



Succeeding with Agile on a Firm Fixed Price Contract



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Note: This is a follow-up to “Bringing Agility to Federal Contracting.”

1.0 Background

Government contracting, like any other transaction, requires balancing competing interests. Federal agencies want to get high-quality products and services at the lowest price possible, while contractors seek to maximize profits. As a result, their interests are often misaligned, which can lead to conflicts between the government and the contractor. The government often prefers firm fixed-price (FFP) contracts, even when other options are at hand. FFP contracts provide predictability in cost and give the agency more control over the specific methods the contractor may use to meet the goals.

Because of this preference, the federal government still predominantly leverages FFP contracts, as indicated by the below publications:

- In a February 2021 Government Accountability Office (GAO) Report on Department of Defense (DOD) Acquisition and Procurement reports that from fiscal years 2010 to 2019, DOD obligations on fixed-price incentive contracts rose from \$16 billion to \$50 billion.
- DOD guidance encourages the use of fixed-price incentive contracts in acquiring major weapons systems. These provide contractors with incentives to keep costs low and stay on schedule.
- The General Services Administration (GSA) digital services’ 18F De-risking Guide, confirms that firm fixed-price contract types “are perhaps the most commonly used methods to manage contractor performance. Government prefers the FFP contract type for a number of perceived benefits, and legislators and overseers encourage its use.”
- The Department of Energy (DOE) Acquisition Guide states that, “Generally, a firm fixed-price type contract is the most preferred.” DOE also considers variations of FFP, such as Fixed Price Incentive, Firm Fixed Price Level of Effort (LOE) and Fixed Price/Firm Target.

Given the degree of emphasis on firm fixed-price contracts, it is perhaps not surprising that the federal government has developed some anti-patterns with procurement processes, resulting in inefficiencies. (An anti-pattern, in the world of software engineering and project management, is a frequently chosen response to a common situation that is often ineffective.) Some of those anti-patterns include:

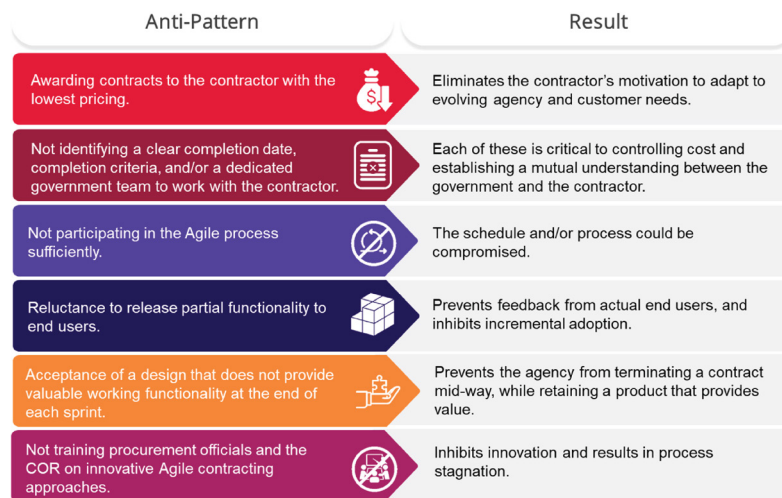


Figure 1: Government contracting anti-patterns and the results

When the government procures an Agile IT solution, collaboration between the government and the contractor and acceptance mutual responsibility for risks and outcomes is crucial.

2.0 Introduction

The federal contracting industry constantly needs more effective and efficient acquisition models and processes because markets are constantly changing. Federal procurement professionals on both the government and the contractor sides are working together to come up with creative solutions for Agile contracting in the government. In addition, the Federal Acquisition Institute (FAI) and the GSA are continually revising the ways in which agencies may implement Agile contracts.

In the meantime, there are multiple approaches documented in the Federal Acquisition Regulation (FAR) handbook that can guide agencies in contracting in an Agile environment. This paper presents some ideas and approaches to apply FFP contracts to Agile projects; however, this is not the only viable approach. A Contracting Officer (CO) can authorize any contract as long as it does not violate the FAR, is not prohibited by law, and is in the best interest of the government.

Let's first compare the two most common contract types: FFP and Time & Materials (T&M). FFP assumes that the government can get exactly what it wants and can get it for a predetermined price. Setting a fixed price provides an opportunity for competitive bids, which can, in theory, provide economic advantages since the government can award the contract to the bidder with the lowest cost.

However, FFP assumes that the government understands its needs far in advance of implementation; the contract's requirements and early design details reflect those needs. This leads to traditional Waterfall development methodology.

