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Delivering Complex Projects With Agile Project Management

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With its step-by-step methodology, waterfall project management remains the preferred delivery model for projects with an end result clearly established from the beginning. But for complex projects with evolving or ambiguous requirements, agile project management — with agility and flexibility built in — may be worth a closer look.

Just 55% of construction projects in 2021 were completed on time, according to the Project Management Institute's (PMI) latest Pulse of the Profession report. PMI also reports that 38% of 2021 projects exceeded their original budget, and 27% did not meet the owner's original business goals and intent.

In addition to the COVID-19 pandemic, the reasons for this underperformance vary, from limited planning time and scope creep to extreme weather conditions and poor project management. In some cases, the approach to project management, rather than the execution, falls short. In fact, more challenging projects often perform far better when traditional project management is replaced with newer, more agile approaches.

Project Management Alternatives

Designers and builders have historically relied on waterfall project management, a linear method of performing projects in sequential steps. It begins with a project being planned, start to finish, with clearly defined requirements, expectations and scope. Only after the deliverables for any given step are complete does the team progress to the next one. This highly structured, document-heavy approach is most successful on projects where the final product is clearly defined and understood, and adequate time is available for project planning.

While waterfall project management brings rigor to processes that can be refined and repeated on future projects, it also has disadvantages. For example, it includes very little built-in flexibility for changes along the way — which can become problematic when issues arise or disagreements emerge over project objectives among stakeholders in the later stages of execution. Because of its linear nature, projects can also take longer to complete. Issues with one phase's deliverables may not be discovered until a project has entered a new phase, raising the prospect of costly rework.

Beginning in 2001, an alternative approach emerged. That is when 17 software developers worked together on a management solution for projects whose end products were not so clear-cut. Their discussions centered on ways

to meet project budgets and schedules when working through requirements that were volatile, uncertain, complex or ambiguous. They were also interested in developing ways to speed innovation that was sometimes slowed by strict adherence to process-driven methods.

Their collaboration culminated in the publication of the Agile Manifesto, a brief document that outlined a new, more flexible project management philosophy. Rather than describing a strict method, it described four principles that inform an agile mindset:

- **Unity:** "Individuals and interactions over processes and tools," declares the first principle of agile project management. This principle may seem like a dramatic departure from waterfall project management, which trained generations of project managers to strictly follow processes. Agile project management does not reject processes but seeks to guard against situations where completing the process — rather than developing an innovation solution — becomes the end goal. Agile project management instead prioritizes interactions among team members. Because developing unity among team members can be difficult, frequent meetings and interactions help create cohesion and a sense of belonging. Both are key to project success.
- **Simplicity:** "Working products over comprehensive documentation," is the second principle of agile project management. This principle reminds team members that delivering a superior product is more important than producing superior documentation. While project documentation is necessary, prioritizing its development can impede final project delivery.
- **Transparency:** "Customer collaboration over contract negotiation," is the third agile principle. This reminds team members to involve their client throughout project development and to consider the changes the client desires as the project progresses. While even a voluminous contract document cannot anticipate every modification a project may require, a strong relationship forged by a truly transparent agile approach can result in simpler, more effective negotiations.
- **Adaptability:** "Response to change over following a plan," asserts the fourth and final principle of agile project management. The method and speed by which an agile team adapts to emerging needs demonstrate its adaptability. A rigid team that rejects owner suggestions may meet a project's budget but fail to achieve its larger objective. An adaptable team that embraces client-driven changes may, on the other hand, fast-track a project's success. Teams able to anticipate and respond to obstacles also forge better outcomes. They represent adaptability in its truest sense.

Agile Project Management's Impact on Design and Construction

While originally conceived for software development, agile principles are now used in project management by industries worldwide, including design and construction. Its appeal lies in its simplicity and flexibility.

In practical terms, agile project management replaces traditional project phases with an iterative approach to project delivery. Rather than following a linear path, these projects evolve as team members work on multiple project phases at the same time. Procedures are repeated as the project team's understanding of the end product increases.

With each iteration, the project team has the flexibility to experiment with or change the project's direction. Because of the transparent nature of this approach, the team shares its progress with the client and incorporates feedback as the project progresses. Deadlines are often short to encourage efficiency.

