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Evolution of an Innovation Capability

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Making Crowdsourcing Work Within a Large Enterprise

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Abstract

As a form of crowdsourcing, idea competitions offer a mechanism to engage larger groups in innovation activities. While much of the literature on crowdsourcing focuses on idea competitions that cross a firm's boundaries to engage external partners, relatively little is known about how this approach can be used within large companies, to engage the internal community. We describe how an internal idea competition in a large company has evolved over time into a much broader innovation management system that supports a range of different types of innovations, and how it has altered the firm's overall approach to innovation and corporate entrepreneurship.

Keywords: Innovation culture; Crowdsourcing; Idea competitions

Introduction

In a recent survey of company leaders from around the globe, almost 80 percent reported that they consider innovation as a top-three priority for their firms (Ringel, Taylor, and Zablitz 2015). Many companies are paying increasing attention to building the capabilities needed to make innovation happen (Weigel and Goffin 2015). A large part of this focus is figuring out how to tap into the creativity of employees. In this vein, work has focused on serial innovators (Griffin, Price, and Vojak 2012) and entrepreneurial teams within large companies (Ries 2011). But firms continue to seek ways to access the creativity of the larger body of employees, beyond the innovation function itself. Intra-firm crowdsourcing has been a staple of such efforts for years, via physical suggestion boxes before digital tools became available and then using modern tools such as blogs, intranets, and social media. One form of crowdsourcing enabled by modern communication tools is the innovation contest. In this model, participants are offered some form of reward to enter into a competition to provide ideas or solutions to a defined challenge (Boudreau and Lakhani 2013). Research shows that competitions can be powerful tools for gathering many new solutions quickly (Adamczyk, Bullinger, and Moeslein 2012).

In spite of firms' many attempts at crowdsourcing in general and at idea competitions in particular, these systems have yielded limited results. Creating a successful idea competition program within a company raises a number of challenges; careful consideration of the human element is required to design an effective sociotechnical system (Dahl, Lawrence, and Pierce 2011). Getting employees to participate in work outside of their assigned roles is not always simple; incentives that

motivate some employees to participate may not be enough to convince others to join the effort (Wendelken et al. 2014). Further, it is often challenging to maintain participation rates over time, even after a successful first competition (Dahlander and Piezunka 2014). Finally, ideas generated in innovation contests, especially those generated in rapid-fire, short-term–focused innovation campaigns (Elerud-Tryde and Hooge 2014). For that reason, idea contests must be accompanied by thoughtfully structured innovation support systems to ensure that participants’ ideas find their way into the innovation pipeline (Cleaver 2011).

Responding to these challenges, some firms have begun training large numbers of their employees in innovation approaches such as design thinking, others have created in their organizations new roles whose sole responsibility is the support of innovation activities (e.g., innovation catalysts), and yet others are creating spaces and methods for quickly testing new business ideas, sometimes called innovation sandboxes.

In this paper, we report on the efforts of EMC, a global leader in data storage systems and cloud computing, to build an innovation capability that takes advantage of idea competitions to power internal crowdsourcing. Over a 10-year period, EMC has built a system that has evolved from a relatively simple annual innovation contest into a deeply embedded, multipronged innovation approach that has helped drive entrepreneurial behavior throughout the company—and produced more than 400 invention disclosures and patents.

Building an Innovation Contest into an Integrated Innovation System

EMC has a long tradition in innovation. However, nearly a decade ago, the company decided to formalize its approach to structured, employee-driven innovation with a companywide innovation contest. Over the following eight years, EMC has built on the foundation of that contest, creating an innovation management system that has delivered growing numbers of valuable idea submissions (Figure 1). The evolution of the system is best described in three phases, defined by the successive names of the system: Innovation Conference, Innovation Roadmap, and Innovation Network (Table 1).

---Figure 1 near here---

---Table 1 near here---

Phase 1: The Innovation Conference—The Open Idea Box

In early summer 2007, as an initial experiment in soliciting employee ideas to enhance the new product development process, the Office of the CTO sent out a call for ideas to all employees, asking for their ideas to innovate on any EMC products or processes. Winners, it was announced, would receive a small cash prize, and the opportunity to present their idea to senior executives for further consideration and funding. This wide-open call generated more than 400 ideas responses, all submitted to a simple email inbox. The Office of the CTO winnowed the ideas down to thirty finalist teams, which were given the opportunity to rework their idea pitches, and three were selected as winners and recognized at the first EMC Innovation Conference, a gathering

of several hundred people near EMC's headquarters in Massachusetts at which the winners and their ideas were celebrated. Senior management attended the event, which was held in October. In addition to cash incentives, the chance of being recognized at the Innovation Conference clearly was a primary motivational factor for employees to contribute valuable ideas, as finalists put considerable effort into re-working their ideas and pitches for the Conference.