However, this also means that both the government and the contractor stay bound by the contract regardless of changes that arise. If the contract contains requirements that the government later wants to eliminate or modify, the agency and contractor have to take the time to negotiate contract changes instead of building a valuable product.

A T&M contract, a popular alternative to FFP, may appear to be more agile on the surface, but it also has its share of challenges. A T&M engagement is based on the time of labor and the cost of materials, rather than a firm price established at the outset.

The government has to trust the contractor to account for its time and materials accurately. While trust is extremely important in Agile, many factors can undermine it. Simple misunderstandings and events such as changes in market factors, technical conditions and financial situations can cause doubt.

Neither FFP nor T&M contracts provide assurance to either the government or the contractor. In fact, none of the major contract types does. Figure 2 depicts the five most common types of government contracts and their definitions:

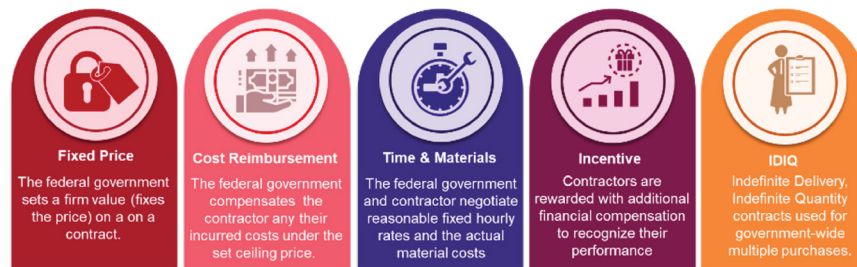


Figure 2: Most common government contract types

The government contracting community can work with any contract type to take advantage of an Agile delivery contract since all contract types come with advantages and disadvantages. Figure 3 below shows a summary comparing each contract type against some Agile criteria.

	Fixed Price	Cost Reimbursement	Time & Materials	Incentive	IDIQ
Risk to Contractor	High	Low	Low	Shared	High
Risk to Government	Low	High	High	Shared	Low
Administration	High	Low	High	High	High
Flexibility to Changing Requirements	Low	Low	High	Low	High
Established Deadlines	High	High	Low	High	Low
Decision Making	Upfront or Scheduled	Throughout	Dynamic	Scheduled	Throughout

Figure 3: Summary of contract types

Any contract type has to be tweaked to work with an Agile process. Therefore, using a FFP contract is a viable option. There are ways to mitigate the challenges with FFP contracts for Agile development projects.

3.0 Relevant Agile Process Concepts

Agile development occurs in short periods of time called “sprints” and “increments”. For the purpose of this paper, “sprint” is to mean intervals between two weeks and four weeks, and “increment” is to mean a time span longer than a sprint and shorter than a year, such as a quarter. For example, Scaled Agile Framework (SAFe®) suggests a program increment of eight to 12 weeks.

The iron triangle diagram is iconic in project management and illustrates the three project constraints: budget, scope and schedule. Waterfall contracts maintain predictability through fixed delivery schedules and system requirements while Agile contracts maintain flexibility for the purposes of quality and end-user priorities using trade-offs made within the contractual parameters between cost, schedule and performance. Agile flips Waterfall’s iron triangle 180 degrees. Fixing cost and time are of utmost importance in Agile. This is also exactly what is important in FFP contracts.

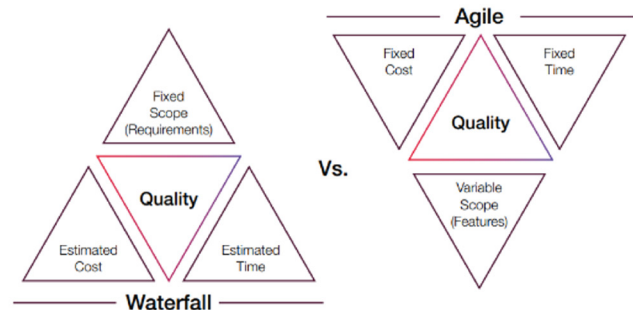


Figure 4: Iron triangle

Agile redefines the way we plan and build products. Traditionally, organizations planned, designed, implemented, tested and delivered projects to customers sequentially. After the organization defined requirements and handed them off to the development team, it was difficult to make any changes.

Agile provides a flexible approach—the team builds products in short increments, allowing opportunities to adjust the plan as the project progresses.

