Grassroots Innovation:

A Promising Innovation Paradigm for Pharmaceutical Companies

Ulrich A.K. Betz[a], Nuno Camacho[b], Michael Gerards[c], Stefan Stremersch[d]

Forthcoming in *Innovation and Marketing in the Pharmaceutical Industry: Achieving Sustainable Success*, Min Ding, Josh Eliashberg, and Stefan Stremersch, Eds., Springer, 2013.

[a] Dr. Ulrich A.K. Betz (ulrich.betz@merckgroup.com) is Director and Department Head of the Innovation and Entrepreneurship Incubator of Merck Serono. HPC: F131/401 Frankfurter Str. 250, D 64293 Darmstadt, Germany
[b] Dr. Nuno Camacho (camacho@ese.eur.nl) is Assistant Professor of Marketing at the Erasmus School of Economics, Erasmus University Rotterdam, the Netherlands. Address: Burg. Oudlaan 50, room H15-09, 3062 PA Rotterdam, the Netherlands.
[c] Dr. Michael Gerards (michael.gerards@merckgroup.com) is Director of the Idea and Knowledge Management, Technology Office Chemicals of Merck KGaA. HPC: C010/102 Frankfurter Str. 250, D 64293 Darmstadt, Germany.
[d] Prof. Stefan Stremersch (stremersch@ese.eur.nl) is Chaired Professor of Marketing and the Desiderius Erasmus Distinguished Chair of Economics, at the Erasmus School of Economics, Erasmus University Rotterdam, the Netherlands, and Professor of Marketing, at IESE Business School, University of Navarra, Spain. Address: Burg. Oudlaan 50, room H15-01, 3062 PA Rotterdam, the Netherlands.

1 INTRODUCTION

Pharmaceutical firms face a period of unparalleled turmoil. Major societal, technological and regulatory challenges require firms to quickly respond to a rapidly changing environment. Healthcare practitioners and payers demand that firms bring new, better and cheaper therapies to market while providing extensive clinical data to prove their superiority and safety. All these trends put considerable pressure on life sciences firms' innovation productivity and performance. Open the annual report from any major life sciences firm and sustainable *innovation* figures prominently as a key imperative for value creation and business growth. Academics also agree with practitioners and consider innovation and therapy creation a key research area for life sciences firms (Stremersch, 2008; Stremersch and Van Dyck, 2009). Unfortunately, despite this recognition, in the last decades the suboptimal productivity of pharmaceutical firms' R&D engines is a widely recognized challenge to the industry's fate.

The cost per new molecular entity (NME) approved by the regulatory agencies to enter the market has been increasing for decades with R&D investments of the pharmaceutical industry rising at an average compounded rate of 12% per year and the output in NMEs stagnant (Munos, 2009). Even though this trend seems to have reversed in recent years - for example approvals of NMEs by the FDA hit a 15-year high in 2012 (Osborne, 2013), the issue on how to improve R&D productivity is considered *the* key challenge faced by the pharmaceutical industry nowadays (Paul et al., 2010; Betz, 2005). Jean-Pierre Garnier (2008), former CEO of GlaxoSmithKline, states that the historically low R&D productivity has been caused by the increasing size and complexity of the pharmaceutical R&D organization. According to Garnier (2008), "if not creatively managed, complexity can cause passionate engagement and courageous risk taking to give way to risk aversion, promises with no obligation to deliver, and bureaucratic inertia" (p.72).

Pharmaceutical firms are obviously not alone in showing bureaucratic inertia, which may stifle innovation and creativity. In a widely cited study of sustainability of innovation in large and mature firms, Dougherty and Hardy (1996) conclude that most organizations indeed exhibit a top-down approach to innovation, emphasizing control over flexibility and creativity. Such approach, however, frequently fails to engage and energize innovative employees and creates strong barriers to successful innovation (Dougherty and Hardy, 1996).

Innovation theorists have for long suggested alternative sources of innovation, such as employees, consumers and other partners (e.g. academia, suppliers, manufacturers; see von Hippel 1988). More recently, innovation and strategy scholars have converged around the notion that top-down vision, planning and goal setting needs to be complemented by other sources of new ideas, such as *grassroots innovation,* i.e. new business ideas that arise from employees in several corners of the organization (Anand, Gardner, and Morris, 2007; Huy and Mintzberg, 2003). Grassroots innovation is increasingly seen as the most natural and sustainable source of change (Huy and Mintzberg, 2003).

The core thesis of this chapter is that for pharmaceutical firms, grassroots innovation programs may be an essential complement to their more traditional and top-down stage gate processes. Therefore, we propose pharmaceutical companies to adopt a proactive approach to grassroots innovation. This proposal mirrors calls by other scholars. Anand, Gardner, and Morris (2007), for example, defend that organizations need to actively setup a process capable of offering the organizational support, political sponsorship and access to resources needed to nurture grassroots innovation. In *The Future of Management,* Gary Hamel and Bill Breen (2007), advise companies to (i) dramatically accelerate their pace of strategic renewal, (ii) make innovation everyone's everyday job and (iii) create a highly engaging and inspiring work environment capable of motivating employees to give their best to achieve the company's strategic goals.

Despite the increasing number of scholars defending grassroots innovation principles, there is a lack of clear practice guidelines for innovation managers on how to embrace such principles. Such lack of guidelines may be hampering firms' adoption of grassroots innovation (Grant, 2008). To fill this void, this chapter (i) provides a conceptual framework that pharmaceutical managers can use to *design* their own grassroots innovation processes and (ii) presents an in-depth case study (*Innospire* at Merck KGaA, Darmstadt, Germany[1], a global pharmaceutical and chemical company) providing the practical steps needed to successfully[2] *implement* our proposed framework.

The conceptual framework, the in-depth case study and the anecdotal evidence from other companies lead us to the following main conclusion: in line with predictions from self-determination theory (Ryan and Deci, 2000), *successful grassroots programs need to promote employees' intrinsic motivation for innovation by satisfying three innate human needs – autonomy, competence, and relatedness*.

2 A CONCEPTUAL FRAMEWORK FOR GRASSROOTS INNOVATION

2.1 GRASSROOTS INNOVATION ROOTS

The concept of grassroots innovation dates back to the 1940s and stems from an unlikely source: the Tennessee Valley Authority (TVA). TVA is a federally-owned corporation established by the United States Congress in 1933. TVA was created to help the Tennessee Valley, a region which was particularly badly hit by the Great Depression, solve a range of problems which required innovative solutions, such as the delivery of low-cost electricity to citizens and companies and better management of natural resources[3]. On June 25, 1942, the

[1] In the remainder of this chapter, for parsimony we always refer to Merck KGaA, Darmstadt, Germany as Merck KGaA.

[2] We consider implementation of a grassroots innovation process to be successful when the business objectives that led an organization to invest in such a process are achieved. Even such objectives are firm-specific, they typical fall in one of three major categories: (i) development of new business (increased revenues), (ii) identification and development of human talent and (iii) stimulation of an entrepreneurial culture in the organization.