In some instances, this recognition became a career booster. For example, one early submission, "Sustainability Packaging Practices," overhauled the entire EMC packaging and shipping process, enabling the reuse of some materials and saving the company millions of dollars and the environment millions of pounds of CO₂ emissions. After this idea was highlighted at an Innovation Conference and in a short video, the team that created it experienced major career advancements. One team member presented the concept live on stage at the EMC World event in front of an audience of thousands of EMC's employees, customers, and partners, alongside EMC's Chief Marketing Officer and Chief Operating Officer, garnering valuable visibility. Another team member moved from her original role to work directly for EMC's Chief Sustainability Officer, and another had an award for excellence in sustainability named after her.

The Innovation Conference was very visible inside the company and quickly came to be seen as a key element of the innovation program. After two years of being held at the company's global headquarters in the United States, the event went global, underscoring the importance of all regions in the company's innovation efforts. The 2009 conference was held in Bangalore, India, and subsequently, the event went virtual, with simultaneous conferences in multiple locations across the globe. A single "main stage" moved to a

different country each year and simultaneous satellite events were held in other locations. The conference continues today; more than 10,000 people attending at more than 16 physical locations each year, with thousands more watching the show remotely.

In this early innovation contest, the entrance end of the innovation funnel was very wide, reflecting the completely open call, which allowed any employee to submit almost any idea (Figure 2). As result, the pool of submissions offered a wide range of diverse ideas, reflecting one of the major advantages of innovation contests. However, that volume and diversity also created challenges in commercializing the ideas selected as winners. Since winning ideas did not necessarily align with the firm's strategy, or have an immediate customer, the commercialization rate for these ideas hovered around 11 percent, on average, in these early years. For many ideas, the Innovation Conference marked the quasi-end point of the early innovation funnel; some ideas simply withered after this burst of visibility. Troubled by the low commercialization rates, and looking for a way to achieve better alignment between contest submissions and the company's strategic needs, the management team decided to make changes to the contest.

---Figure 2 near here---

Phase 2: The Innovation Roadmap—Reshaping the Funnel

In 2010, EMC's management team made two significant changes to the contest's innovation funnel (Figure 3). To reflect the goal of these two changes as guiding the

inventions all the way to commercialization, the innovation management system and the idea contest itself was renamed The Innovation Roadmap. First, to create better alignment between the needs of the business units and the ideas submitted, it asked business units to sponsor strategic challenges. Each business unit across the company was encouraged to articulate a specific challenge and strategic priorities for the innovation contest. This approach both narrowed the range of ideas submitted for a specific challenge and created a direct link between the winning ideas and the business units. Over the course of the next few years, additional sponsors from across the company began to participate as well, including non-product organizations such as Marketing, Human Resources, and Diversity and Inclusion. By 2012, all of the international locations focused on local Research and Development, called “Centers of Excellence (COE’s)” participated by hosting their own unique challenges as well.

---Figure 3 near here---

One example of the effect of this alignment across levels was an idea generated by an innovator who had been a data center administrator at a different company prior to joining EMC. Recalling his personal experience having to come into the office at night and on holidays to physically swap hard drives when storage arrays reached capacity, the innovator realized there had to be a better way to approach storage capacity management. When the Backup and Recovery Systems Division called for ideas to improve its products and increase sales, this innovator suggested an algorithm that could predict

when drives would be full, based on a customer's historic usage, so that additional storage could be ordered in advance, avoiding a scramble to remedy problems when they occurred. When the executive sponsor for this idea saw its impact across several pilot customer environments, he helped the innovator roll it out not only across multiple key accounts, but also across the entire business unit and, shortly thereafter, all of the relevant product groups across the company. He also embedded it in the sales management system so that customers could simply click a button to order additional storage, and customer representatives could also be aware of when drives would fill. By applying a new approach to an existing process, this idea disrupted the sales cycle itself, yielding substantial revenue earlier in the sales process. Ultimately, the idea was scaled across company sites and the innovator ended up working directly for the executive sponsor to lead the implementation of the global process change.

The second major change introduced in 2010 was the creation of a formalized incubation framework to steer all winning ideas toward implementation. The new incubation system consisted of a series of steps tied to what EMC called Incubation Readiness Levels (IRLs). The IRLs provided a series of checkpoints and deliverables that each idea moved from concept to implementation in a logical, stepwise manner (Table 2). At each IRL, sponsors, innovators, and members of the innovation network collaboratively define the next steps for the project and determine the criteria for successful completion of those steps, until the idea is ready for full implementation.

---Table 2 near here---

This support for incubation has been critical for the success of ideas. In one instance, an innovation that initially seemed relatively easy to implement ended up requiring greater investment than its original sponsor wanted to contribute. A Distinguished Engineer (DE) was mapped to the project, in order to help remove some of the roadblocks and reinvigorate the idea's incubation, and in this case, the DE succeeded. A new sponsor was assigned to the idea, which was a concept for a sales enablement mobile application for a specific business unit, and this sponsor helped the innovators to bring the idea to fruition. After the idea had been implemented for one business unit (BU), the innovator was also hired by this new champion, and the innovator now stewards the roll-out of this sales enablement app across the entire company. Without the stage gates introduced by the IRL system, and the human resources aligned to support the innovators at each IRL, an idea in this situation would not have had the additional guidance necessary to push it forward, and would have died as a result of lack of support.

