Legislative Council Staff

Nonpartisan Services for Colorado's Legislature

Memorandum

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February 9, 2021

TO: Interested Persons

FROM: Jean Billingsley, Senior Research Analyst, 303-866-2357

SUBJECT: Agile in the State Budget Cycle

Summary

Agile is a form of project management that responds well to change. One advantage in using agile is that complex information technology (IT) projects are managed in smaller parts, with recurring reviews and adjustments. Organizations, including the public sector, are embracing agile methods because they respond well to the unpredictable changes frequently experienced in complex IT projects. This memorandum explores the Colorado major IT project budget cycle through an agile lens.

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Background

The development of project management methodologies began in the early 1950s with traditional methodologies.[1] Even though agile made an appearance in software engineering beginning in the 1990s, agile became ubiquitous after the Agile Manifesto was published in February 2001.[2] Whereas a traditional methodology makes an assumption that developing a new system should be planned at the beginning of the project, agile reduces project planning documentation. Instead, agile breaks the project into small, recurring iterations that usually last two to four weeks. After each iteration, the agile project team, consisting of business and technical experts, reviews a deliverable that is a small part of the total system. This counters the traditional methodology, which sometimes does not provide the business a solution to review until toward the end of the project. As a result, the traditional team may not be able to address major system issues without investing considerable time and funding.

Some agile methods use a minimum viable product (MVP), which is a smaller piece of the final solution. Figure 1 illustrates in the top row a traditional methodology deliverable where the business

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[1] Webster, F. M. (1999). Setting the stage for a new profession. *PM Network, 13*(4), 63–65.
[2] "Manifesto for Agile Software Development", Agile Alliance, < Manifesto for Agile Software Development (agilemanifesto.org) >, accessed on February 1, 2021.

may not review a workable solution until toward the end of the project. Alternatively, the second row illustrates each agile MVP, which is a workable solution that the business and the technical team reviews during each step.

Figure 1
Agile Minimum Viable Product (MVP)
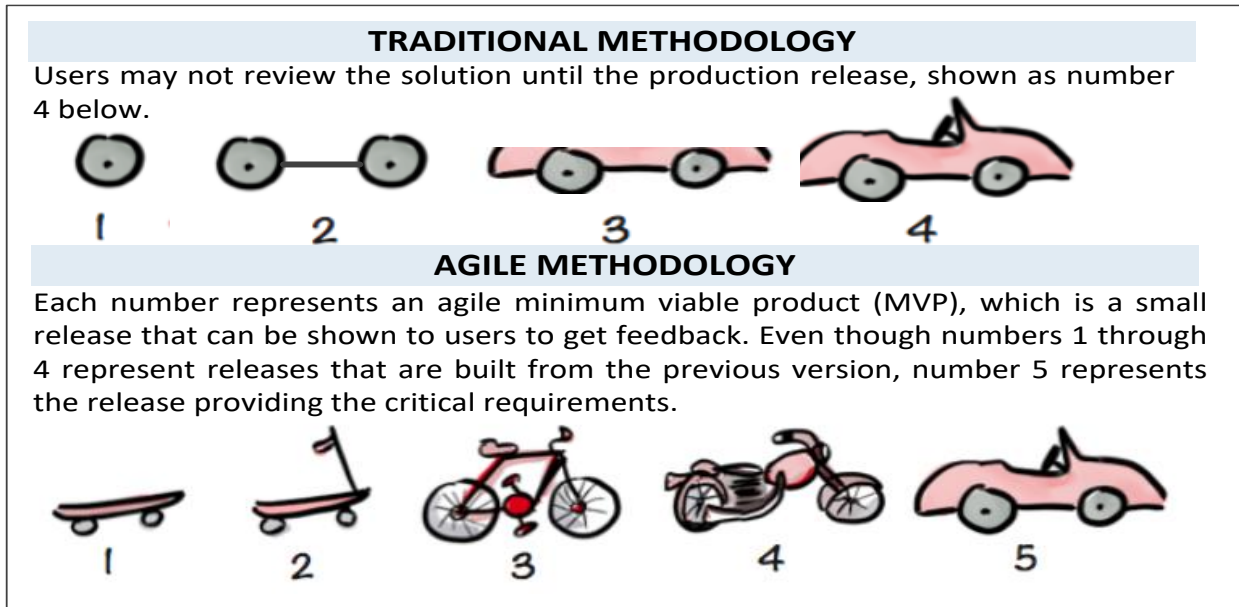
Prepared by Legislative Council Staff, images from Weinhold, Stephan, "Is the minimum viable product really the answer to everything?", Project Management Institute, July 19, 2019, pp. 1.