[3] http://www.tva.com/abouttva/history.htm

British newspaper *The Times* published an article praising TVA's management style, which involved an approach aimed at *"reconciling overall planning with values of democracy"* (Selznick, 1949, p.3). To better understand TVA's response to the need for systematic generation of out-of-the-box innovations, a research project was conducted in 1942-1943 to study their "democratic" or "grassroots" method (Selznick, 1949). Selznick (1949), synthesized the ideas behind this and subsequent studies, while defining three essential conditions behind a grassroots approach in the context of implementation of new programs of the public enterprise:

- **Managerial autonomy**: the local agency has freedom and power to make significant decisions regarding its innovative programs and adapt general values to local conditions;
- **Active participation by the people in the ranks**: management and government stimulate people working at state and local agencies to actively and consciously participate in the development and successful execution of the agency's programs;
- **Self-coordination**: The decentralized administrative agency becomes the key unit of administration and responsible for coordinating the resources needed, with the goal of achieving the "job to be done", thus also assuming the key role in coordinating the work of different layers of the organization (e.g. state and local programs) with the higher-level goals and vision of the federal government.

The definition has then been adapted by different authors who typically equate grassroots innovation with informal innovation processes. For example Knight (1967), introduces the concept of bootlegging, which refers to new ideas which are developed and implemented by highly motivated employees, typically "under cover from the disapproving power in the organization until it is introduced" (p. 493). Knight (1967) also described less contrarian forms of grassroots innovation, in which groups of innovative employees join in a cohort

group or coalition in order to gain sufficient political muscle to bring their innovative ideas to life. Yet, he still classified them as informal mechanisms. By the same token, Huy and Mintzberg (2003) refer to grassroots innovation as *organic change*, which they define as innovation which "tends to arise from the ranks without being formally managed" (p. 80).

Over the years, several companies have adopted grassroots innovation principles. An early adopter was 3M Corp., which has for long allowed its scientists to spend up to 15% of their time in projects of their own interest. In the early 1980s the company was described as nurturing a culture characterized by a "loose network of laboratories and cubbyholes populated by feverish inventors and dauntless entrepreneurs who let their imagination fly in all directions" (Peters and Waterman, 2004, p.14). More recently, other firms have taken the same cultural approach to grassroots innovation. Google is known for its democratic 'brink of chaos' management system, IBM for its Emerging Business Opportunities program (launched in 2000) and Whirlpool for its company-wide innovation philosophy as described in Hamel and Breen (2007). All these rely on informal mechanisms to promote grassroots innovation.

Another well-known deployment of grassroots innovation principles is the entrepreneurial bootcamp program of French telecom equipment manufacturer Alcatel-Lucent. In 2006, Alcatel-Lucent Belgium started organizing an annual Entrepreneurial Boot Camp with the goal of inspiring all employees to propose new ideas and identify new business opportunities for the company (Camacho et al., 2012). By 2012, this practice has been globally rolled out within Alcatel-Lucent from US over Europe to China and is an important component of the innovation funnel of the company and its R&D organization Bell Labs.

Grassroots innovation initiatives have also been implemented in the pharmaceutical industry. Germany-headquartered Bayer AG launched its *Triple-i* initiative in 2006. Standing for "inspiration, ideas, innovation," *Triple-i* is a grassroots innovation initiative through

which Bayer seeks to strengthen the innovation culture throughout the organization and develop new lines of business consistent with the company's mission statement[4]. Employees can use *Triple-i*'s portal to submit their ideas and rate or expand on their colleagues' ideas[5]. In order to filter such ideas, innovation experts - based at Bayer's headquarters - filter the most promising ideas in terms of customer benefits, novelty, feasibility and fit with the company's mission and portfolio[6]. The screening questions are kept simple and the whole process is quite informal and entrepreneurial. Between 2006 and 2011, more than 11,000 ideas have been submitted, 150 of which have been approved, from which five have translated into new products[7].

Another example of a grassroots innovation initiative in the pharmaceutical industry is GlaxoSmithKline's (GSK) Spark network (Birkinshaw and Robbins, 2010). Spark started as an informal network of globally dispersed marketing and R&D employees from GSK's Consumer Healthcare division. The goal was to "spark" new ideas for GSK's consumer brands. In 2008, Spark organized its first get-together: an Innovation Jam held in Kew Gardens, London. Then, in 2009, Spark championed an informal idea contest whereby network members and other employees were invited to submit new business ideas and trained on how to persuasively present them. The ideas were then voted by other employees and a winning idea was selected by delegates at GSK Senior Leaders meeting 2009 from those that made it to a Top 50 list. The winning idea was supported for future commercialization (Birkinshaw and Robbins, 2010).

---

[4] Goals that Werner Wenning, Chairman of the Board of Management of Bayer AG in 2006, was confident were already being achieved by *Triple-i's* first edition, see Bayer Annual Report 2006, p.7. Available in http://www.bayer.com/en/gb-2006-en.pdfx, last accessed, March 3rd, 2013.

[5] Bayer, *Sustainable Development Report 2010,* p. 31. Available in http://www.sustainability2010.bayer.com/en/online-supplement-to-the-sustainable-development-report-2010.pdfx, last accessed March 3rd, 2013.

[6] Waghorn, T. 2010. "How One Company Gets Its Employees Innovating." *in Forbes.com,* March, 15th. Available in http://www.forbes.com/2010/03/15/bayer-employee-innovation-leadership-managing-engagement.html, last accessed on March 3rd, 2013.

[7] Bayer News Channel (2011), "Record Participation in Triple-i," April 20th. Available in http://www.bnc.bayer.com/bayer/bnci.nsf/id/F3EF9641170DB993C12578770026A87C, last accessed March 3rd, 2013.

Some scholars claim that GSK Spark and other informal grassroots innovation initiatives (e.g. UBS's Idea Exchange, Best Buy's resilience program) have achieved modest success (Birkinshaw, Bouquet and Barsoux, 2011). Despite being able to find entrepreneurial talent and benefit from employee engagement, informal grassroots initiatives may sometimes miss key benefits associated with top-down innovation, such as direct alignment with the company's goals and a high level of internal sponsorship of the resulting projects (Birkinshaw, Bouquet and Barsoux, 2011). Hence, to be sustainable, grassroots innovation processes need to combine bottom-up passion and engagement with a structured *process* capable of guaranteeing internal sponsorship and fit with the overall strategy of the company. Such structured process needs to provide formal training and development opportunities, help employees focus on ideas that fit well with the company's mission and ensure the firm is able to acquire the necessary buy-in and resources.

In this paper, we describe more in full, the experiences of Merck KGaA, a global pharmaceutical and chemical company headquartered in Darmstadt, Germany, with such a structured process for grassroots innovation. Merck KGaA's award-winning *Innospire* process, the in-depth case study we discuss later in this chapter, is one of the first examples we are aware of a more formalized grassroots innovation process in a company operating in life sciences. At *Innospire*, the full process is managed and supervised by a dedicated team, which monitors and supports participating teams since the start of the process until incubation and handoff to strategic business units. Moreover, employees are required to form self-assembled teams, and to constantly work to improve their ideas and business plans, for instance by participating in innovation bootcamps. Such formal process guarantees that participating teams have access to internal sponsors and to a series of resources set aside to help converting their ideas in new businesses for the company. Thanks to its formalization of grassroots principles, the process has shown to be sustainable in the long term.

