Adding Value to Stage-Gate Through the Use of Challenges

Introduction

Companies with lengthy or complex product development cycles typically employ a wide-variety of structured methodologies, processes, and tools to more efficiently manage these cycles, reduce risk, and accelerate time-to-market for new products or services. Product lifecycle management (PLM), Stage-Gate\(^1\), new product development and introduction (NPDI), lean manufacturing, Six Sigma\(^2\), and total quality management (TQM) are examples.

Each of these approaches has specific desired outcomes: issue resolution in PLM, failure management in Stage-Gate, quality improvement in TQM, waste elimination in lean, and so on. And, inherent in all of these approaches, is the desire to better manage, mitigate, and spread risk. Yet the issue facing many companies, in light of the length and complexity of product development cycles, is how to get to these desired outcomes faster, more cost effectively, and with less risk.

This white paper explores one such method, specifically the use of prize-based “Challenges” – enabled via open innovation and crowdsourcing – to accelerate innovation outcomes and improve business performance through integration to existing processes. Stage-Gate, a popular program and project management framework, will be assumed to already be in practice, a fact true within a vast majority of innovation practices.

This white paper provides readers with:

- A brief overview of Stage-Gate
- The working definition of a Challenge and how it is developed
- A real-world case study of a Challenge in action
- Examples of Challenge scenarios in the context of Stage-Gate practices
- The value of a challenge-driven approach to product development
- A call to action
By itself, Stage-Gate – or the custom derivatives of it that are currently employed in the field – has proven its value to countless organizations. When Challenges are leveraged to supplement Stage-Gate, companies can achieve near infinite problem solving capacity and pay only for solutions, not failure. As such, this alignment can have a significant and tangible impact on the business.

**Overview of Stage-Gate**

Most innovation practitioners, especially those working within private industry, are already familiar and proficient with the Stage-Gate Process. While it may be called something different internally (e.g., flow scheme, phase-gate), this approach as described by Robert Cooper in the business literature of the 1980s is a framework for dividing product development into discrete stages which are separated by decision points, also known as gates (see Figure 1). The purpose of gates is to ensure that the project is on track and to make a “go/kill” decision for continuation. Gate reviews, often conducted by a cross-functional steering committee, are based on established criteria that must be met in order to proceed to the next stage in the process.

**Figure 1: Stage-Gate Process**

Both stages and gates play an important role throughout the process and are usually articulated in a manner specific to a given industry sector. Stages are where work is completed and gates are where continuation decisions are made. And while no one description or illustration adequately serves the various sectors practicing Stage-Gate, the generic description in Figure 1 suffices for the purpose of this discussion despite its shortcomings.

In practice, the stages shown in Figure 1 may include numerous sub-stages and gates depending on how the process has been defined and structured within a specific sector or company. This is particularly true when Challenges are leveraged to supplement Stage-Gate, companies can achieve near infinite problem solving capacity and pay only for solutions, not failure.
of the “Development” stage which often comprises several important sub-stages with labels like hypothesis testing, prototyping, market form development, and so on. The sub-stages in Development are frequently the most important points of problem-solving and risk resolution in the entire product development process.

Gates, on the other hand, typically consist of inputs, decision criteria, and outcomes in order to make the “go/kill” decision and outline next steps. Gate reviews by themselves tend to be short affairs. It is the heavy-lifting work in the stage preceding a gate where key issues and problems are revealed. It is in these areas that Challenges not only help to effectively manage, spread, and resolve risks, but they can also add significant value to Stage-Gate by helping to resolve barriers and thereby accelerate product development cycles.

Working Definition of a Challenge

In the InnoCentive nomenclature, a Challenge is a well-formed problem whose solution has value to a company. Challenges come in a variety of forms, from pure ideation – a broad question formulated to obtain access to new ideas – to those that require more rigor (e.g., the physical attributes of a disease biomarker or material). By definition, Challenges are specific, detailed, and actionable. Via rigorous methodology, Challenges are formulated, prioritized, posted to an audience/channel, tracked, and the resultant solutions evaluated and awarded. Depending on the channel selected, proper management of intellectual property (IP) is an essential component of the Challenge process (see Figure 2).

