lack of immediate culture change. Kanban encourages pursuit of incremental change while respecting the current process, roles, responsibilities and titles. 'Start with what you do now' is the underlying theme in Kanban. Because roles, responsibilities and daily behaviors are not changed, the resistance and emotional impact that can come with Scrum is removed. As such, Kanban is becoming the preferred approach when specific improvements and little change management impact are desired. Today, many private sector

companies maintain expertise in both Scrum and Kanban and selectively deploy them depending upon the situation and need.

RECOMMENDED ACTION FRAMEWORK

Agile adoption in the federal space no longer has to wait to come across challenges before attempting to fix them, as the private sector did. Most of these challenges have already been overcome once before, and we can use that blueprint to proactively mitigate risks.

CC Pace has developed a four-step framework for government agencies to follow in order to have the smoothest Agile transition possible:

- 1. Assessment** - The initial step is self-awareness. Most agencies have begun an Agile initiative. Moving forward effectively, however, requires being aware of where you currently are and establishing a common understanding of the current state of Agile within the agency. To determine this baseline position, an assessment of the agency's maturity level with respect to Agile techniques and best practices should be performed. The assessment examines the wide-ranging aspects of "being Agile" including people, process, and organizational components. A structured survey and interview process gathers information across these components, augmented by first-hand observation from seasoned Agile experts. The maturity level assessment report depicts in graphical representations and narrative descriptions the current state of Agile for the agency sector being examined.
- 2. Roadmap** - The second step defines the target future state and development of a roadmap for getting there. The analysis required to develop the future state should consider alternative practices successfully adopted with the private sector, while recognizing the unique aspects of the federal sector. The analysis should also examine new Agile-like approaches that are emerging to handle different types of situations, such as Kanban. Using this assessment in concert with the goals and budgetary considerations of the Agency, a road map can now be created for increasing Agile adoption and transforming the Agency to the desired future state.
- 3. Training** - Next, the focus moves to knowledge acquisition throughout the organization. An agency-specific set of customized Agile courses should be developed that establish a common set of knowledge and expectations for what an Agile transformation means. This will set the stage for the changing roles, responsibilities and expected outcomes across the organization. For large-scale adoptions, this customized training is ideal as it will align the Agile process to an agency's environment. Not only will the training define the changing roles and responsibilities, it will also build momentum and excitement for transitioning to the new approach.
- 4. Process Improvement** - The roadmap developed in Step 2 should highlight the incremental process improvement nature of Agile adoption. As Agile teams begin judiciously taking on new practices, process coaches should simultaneously be put in place to provide guidance for these teams and the agency as a whole. These process coaches provide direction and encouragement for teams and help ensure that they resist falling back upon the comfort of the 'old way' of doing things. They also provide insights to when a team may or may not be ready to begin using new practices. Most importantly, process coaches transfer knowledge to the team they support, manage conflicts and draw from their experience to propel teams forward. As appropriate, they will likely recommend bringing in Agile engineering specialists to complement the process changes with engineering practice changes.

CONCLUSION

We believe the government will follow the private sector's path towards Agile maturity and will be applying both SAFe and Kanban where appropriate. As the private sector continues to gain Agile competencies, new challenges will be uncovered and new techniques and solutions will popularize as a reaction. We believe the government will follow suit and benefit from solutions already tested and amended in the private sector. To effectuate this evolution, we anticipate that a structured framework as outlined in the previous section will be adopted.