Based on the conceptual roots of grassroots innovation and the study of cases, we define **grassroots innovation processes** as a set of mechanisms, processes and resources which a company puts in place to (i) promote the emergence of self-coordinated and self-assembled teams (ii) composed by selected employees in the ranks (typically from different organizational levels and functions) with (iii) sufficient managerial autonomy to propose new business ideas and, (iv) who are given, conditional on pre-determined strategic fit and market opportunity criteria, sufficient resources to take those ideas to market.

2.2 Designing Grassroots Innovation Processes: A Conceptual Framework

Our conceptual framework (see Figure 1) builds upon self-determination theory (Ryan and Deci, 2000) to relate the mechanisms behind grassroots innovation programs (e.g., participant selection, formation of innovation teams, the possibility for employees to receive training and coaching) to basic human needs of competence, autonomy and relatedness and to the key drivers behind probability of success, namely intrinsic motivation.

In addition to adequate design of the grassroots innovation program's mechanisms, management support is crucial to the success of grassroots innovation programs. We focus on key management support drivers of successful corporate entrepreneurship efforts synthesized by Hornsby, Kuratko, and Zahra (2002): (i) *resource allocation*, (ii) *visibility of involvement*, (iii) *tangible incentives* (or rewards), (iv) a structure that fosters *organizational support* and (v) *tolerance for failure.* We now discuss how SDT can help managers, in innovation-intensive firms[8] (such as pharmaceutical and life-sciences), design better grassroots innovation programs.

[8] By innovation-intensive firms we mean firms in sectors characterized by frequent product, service, process or business model innovation and firms with high innovation-related expenditures and/or high R&D intensity. Hence, we believe that our framework is applicable and valuable R&D-intensive firms, such as pharmaceuticals, but also to firms in sectors – namely services – that may have lower levels of formal R&D but depend on frequent process, service or business model innovation.

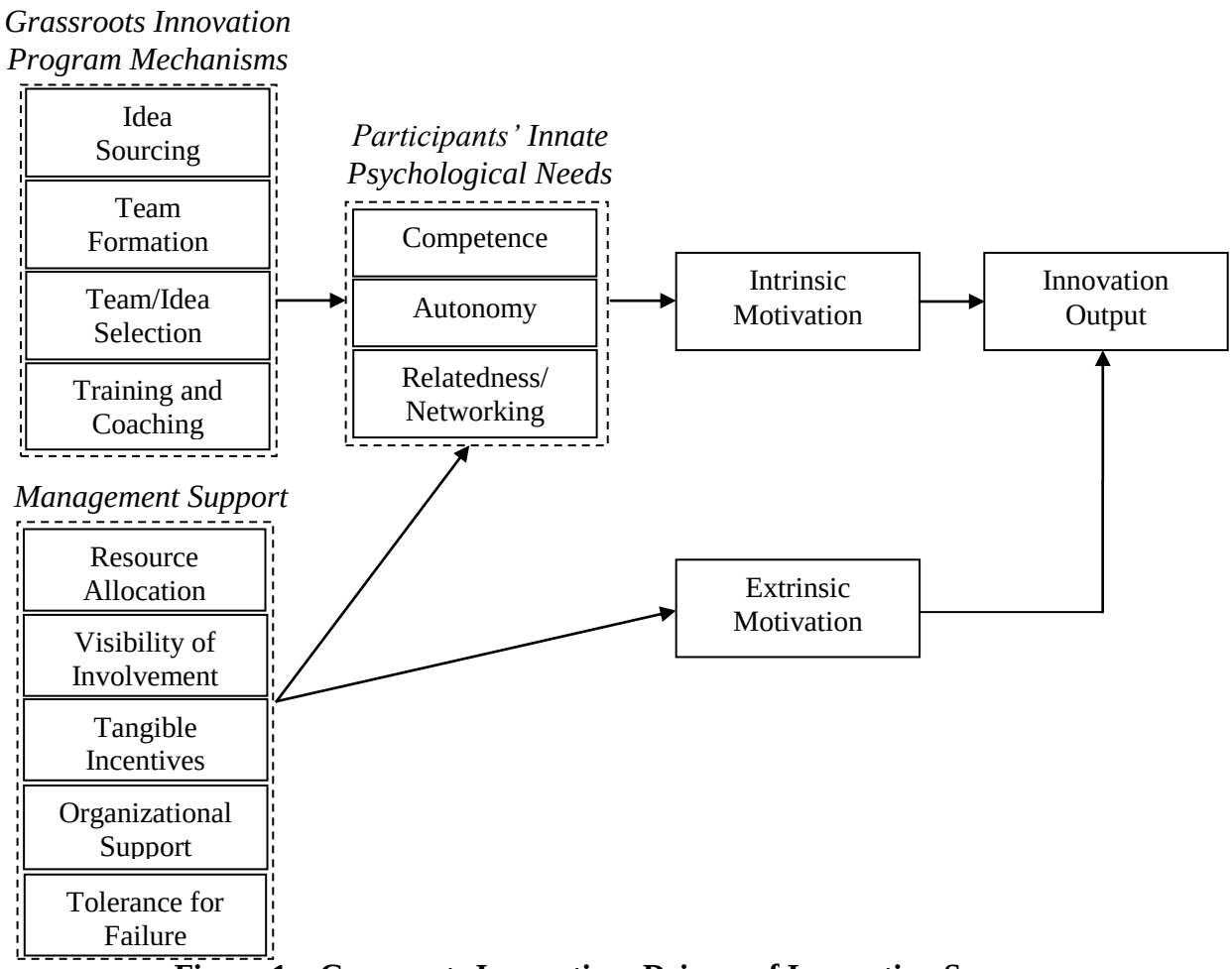

Figure 1 – Grassroots Innovation: Drivers of Innovation Success

3 THEORETICAL FOUNDATION FOR GRASSROOTS INNOVATION: SELF-DETERMINATION THEORY

SDT provides a comprehensive explanation of the microlevel drivers of human motivation which has been repeatedly validated in a variety of contexts (Deci and Ryan, 1985, 2000; Ryan and Deci, 2000), including employee motivation (Gagné and Deci, 2005), which is a key driver of sustainable innovation (Amabile, 1997).

3.1 INTRINSIC VERSUS EXTRINSIC MOTIVATION

With its origins in the concept of autonomy (Deci, 1975), SDT distinguishes between intrinsic versus extrinsic motivation of behavior (Ryan and Deci, 2000). Intrinsic motivation is "the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" (Ryan and Deci, 2000, p.70). Intrinsically motivated

employees participating in grassroots innovation would thus be moved by autonomous reasons, i.e. by their authentic interest in the act of innovating and creating new business. In contrast, extrinsic motivation occurs when people are motivated by the possibility that their actions will allow them to achieve a desired consequence or avoid an undesirable one, i.e. their action is instrumental to its consequences (Gagné and Deci, 2005).

