Meeting the Challenges of Agile-Stage-Gate—Part II

*Blending Agile and Stage-Gate methods has many benefits,*
*but also creates major implementation challenges.*

Robert G. Cooper

Three major challenges include dealing with changing product definitions, very short-term planning cycles, and scale up of the system.

Summary: While Agile-Stage-Gate yields benefits for manufacturers, clearly the world of hardware development is very different than the Agile software world. Part II in this two-part series deals with three more implementation issues: The first is coping with product definitions that are fluid – they change and evolve as Development proceeds. A second issue is reconciling the short-term planning horizon of Agile, namely a 2-4 week sprint, with the longer planning horizon in a gated system, typically an entire stage which may last months. The third issue is how to scale up the Agile-Stage-Gate system to handle larger and more complex projects and programs. Many creative solutions are illustrated via the experiences of early adopter firms.

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“Innovation requires mutual respect for what everyone brings to the table.”

necessary, they are not always consistent with being innovative.

“Fail fast” is a favorite incorrectly used term that so many people are fond of as an excuse for when they go bankrupt. The truth is that the term should actually be “recognize failure fast, then fix it or get out,” but that wouldn’t be a good title for a book. Employees who understand their role in the innovation effort also understand that they are all critical to this modified version of “fail fast.”

The trick to getting the culture right is to recognize and communicate to all of these individuals that their role is critical, recognized and respected. Just as the prophet wants the “perfect” product that he or she envisions, the conqueror wants to get it to market quickly and take over the world, while the treasurer wants to preserve the kingdom’s resources.

One can choose to compromise or embrace the opportunity to be a member of a dynamic team of innovators. A great culture for innovation is one where everyone recognizes that they are on an innovation team and that sometimes they just need to contribute what they can and avoid the instinct to stop creativity in the name of doing their job. This is the culture of trust, which most organizations have been working on for the last 30 years. Innovation requires that organizations work together but separately with a mutual respect for what everyone brings to the table.

Maybe you had it right when you took your team to a trust and team building exercise—you just didn’t know that you were being clairvoyant about the needs of the organization in building a future of innovation!

Correct Answers

1. gnitacol-oc
2. ! noitseuq kcirt. Depending on the current state of your organization it may be both easy and inexpensive to change your culture. An assessment is recommended before starting an innovation project to better understand your situation.
3. erehwyreve, enoyreve
4. b, d, e
5. ! noitseuq kcirt rehtona—They are all important!

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Corporate Experience

MEETING THE CHALLENGES OF AGILE-STAGE-GATE—2

By Robert G. Cooper

“More than 10 years ago, the software world began to integrate Agile into Stage-Gate®: the gating model that provided strategic direction to projects, dealing with the ‘what’ and ‘why,’ while Agile focused on
task execution within the stages, namely the ‘how’,’ wrote Robert G. Cooper in the Sept/Oct 2017 CIMS Innovation Management Report(1).

Prof. Cooper, who introduced Stage-Gate®, reported that a handful of early-adopter manufacturing firms have begun to use this Agile-Stage-Gate system for physical or hardware products, gaining significant increases in productivity, reductions in time-to-market, and a much higher likelihood of getting the product right. But there are major challenges to making this happen. This second in his two-part series outlines more of these challenges, and how some companies are finding solutions.

Part 1 focused on what appears to be the number one challenge facing manufacturers adopting Agile-Stage, namely finding the resources to field dedicated, co-located project teams. Three other prevalent challenges are:

1. **Dealing with a changing product definition.** Traditional product development requires that the product be defined before physical development begins. Based on voice-of-customer, market and technical studies, the project team defines the new product’s requirements and high-level specs before charging into development. Significant changes to this definition are viewed as negative, especially after a “specifications freeze.”

By contrast, Agile thrives on changing customer and product requirements: The product definition is fluid, and comes together over the course of development! This lack of a solid definition at the outset of development means that projects must be approved and development work begun based on fluid and changing information. This is challenging for many developers and for management, given the level of ambiguity.

2. **Reconciling short-term planning of Agile (typically the team works from a 2- to 4- week action plan) versus the longer-term plan(usually months) for a manufacturing product-development project.** The questions that are often posed include: How can the team stay on course and strive toward an ultimate objective when they only have a two-week time horizon? And how does management approve a major development initiative without a clear development plan, or an accurate cost to execute?

