Agile Management in Product Development

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Agile emerged in software development in the 1990s and became popular mainly after the issue of the Agile Manifesto by Beck and coauthors in 2001. Influenced by the culture of value maximization and waste reduction that found its first expression in lean manufacturing, Agile's methods contrast with traditional methods of software engineering, which tend to be bureaucratic and hierarchical. Agile values include collaboration, team empowerment, iterative and incremental development, increased customer engagement, and adaptability to change.

Today, Agile is consolidated in software development, and its adoption continues to grow year after year. In VersionOne's *13th Annual State of Agile Report* on the use of Agile in companies around the world, 97 percent of respondents reported that their organizations use Agile development methods—up from 80 percent in 2011. That growth—and the documented benefits Agile has yielded those companies—has attracted the attention of other companies, makers of physical things and designers of experiences alike, in industries as diverse as consumer products, education, and health care.

According to the *Agile Practice Guide*, Agile techniques and approaches can enable companies to respond effectively to disruptive technologies and increased customer demand for more immediate value delivery. According to Porter and Heppelmann, in a 2014 *HBR* article, the emergence of smart products—products connected to information networks in ways that provide alternate avenues for creating and delivering value—is exponentially expanding opportunities for new product features and capabilities and even new business models, ushering in a new era in business competitiveness. In this new paradigm, product development processes must accommodate changes that occur in a project's late phases and even after the sale. Agile, with its quick, iterative cycles and close customer contact, offers a way to adapt to this challenging environment. An Agile mindset can help a company build and sustain competitive advantage, even as small organizations and startups gain space, profiting from their ability to rapidly develop products as customer needs emerge.

But skeptical managers may ask, does it really work? Evidence is emerging that it does work, and not just in software. Serrador and Pinto, in their 2015 article, report on their empirical investigation of this question, through an analysis of 1,002 projects across multiple industry and countries. They found that the level of Agile used in a project has a statistically significant effect on project success, especially on two dimensions: efficiency and stakeholder satisfaction. High-technology, health care, and IT firms saw the most benefit, mainly because they are heavy users of software, Agile's birthplace, and thus more accustomed to the Agile mindset. But firms in other industries also saw the impact of Agile on project outcomes.

Increasingly, Agile's practices are being adapted to projects that are not exclusively software based. In their 2014 article, Conforto and coauthors describe an exploratory survey of 19 companies in different industrial sectors to identify common Agile practices and enablers of Agile implementation. The companies surveyed had some organizational enablers similar to software companies, such as highly experienced project teams and project managers, small project teams (up to 12 professionals), and multidisciplinary project teams that include key departments.

Conforto and coauthors suggested further investigation on how to develop a hybrid management model, one that integrates Agile with more traditional approaches to help access the benefits of Agile while addressing other needs. Such an approach, they suggested, could also moderate some of the barriers to a full Agile implementation, such as the resource demands created by dedicated project teams, the challenge of colocating all project team members, the difficulty in creating large multidisciplinary teams, and the challenge of involving customers with a high degree of influence in development processes.

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Robert G. Cooper, in a 2014 *RTM* paper, arrived at a similar conclusion. He noted that several companies were evolving new idea-to-launch processes from the traditional Stage-Gate method—of which Cooper is the inventor. The new processes, Cooper noted, retained the overall Stage-Gate structure but executed within stages using Agile. In this model, as Cooper elaborated in a 2016 follow-up paper, Stage-Gate is a macroplanning process. Its stages span the entire idea-to-launch chain, guiding investment decisions from idea generation through business case development and market launch. Agile is a microplanning or project management tool that brings agility, adaptability, and speed to development projects.

Cooper and coauthor Anita F. Sommer have since investigated the workings of the Stage-Gate–Agile hybrid in a series of articles, in *RTM* and elsewhere. They have found that Agile is most commonly used by technical teams in the development and testing stages of the Stage-Gate process, although there is no reason why it could not be used in other phases.