Several authors have demonstrated, over the years, that intrinsic motivation, being more 'authentic' than extrinsic motivation, leads to better outcomes such as enhanced performance, persistence in desirable behaviors, creativity, energy and even well-being and self-esteem (Ryan and Deci, 2000). Amabile (1996) argues that intrinsic motivation boosts employee creativity. Lakhani and Wolf (2005) surveyed programmers who had voluntarily contributed code to open source software projects and found that, for almost half of them, intellectual stimulation and self-improvement were among the most important reasons cited for such time investment. Von Hippel (2005), suggests that "employees of a firm may wish to experience this type of intrinsic reward in their works as well, but managers and commercial constraints may give them less of an opportunity to do so" (p. 61).

In contrast, some self-determination theorists argue that tangible incentives, such as monetary or other rewards contingent on task performance, may *undermine* intrinsic motivation (Collins and Amabile, 1999; Condry, 1977; Deci, Koestner, and Ryan, 1999). Yet, not all authors agree with this claim. Baer et al. (2003), for instance, found more complex relationships whereby the effects of extrinsic rewards depend on job complexity and employees' creative problem solving style. In psychology, Eisenberg and Cameron (1996) argue that the detrimental effects of extrinsic reward occur in restricted and easily avoidable conditions.

Hence, prior literature suggests that trying to enforce an entrepreneurial mindset *solely* through tangible incentives is unlikely to yield benefits in terms of innovation

performance. This does not mean that allowing entrepreneurs to participate in the commercial success of their idea is counterproductive. In fact, prior research has shown that senior management can promote innovation by rewarding - through tangible incentives such as bonuses and opportunities for career progression – creative performance (Abbey and Dickson, 1983; Jung, Chow, and Wu, 2003). However, these tangible incentives will most likely be more impactful for employees who are already intrinsically motivated for innovation or whose motivation can be triggered with adequate organizational mechanisms.

3.2 Innate Psychological Needs: Competence, Autonomy and Relatedness

In order to better understand and explain variation in intrinsic motivation, Deci and Ryan (1985) introduced Cognitive Evaluation Theory (CET), which suggests that intrinsic motivation can be enhanced by supporting three innate psychological needs: *competence*, *autonomy* and *relatedness* (Ryan and Deci, 2000).

In the context of grassroots innovation programs, *competence* refers to participants' perceived capability, or self-efficacy, to transform their original ideas into a viable and implementable idea for a new business. Successful innovation in technology-intensive firms requires access to knowledge diversity and to channels capable of enabling the transfer of complex knowledge (Wuyts, Dutta, and Stremersch, 2004). At a micro-level, the need for innovation *teams* to have adequate levels of knowledge depth and diversity is also well-established (e.g. Griffin and Hauser, 1996; Nakata and Im, 2010; Pinto and Pinto, 1990). This entails, for example, being able to actively contribute to the success of a new venture team, write a business plan and pitch a business idea to senior management. As such, feelings of competence should be higher for people or teams with access to the relevant knowledge sources, which can be spurred by mechanisms such as team formation, training and coaching. For example, allowing participants to form their own teams (self-assembled team formation)

and providing participants with skills facilitation training and professional coaching should facilitate the team's knowledge depth and diversity.

While competence is a necessary condition for intrinsic motivation, it is not sufficient. According to SDT, participants also need to perceive their innovation efforts to be driven by their own volition, i.e. they need to have a sense of *autonomy* (Deci and Ryan, 2000; Fisher, 1978). The idea call, participant/idea selection and reliance on self-assembled teams play an important role here. Firms can use these mechanisms to attract intrinsically motivated employees and increase their perceived autonomy.

Finally, if the members of a grassroots innovation team enjoy higher levels of *relatedness*, intrinsic motivation will also be reinforced. Relatedness means that employees get along with their colleagues (e.g. other team members) and find it easy to establish mutually beneficial ties with like-minded colleagues. Certain program mechanisms, such as networking events and reliance on self-assembled team formation, help promote relatedness. Recent research proposes that a firm's ability to promote relatedness and new networks actually plays a more important role in promoting corporate entrepreneurship than participants' individual networks (Kelley, Peters and O'Connor, 2009).

In sum, successful grassroots innovation programs need to be able to promote employees' perceived autonomy (e.g. employee participation should be supported by their supervisors, but completely voluntary instead of delegated by management into a project), competence (e.g. through delivery of necessary training and coaching for employees to transform their ideas into business plans) and relatedness/networking (e.g. by promoting interaction with colleagues from different divisions, hierarchical levels, regions, etc). In Table 1, below, we give examples of desirable design features, organized according to the mechanisms behind grassroots innovation programs (see also Figure 1).

Grassroots Innovation Program Mechanisms	Suggested Program Design Features	Benefit According to SDT
Idea sourcing	An inspiring call for ideas.	Selecting employees who are *intrinsically motivated* for innovation.
Team formation	Allowing participants to voluntarily join in self-assembled teams.	Promoting participant and team *autonomy*. Facilitating *relatedness* and efficient *networking*.
Team/idea selection	Setting meetings outside normal working hours. Carefully selecting the ideas which proceed to the next stages of the program.	Guaranteeing that the teams which continue in the program to further develop their ideas are the most promising ones (select those with high *competence*). Promoting *intrinsic motivation* through 'hard-won' victory.
Training and coaching	Collaborating with external organizations for training and coaching of participating employees.	Complementing internal knowledge and improving employees' perceived *competence* to bring new ideas to market.

Table 1 –Beneficial Program Design Features in Grassroots Innovation Programs

3.3 Senior Management Support

Despite the benefits of intrinsic motivation, employees often need to be extrinsically motivated by incentives such as approval and support by senior management or other tangible rewards (Gagné and Deci, 2005). There is a well-established literature on the importance of senior management's role in encouraging an entrepreneurial mindset among employees (Gupta, Raj, and Wilemon, 1986; Hornsby, Kuratko, and Zahra, 2002; Roberts and Fusfeld, 1981; Quinn, 1979). In the case of grassroots innovation programs, management support actions capable of motivating employees include prospects of career progression unlocked by participation in such programs, the visibility gained in the organization, the chance to access unique knowledge and new career development paths, or simply being able to work on something one is passionate about. We organize these management support actions along the five dimensions identified by Hornsby, Kuratko, and Zahra (2002).

The first dimension, *resource allocation,* refers to the level of resources – such as budget, personnel and time –that senior management invests to promote grassroots innovation. Literature in psychology and organizational behavior shows that availability of resources is associated with higher employee motivation (Schaufeli and Bakker, 2004),

higher employee engagement (Demerouti et al., 2001; Kahn, 1992) and willingness-to-experiment and take risks (Burgelman and Sayles, 1986). In grassroots innovation programs, availability of resources should promote employees' perceived autonomy (no need to constantly go through formal approval processes) and intrinsic motivation for innovation. For instance, it streamlines advancement of projects (e.g. through access to dedicated budget lines) and it signals the support of senior management to grassroots innovation.