In the three years following the implementation of the sponsor challenge model and the IRL system (2010–2013), incubation timelines accelerated and implementation rates for winning ideas improved to 47 percent, on average. As a result, the contest produced a series of ideas that generated substantial revenue for their sponsoring organizations (in addition to cost savings, process improvements, patent filings, and positive internal and external publicity).

Phase 3: The Innovation Network—Broadening the System

In 2013, EMC realized that the second version of its innovation management system, while successful in its own right, had raised a new set of questions. First, ideas in incubations still faced the challenge of limited R&D resources, especially those ideas from some non-product-carrying organizational sponsors. Further, groups that lacked the ability to develop prototypes for their ideas had greater difficulty gaining full traction with executive sponsors, and thus experienced less success. In response to this challenge, EMC created the Incubation Fund. This fund, which is a collaborative effort of sponsoring organization (business units, divisions, and Centers of Excellence), is centrally pooled and managed by the Office of The CTO, which distributes resources for incubation to winning idea teams. Sponsors can choose to participate at four different levels (Bronze, Silver, Gold, Platinum), each with a corresponding contribution amount. All teams that complete the first and second IRLs are eligible to apply for resources from the Incubation Fund.

The second question raised by the new system was how to take full advantage of the many ideas that did not ultimately become winners. An innovation contest, by design, only makes use of the winning ideas, which typically make up a small fraction of all submissions. Innovation contests are considered efficient for precisely that reason: only the winner gets paid. But that also means many more ideas—a number of which may have significant value—are not fully explored. In EMC's case, the number of winners correlated to the number of challenge sponsors in a given year and to sponsors' incubation appetites and capabilities. That meant that only about 0.04 percent of ideas submitted were actually developed and yielded value for the company. This very low

number suggests that many ideas that are almost as good as the winning ideas remain unused.

In addition, while the shift to the sponsored challenge model resulted in considerably higher implementation rates and substantial revenue contributions from some of the most exceptional ideas, the nature of the model presented another problem. All challenges were framed around executive priorities, and the ideas that won were those that best matched the challenges. While this alignment increased the probability of winning ideas being pulled through to implementation, it excluded “wild” or radical ideas. Innovators with great ideas that were not relevant to the challenges presented in a given year did not have a venue for those ideas.

Recognizing these issues, EMC reached the conclusion that different types of innovation require different incubation paths and different programs to support them. That recognition led to the development of two additional avenues to collect ideas for different types of innovations: EMC Enhancements, which focuses on incremental ideas, and the New Business Development Process, which focuses on radical innovations (Figure 4).

---Figure 4 near here---

EMC Enhancements provides employees the opportunity to propose an idea to improve upon an existing product, service, solution, process, or program, or create a new

one, at any level within their own organizations, from the immediate core team to the overarching business unit or macro-organization under its executive vice president. EMC Enhancements leverages the company's internal crowd to not only submit but also review, improve, and advance ideas. In contrast to the innovation roadmap, where the idea selection is typically done by management, in EMC enhancement any employee can online view, rate, and comment on any idea. Once an idea has received a defined number of positive reviews (set by the EMC Enhancements Steering Committee, based on current program participation), it is sent to the corresponding idea submitter's manager, who evaluates it and assesses/approves the time and resource asks from the idea submitter. If the idea receives approval, the innovator then leverages the resources approved by her management team in order to implement (within the timeline defined), then returns to the online tool and notes the project's performance against a set of defined success metrics, which capture the idea's impact on the organization and on the company at large (Table 3). The organization's management team then reviews the innovator's assessment and agrees or disagrees. If the management assessment is in agreement with the innovator assessment, the idea is marked as finalized and the idea is sent to the EMC Enhancements Steering Committee, a group of innovation leaders from across the company. The steering committee assesses all implemented ideas each month and assigns to each idea a monetary reward correlating to its impact. In contrast to the annual innovation contest, this program does not follow an annual rhythm, but rather is ongoing, and allows submission of ideas at any time.

--- Table 3 near here---

To address the question of underserving potentially radical innovations, EMC developed another new avenue, the New Business Development Process (NBDP). At the beginning of the NBDP, new technology areas are typically identified through multiple channels, including direct customer feedback from the field; data aggregation from sources such as trade publications, technology journals, Google searches, blogs, and social media; research work with colleges and universities; direct feedback from executive insights; and innovation ideas gathered through the Innovation Roadmap and EMC Enhancements pathways. When top executives make the decision to pursue one or more of these technologies and develop solutions aligned with the technology, a single “executive lead” is assigned to champion the resulting workstreams, and subject matter experts (SMEs) from across the company (including new hires from the outside) are organized into formal teams focused on leveraging the target technologies. A side benefit of archiving the 20,000+ ideas submitted to the innovation contests over the years is that those archives provide insight on who within the company may already be thinking about a particular topics or technology, helping identify SMEs inside the company.