Using Agile product management techniques, development teams can:

- Learn from customers throughout the product life cycle
- Adjust plans frequently to meet customer needs
- Deliver value to customers in increments
- Respond to new and changing requirements rapidly
- Collaborate with the development team to deliver work quickly

4.0 Challenges and Solutions

Implementing Agile with FFP contracts does not come without challenges. Agile development addresses complex problems that cannot be fully analyzed and documented in advance. FFP contracts in Agile fail due to a lack of understanding of Agile and Agile contracting, which leads to unrealistic expectations and writing these unrealistic expectations into the contract.

For Agile projects, a contract should make it possible to develop features during the course of the project that are not fully defined, or even known, at the beginning. This makes designing and responding to a contract very demanding. As the needs of the government and/or the business environment change, the contract requirements change along with them. To accommodate this, we need a new way to negotiate, draft and manage contracts.

A modular contracting approach breaks up large complex procurements into multiple tightly scoped and successive increments. The agency drafts the master contract upon contract award. During execution and delivery, the contractor's team works with the government to define incremental scope. What the team learns during this process informs the next increments contract. This process repeats until the end of the project.

When agencies combine modular contracting with human-centered and Agile practices, it benefits both the government and the contractor, as summarized in Figure 5:

Government Benefits	Contractor Benefits
Reduces vendor lock-in	Align work to capabilities
Mitigates risk	Mitigates Risk
Encourages rapid delivery	Receive fast feedback
Results in usable capabilities	Understand requirements
Increases visibility	Access to government

Figure 5: Modular contracting benefits

4.1 Statement of Objectives

Critics of using FFP for Agile cite fixed scope as the key factor that makes FFP “anti-Agile.” Perhaps this is because they are thinking of the way scope was fixed traditionally, and not how scope can be documented while still providing the flexibility that Agile requires. A contract's Requirements Specification document contains a long list of “supplier shall” statements and is standard in traditional government contracts. These requirements are typically documented in a SOW.

However, the government can use an SOO to set a high-level scope, instead of an Ways to mitigate some of the challenges when using FFP for an Agile delivery contract appear below and will be detailed in the subsequent subsections:

- A. Use a Statement of Objectives (SOO) rather than a Statement of Work (SOW)
- B. Fix capacity, not delivery milestones and scope (software factory approach)
- C. Engage in proper product management practices and continuous planning
- D. Translate Agile delivery to traditional project management governance

Since a key benefit of Agile is embracing changing requirements and priorities, using an SOO reduces the time and effort needed to develop precise and detailed requirements. It also allows requirements to change as users provide feedback incrementally as a system is developed. These changing priorities could stem from changing legislation, executive orders or mandates among other things.

In addition to an SOO, the government and the contractor agree on a product roadmap with a clearly defined Definition of Done and a method to foster continuous collaboration as the product roadmap is translated into items in a product backlog.

The Definition of Done is documented in the proposal response based on the contractor's proposed Agile solution, and is part of the government's evaluation criteria. As a team matures, the Definition of Done expands and includes more

elements. The government should allow for this re-negotiation in the contract award terms. The government benefits from developing solutions incrementally in a series of short sprints, allowing for faster customer feedback, which mitigates potential risk of rework. The government builds subsequent increments on top of the previous ones. The contractor focuses on a strategy for incremental value delivery, which provides the best value and quality within a short, sustainable lead time.

At the beginning of a project, there is a lot of uncertainty about the product or the nature of work required, so estimating the level of effort early on is risky. Historically, this is the time when the agency writes its detailed requirements into the contract. As the agency carries out more research and development, it learns more about the project. Uncertainty tends to decrease as time goes on. However, it reaches zero only when there is no more outstanding risk, which usually happens only at the end of the project. This concept is called the Cone of Uncertainty and is depicted in Figure 6 below.

The Cone of Uncertainty is relevant because technical and business environments change rapidly in the software field. Before significant commitments to detailed scope are made, the uncertainty should be reduced to a level where the government can accept the risk. The software business is volatile and there is external pressure to decrease the uncertainty level over time. The development team must actively and continuously work to reduce that uncertainty. Research, and decisions that remove the sources of variability from the project, narrow the Cone of Uncertainty.

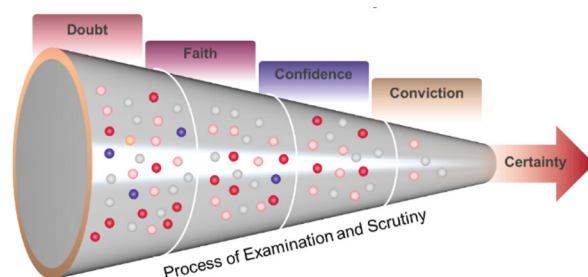


Figure 6: The Cone of Uncertainty

Creating precise requirements is not the best way to obtain price competition. When the government defines outcomes and objectives and seeks price competition from vendors who may propose new ways to achieve those outcomes, it allows for innovation.