Figure 2: End-to-End Challenge Process

Once a problem – or idea, issue, or opportunity for that matter – is defined with a sufficient level of precision, they are articulated as Challenges that may then be distributed to an appropriate channel for innovating. Such channels include traditional inside innovation as well as a host of open innovation approaches including contracted engagements, university grants, joint development ventures, and crowdsourcing. Within the narrower spectrum of crowdsourced approaches, the channel may even be configured for more specific channels, defined by the nature of the “crowd” or audience to which the problem is addressed. Indeed, one can...
articulate three Challenge archetypes that are defined by their crowd-sourced innovation channel:

- **Internal Challenges** that reach all employees or select groups of employees
- **Invitational Challenges** that reach select groups of partners, suppliers, retirees/alumni, or customers
- **External Challenges** that reach open and public communities of problem solvers

When the use of Challenges is practiced widely, they constitute an innovation framework that InnoCentive calls Challenge Driven Innovation (CDI). This framework leverages open innovation and crowdsourcing along with defined methodology, process, and tools to help companies develop and implement actionable solutions to their key problems and opportunities. CDI is a proven mechanism for decomposing problems into manageable fragments and distributing the work to the individuals and groups that can best solve them.

**A Real-World Challenge in Action**

A major pharmaceutical company had a drug candidate in the pipeline for cardiovascular disease. The molecule under consideration was being prepared by the use of a familiar reactant, and it was assumed that this reactant would be available commercially at a reasonable price. As efforts progressed, it seemed that the biology was working as planned, but surprisingly, the drug candidate was prohibitively expensive to prepare due primarily to the lack of availability of this reactant at a sufficiently low price. Thus it was going to be necessary, to meet criteria of commercial viability and pricing, to design a new method for preparing this ingredient, one not known at the present time.

Inasmuch as the drug development team was busy on other efforts and knew that the development of a new route was fraught with false starts and frequent failures, they engaged InnoCentive and posted the Challenge to its global community of problem solvers. More than 200 people signed up to work on the problem, and the pharmaceutical company received 17 different proposals, all demonstrating varying degrees of success. The best submission met all of the criteria for quality, purity, ease of preparation, and most importantly, lower cost. It was submitted by a retired executive that had stopped working in a laboratory years ago but had built a small lab upon retirement to rekindle his old love of lab work and chemistry. The award of $25,000 was paid, the intellectual property was transferred, and the commercial viability of the drug candidate allowed for its continued advancement. The entire process from start to finish (i.e., problem identification to solution) took less than six months.
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A couple of points to highlight in this example are:

- The ability of open innovation and crowdsourcing to tap and harness otherwise unengaged contributors as sources of new innovations and technical knowledge. Indeed, one must ask whether hiring additional scientists – a time-consuming and costly endeavor – would have made a difference.
- The acceleration of innovation outcomes, along with the mitigation of both cost and risk associated with a purely internal problem solving approach. The pharmaceutical company paid only for success, not for the myriad failures and dead-ends familiar in new development endeavors.

Challenge Scenarios in the Context of Stage-Gate Practices

Challenges can intersect the usually practiced Stage-Gate at several points in the process. Figure 3 details three illustrative scenarios.

Figure 3: Examples of Challenges within Stage-Gate

Scenario #1

In this scenario, Challenges front-end the process by feeding the discovery pipeline. A type of Challenge referred to as an Ideation Challenge (in the InnoCentive nomenclature) is particularly relevant in this scenario. While Ideation Challenges are formulated as broad questions in order to obtain access to new ideas, without appropriate structure and definition, pure ideation exercises risk time and effort without a defined outcome. A robust Challenge methodology, on the other hand, ensures that Ideation Challenges are specific and detailed, desired outcomes are well-defined, and success is measureable. An example might be a detergent manufacturer looking for novel ways of introducing the softening process in the laundry cycle.

Challenges enabled the pharmaceutical company to pay only for success, not for the myriad failures and dead-ends familiar in new development endeavors.

Without appropriate structure and definition, pure ideation exercises risk time and effort without a defined outcome.
Scenario #2

Challenges in this scenario are designed to clarify and rectify problems within a stage to improve decision making capability at the subsequent gate. When used within earlier stages, Challenges confirm project direction, address viability concerns, and prove/disprove core assumptions. They can also reveal structural impediments such as process inefficiencies and productivity issues that must be addressed. For instance, inadequate staffing is a common issue affecting many project teams. Challenges can be leveraged as an offset – in essence, “outsourcing” problems to external problem solvers instead of relying solely on insourced talent. An example in this scenario might be the use of Challenges to propose alternative means of interpreting data that would have otherwise formed the basis for a kill decision.

Scenario #3

Projects can come to a screeching halt at any time and for a variety of reasons, which increases both cost and the risk of failure. As such, Challenges are a viable mitigation mechanism. In this scenario, a project team well into product development may realize that a material it thought would suffice was not sufficient, that the production of the material would be too costly, and so on. Challenges become a valuable tool to help the project team expand beyond its core expertise to not only resolve these barriers but also develop innovative solutions previously tried (and failed) or not even considered. An example might be the one cited earlier – the commercial viability of a drug candidate – whereby a possible gating concern that would lead to a kill decision was obviated by an externally derived solution that permitted the candidate to be advanced.