As these teams begin to develop material prototypes and pilot projects, the ideas are continually vetted through numerous internal and external sounding boards, including customer advisory boards, select industry luminary advisors, and internal product and engineering leadership boards and councils. Finally, market-ready products are piloted with trusted customers. Efforts to close potential technology or go-to-market gaps can include strategic external investments through partnerships or acquisitions.

Lessons Learned from EMC's Experience

EMC's innovation management system evolved out of efforts to continually improved its performance, address its shortcomings, and expand its reach. This history suggests five lessons that should be considered by any company seeking to create an innovation management system based on innovation contests (Table 4).

---Table 4 near here---

1. **Provide appropriate incentives for contributors.** Just as in external innovation contests, direct cash prizes do matter in motivating participation, but firms can and should use a broader range of incentives, as well. Public recognition of winning ideas in public forums such as EMC's Innovation Conference and public acknowledgment of career advancements based on winning ideas also provide powerful extrinsic motivation in the form of recognition. In addition, companies can make use of powerful intrinsic motivations by invoking the idea that winning ideas contribute to moving the entire organization forward, giving employees a sense that they are solving meaningful problems and contributing to something larger than themselves. Of course, achieving this requires a credible vision in the first place, as well as constant and consistent communication throughout the organization.
2. **Align innovation incentives across leadership levels.** Even the best idea needs a reliable executive champion who can represent the demand for it and who has the resources and political clout to sponsor its advancement. Sponsored challenges are a

good way to align incentives for the employees submitting ideas and the executives responsible for providing support and resources to incubate winning ideas. However, well-articulated challenges must walk a fine line between two extremes: If they are too broad, they produce ideas that are not sufficiently relevant; if they are too narrow, they may not allow enough room for innovative thinking. Aligning employee ideation with executive stakeholder interests and the company's strategic direction improves the probability that ideas will be commercialized. EMC has also discovered that the involvement of sponsors and managers in the incubation process is an important element, as it helps innovators keep ideas aligned with company strategy. This effect can be strengthened by asking executives to contribute to an incubation fund.

- 3. Provide support for innovators at both the front and the back end.** While an innovation contest can serve as the central element of an innovation management system, support for individual contributors and their ideas will make the system much more productive. At EMC, the Innovation Network involves not only the administrative team that governs it, but also diverse experts who volunteer their skills and time to advance ideas. These collaborators are integrated into idea development teams as a support network that complements the innovators' abilities and strengths. EMC Fellows and Distinguished Engineers, as well as leaders in marketing, human resources, and finance, among many others, provide innovators with expertise they need to make their ideas a reality. This is true for initial submissions as well as for incubation. Making additional consultants and mentors available to innovation teams provides multiple benefits. Beyond providing direct support for the development of an idea, the additional resources expand the network of people interested in

advancing the idea, creating a snowball effect that generates positive publicity and support for the ideas and keeps them relevant and prioritized within the sponsoring organization and across the company as a whole.

4. **Recognize that different innovation types require different processes.** The spectrum of innovations ranges from small, incremental improvements of existing processes to new approaches to known and well-articulated problems, to radical ideas whose true value only emerges with continued exploration. Each of these innovation types can provide value to a firm, and each type needs specific support to make it real. However, different innovation types need to be sourced, evaluated, and supported differently. Incremental innovations need simple avenues with low hurdles and little or no waiting time. Radical innovations, on the other hand, need substantial exploration before their potential value can be determined. Innovations in the middle of the spectrum (EMC labels these “adjacent” and “disruptive” innovations) benefit from the scale and visibility of regular innovation contests, coupled with structured incubation support. The elements of a firm’s innovation management system should reflect the types of innovation the firm wants to pursue.

5. **Enable fast, broad, and easy access to innovation information.** Both participants and managers of innovation processes prefer to spend time moving innovations through the system rather than preparing reports or searching for information. For this reason, the use of some form of centrally located, easily accessible innovation management platform, either built internally or customized from a commercially available application, is highly advisable. EMC has created its own suite of innovation and intellectual property management tools, called X-Central. X-Central,

which is a homegrown platform, allows employees to access innovation information, submit ideas, review past ideas, manage their time contributions, and collaborate with peers and co-innovators around the world. X-Central also allows sponsors and managers to review and assess ideas and prioritize them according to strategic objectives. Hosting all ideas in a central location enables innovators to improve their ideas by building on prior knowledge and accessing existing resources within the company. X-Central, for instance, allows innovators to use natural language processing and semantic reasoning built into search and idea submission fields to canvass all ideas and find subject matter experts, potential co-authors and team members, and existing approaches to similar problems. One of EMC's major goals for the near future is to accelerate revamping of the X-Central platform to facilitate a "self-service" model for all employees across the company. The changes under way will decentralize program management as much as possible, in order to empower every employee in the company to innovate anytime and anywhere.