Second, *visibility of involvement* refers to the willingness of managers to support and facilitate grassroots innovation and employees' entrepreneurial activities (Damanpour, 1991; Kuratko et al. 1993). Besides allocation of sufficient resources (as discussed above), managers can increase the visibility of their involvement in grassroots innovation by championing employee innovation, by institutionalizing grassroots innovation within the firm and guarantee the involvement of senior managers in the program to signal its importance (see Hornsby, Kuratko and Zahra, 2002). Innovative employees will easily relate with managers who champion grassroots innovation. Most employees will also feel that, with so visible senior management support, it will be easier to connect with other like-minded employees and establish mutually beneficial relationships with them.

The third dimension, *tangible incentives*, refers to performance-based rewards (monetary or non-monetary) aimed at spurring employees' motivation and entrepreneurial activity. Both common wisdom and prior literature (Barringer and Milkovich, 1998; Hornsby, Kuratko, and Zahra, 2002; Sykes, 1992) suggest that appropriately setting reward systems tends to spur entrepreneurial activity among employees. Yet, according to SDT the use of extrinsic reward mechanisms will only boost entrepreneurial activity if such non-intrinsic motivators are adequately internalized by employees. A key tangible incentive which is seen as personally relevant by most employees - and thus of crucial importance for the mid and long-term sustainability of grassroots innovation processes - is the career rewards to

employees who participated and contributed to the grassroots innovation initiative. Prior literature shows that career benefits and compensation strongly influence employees' actions and decisions (Gibbons and Murphy, 1992). Hence, companies should ensure that innovators and intrapreneurs get high status and recognition in the organization, and that participation unlocks new career paths. In addition, companies can also offer bonuses or other financial rewards. These actions are very important for the sustainability of a grassroots innovation program as other employees will carefully monitor whether the innovators who participate in previous editions are rewarded, tolerated or punished and whether initial top management communication is backed-up by real actions later down the road.

The fourth dimension, *organizational support*, refers to the deployment, by senior management, of a supportive administrative and organizational structure capable of supporting the grassroots innovation program (Burgelman and Sayles, 1986; Hornsby, Kuratko, and Zahra, 2002; Zahra, 1993). The boundaries of such organizational structure should typically go beyond the firm and offer channels for teams to acquire knowledge from external organizations. Cohen and Levinthal (1990) suggest that the knowledge generated by external partners may be used to complement and leverage a firm's internal knowledge and resources, contributing to higher levels of organizational innovation. More recently, Gumusluoglu and Ilsev (2009) found that external support played a key role in boosting a firm's capacity to develop and bring to market new or improved products or services. Specifically, a higher level of external support significantly increased the capacity of *transformational leaders* (i.e. those who are able to motivate their followers to transform nonintrinsic incentives into intrinsic motivation; Jung, 2001) to boost innovation output (Gumusluoglu and Ilsev, 2009). In terms of SDT, both an internal support organization and access to external knowledge can boost participants' sense of autonomy and competence, leading to higher intrinsic motivation and, consequently, innovation output.

Management Support Dimension	Suggested Management Support Actions	Benefit According to SDT
Resource allocation	Establish a dedicated team to supervise and manage the project. The team should ensure participating teams have access to adequate budget and organizational resources for advancement and nurturing of projects. Allow employees sufficient time to work on innovation projects they feel passionate about.	Boost employee *autonomy* and *intrinsic motivation*.
Visibility of involvement	Frequent and visible involvement of senior management in the promotion of grassroots innovation.	Boost *relatedness* and *intrinsic motivation* for grassroots innovation.
Tangible incentives	Provision of appropriate rewards and recognition for innovators. For example, offer participating employees incentives such as career progression or financial rewards.	Boost *extrinsic motivation* for grassroots innovation.
Organizational Structure	Offer participating employees training in business case preparation and the chance to access new knowledge and career development paths.	Boost *extrinsic motivation* for grassroots innovation. Improve employees' perceived *competence* to bring new ideas to market.
Tolerance for failure	Acknowledge that failure often is part of developing a successful innovation. Avoid being too critical of breakthrough ideas too soon. Do not push or blame people when they make 'smart' errors. risk-taking.	Boost *intrinsic motivation* for grassroots innovation. Improve employees' perceived *competence* to *autonomously* bring new ideas to market.

Table 2 – Beneficial Management Support Actions in Grassroots Innovation Programs

The fifth and final dimension of management support is *tolerance for failure*, i.e. managers' willingness to show a tolerance for failure and to take risks in grassroots innovation (Hornsby, Kuratko, and Zahra 2002). Tolerance for failure promotes employees' intrinsic motivation and willingness to undertake entrepreneurial (and risk-taking) activities (Hornsby, Kuratko, and Zahra 2002). If senior managers are intolerant to failures, employees will feel less capable and willing to autonomously experiment with new ideas and learn from smart errors, hurting intrinsic motivation for innovation (Kriegesmann, Kley, and Schwering, 2005). Hence, companies should acknowledge that failure is often part of developing a successful innovation, in order to signal tolerance for failure and to promote experimentation

and smart risk-taking. In Table 2, we summarize examples of management support actions, in each of these five dimensions, along with their predicted benefits according to SDT.

4 THE INNOSPIRE INITIATIVE AT MERCK KGAA: AN IN-DEPTH CASE STUDY

4.1 THE BIRTH OF INNOSPIRE AT MERCK KGAA

In late 2008, Merck KGaA[9], headquartered in Darmstadt, Germany, initiated a new innovation initiative to collect and advance innovative ideas to generate new business at all levels inside the company. Merck KGaA is a global pharmaceutical and chemical company with total revenues of €10.3 billion in 2011, a history that began in 1668, and a future shaped by more than 40,000 employees in 67 countries.[10] The companies' activities come under the umbrella of Merck KGaA, in which the Merck family holds an approximately 70% interest and free shareholders own the remaining approximately 30%. In 1917, the U.S. subsidiary Merck & Co[11] was expropriated and has been an independent company ever since.

Innospire, a word composition from innovation and inspiration, was designed with four main goals in mind. The first goal was to mobilize the full innovation potential of a large global organization, from all employees, across organizational boundaries. The second goal was to promote relatedness and networking across both the chemicals and pharmaceutical divisions of Merck KGaA in order to boost cross-fertilization. The third goal was to generate an environment for entrepreneurial individuals to form highly motivated teams and move forward with their new business idea. The fourth goal was to foster an innovative and entrepreneurial spirit within the organization and to signal that innovation is important, also and especially in budgetary challenging times.

[9] www.merckgroup.com
[10] In 2009 when innospire started Merck had total revenues of € 7.7 billion and approximately 33,000 employees in 61 countries.
[11] www.merck.com

The first author started the initiative to design and implement the *Innospire* program at the Merck KGaA. After convincing management of the benefits of such a grassroots innovation process, the first and third authors jointly rolled it out in collaboration with the fourth author who served as a process consultant on *Innospire* and designed the bootcamp program, developed the training plan, and served as principal facilitator of the bootcamp program, delivering both skills training sessions and acting as a professional external coach for the six finalist teams. The first and third authors also acted as coaches to the teams, allowing the collection and analysis of observations and data to be collaborative.

