



CMMI Institute

HOW AGILE PRACTICES CAN EMPLOY CMMI TO MEET THE US GAO REQUIREMENTS

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HOW TO ANSWER TO US GAOS' REQUIREMENT TO USE AGILE METHODS

Back in July 2012 The Government Accountability Office was asked to identify:

1. effective practices in applying Agile for software development solutions and
2. federal challenges in implementing Agile development techniques.

GAO-IDENTIFIED PRACTICES AND APPROACHES FOR APPLYING AGILE

- The GAO identified 32 practices and approaches as effective for applying Agile software development methods to IT projects (google: GAO-12-681)
- The practices generally align with five key software development project management activities:
 - (1) strategic planning, (2) organizational commitment and collaboration, (3) preparation, (4) execution, and (5) evaluation.
- Officials who have used Agile methods on federal projects generally agreed that these practices are effective.

THE 10 GAO-IDENTIFIED PRACTICES FOR APPLYING AGILE

- Specifically, each practice was used and found effective by officials from at least one agency, and ten practices were used and found effective by officials from all five agencies. The ten practices are:
 1. Start with Agile guidance and an Agile adoption strategy.
 2. Enhance migration to Agile concepts using Agile terms, such as user stories (used to convey requirements), and Agile examples, such as demonstrating how to write a user story.
 3. Continuously improve Agile adoption at both the project level and organization level.
 4. Seek to identify and address impediments at the organization and project levels.... (continued)

THE 10 GAO-IDENTIFIED PRACTICES FOR APPLYING AGILE (CONTINUED)

... (continued from previous)

5. Obtain stakeholder/customer feedback frequently.
6. Empower small, cross-functional teams.
7. Include requirements related to security and progress monitoring in your queue of unfinished work (the backlog).
8. Gain trust by demonstrating value at the end of each iteration.
9. Track progress using tools and metrics.
10. Track progress daily and visibly.

THE 14 GAO-IDENTIFIED CHALLENGES

- The GAO identified 14 challenges with adapting to and applying Agile in the federal environment based on an analysis of experiences collected from five federal agencies that had applied Agile to a development effort.
- The 14 challenges are:
 1. Teams had difficulty collaborating closely.
 2. Procurement practices may not support Agile projects.
 3. Teams had difficulty transitioning to self-directed work.
 4. Customers did not trust iterative solutions.
 5. Staff had difficulty committing to more timely and frequent input.... (continued)

THE 14 GAO-IDENTIFIED CHALLENGES (CONTINUED)

(continued from previous) ...

6. Teams had difficulty managing iterative requirements.
7. Agencies had trouble committing staff.
8. Compliance reviews were difficult to execute within an iteration time frame.
9. Timely adoption of new tools was difficult.
10. Federal reporting practices do not align with Agile.
11. Technical environments were difficult to establish and maintain.
12. Traditional artifact reviews do not align with Agile.
13. Agile guidance was not clear.
14. Traditional status tracking does not align with Agile.

USING CMMI TO MEET THE 14 CHALLENGES FOR APPLYING AGILE

- Although the GAO identified 10 effective practices for applying Agile, they also identified 14 challenges with applying it. What can be done to overcome these challenges?
- The Capability Maturity Model Integration (CMMI) identified best practices when applied with Agile development techniques, can help answer and satisfy these challenges.

WHAT IS THE CMMI?

- The Capability Maturity Model Integration (CMMI®) is a world-class performance improvement framework for competitive organizations that want to achieve high-performance operations.
- Building upon an organization's business performance objectives, CMMI provides a set of practices for improving processes, resulting in a performance improvement system that paves the way for better operations and performance.
- CMMI helps an organization develop their organizational capabilities by learning new behaviors that can help improve performance, speed, quality and profitability.

WHAT IS THE CMMI?(CONTINUED)

- The CMMI is divided into Process Areas (PA) named for their area of coverage in any software development effort, examples are Configuration Management (CM), Process and Product Quality Assurance (PPQA), Measurement and Analysis (MA), etc.
- With each PA, there are a series of Specific Practices (SP) identified for that PA. Each PA explains what needs to be done, but the user of the model chooses “how” to do it. CMMI is lifecycle-agnostic.