Taken together, these five lessons inform the creation of a powerful innovation management system: Build pathways for innovations to emerge that are aligned with corporate strategy. This requires appropriate incentives, work processes, and information technology support for all stakeholders involved with the system.

Conclusion

Over nearly a decade, EMC's innovation contest has evolved from a simple, annual open call for ideas into a sophisticated innovation management system that generates thousands of idea submissions. Recognizing that different types of innovations require

different incentives, support, and recognition, the system today enables the pursuit of both radical and incremental ideas, supports focused strategic challenges, and supports grassroots initiatives on an ongoing basis.

Today's organizations increasingly rely on corporate entrepreneurship to remain competitive. Internal crowdsourcing through contests can be an effective mechanism to achieve this, especially if it is part of an overall innovation capability for the company, as opposed to a stand-alone program. As EMC's case makes clear, successful companies will be those who think of internal crowdsourcing as a sociotechnical system that takes into account both innovators' and managers' objectives and incentives and provides the resources needed to make it all work.

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TABLES AND FIGURES

Table 1.—EMC’s three phases of internal crowdsourcing

Phase	Objectives	Issues
The Innovation Conference (2007–2009)	Issue an open call to all employees to gather a large number of diverse ideas. Recognize and celebrate winning ideas and innovators at a highly visible Innovation Conference. Spur viral communication of successes.	Low commercialization rate for submitted ideas due to lack of immediate customers. Ideas not necessarily aligned with the firm’s strategy.
The Innovation Roadmap (2010–2013)	Make business units sponsors of innovation challenges. Create a formal incubation framework to support idea implementation.	Limited R&D resources in some divisions created biases. Many good ideas not selected as winners were left unused.
The Innovation Network (2014–Present)	Create an Incubation Fund to support development of winning ideas. Support different types of ideas, including a range of incremental to radical innovations. Create continual innovation submission programs, in addition to the yearly event.	Finding the right subject matter experts in the firm to advise, evaluate, and reward ideas. Coordination and resource issues associated with managing a complex portfolio of idea programs.

Table 2.—EMC Incubation Readiness Levels (IRLs)

IRL	Name	Deliverable
1	Business Case	Business case (<i>Why</i> the idea should be incubated)
2	PoC Definition	Proof of concept definition (<i>How</i> the idea will be incubated)
3	Prototype Begins	First development of prototype
4	Prototype Checkpoint	Partial prototype showing significant progress
5	Prototype Demonstration	Fully demonstrable prototype of at least one major component
6	Incubation Complete	Full working prototype
7	Implementation Begins	Definition of next steps

Table 3.—EMC Enhancements success metrics

Type	Name	Description	Measurement
ROI Metrics	Revenue generation	Ideas which have directly contributed to newly realized revenue	Exact financial contribution (\$)
	Cost savings/Total cost of ownership reduction	Ideas which have helped EMC to realize some form of substantial cost savings	Specific cost savings per employee/unit (4), man hour reductions, juxtaposition to cost of buying technology, etc.
Qualitative Metrics	Increase in Total Customer Experience (CSAT)	Ideas which significantly improve customer sentiment for a particular product/service/solution	Employee satisfaction rates, product net promoter scores, Blogosphere sweeps, Significant product feature add-ons
	Productivity Improvement (via Process Improvement)	Ideas which have directly improved the way that processes work, and/or the way that things are done at EMC, resulting in improvements in productivity	Decreased turnaround time, Reduced cycle time ratio, Reduced downtime, Increased availability/utilization
	Innovation Measurements	Ideas which have changed the way people think about, or approach a relevant workstream either at EMC, or the IT industry as a whole	Patents created/issued, White paper published, Conferences spoken at, new product roadmaps affected
	External publicity/PR	Ideas which have gained significant traction regarding external awareness	Press releases, website/blog mentions, Periodical publications, etc.

Table 4: —EMC’s lessons learned

Lessons Learned	Important Considerations
Provide appropriate incentives for contributors	Consider both extrinsic and intrinsic motivations Cash prizes matter, but public recognition is as important Publish career advancements associated with innovations
Align innovation incentives across leadership levels	Challenges can provide guidance of where new ideas are valued Challenges create incentives for executives to pull inventions through implementation Joint incubation fund can further increase alignment
Support innovators at both the front-end and the back-end	Support in submission development increases chances of winning Incubation process helps nascent ideas to evolve Joint incubation fund provides necessary resources
Recognize that different innovation types require different processes	Innovations differ by their degree of radicalness Incremental innovations need process with low hurdles and no waiting times (ongoing) Radical innovations require the merging of information from many different channels; their development may require the creation of new organizational units Innovation in the middle of the spectrum are well suited to innovation contests
Enable fast, broad, and easy access to innovation information	Innovation contests typically focus on annual idea submission and process admin Centralized tool enables additional insights (connecting employees, finding SMEs, etc.)