Challenges also help to increase solution diversity – the proverbial “eggs in one basket” – insofar as project teams are no longer solely reliant on internal resources (and hence internal thinking) to solve problems. And they distribute risk, that is, the financial burden of failures are born by the marketplace and not by the company posting the Challenge.

A Challenge-Driven Approach to Product Development

As Challenges become a more well-established methodology and toolset for dissecting product development, a whole new potential exists to transform historically serial processes into massively parallel processes. In the CDI framework referenced earlier, a portion of the innovation is formulated as a Challenge, in which a “Challenge” essentially represents the problem statement for a block of work that can be modularized and in most cases rendered “portable.” Such a block of work can be outsourced, insourced, or crowdsourced as an integral unit. According to The Open Innovation Marketplace: Creating Value in the Challenge Driven Enterprise, the central processes to this framework are those of dissection, channel distribution, and integration (see Figure 4).
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Figure 4: Challenge Dissection, Distribution, and Integration

- **Dissection**: Taking a large, complex project or problem and decomposing it into discrete modules (Challenges).
- **Channel Distribution**: Placing individual Challenges into the appropriate innovation channels (e.g., crowdsourcing to a global community of problem solvers).
- **Integration**: Reassembling the individual Challenges into a functional whole.

How is this concept relevant in the context of product development and classical Stage-Gate approaches? For the most part, historical processes such as Stage-Gate are *serial* in nature. CDI, on the other hand, can (and often should) be executed in *parallel*, which produces results faster and more cost effectively while reducing the risk of project delays, bottlenecks, or failure at multiple points along the development path.

Indeed, at the outset of a project, there are always multiple potential issues and barriers defined that will ultimately be addressed at an appropriate stage (again, to manage and minimize overall risk). The parallel nature of Challenges enables project teams to tackle several of these issues at once without having to rely solely on captive project resources to get the work done. When coupled with the marketplace bearing the cost of failure and capacity being greatly enhanced by use of “virtual” researchers, new product development sequences can be entertained under open innovation that could never be practiced with “closed innovation” alone.

This is the crux of challenge-driven product development – companies that embrace it have near infinite capacity, and they pay for solutions, not failure.

Challenges can executed in parallel, which produces results faster and more cost effectively while reducing the risk of project delays, bottlenecks, or failure at multiple points along the development path.

Companies that embrace a challenge-driven approach to product development have near infinite capacity, and they pay for solutions, not failure.
A Call to Action

While all companies have unique requirements, there are a few general tips to consider in order to get started using Challenges to accelerate innovation outcomes. These include:

- **Identify key problems that need solving:** Look for discrete barriers to progress or opportunities within your innovation portfolio of projects that can be articulated in a way that others, even from diverse disciplines, could make important contributions to your progress.

- **Pilot the Challenge approach:** Launch a series of Challenges to test their ability to rapidly solve the key problems that you identified. Consider leveraging a variety of sources for problem solving including internal groups and teams as well as external problem solver networks in order to develop a strong understanding of the nuances involved and value provided by tapping into diverse channels and audiences.

- **Measure and analyze the impact:** Build simple metrics that examine the value received, the avoidance of internal resource consumption, and the simultaneous progress that was made by internal resources while external ones were leveraged appropriately for discrete blocks of work. Be sure to consider the gains offered by allowing only the successful solutions to be paid for and acquired with no cost burden due to the failures.

Looking forward – and having tested the effectiveness of Challenges within your organization – it is advisable to create an enterprise-wide vision for broadening the reach of Challenges and infusing them into your core innovation strategy and portfolio. This vision includes expanding Challenges into new groups, divisions, and business processes (e.g., beyond R&D into marketing or operations) and fully integrating them into your foundational business processes (e.g., Stage-Gate, PLM).

Conclusion

All companies face dozens if not hundreds of problems, issues, and barriers during a typical product development cycle. The inability to rapidly solve these problems can result in project failure and excessive development costs to the company. While management frameworks such as Stage-Gate have historically provided much needed structure, they do not and were not intended to address open methods and channels for actually solving problems. As a proven methodology, Challenges and CDI provide this capability by enabling companies to tap into diverse perspectives and talent to solve problems faster, more cost effectively, and with less risk, ultimately resulting in accelerated innovation outcomes and improved business performance.

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Endnotes

1. Stage-Gate is a registered trademark of Product Development Institute, Inc.
2. Six Sigma is a registered trademark of Motorola, Inc.
3. Mario Vellandi’s remix diagram of Cooper’s Stage-Gate Process as posted in Melodies in Marketing
4. InnoCentive, Inc.
5. InnoCentive, Inc. overlay of remix diagram produced by Mario Vellandi/Melodies in Marketing