Agile can be implemented via any of a variety of frameworks and toolsets; Scrum has emerged as the most appropriate for hardware development, especially within hybrid processes. Cooper and Sommer, in their 2016 article, reported that Scrum was used for all the case studies they had explored. Sommer and coauthors, in a 2015 *RTM* article reporting on an empirical study of five companies using hybrid processes, identified Scrum as the method adopted by all five companies. The companies adopted Stage-Gate at the strategic level and Scrum practices at the execution level. Scrum tools such as time-boxed sprints, stand-up meetings, retrospective meetings, backlogs, and scrum boards were used within each stage, to accelerate development and add flexibility.

Other authors have also proposed hybrid frameworks for non-software product development. In a 2016 article, Conforto and Amaral described a hybrid framework called iterative and visual project management method (IVPM2). They demonstrated that the framework contributed to project and product development performance. Lehnen, Schmidt, and Herstatt proposed another hybrid method in their 2016 article. Studying companies' use of the lead user method, they noticed that companies implementing this method often faced challenges in project management; to address these difficulties, they proposed a hybrid model that used Scrum to execute each stage of the lead user method. The hybrid framework helped participating companies overcome the challenges by increasing flexibility, reducing bureaucracy, and decreasing hierarchical issues in the project team.

Resources

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Hybrid models appear to be a promising route to integrate Agile methods into physical product development. However, these methods are in their early days, and they are not unanimously accepted. The one point on which everyone agrees is that pure Agile—Agile as software companies implement it—doesn't fit physical products. Some degree of adaptation is required.

For instance, Cooper and Sommer, in their 2016 article, suggest several adjustments to the usual Scrum model: redefine what is meant by a "done sprint," since it is not possible to deliver a working physical product every sprint; integrate traditional-model planning into sprint planning; and apply Agile discriminately, in appropriate contexts. Some work has been done to define what is an appropriate context for Agile. Stelzmann, in a 2012 paper, proposes a classification scheme to define the "right" context for Agile along two dimensions: feasibility (prototyping, testing, and implementing changes can be done quickly and cheaply and the system is not safety-critical) and demand for Agile (high market dynamism, high level of innovation, and high rate of change).

But what about the results? What results are companies seeing from applying Agile in the development of physical products? Unsurprisingly, given the newness of hybrid methods and other frameworks for applying Agile to physical products, results are sparse. In their 2018 *RTM* article, Cooper and Sommer describe a set of case studies; that work suggests that Agile offers to physical product development most of the same benefits IT projects see, including reduced time to market and increased development productivity, faster responses to changing market conditions and customer needs, higher project team morale, and improved within-team communication.

Of course, challenges remain—those that have been identified, by Cooper, Sommer, and others, and those yet to emerge as more companies explore Agile implementation. Some of these challenges arise from the inherent differences between software and physical products, such as the fact that a physical product is not infinitely divisible in the same way as software, making it difficult to break into time-boxed sprints. Physical product makers looking to implement Agile must also face down-management skepticism, problems with scalability, and the difficulty of finding the resources required to field dedicated, colocated teams.

Agile is increasingly escaping the bounds of software and presenting itself as a reality in the development of physical products. New ideas, such as the development of hybrid models that combine Agile with traditional product development models, offer new possibilities for addressing the challenges presented by rapidly evolving markets. Companies that find ways to integrate Agile into their product development processes may gain competitive advantage in an increasingly innovative and dynamic environment.

Reviews

Creative Construction: The DNA of Sustained Innovation
Gary P. Pisano (PublicAffairs, 2019)

Do startups have a natural advantage over established firms in terms of capability for transformational innovation? Do scale and business success inevitably presage disruption by a new market entrant? Fortunately for existing enterprises, *Creative Construction* makes a compelling case that the answer is no and presents practical advice for defining a strategy, creating a system, and nurturing the culture needed to succeed with innovation at any scale. Gary Pisano offers conceptual frameworks that are well grounded in the innovation management literature along with sensible guidance for implementation, based on numerous case studies and his own quest to resolve paradoxes and dispel myths about innovation.

Defining creative construction as "sustaining and rejuvenating an existing organization's innovation structures," Pisano compares it to the job of renovating a home while living in it—building something new out of something old. This is one of many well-chosen and entertaining metaphors used throughout the book; the figurative language helps readers both understand a set of tailorable tactics and build confidence to apply them.