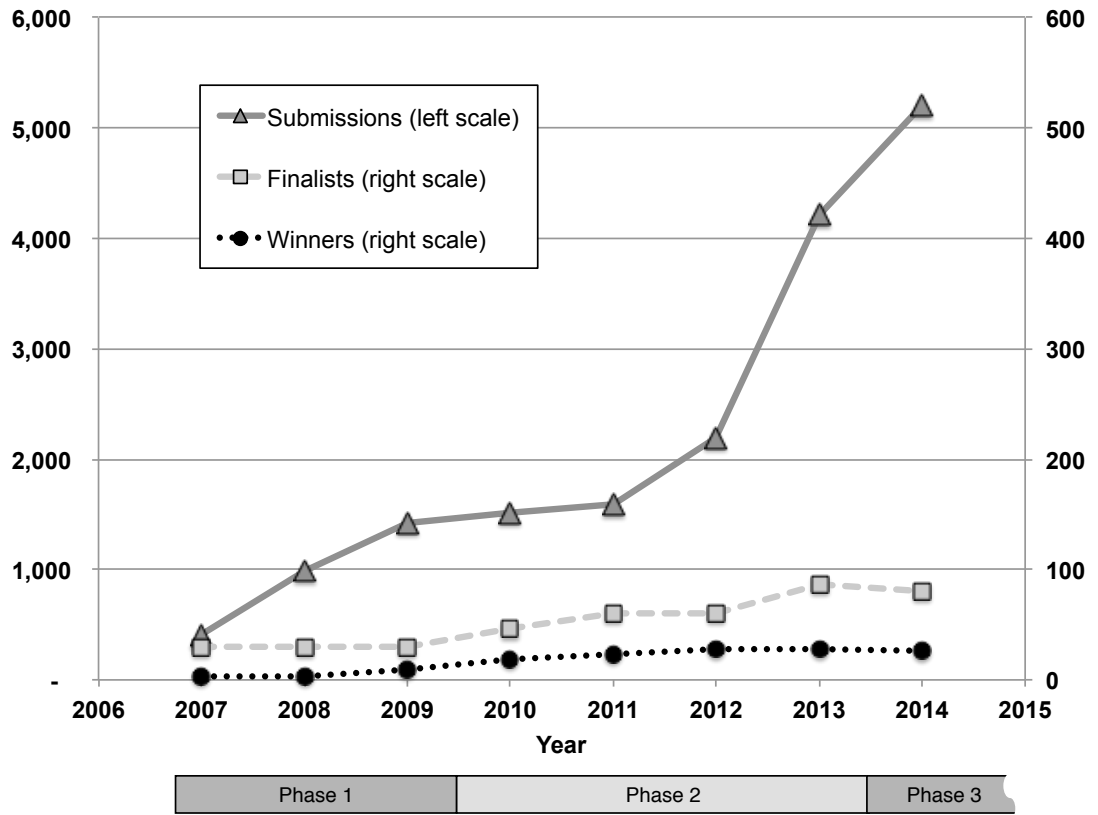


Figure 1.—EMC’s innovation contest submissions, finalists, and winners

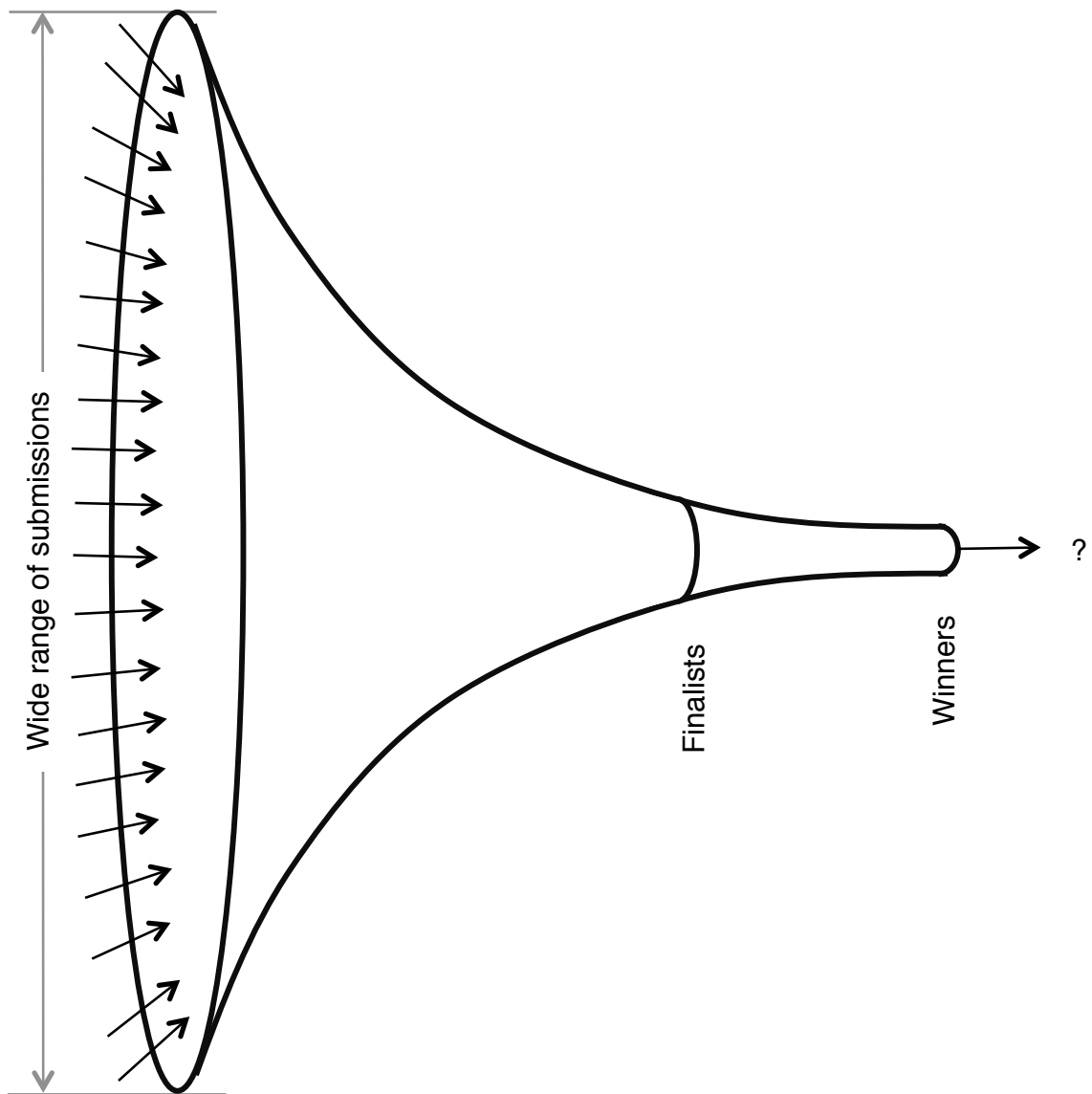


Figure 2.—The idea funnel at the beginning: The Innovation Conference (2007–2009)