Advantages and disadvantages. Although an agile approach creates regular reviews and project adjustments, agile is not a magic bullet. Depending on the nature of the project, the organization, and the team's expertise and availability, a project may use aspects of agile and traditional methodologies. For example, since an agile team develops smaller parts of a larger solution, juggling dependencies and ensuring the overall project vision may be more challenging; thus, the project may use traditional planning to establish a schedule and budget benchmarks. For complex IT projects, Table 1 lists the advantages and disadvantages of agile and traditional methodologies.

Table 1
Advantages and Disadvantages of Traditional and Agile Methodologies
in Complex IT Projects

	Advantages	Disadvantages
Traditional	- Requires a detailed budget and schedule plan used to manage the progress - Requires less participation from team members representing the business - Usually requires centralized communication among the teams	- Reliance on design documentation may mask issues - Solution may not be reviewed until late in the project - Extensive requirements might be difficult to digest and keep up-to-date - Gaps between the documentation and the intent may not be discovered until late in the project - Approval is usually required at each stage before advancing to the next stage

Table 1 (Cont.)
Advantages and Disadvantages of Traditional and Agile
In Complex IT Projects

	Advantages	**Disadvantages**
Agile	• Early and frequent user input from design through implementation reduces the risk of unforeseen issues • Team members are usually more nimble and able to make changes quickly to meet essential business requirements	• Some agile methods require high-performance, self-managing team members, who are experts in the business and technical requirements (e.g., projects relying mostly on the vendor without active organization involvement may experience issues later in the project) • Team members must be available to actively participate during the short, time-boxed iterations • Some agile projects may face risk if a vendor is solely managing the project without active engagement from state employees representing the business and technical needs • The flat team structure of some agile projects requires self-organizing team members who are empowered to make quick decisions • Frequent re-evaluation of the business needs may change the initial estimates for the scope, schedule, and budget

Prepared by Legislative Council Staff.

18F and Colorado Digital Services. Government organizations have struggled with major IT projects that resulted in budget overages, extended schedules, systems with defeats or systems that fail to meet critical requirements. Agile is often seen as a method to avoid these project issues. For example, after the unsuccessful launch of the national health care exchange, HealthCare.gov, the federal administration organized 18F to use an agile approach for its major IT projects.[3] Based on 18F, some states, including Colorado, created groups consisting of agile experts. Specifically, Colorado Digital Service, created in October 2019, partners with state employees to incorporate agile practices.[4]

Federal funding. Some state IT capital construction projects rely on federal funds, such as grants from the Centers for Medicare and Medicaid Services (CMS). These federal grants may require traditional planning documentation. Nevertheless, given some of the disadvantages of using traditional methodologies to manage unpredictable project changes, CMS and other federal agencies continue to recognize that agile may be advantageous. In June 2017, CMS announced that it was proceeding with an agile mindset.[5] The U.S. Office of Management and Budget also published its TechFAR handbook, which provides instructions for federal acquisition regulations and agile principles.[6]

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[3] "What is 18F," Government Technology, < https://www.govtech.com/civic/What-is-18F.html >, accessed on April 7, 2020.
[4] "Introducing Colorado Digital Service," Colorado Digital Service, < https://sites.google.com/state.co.us/coloradodigitalservice/home >, accessed on April 7, 2020.
[5] "CMS Agile Transformation," CMS.gov, < https://www.cms.gov/Research-Statistics-Data-and-Systems/CMS-Information-Technology/Agile-Transformation >, accessed on May 4, 2020.
[6] "TechFAR Handbook," United States Office of Management and Budget," < https://techfarhub.cio.gov/handbook/ >, accessed on May 4, 2020.
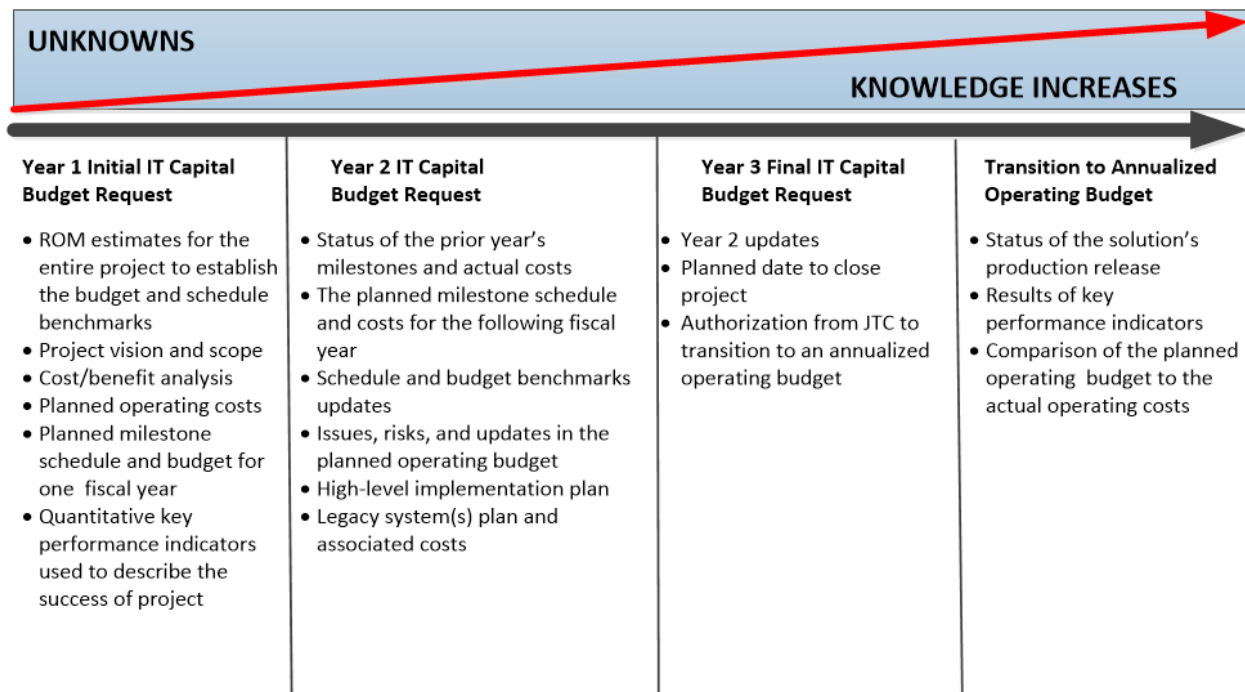
IT Capital Construction Budget Process