The foundation for creative construction is innovation strategy, which promotes alignment among diverse groups within an organization, clarifies objectives and priorities, and helps focus efforts around them. "Without clarity around the questions of how innovation is supposed to create value and lead to value capture, different parts of the organization can easily wind up pursuing conflicting priorities," Pisano asserts. He notes that *innovation* conveys something positive, but it can potentially mean anything; on its own it means nothing. Thus, innovation must be considered in fine-grained ways to make the concept useful—for example, distinguishing between routine, disruptive, radical, and architectural innovation. Companies engaging in creative construction must explicitly consider the supporting and opposing influences for each of these types of innovation, as well as factors such as home-court bias.

Four key questions guide the formulation of a creative construction innovation strategy and the allocation of resources across different kinds of innovation opportunities:

1. How fast is your core market growing?
2. What are the unmet customer needs?
3. How much potential does your existing technological paradigm offer for improvement?
4. Where can you create barriers to imitations?

The life cycle of a given industry is not necessarily linear from growth to maturity to decline; industries can revert to a state where new opportunities emerge for transformational growth, a process Pisano calls "de-maturing." In the auto industry, for example, incremental innovations in manufacturing efficiencies and passenger comfort and safety are being supplanted by transformational innovations in powertrain technology (electric motors and batteries), driving systems (AI guidance), and business models (ride sharing).

Companies must be watchful and dynamically tune their balance of innovation, anticipating and responding to changes in the competitive environment with targeted countermeasures, such as building complementary technological capabilities that are hard to imitate, focusing on business model innovation, and cranking up the treadmill for rapid routine innovation.

The second part of *Creative Construction* addresses the innovation system; Pisano emphasizes that there are no universal best practices. The leadership challenge is to design an innovation system that is suited to the organization's strategy and circumstances. That system must perform three basic tasks: search for valuable problems and solutions, synthesize diverse streams of ideas into coherent business concepts, and select opportunities. These tasks might be executed in parallel or even reverse order, depending on the company's needs and context; the book offers a number of case studies alongside concise coaching, such as "Search generates hypotheses about problems that may be valuable to solve and solutions that might be worth exploring." Several practical approaches are suggested for engaging the organization in broader search.

Part three of the book—the most thought-provoking part of the book—addresses innovation culture, noting that it is an extraordinarily powerful driver of organizational behavior and performance. Pisano is encouraging. "Although innovative cultures are actually quite rare, I do not agree that changes antithetical to innovation are inevitable," he says. "Organizational cultures, like everything else about organizations, are human creations. As such, they can be shaped through the hand of management."

According to Pisano, the academic research and case studies on innovative cultures have consistently identified key characteristics: a tolerance for failure, a willingness to experiment, psychological safety, collaboration, and flatness. The ubiquity of these factors raises a critical question: How could a set of organizational practices that everyone seems to love be so hard to implement? In part, Pisano notes, it's because they're counterbalanced by some far less attractive attributes: no tolerance for incompetence, highly disciplined execution, brutally candid communication, individual accountability, and strong leadership. Companies seeking to be innovative must embrace both sets of attributes: "These less palatable practices," according to Pisano, "are critical complements to the more pleasant ones."

In a creative constructive organization, leaders are viewed as cultural architects, actively engaged in engineering culture to support organizational priorities. Leaders should take direct ownership of the culture, model the behavior they desire, nurture parts of the organization with existing or nascent innovative cultures, and get the right people. The book offers suggestions and cautions for leaders attempting to create a "startup culture" in an existing organization. The book concludes with an optimistic call for creative constructive leaders—cultural warriors who develop and practice habits of mind that look outward, view innovation as a competitive weapon, embrace being different, are disciplined about short- and long-term trade-offs, take a systems perspective on innovation capabilities, innovate organizations, and access the best talent.

Creative Construction connects the dots and extends conventional wisdom about innovation management, providing a sensible approach to sustaining transformational innovation. The book's engaging narrative, supported by real-world case studies, easy-to-understand explanations of key concepts, and well-structured implementation guidance, make it both eminently readable and valuable to a broad audience.