HOW THE CAPABILITY MATURITY MODEL INTEGRATION (CMMI) CAN ANSWER THESE 14 CHALLENGES

- Recently, the CMMI Institute's has updated some of the process areas in the Capability Maturity Model® Integration to help those using Agile to interpret its practices.
- The CMMI does not tell you 'how' to perform a technique or practice, it tell you the practices you 'should' employ for best results.
 - CMMI does not provide a single process. Rather, the CMMI framework models what to do to improve your processes, not define your processes.
 - Therefore the CMMI can and is used with any and all software development lifecycles from Agile to Waterfall, to Spiral, etc.

USING AGILE WITH CMMI

- Many Agile techniques and ceremonies are used to implement CMMI practices since these best practices can be proven by implementing Agile techniques.
- Experience has proven that Agile and CMMI when used together can prove that the methods, techniques and practices can coexist and prove more powerful in developing an organization's capability to build quality software products that satisfy the customers requirements and answer to changing needs.
- As a CMMI Lead Appraiser and Agile Coach (SPC and CSM) I have been coaching, mentoring and appraising CMMI organizations who employ Agile software development lifecycles with complete success. I am a CMMI Lead Appraiser, as well as a certified Introduction to CMMI instructor.

MEETING THE 14 GAO-IDENTIFIED CHALLENGES BY ADOPTING CMMI

Challenge #1: Teams had difficulty collaborating closely.

Tools and culture. Support the infrastructure through sponsorship

- Integrated Project Management (IPM), if CMMI is implemented than Specific Practice (SP) 1.6: Establish and maintain teams can be used to describe guidelines and a defined process (SP 1.1.) for each team to use.
- The Project Planning (PP) Process Area (PA) in CMMI asks that the organization establish and maintain plans that define the project/work activities (PP Specific Goal (SG) 2).
- Management should be supportive of teams who may not be in the same work space, but who can collaborate within a virtual tool for writing user stories and tracing them to releases. (Requirements Management (REQM) SP 1.4.

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #2: Procurement practices may not support Agile projects.

Still have to use Suppliers. Business Case and evaluation.

- The Supplier Agreement Management (SAM) PA supports subcontractor arrangements with contracts and vendors who supply products that are delivered to clients as part of the overall software solution. criteria.T
- Requirements and criteria can be represented as user stories used in Agile and Epics for Business and Support that are used in SAFe to provide a business case for selecting/using a particular vendor (SAM SG 2).

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #3: Teams had difficulty transitioning to self-directed work.

Hiring/Training of Scrum Masters and Product Owners is imperative!

- The teams could look at Project Planning (PP) and Project Monitoring and Control (PMC). These two process areas in the CMMI invite the teams to collaborate and come up with their own working estimates.
- This works extremely well with CMMI asking that all commitments to the project/work plan be reviewed by everyone (Sprint Teams) affected (SP3.1). CMMI encourages group and team collaboration and understanding of the estimates of the work in a project (PP SP 3.2).

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #4: Customers did not trust iterative solutions.

Customers will love it. They can input and visibility each Sprint.

- Let customers know that through the Agile-defined position of Product Owner, they have full visibility into the requirements and what they need delivered to them in the next iteration.
- The Product Owner can track the requirements with the customer through the Sprint Backlog and using the Requirements Management (REQM) PA SP 1.5 and Requirements Development (RD) SP 2.1 where product requirements are based on customer requirements.

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #5: Staff had difficulty committing to more timely and frequent input.

Daily standups, weekly planning and sprint retrospectives will run smoothly with time.

- In process verification is supported by the VER PA and also the Agile ceremony of Sprint Demo (VER SG 3).
- This allows for defects to be found much earlier than if they were using a waterfall lifecycle.

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #6: Teams had difficulty managing iterative requirements.

See product components early and often.

- Software requirements constantly change in definition and in scope (RD). User Stories (As a user I want to do.....)
- In Agile, they can be maintained in a collaborative tool that everyone can and should have visibility into. This way the iterative requirements (REQM PA) can be seen by everyone and managed effectively.