For complex IT projects, initial budget and scope estimates may be based on market research or similar projects. Regardless of whether an agile or traditional method is used, initial budget request estimates may be a rough order of magnitude (ROM), which is an educated guess that will likely change as the complex IT project progresses. Even though an IT capital budget request may include ROM estimates for one year, departments are usually given spending authority in three-year increments.

With a three-year spending authority, the Joint Technology Committee (JTC) may still assess the results of a one-year appropriation by comparing the planned one-year milestones to the completed milestones. For example, a department may request $500,000 to develop a prototype in year one of a three-year project. Due to delays in procurement, the department may not begin developing the prototype until two years after the appropriation. When the department submits the project's year-two budget request three years after the initial appropriation, the JTC may use the results of the prototype milestone to determine if the project should continue as planned.

As the project progresses and the team's knowledge increases, the department should provide updates to the JTC. Figure 2 provides an example of JTC oversight for a fictitious three-year project.

Figure 2
Recommendations for Multi-Year IT Budget Cycle

Year 1 Initial IT Capital Budget Request	Year 2 IT Capital Budget Request	Year 3 Final IT Capital Budget Request	Transition to Annualized Operating Budget
• ROM estimates for the entire project to establish the budget and schedule benchmarks • Project vision and scope • Cost/benefit analysis • Planned operating costs • Planned milestone schedule and budget for one fiscal year • Quantitative key performance indicators used to describe the success of project	• Status of the prior year's milestones and actual costs • The planned milestone schedule and costs for the following fiscal year • Schedule and budget benchmarks updates • Issues, risks, and updates in the planned operating budget • High-level implementation plan • Legacy system(s) plan and associated costs	• Year 2 updates • Planned date to close project • Authorization from JTC to transition to an annualized operating budget	• Status of the solution's production release • Results of key performance indicators • Comparison of the planned operating budget to the actual operating costs

Prepared by Legislative Council Staff.

Figure 2 illustrates project updates a department might provide the JTC, such as:

- performance metrics to determine the progress;
- planned operating budget;
- high-level issues and risks;
- costs to continue maintaining legacy system(s) that are affected; and
- costs until the new system is fully operational.

IT operating appropriations. After an IT capital project implements a new solution, the department submits an IT operating budget request to the Joint Budget Committee (JBC). An IT operating appropriation provides the department recurring, annual spending authority unless a change is requested. These IT operating budget requests are not reviewed by the JTC unless the JBC requests a JTC recommendation. Depending on the level of General Assembly oversight required, the technical solution being built with an annualized operating budget may be an MVP, or part of the total solution. Legislators may require the agile team continue to report progress to the JTC until the solution meets all critical requirements, including decommissioning existing systems.

Joint Technology Committee Letter

On September 29, 2020, the JTC sent a letter to the JBC summarizing JTC deliberations about agile methodologies and their impact on the IT capital budget cycle (see Appendix A: JTC Letter). The JTC agrees that departments should use agile, traditional, or a hybrid methodology for the state's IT projects. Additionally, the JTC agrees that, pursuant to Section 24-75-303, C.R.S., IT capital appropriations remain available to the department for a period of three years. Still, if spending has not commenced in the first fiscal year, the appropriation is not available in subsequent fiscal years.