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Trillion Dollar Coach: The Leadership Playbook of Silicon Valley's Bill Campbell

Eric Schmidt, Jonathan Rosenberg, and Alan Eagle (New York: HarperCollins, 2019)

How can a coach be worth a trillion dollars, especially one that few have heard of? Bill Campbell just might be. Campbell served as the CEO of Intuit and Claris and as an early vice president of marketing and sales for Apple. He is the one who made the decision to run the famous Apple Super Bowl advertisement in 1984, over the objections of the Board of Directors. Following his official retirement, Campbell worked as an executive coach to some of the biggest names in Silicon Valley—Eric Schmidt at Google, Steve Jobs at Apple, Brad Smith at Intuit, John Donahoe at eBay, Vice President Al Gore, Dick Costolo at Twitter, Marissa Mayer at Google and later Yahoo, and dozens more.

Campbell, who was known as "Coach" in recognition of his previous career as a football coach for Columbia University (his alma mater), passed away in April 2016. The authors collaborated with a group of his disciples to create this book as a kind of memorial. It encapsulates four core principles of management and leadership that "Coach" taught.

Principle 1: Your title makes you a manager; your people make you a leader. Campbell learned this from a fellow executive when he was leading Claris. Donna Dubinsky brought him the news that his executive team was planning to quit if he did not stop micromanaging them. In that session, she used these words to explain to him why he could not lead as a dictator. Some of the practices that emerge from this principle include:

- Give your people the tools, information, training, and coaching they need to succeed.
- Start meetings by sharing personal, non-business stories.
- Create structure for 1:1 meetings, and spend time preparing because these meetings are essential for helping people grow.
- Listen to all perspectives on a question and only use your authority to break ties when necessary.
- Define the company's "first principles" and let those principles guide decisions.

Principle 2: Build an envelope of trust. Create a circle around your team within which everyone keeps his or her word, is loyal to the team and to its members, acts with integrity, and

maintains discretion. Practices that support this principle include:

- Reserve coaching for those who are honest, humble, willing to persevere through difficulty, and open to learning.
- Listen to people with your full and undivided attention without thinking about what you are going to say next.
- Deliver negative feedback with a caring spirit and in private.
- Don't give commands; instead, guide people to the best decision for themselves.
- Believe in people more than they believe in themselves.
- Let people bring their full identities to work.

Principle 3: Team first. Campbell believed in creating effective teams of the geniuses who are attracted to companies like Google and Apple and instilling in them an ethos of making sacrifices for the team. Practices that illustrate this principle include:

- Understand that the first step to solving a problem is selecting the right team to work on it.
- Select players that have "smarts and hearts"—the ability to learn fast, work hard, exhibit empathy, and put the team first.
- Pair people up so they have a strong connection to at least one other person on the team.
- Intentionally include women in traditionally male-dominated companies and teams.
- Tackle the biggest problems first.

Principle 4: Harness the power of love. There is a place for chaste love in the workplace. Campbell believed in caring for people and showing it through hugs and sharing of personal experiences. He also showed that he cared through a set of comedic and profane "Bill-isms," which we can't repeat here. However, we can describe the practices that express this principle:

- Show care about people by being interested in their entire lives, both work and personal.
- Publicly cheer people and their successes.
- Create communities inside and outside of work.
- Be generous with your time, connections, and resources.
- Hold a special reverence and protection for people with the most vision and passion for the company, especially the founders.

Each of these principles and practices are supported by published management research; the authors provide ample citation. But Bill Campbell developed and practiced these principles through a lifetime of experience in football and high-tech companies. *Trillion Dollar Coach* is a tribute to a man who was loved by dozens of people, including the authors. As a eulogy to Campbell, it's focused on sharing his successes and effective behaviors. It is perhaps surprising to find a book by technology luminaries like Schmidt, Rosenberg, and Eagle that focuses on simple principles of interpersonal behavior, but those principles drove the success of the man they all knew as "Coach." The book is an easy read with simple messages, as much a motivational guidebook as a management text.

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