4.2 Capacity-Based Model

An Agile FFP contract leverages a capacity-based model, also known as the “software factory” approach. Instead of purchasing and contracting specific scope items or products, the agency purchases the software factory. Simply put, the client indicates the “what” in the work scope, the contractor indicates the “how” and “how long.” This is advantageous to the government as this allows the contractor to deliver new and innovative solutions while developing features and performing Operations & Maintenance (O&M). The contractor sets aside a portion of the team’s capacity for innovation research and development, proof of concept validation and continuous growth.

In a capacity-based model, cost is fixed by team capacity and a schedule is established with a series of time boxes. To establish a baseline, the contractor evaluates similar projects based on historical velocity metrics or industry recommended best practices. It determines what types of roles it needs on its team to accomplish the tasks outlined in the Request for Proposal (RFP) via a Staffing Plan and costing based on capacity. For scaled projects with multiple teams, the total capacity is the sum of the capacity of all the product teams.

Buying the Process not the Product

The government is buying the Agile process and the Agile team, not the product with a detailed list of requirements. So, it has to trust the team and the process. With constant collaboration, the government and the contractor are building a product that is valuable to the end users.

The government needs reassurance to buy a process instead of detailed requirements. The government can ask potential bidders for a demonstration or sample to evaluate. This allows the agency to solicit ideas, evaluate contractors' capabilities, and meet the team that would be directly supporting them. Procurements by GSA for its Agile Delivery Services Blanket Purchase Agreement and USCIS for its Flexible Agile Delivery Services II have used this method. GSA's 18F Agile Delivery Services solicitation received a working software artifact from more than 100 proposers with no proprietary restrictions on use of those artifacts. Many of the ideas represented by those artifacts were unexpected and creative. For smaller procurements, agencies can use a hack-a-thon model, in which vendors receive a challenge, and then plan, design, develop and present their working software solution all within a limited period, for example, eight hours.

Another approach the government can take to evaluate the contractor's proposed process is to invite several vendors to perform the first sprint in a major project. Then the agency selects a vendor based on real performance, as opposed to written promises and assertions in a proposal.

Upon contract award, the agency and contractor use capacity planning techniques to adjust the upcoming increment contract's capacity, since with modular contracting there are multiple shorter-term contracts. The contractor and government collaborate to prioritize the product backlog and plan each contract period and increment based on the agency's priorities and on the team's capacity. Based on the established capacity, the team plans and commits up to 80% of the team's capacity to product backlog items. The remaining 20% is reserved for overhead.

Each Agile team captures metrics and updates historical velocities on a regular cadence. This increases the predictability of the team's iterative value delivery. When the agency requests changes or new scope items that are not part of the current plan, the contractor and the government de-prioritize similarly sized work from the product backlog to make room in the capacity for the new scope/changes, or do a contract modification to add capacity and funds to accommodate the new requests/changes. At the completion of the time box, the contractor invoices the client for the capacity of work delivered by the contractor.

The contractor uses a relative estimation as a user story sizing approach. User story sizing is the systematic process of estimating the time and effort required to complete each user story. It often involves using strategies like the Fibonacci Sequence to make rough estimates about the effort needed to develop a feature or fix a bug. Relative estimation considerations including relative size, complexity, and uncertainty. The contractor works with the government to prioritize the product backlog and plan each contract period and increment based on the team(s) size and capacity. Figure 7 below represents the capacity of the contractor's proposed team for each contract period.

	Base Year	Option Year 1	Option Year 2	Task Order 1
 Number of Increments	4	4	4	2
 Teams' Size (# FTEs)	100	100	100	40
 # Agile Teams	10	10	10	4
 Teams' Increment Capacity (Story Points)	500	550	550	220
 Contract Period's Capacity (Story Points)	2000	2200	2200	440
 Contract Period Invoice (20% PM Overhead)	\$440k (\$110k/Increment)	\$440k (\$110k/Increment)	\$440k (\$110k/Increment)	\$84k (\$42k/Increment)

Figure 7: Agile Team Development Capacity

4.3 Product Management Practices and Continuous Planning

Agile focuses on user centricity and many IT projects fail because users do not find the product of value to them. Therefore, adoption and user satisfaction are the most important measures of success.

With Agile, fast feedback loops are built in at a sprint level and an increment level, which enables the contractor to incorporate user and stakeholder feedback into the development process. This focus on user centricity motivates contractors to consider organizational change management practices to include users, customers and change champions up front. This produces better designs and human-centric products, and results in more effective user training and support as each Agile increment is released.