Consider, for example, the piping, electrical and instrumentation design for a new refinery. With traditional project management, 3D models of these designs might be reviewed with the client only at agreed-upon milestones, such as at 30%, 60% and 90% completion. With agile practices, key personnel might review progress every week or two. This approach helps avoid surprises and gives the client an opportunity to respond to changes in near real time.

Multidisciplinary teams often find that they innovate more and move through a project development's life cycle more quickly using an agile approach. But agile has potential downsides as well. Because team members are working on multiple phases at a time, the potential for overlap or wasted effort looms. Because early-stage deliverables are not required before the team looks to later stages, effective communication is essential to keep the project team on the same page. Project timelines are also more difficult to project, given that these projects are more susceptible to change.

A helpful way to compare waterfall and agile approaches is through the lens of the constraints every project faces. Regardless of project management approach, a project manager must juggle and work within the confines of its scope-of-work, budget, timeline and quality requirements.

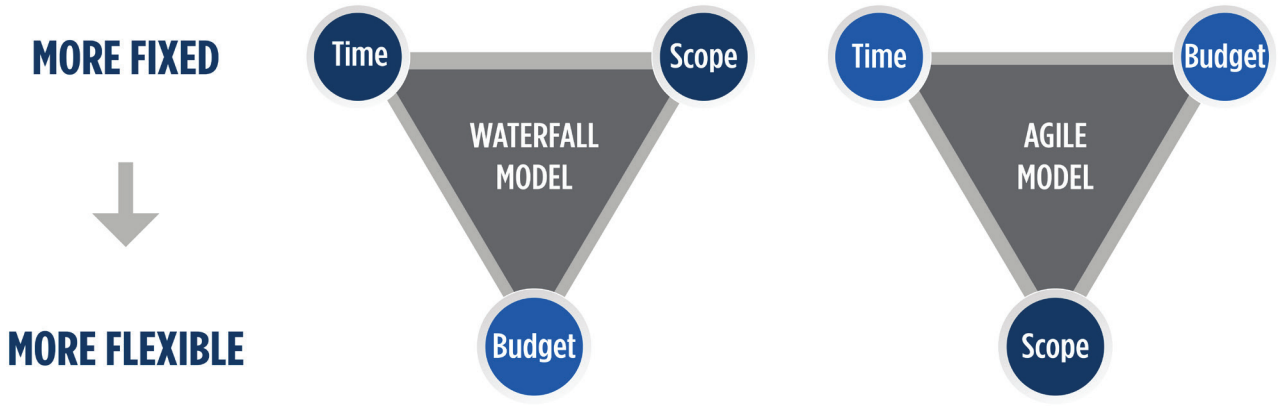

***Figure 1:** Each of the three main project factors can be thought of as the vertex of an equilateral triangle.*

Project quality and success are most influenced by the other three constraints: scope, budget and timeline. See Figure 1.

With traditional waterfall project management, the budget is driven primarily by the scope of work and the time in which the project team must complete the work, both of which are largely fixed from the onset. If one of these two factors changes, the budget will be impacted. With agile project management, the calculus shifts. The project schedule and budget remain constant from the start, while the project scope may be subject to change as the project team completes its iterative processes.

In practical terms, an agile project team with a flexible scope still maintains a change management process. Managed effectively, however, an agile project rarely needs to use a change management procedure. Rather, the project team keeps its client abreast of each iteration of the project, and the client is invited to review and contribute suggestions for improvements along the way. A rigorous change management procedure only becomes necessary when changes may be unhelpful or unnecessary.

Let the Management Style Fit the Project

Because agile project management does not prescribe specific practices, it is highly adaptable. Users with an agile mindset can internalize its principles but then customize or omit specific practices based on the right fit for their project requirements. As they consider each principle from the Agile Manifesto, they strike a balance between the two sides and find a framework that works for them.

Even so, agile project management is not right for every assignment. Because waterfall methods are change-averse, they are typically a better choice on projects with requirements and designs that are not expected to change over the course of the work. Agile approaches, on the other hand, are designed not only to accept change but also to encourage and facilitate it through frequent iterations and client feedback. That does not mean that a change in scope is inevitable. Agile project managers simply recognize that the scope may need to be tweaked to achieve the desired result.

Ultimately, both waterfall and agile approaches have a place in design and construction. In some cases, they can be modified and blended to meet specific project needs. Successful and sustainable organizations know when, where and how to adopt and deploy them both to achieve optimal results.

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