The first idea call for *Innospire* was launched in 2009, about 9 months after starting the preparation. The branding and communication of *Innospire* was carefully planned to appeal to intrinsically motivated employees and spread through extensive distribution via Merck KGaA's internal systems. In its first edition, more than 462 ideas from 550 idea champions – some ideas were joint submissions with multiple idea owners[12] – were submitted from all corners of the organization, from all divisions and from 32 countries all over the world, affording ample opportunities to measure the acceptance and impact of *Innospire* through interviews with managers and employees.

From the 462 submitted ideas, the most promising 17 ideas were then selected by a global cross-divisional selection committee of scientific, technical, patent and business experts. Merck KGaA organized an innovation marketplace at which idea owners presented their ideas and composed project teams of volunteers that had all skills required for the process. From these 17 ideas and their respective teams, again a selection of 6 finalist teams was made which were offered a program to assist them in advancing their idea to a professional business plan, which we called the *Innospire* bootcamp.

[12] And there were also some participants that submitted more than one idea.

These 6 finalist teams all presented a business plan in front of a "grand jury", which was a combination of the executive management boards for the pharmaceuticals and chemicals divisions. From the 6 finalist teams, 2 won support of the grand jury and received direct *Innospire* seed funding, while 3 others obtained executive committee buy-in for their new business ideas to be supported directly by the respective divisions.

The idea pool generated was so rich that in the following year the available set was again mined and the top 15 ideas among those not already picked for the 2009 process were further advanced to business concepts in the frame of a first bootcamp meeting. We then used a "wisdom of the crowds" approach and gave all Merck KGaA employees a chance to discuss pros and cons, in an online corporate discussion forum, and vote in the corporate intranet for the most promising projects according to their view (thumbs-up/thumbs-down voting). This approach is also in line with the tenets of SDT, as it should promote feelings of autonomy, competence and even relatedness among employees involved in grassroots innovation. Almost 2,000 Merck KGaA employees participated, demonstrating that the initiative was able to achieve a considerable mobilization of employees for innovation. The 5 projects collecting the most support from other employees were allowed entry into the second bootcamp and advanced to full business plans. From the 5 finalist teams, 1 won support of the grand jury and received direct *Innospire* seed funding, while 3 others were implemented directly in their respective divisions.

4.2 Design Features of the Innospire Process

This section presents design features of the program in terms of the grassroots innovation program mechanisms (idea sourcing, team formation, team/idea selection, training and coaching) and the management support (resource allocation, visibility of involvement, tangible incentives, facilitation of external support and tolerance for failure) described in our conceptual framework (see Figure 1). Figure 2, below, summarizes the five phases of the

Innospire process: (i) idea sourcing, (ii) idea selection, (iii) innovation marketplace (to promote self-assembled innovation teams), (iv) innovation bootcamp (to offer skills training and professional coaching) and, after a grand jury event selecting the projects to be incubated, the (v) enabling projects phase, where a few ideas are selected for incubation, which is the natural step after the conclusion of the grassroots innovation process per se (which comprises the first four phases).

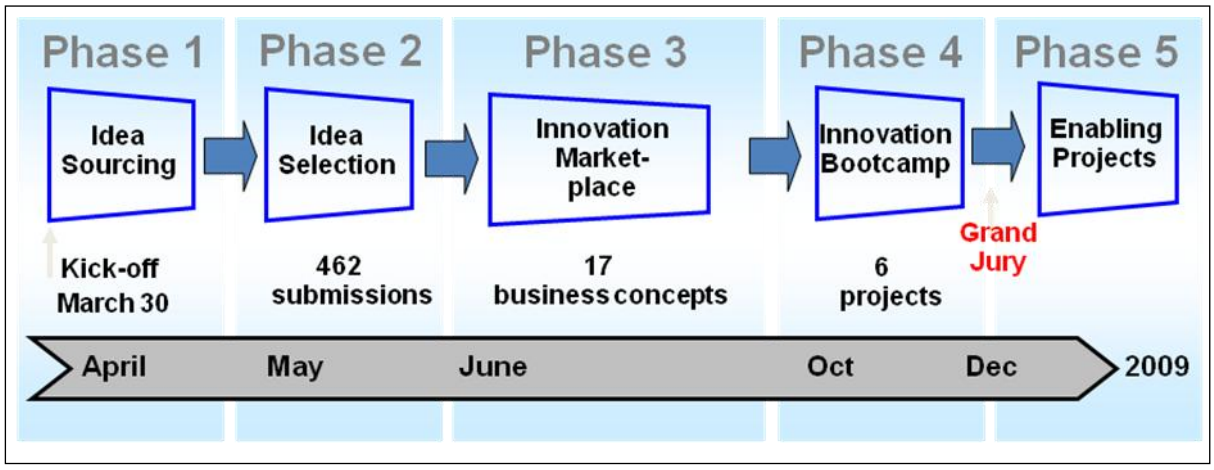

Figure 2: The Five Phases of Merck KGaA's *Innospire* Process (Initial Year, 2009)

a) Idea Sourcing

We communicated the new process to the organization and solicited ideas in diverse ways. Very important for the process was the full support from top management. The heads of the Chemicals Division and of Merck Serono (the pharmaceutical division) started the idea submission process with an e-mail sent to all employees encouraging them to participate and think outside-the-box. To support the idea collection phase further, we built an intranet site giving all background information required plus video statements of the two board members. Several site managers organized local idea brainstorming sessions, to enhance idea submission from a certain site or country even further. At the main sites of Merck KGaA, we put up posters with eye-catchers at main entrances and at highly frequented local places informing about the idea submission phase.

We made it clear from the start that this was not a pure idea contest but that the idea owner would step into a process that would last at least for a year in which he would, together with his team, turn the idea into a viable business plan. In line with the predictions of SDT, we expected this decision to help us craft an entrepreneurial mindset among idea champions and reduce the focus on extrinsic motivators for participation. In addition, besides the *Innospire* mechanisms per se, top management gave a clear signal that Merck KGaA is serious about leveraging these ideas into business providing support for implementation beyond a mere idea contest. With this decision, we expected to improve participants' feelings of relatedness and security with respect to their participation in grassroots innovation and also accelerate transformation of extrinsic motivators (e.g. career progression) into more internal sources of motivation and regulation.

We did not provide any restrictions on the minimum size of the business or the time to market. This was done in order not to discourage or kill-off immature ideas from the start, but rather to create an environment where everything can be proposed and optimized further throughout the process. One clear direction provided was that ideas that exploited cross-divisional synergies between our chemicals business and our pharmaceutical business were especially welcome. Seven of the thirteen ideas we eventually would retain were of such nature.