3. **Scaling up to larger, more complex programs.** Agile was developed in the software world for smaller development teams, usually co-located, and for smaller IT firms. Fast forward to today: How does one scale up Agile-Stage-Gate to accommodate larger projects or programs, typical of many manufacturing firms, where the project consists of a number of sub-projects?

The issue includes synchronizing the timing and progress of interlinked sub-projects that make up a major program where the results of one sub-project are needed in order to begin the next one. That is, the “done” points of the many inter-linked projects must be time-synchronized across projects. The challenge is greater where the sub-teams are geographically dispersed.
Let’s look at solutions:

**Fluid Product Definitions**

One major benefit of Agile-Stage-Gate is that the system is adaptive and empirical. That is, through the multiple iterations and demos with customers, versions of the product are constantly validated by customers.

Based on this rapid and frequent customer feedback, the project team adjusts the product definition in real time, similar to a strategic pivot in the Lean Start-Up system (2). Thus, the team makes course adjustments, much like the guided missile in the accompanying sketch (3), whereas in classic product development a fixed product definition is the target, which the cannonball often misses.

The challenge is this: The product definition at the beginning of development in an Agile-Stage-Gate project is very dynamic, which creates ambiguity for both the project team and management. Indeed, the product may only be 20% defined at the point of project approval, which marks the beginning of physical development work (typically the product is 40-60% defined at this point).

This ambiguity must be dealt with, not resisted: Some firms have thus modified their product definition template to include two columns: those elements that are fixed (known at the start) versus those that are variable (fluid and unknown) elements.

This initial fixed/fluid definition is then approved, and becomes the basis for the first “product” iteration or protocept for validation. And with successive iterations, the product definition evolves and firms up as the project is constantly being validated and adjusted through multiple demonstrations to customers in real time.

Nonetheless, a higher level (albeit somewhat tentative) product definition is required at the outset of development, which is sufficient for planning and project approval. This definition is not as granular and specific as in the traditional gating model (for example, no detailed specifications), while even the product requirements contain both fixed and variable elements (perhaps 50% fixed and 50% variable) still to be validated and confirmed).

One implication is that senior management is faced with approving the project for development while the product is only half defined—potentially an uncomfortable task for many senior people not used to such ambiguity in investment decision situations. But the counter-argument is that in the new Agile-Stage-Gate model, management remains engaged in the project and participates in regular demos and check-ins following each sprint as the project moves forward.

An added and unexpected benefit is illustrated at Danfoss, a major European manufacturer. As related by a group from Danfoss (2), “These stakeholders [senior management] were relieved not to have to provide and approve the entire product specification at the outset, but were able to adapt and learn with the development team as they went through the design iterations.” Interestingly, continued the account, “the greatest challenge came from developers who were frustrated by not having a frozen product specification. Some disliked having to iterate and involve
people outside the team, rather than being able to lock themselves in a room for six months and come out with a final product.”

**Two-Week Plans Vs. Plans for the Entire Stage**

The project plan presents a similar dilemma. In the Agile-Stage-Gate model, one goes from a project backlog (list of tasks) to a “schedule” of tasks for the entire stage; both are created at the beginning of Development, based on best estimates at the time. The schedule is similar to a traditional development plan (a Gantt chart), but it must necessarily be tentative and not detailed (only the major tasks with approximate timing are outlined here) (2).

From this schedule, a budget or development cost is determined. And it too will be somewhat tentative, an estimate. Given the high probability of change, the tasks within stages and thus the project’s costs are variable during the earlier phases of the project. But as uncertainty decreases over time, the schedule and the budget both become increasingly fixed or stable.

To make this new system work, management must learn to accept ambiguity and approve projects where both the product definition and the action plans (and related costs) could change. But as one executive commented, “So what’s new here—plans and scope always change in our projects! Now we just admit it—we’re not in denial.”

Another planning issue is that project teams can become so focused on the sprints—the next few weeks and their objective for that sprint— that they lose sight of the longer term and ultimate goal: tasks to be done much later in the project, and indeed the final product and its launch. As a result, at Chamberlain (U.S. maker of residential remote control devices), senior management meets with the team periodically, and more often than at gate reviews, to ensure that sprint goals as well as the ultimate goal are visible. Thus, senior management is much more engaged with project teams than in the traditional gating model (4).