Department updates to the JTC. Depending on the level of legislative oversight sought for large IT appropriations, the JTC may consider changes in statutes and departmental updates. As the state and the federal government continue to mature in their adoption of agile, the Colorado General Assembly and the departments should continue to collaborate to establish the right balance between legislative oversight and the agile necessity to be nimble.

Rep. Jonathan Singer, Chair
Rep. Mark Baisley
Rep. Brianna Titone

APPENDIX A

Sen. Nancy Todd, Vice-Chair
Sen. Jeff Bridges
Sen. Jack Tate

Joint Technology Committee

State Capitol Building, Room 029
Denver, Colorado 80203-1784
(303) 866-3521

September 29, 2020

Representative Daneya Esgar
Chair, Joint Budget Committee
200 East 14th Avenue, Third Floor
Denver, Colorado 80203

Representative Esgar:

On September 14, 2020, the Joint Technology Committee (JTC) met to review the implementation of agile budgeting methodology for information technology (IT) capital projects in the state budget cycle and to discuss the Joint Budget Committee (JBC) letter sent to the JTC on March 10, 2020. The JTC agrees that the departments should continue to choose the use of an agile methodology for IT projects, with the understanding that on certain projects traditional or waterfall methodology may be more appropriate. The JTC recommends the following for consideration by the JBC.

1. **Period of appropriation spending authority**

   Pursuant to Section 24-75-303, C.R.S., capital construction appropriations, including IT, remain available for a period of three years. However, if spending has not commenced in the first fiscal year, the appropriation is not available in subsequent fiscal years. The JTC recommends no changes to this spending authority for IT capital projects. However, for multi-year IT capital budget requests, the completion of the previous year's milestones and the corresponding budget that is spent and encumbered may be considered when determining future appropriations. Specifically, for an IT capital project to receive future appropriations, it should provide:

   - the completion and results of the previous fiscal year's milestones;
   - the budget spent or encumbered during the previous fiscal year compared to the estimates in the original budget request; and
   - the differences between the estimates and actual status for the entire project's budget and schedule benchmarks.

   In some cases, the JTC may also consider federal funding requirements that necessitate a state funding match in order to demonstrate state support for the project.

2. **Expectations for reporting progress and standards for reporting metrics**

    The JTC understands that the adoption of an agile methodology for IT projects requires a cultural change throughout the state in order to support the agile iterations of inspecting and adapting. Nevertheless, departments should continue to provide regular updates on the following to allow legislators to assess the progress of capital IT projects:

    - an updated system vision that includes both IT capital and operating objectives;
    - budget, schedule, and scope benchmarks for the entire project; and
    - an annual milestone schedule and corresponding estimated costs.

    Changes in the annual estimates, and the project's budget, schedule, and scope benchmarks, should be reported to the JTC through the existing reporting procedures and budget request cycle, or when deemed necessary or beneficial to the success of the project. The JTC may also consider the following when completing its oversight of a major IT project:

    - deliverables that meet the stated scope, including decommissioning applicable existing technology and resources;
    - confirmation that deliverables meet an acceptable level of functionality and quality; and
    - comparisons between projected operating budget estimates provided in the IT capital budget requests and the actual operating budget requests.

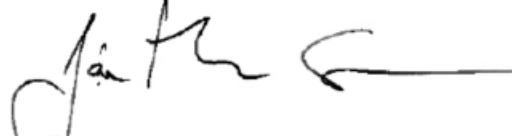3. *Expectations for communicating changes to the JTC and JBC*

    IT capital projects should remain under the JTC's purview until the project's deliverable(s) meet the critical requirements, including decommissioning any impacted existing technology and resources. In other words, projects should only receive an annualized operating appropriation by the JBC after the agile deliverables provide proof of such critical requirements.

4. **Recommendations for common language and definitions**

    The JTC agrees that executive branch agencies should use common IT terms regardless of the methodology used (e.g., agile or traditional) when communicating with the legislative branch. The legislative branch, the Governor's Office of State Planning and Budgeting, and the Governor's Office of Information Technology should continue to collaborate to develop common terms and consistent information that apply to all methodologies to ensure clear communication in future budget requests and legislative updates.

If you have any questions or concerns about the JTC's recommendations, please call Jean Billingsley, Legislative Council Staff, at 303-866-2357.

Sincerely,

Representative Jonathan Singer, Chair

c: Joint Technology Committee Members
    Joint Budget Committee Members
    Joint Technology Committee Staff
    Lauren Larson, Governor's Office of State Planning and Budgeting
    Kate Sneed, Governor's Office of Information Technology
    Tony Neal-Graves, Governor's Office of Information Technology
    Kachina Weaver, Governor's Office
    Carolyn Kampman, Joint Budget Committee Staff
    Alfredo Kemm, Joint Budget Committee Staff
    Scott Thompson, Joint Budget Committee Staff