Another important expectation to manage already in the idea generation stage is that the time the teams invest in the process is 'on top' of their current duties. In this early stage it would be politically not feasible to remove active objectives and get people additional dedicated time assigned by their line managers. Yet, another important reason for this decision was, again, to allow a self-selection mechanism guaranteeing that participants had higher-than-average propensity of being intrinsically motivated toward grassroots innovation.

In the end, this is part of the selection process, making sure that only teams form that are really dedicated and fully believe in the benefit of their idea.

b) First Idea Selection

Many ideas submitted were ‘early stage' ideas. In the selection process, it is important not to be too critical of certain ideas too soon, otherwise one may signal intolerance for failure and reduce the sense of security and relatedness of participants with more radical or less developed ideas, ultimately failing to see the value of such ideas. The overall goal was to retain ~6 ideas per year of which the teams would undergo an intensive bootcamp program.

The path to boil the submitted ideas down to the 6 finalists was composed of a mixture of “valuation” and “survival of the fittest”. Only the ideas that manage to recruit a dedicated enthusiastic team survive. In other words, to survive, an idea owner needs to be able to assemble an intrinsically motivated team that believes in the project idea to an extent that it is willing to invest own time after end of business or at the weekend.

As a first step, an interdivisional committee, of 17 people with diverse backgrounds, ranging from R&D, manufacturing, marketing, legal, IP, business development to HR and workers council representatives evaluated the submitted ideas on the following questions: (i) is the idea suitable for further optimization to a full business plan?, (ii) is the market attractive in terms of its potential revenue?, (iii) is the industry the idea is in attractive, in terms of its competitive situation?, (iv) is the idea interdisciplinary (across pharmaceuticals and chemicals)?, (v) does the idea fit Merck KGaA?, (vi) is it a breakthrough or incremental idea? and (vii) what is the risk profile of the idea (in terms of proof of concept feasibility)?

This was not an easy task and two full day meetings with the entire committee, plus extensive preparation, pre-evaluation and consultation with further experts outside the evaluation committee were required to do the job. Portfolio aspects played a role too, to make sure that in the final set a good mixture was represented concerning: Pharmaceuticals vs.

chemicals, representation of various sites, quick wins vs. blue sky ideas, etc. The final decision was taken by majority of vote.

c) Innovation Marketplace: Promoting Self-Assembled Team Formation

To foster team formation innovation marketplaces were organized at three major sites, Darmstadt (HQ of Merck KGaA), Geneva (HQ of Merck Serono) and Boston (HQ of Merck Millipore in 2010). At these events, idea owners presented their ideas to a broader audience within the company, discussed the idea with interested colleagues and tried to recruit additional team members. All project ideas had a poster on which the core of the idea was represented, supplemented by a PowerPoint presentation or video of the idea champion shown on a screen. We announced this market place to all employees and invited people desiring to be "*innospired*" to attend the event. Top management was present at all events to signal support.

In addition to the local marketplace events, the teams presented their ideas on a virtual intranet marketplace with a videotaped oral presentation and a presentation file. All Merck KGaA employees had the chance to get more information about the concepts and expertise still missing to complement the teams. To fill the vacant functions employees had the opportunity to contact the idea champion directly. Some ideas could not be presented in full detail on the intranet platform due to confidentiality and know-how protection.

Subsequently, team champions were actively coached on team formation and offered in-roads to the organization to find the right competences. Typically team leaders were scientists and the skills they searched for in the organization to complete their team consisted of experienced business developers, marketers and finance executives. In pharmaceuticals, specialized skills were often considered crucial for teams' therapy innovation efforts. Prior literature has shown that the market success of new therapies requires a deep understanding of specialized topics such as pricing (Verniers, Stremersch, and Croux, 2011), reimbursement

and regulatory regimes in different countries (Stremersch and Lemmens, 2009), and experience with the increasingly complex clinical studies required for market approval (Gassmann and Reepmeyer, 2005). Thus, several teams at *Innospire* attempted to add such specialized skills to their team.

In the first year, the 6 strongest ideas and teams that would enter the innovation bootcamp were selected by the interdivisional evaluation committee on the basis of the following criteria: (i) idea progression since the previous stage, (ii) leadership potential of the idea owner, (iii) completeness of skills in the team, (iv) business potential of the idea, (v) fit of the idea with Merck KGaA, (vi) probability of success in (further) developing the underlying technology and (vii) portfolio balance.

In the second year, as stated above, a 'wisdom of the crowds' approach was used to select the projects allowed access to the bootcamp. Experiences with this approach were mixed. We found that two main disadvantages of the popular voting approach were: (i) people voted disproportionately for projects that had an emotional appeal (e.g. a cool new technology or "save the planet" type of ideas); (ii) people voted disproportionately for people they knew and liked. The big advantage was that the approach allowed for a strong engagement to be generated and thousands of employees were exposed to the ideas and voted and many even contributed with proposals for further improvement. The visibility of the entire *Innospire* process was greatly enhanced by the public voting exercise.

d) Innovation Bootcamp: Skills Training and Professional Coaching

The six finalist teams gathered in an intensive program in which about five members of each team received a basic management training, optimized towards writing a business plan, found time to advance their ideas together with coaches and also underwent a series of challenge meetings and dry-run presentations in order to make sure that the business plans to be presented to the grand jury were of the highest quality. The bootcamp consisted of seven

days, divided in two blocks of 4 and 3 days. The first block of 4 days covered innovation strategy (e.g. platform versus product innovation), marketing strategy (mission, vision, goals, objectives, market definition, SWOT and market strategy) and market forecasting (e.g. market size forecasting and temporal pattern). Participants presented their initial business concept on the first day and then an initial business plan on the last day of this 4-day block. About half of the time was devoted to coaching the teams on business case issues. This first 4-day block was mainly intended to "*test the business case*". The fourth author was the main facilitator of the bootcamp and we inserted internal speakers to discuss with participants technological hurdles in development and manufacturing, financial management of the firm, and pricing.

Besides the further development of the business cases, the fun factor for the bootcamp participants was also addressed by special team building events which were very important for the interaction between teams and for energizing the individual team power and *Innospire* spirit after long sessions of tough team work and challenging presentations.

The second block of 3 days, which commenced about 4 weeks after the first block, was mostly intended to "*further develop and present the business case*". Beyond work on timing of entry (is the time right? roadmapping) and NPV (Net Present Value) calculation, all time was devoted to coaching and presentation training. At the end of the 3 days, we organized a "dry-run" attended by two senior business development executives who had never seen the business plans before, to provide a fresh view.