**Scalability for Larger Projects With Multiple Sub-Projects**

An extensive survey of agile-scrum participants in the software world by Akin and Majid revealed that “working with multiple teams is a tough job... Although Scrum [instructions] talks about scrum of scrums... this technique doesn’t work well when the teams are distributed.” (5)

Another study, also in the software field, concluded that “dividing product development into short sprints requires careful planning; external dependencies, such as deliveries of software from other teams, can lead to delays and the failure of individual sprints.” (6)

While manufacturers’ experience with Agile is still very limited, one recommendation for development programs with many sub-projects is a technique borrowed from internal IT departments, namely the “scrum of scrums” mentioned above—that is, a multi-team stand-up meeting. This is not a status meeting, nor is it a meeting for scrum masters to talk about the Agile process, but a short meeting of a few key people from each sub-team, held every week or two, to keep each sub-project team abreast of important issues, including scheduling, timing, synchronization, and progress.
Globally dispersed sub-teams add to the challenge, but solutions include: getting the teams together at the beginning in one location for an entire sprint; using modern audio-visual meeting communication methods; and limiting global sub-team locations to mutually convenient time zones for a given program. Most early adopters of Agile-Stage-Gate are being quite selective about pilot and early projects to avoid these additional layers of complexity, for example avoiding projects with global teams or interlinked sub-teams.

Another way to scale Agile in large organizations, again borrowed from the software sector, is SAFe (Scaled Agile Framework), a more structured approach to handle multiple sub-projects. SAFe specifies three levels in the development organization: team, program and portfolio. Teams typically work with two-week sprints, while programs may have 5-10 teams and operate with iterations of about 3-5 sprints, or about 6-10 week program iterations. At the end of each program iteration (6-10 weeks) is a meeting to synchronize the numerous sub-projects. Although SAFe may be appropriate for manufacturers, to date there is little evidence of its use in that context.

Further, traditional gates in Agile-Stage-Gate provide the major endpoints, where all sub-teams deliver their promised work; thus each gate is a built-in synchronization point across all sub-projects.

Portfolio planning is the third level of SAFe, which is similar to portfolio management of the entire pipeline of projects and has been a common feature of Stage-Gate since the mid-1990s. So nothing new here for manufacturers!

Just Try It!

The resounding advice from the business leaders at Danfoss is simple: “just try it!” Set up a small task force and work out how you will deal with the tough issues, some of which have been outlined in this two-part series. But in the Agile tradition, don’t try to get all the answers before you start: Begin with several selected pilot projects, provide coaching, monitor closely, and adjust as the projects move along.

References


By Michael F. Wolff

More than half a billion fifth-generation (5G) mobile subscriptions, covering 15% of the world’s population, will be active by 2022, forecasts Swedish communications company Ericsson. Its June 2017 Mobility Report credits the industry’s approval of a new standardization schedule with accelerating 5G deployment throughout several consumer and enterprise sectors.

“Consumer adoption of virtual reality, augmented reality, smart homes, self-driving cars, drones, and other devices is set to rise with the activation of 5G standards and 5G-enabled devices,” says Ericsson. “IoT communications, high-performance mobile connectivity and cloud services are expected to become key driving forces behind business innovation,” the report continues, citing healthcare among other industries it sees benefitting from 5G adoption.

Truly Revolutionary

“5G will be truly revolutionary,” asserts The Institute of Electrical and Electronics Engineers (IEEE) in its March 2017 news publication, the institute. A feature on “The New Wireless Frontier” describes a recent IEEE 5G Initiative (http://5g.ieee.org) “to help industry, government and academia to work together and lay the foundation so that the opportunities envisioned for 5G can be realized.”

Alex Wyglinski, co-chair of an IEEE 5G working group, highlighted those opportunities for CIMS Innovation Management Report: “As the next-generation wireless network technology, 5G is expected to significantly increase data speeds, produce ultra-low latency times, support the connection of many more devices, and increase energy efficiency of network elements.

“The ‘killer feature’ or revolutionary change of 5G over past standards is how it is also going to support wireless connectivity of all devices, whether they are cellular devices or not,” Wyglinski continued. “Specifically, 5G will enable wireless connectivity within the Internet of Things context. Furthermore, 5G is also a candidate technology for supporting vehicle-to-