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #7: Agencies had trouble committing staff.

Resources: GP 2.3. Motivation and buy-in.

- The Project Planning (PP) and Project Monitoring and Control (PMC) PAs can help the Agile team understand their commitments and what is contained in each Sprint Backlog for the requirements that must be met.
- Staff are considered resources and are covered under the CMMI Generic Practices in GP 2.3 requiring each project to "provide adequate resources for performing the process and developing the work products".
- Organizational Training is also very important for roles and role definition.

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #8: Compliance reviews were difficult to execute within an iteration time frame.

PPQA requirements do not go away. They are embedded.

- The Verification (VER) PA can be performed at the Sprint reviews where the software is delivered to the customer as the Mean Viable Product for the customer to review. The VER PA supports this activity for reviews.
- PPQA (Process and Product Quality Assurance) AP 1.2) can also be performed during various reviews and retrospectives (Organizational Process Focus, SP 2.1)) during the implementation of Agile.

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #9: Timely adoption of new tools was difficult.

It needs to become the culture and determined early and upfront (TS).

- Tools should be determined when the Vision (an Agile form of a Charter) is written for the Agile product and product components in support of the development of the product.
- The adoption of tools is covered with the best practices in the Technical Solution (TS) PA, under SP 1.1, and under all PA with the Generic Practice 2.3 “provide adequate resources for performing the process, developing the work products, and providing the services”.
- Tools should be selected well in advance and the Supplier Agreement Management (SAM).

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #10: Federal reporting practices do not align with Agile.

The GAO understands this and is working on how to Audit Agile developed software.

- The Project Planning (PP) PA asks in that lifecycle phases are defined (SP 1.3). Phases can be any activity used in Agile for the development and delivery of product.
- Requirements Management (REQM) can help explain the tracking and traceability of requirements to the User Stories and their estimates in Story Points (using Measurement and Analysis from that PA).

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #11: Technical environments were difficult to establish and maintain.

Tools, tools, tools. Agile supports automation.

- The Technical Solution (TS) PA covers how the design of products and product components are to be implemented, along with the environment needed for their development.
- Validation is defined in the VAL PA in SP 1.2 and the environment for Verification defined using the VER PA SP 1.2. These best practices can help define the needed environment.

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #12: Traditional artifact reviews do not align with Agile.

Determine what is needed for traceability (REQM).

- Traditional artifacts and large documents are not part of the Agile process. This is not to say that requirements, design and code is not documented.
- They are now available for virtual access in tools that perform the Configuration Management (CM) PA to ensure that these assets are controlled for change management processes.

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #13: Agile guidance was not clear.

Guidance must come from the top with Sponsorship

- Guidance on processes is covered in Organizational Process Definition (OPD) of the CMMI. This PA describes how an Organizational Standard Software Process (OSSP) must be developed to describe how exactly the software is to be built
- OPD expects the organization to be trained (OT) on these processes and to work with in the constraints and allows tailoring when necessary and controlled (See the PA of Integrated Project Management (IPM) and Risk Management (RSKM)).

MEETING THE 14 GAO-IDENTIFIED CHALLENGES WITH CMMI

Challenge #14: Traditional status tracking does not align with Agile.

Project Monitoring and Control (PMC)

- Status becomes more commonplace with Agile as the daily Scrum meetings ask, “What did you do yesterday, what will you do today, and what do you need help with?”. This supports PMC.
- Burndown Velocity of the User Story estimates do a much better job of a daily Metric of project status (see the Measurement and Analysis (MA) PA and the requirements in CMMI).

LEARN MORE ABOUT HOW AGILE AND CMMI WORK TOGETHER

- CMMI can provide the “Capability” that Agile practices in order to be implemented in a standard way of developing software.
- These answers to the 14 challenges identified by the US GAO were generated by Margaret A. Tanner Glover, a certified CMMI Lead Appraiser, CMMI Introduction instructor, CSM, CPO, SPC and Agile Coach.
- Visit ExcellenceinMeasurement.com for more.