The primary artifact depicting the project schedule is the product roadmap. Agile product management practices require flexibility. This is because the contract architects spend less time defining the product upfront, so product managers must continuously adapt the product roadmap and reprioritize what to build based on customer feedback. The contractor discusses the product roadmap scope, changes and priorities with the government as a part of regularly scheduled backlog refinement and requirements discovery meetings prior to making updates.

As shown in Figure 8, the contractor’s product management team breaks down the Themes/Initiatives into Epics and target each Epic for an increment based on priority. The contractor with the government ensures that the Epics are properly refined, prioritized and the requirements and technical solutions are captured and documented in each Epic. Prioritization is based on business value, dependencies, architecture runway or other relevant considerations. The product roadmap will reflect the priority and targeted delivery timeline for each Initiative/Theme.

When planning the increment, the team further decomposes Epics and breaks them down into stories/non-functional requirements (NFRs). The team(s) estimate their capacity, as detailed in the capacity planning model subsection above, for each sprint and draft plans for delivery. Stories and NFRs are developed and delivered, incrementally over the course of the increment.

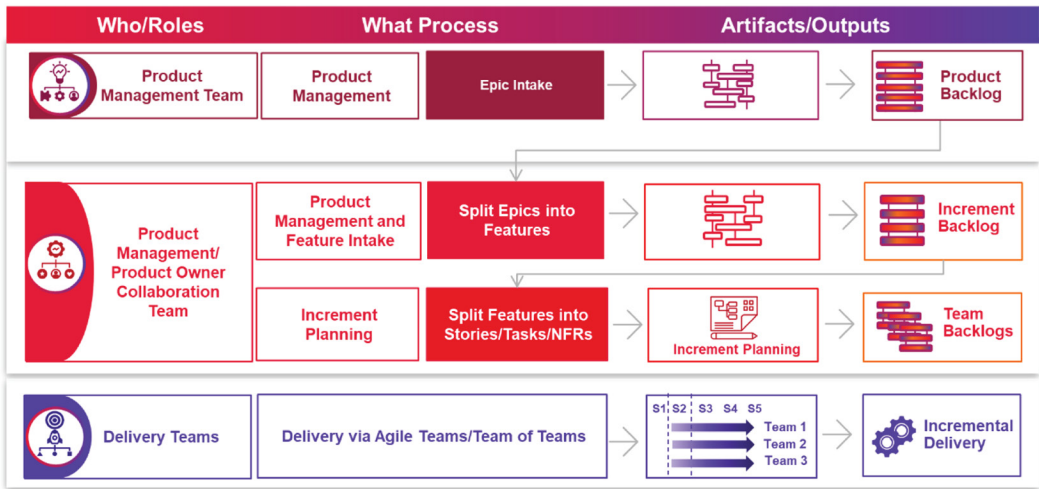


Figure 8: Product management approach

4.4 Program/Project Governance

Program/Project governance should reflect the Agile manifesto values of people over process, value over documentation, collaboration over contract and responsiveness over sticking to a plan. Every project team wants to make better decisions and achieve their objective, no matter the methodology. Ultimately, Agile governance is not about adding more rules to a flexible framework, but about establishing the fastest route that creates the most value.

The relationship and trust between the government and the contractor will grow and naturally result in less prescriptive contracts. Contracting staff remain independent from the program staff, but these two groups still collaborate. The separation of responsibility in government between procurement and program staff ensures that a government employee cannot determine the need for an item, and then negotiate the purchase of that item. This creates a check and balance.

A key benefit of the Agile approach comes from collaboration between those doing work, the procurement staff and their customers, the program staff. Another benefit is the ability and willingness of Agile team members to step into each other's roles to complete work quickly. For example, procurement staff and program staff could jointly serve as a product owner during service delivery by an Agile vendor.

Measuring success in procurement will always be challenging and an Agile approach will not change that. As with Agile, user acceptance is an important in addition to looking at traditional measures of value and procurement success. The core measures of procurement success are that the team delivered the right items and services to carry out the agency's mission, and that the outcome successfully advances the agency's mission.

5.0 Conclusion

In most instances, an agency will want Agile development services because they do not have enough information to define precise requirements, want innovation from the contractor, expect greater value from collaboration between developers and customers and/or need to stay within budget. Federal agencies desire Agile services because the value incremental delivery and the collaboration with customers/users during development. Firm fixed-price contracts, despite their seeming rigidity, are amenable to adaptations that make them more Agile.

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