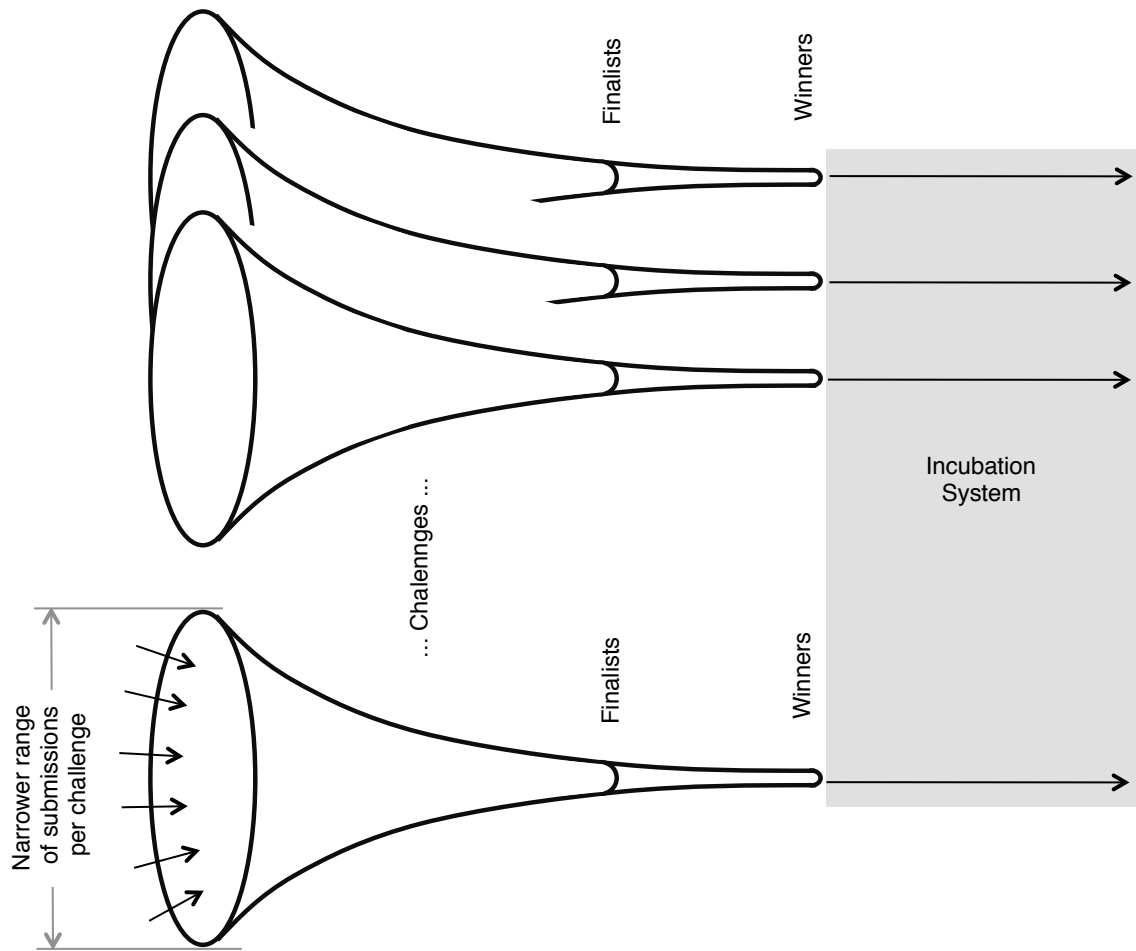


Figure 3.—The idea funnel reshaped: The Innovation Roadmap (2010–2013)

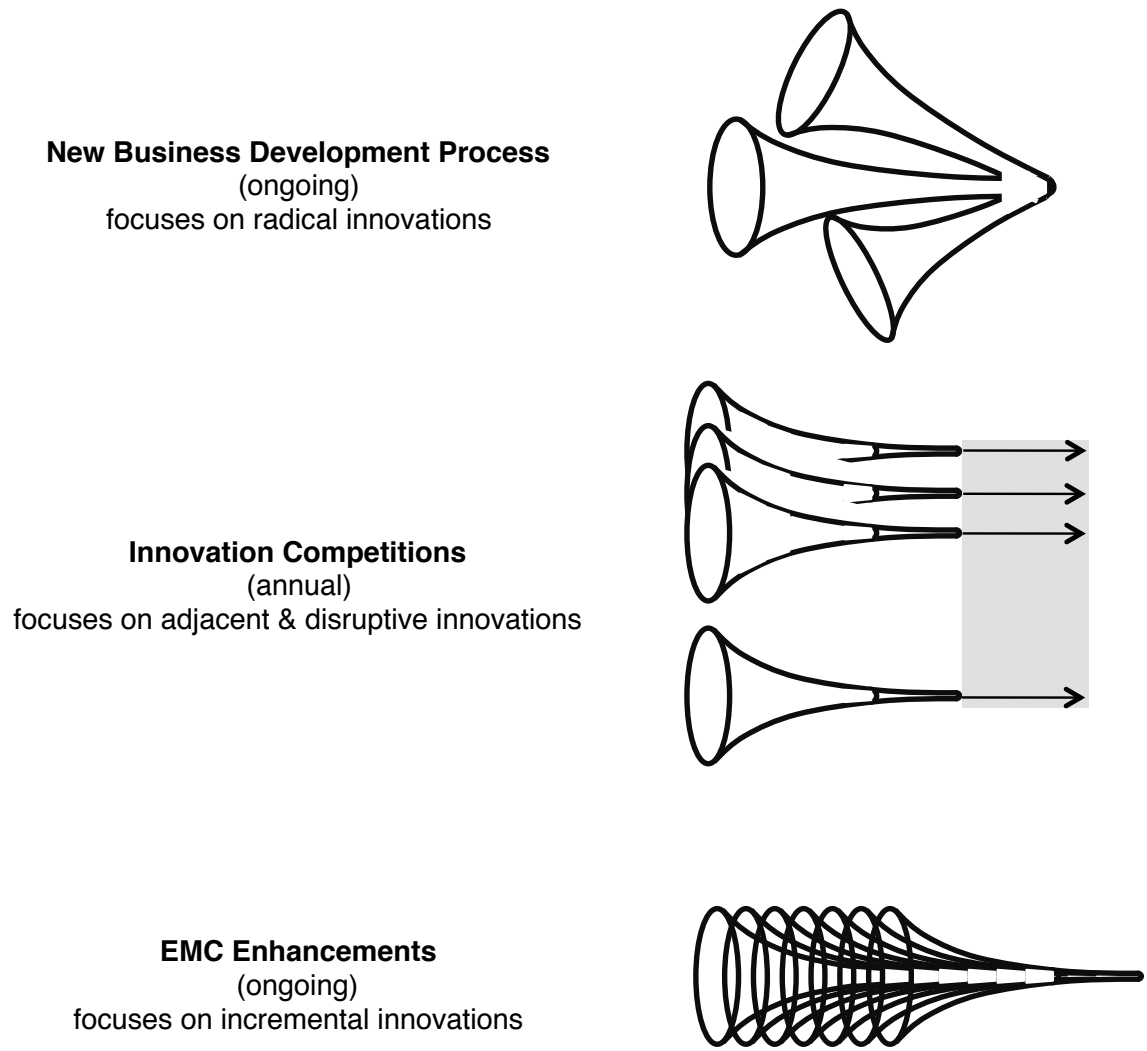


Figure 4.—The idea funnel expanded: The Innovation Network (2014–present)

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