The innovation bootcamp component served as key supporting factor to the success of *Innospire*. It was a unique opportunity to complement participants' perceived competence and increase their relatedness (through teamwork and coaching). Furthermore, the collaboration with the fourth author as external facilitator and dedication of a sufficient number of days to the innovation bootcamp sessions, was perceived by participants as a

signal of high managerial support for grassroots innovation (through resources, visibility of involvement, the tangible incentive of the training itself and the access to external knowledge and support) and thus as a key incentive for their participation. It is of utmost importance, however, to make sure that scientific and technological questions, probability of technical success, strengths and weaknesses of the suggested approach, critical issues, go-no go milestones and a thoroughly thought through project plan receive sufficient attention in the project teams coaching towards preparation of a final business plan. We have further strengthened these very important points by adding scientific advisory boards for thorough scientific and technological assessment of the proposed ideas. In addition, the teams received the internal support of the patent and legal departments.

e) Final Idea Selection: Grand Jury Event

The final step was a 2-day grand jury event. We convened one day before the grand jury meeting for a last "dry-run" of the presentation. After additional preparation the following day, the teams presented to the combined management boards of the chemicals and pharmaceutical division.

f) Enabling Projects and Incubation

After the grand jury event, proper project incubation and governance of the winning projects are crucial for success. In order to enable project incubation, Merck KGaA provided a budget within a ring-fenced innovation incubator with the goal of allowing the advancement of projects in the frame of an innovation greenhouse.

The governance of the *Innospire* incubator projects was done by a special Innovation Steering Committee with members from both the chemicals and pharmaceutical division. This governance and the dedicated *Innospire* budget set project teams into a "greenhouse" environment for a certain timeframe. This helped the projects to move forward independently of organizational constraints or restrictions from current operative business unit strategies.

Project champions were asked to report on a quarterly basis and the Innovation Steering Committee is responsible for approving budget for the following years. The Innovation Steering Committee is also regularly informed on the progress of the *Innospire* projects pursued within the divisions.

A key mechanism needed to successfully enable and incubate promising projects is to adequately prepare and implement the transfer of projects from the innovation incubator/greenhouse to the internal customer, the strategic business unit interested in developing and launching a successfully researched innovation or product to the market. This process required extensive communication to ensure a smooth handover. In that regard an involvement of business unit representatives early on, including invitations to the Innovation Steering Committee and project team meetings, was deemed essential.

Consecutive editions of the *Innospire* process taught us that to make the process sustainable, the incubation step is crucial. In this step, it is important to maintain a stringent follow-up of the best ideas and handoff the ideas to the strategic business units at (and only at) the right time. Sufficient attention during incubation and existence of a specific budget allocated to help mature the idea (conditional on successful performance in certain key performance indicators) are essential. It is also crucial that management supports the projects up to market launch and that all innovators and team members get their deserved reward and recognition. We have also organized acceleration workshops for the incubated teams to support them in trying to accelerate their time to market. In a way, the real process really just starts after the grand jury approval.

4.3 Results of the Innospire Process

The *Innospire* program transformed the innovation landscape at Merck KGaA. The main benefits obtained were (i) employees' perceptions about the competence-enhancing aspect of *Innospire,* (ii) their greater sense of autonomy, (iii) unique opportunities for networking and

improved relatedness and, consequently, (iv) new promising innovations in Merck KGaA's pipeline. We discuss each in turn.

a) Competence-Enhancing Effects of Innospire

The feedback of the participants was outstanding. Several participants stated that they would have not been able to bring their idea forward if it was not through the *Innospire* process. A considerable number of participants found *Innospire* a life-changing event. Many of them were scientists who had barely been exposed to business. This process was an initiation in business logic for many of them, boosting their skills and perceived capacity to autonomously transform ideas into full-fledged projects for new businesses. We repeatedly solicited feedback on the process. In one such session, one participant commented that "*Innospire* is a great opportunity to bring ideas into business while learning in a professional way," hinting at the competence-enhancing benefits of the program she enthusiastically concluded that it was "definitely the best education you can get at Merck." Similarly another participant expressed her gratitude to the "great opportunity to broaden my expertise and knowledge." As one participant pointed out, "*innospire* has helped me to develop my personality."

b) Increased Autonomy

Besides its competence-enhancing benefits, another key benefit of *Innospire* was to spread the idea that innovation is a responsibility of every employee. We observed a high level of dedication and motivation of project teams. A culture was shaped that allowed the entrepreneurial teams to consider a project as their "baby," being provided resources by the company to move it forward. This turned out to be highly motivating for project teams and helped to rapidly change perceptions of some of being treated as a dispensable turning wheel at the merit of line management. In the words of a participant, *"Innospire* makes the *whole* company more aware of how dependent we are on new products." Indeed, many participants indicated they were very pleased with the enhanced sense of autonomy they gained and the

trust they felt was being put on their capacity to innovate. These feelings also helped increasing employee loyalty to the organization. For example, one participant said "*Innospire* adds a lot to the fun I have in my job and makes Merck a more attractive employer."

c) Increased Relatedness and Networking

Besides this competence- and autonomy-enhancing aspects, the *Innospire* process stimulated networking and relatedness among employees in several ways. The opportunity to come together and discuss with colleagues from other divisions was highly appreciated and contributed substantially to idea advancement. Summarizing her experience at *Innospire,* one participant said that "it gives the opportunity to discuss with people that you would not meet normally, and this allows you to come up with breakthrough ideas." The process especially succeeded in bringing forward ideas at the cross-section of both business divisions, suggesting that the relatedness of people from different corners of the organization was significantly improved. Teams working on such projects were mixed teams, with representatives from the chemicals and pharmaceuticals divisions. In one case, the technology base lied within the pharmaceutical division (biotech) and the application lied in the chemicals division. In another case, the technology base lied within the chemicals division, while the application lied in the pharmaceutical division. Recognizing this key advantage, another participant said that "*Innospire* gives us a chance to make cross-divisional ideas real… such ideas would have no home in the business units and would not have a chance otherwise." In hindsight, we can conclude that networking was certainly a key pillar of success of the *Innospire* process.

d) Improved Innovation Output at Merck KGaA

Besides the very important benefits for employees, the organization also benefitted from the innovative ideas that were discovered, polished and improved through the *Innospire* process. Recognizing such improvement in innovation output due to the program, one of the

participants said that *Innospire* helped "opening new horizons for the company to move forward in innovation."

Senior management was also very enthusiastic with the results of *Innospire* and, therefore, a second idea call was initiated in 2011 with the number of submitted ideas for new products up 20% vs. the first call in 2009 (we do recognize that number of ideas is a bad metric for innovation but disclose it here for full information). 19 ideas out of the 2011 campaign were advanced to the innovation marketplace stage, 6 were advanced through the bootcamp and out of these 4 were approved by management and received funding.

The next *Innospire* idea call is scheduled for autumn 2013. In total, so far, the *Innospire* initiative has resulted in ~800 ideas submitted via 2 idea collection campaigns in 2009 and 2011. 51 of these were advanced to business concepts and presented to a broader audience at the physical and online innovation marketplaces. The 17 most promising business concepts were advanced to full business plans and presented to Top Management for approval. A total of 13 projects have received funding and went operational. Four of these projects were funded from a centrally dedicated *Innospire* incubator budget and nine received direct funding from the business units. Topics were very broad reflecting the strategic fields of Merck KGaA, including areas located at the interface between the divisions: improved monoclonal antibodies for drug discovery, new approaches for personalized medicine, imaging technologies, a new medical device, new drug discovery tools, improved formulation technologies, probiotics, cosmetics, energy, water, gas separation and next generation display materials.

In terms of pharmaceutical innovation, the *Innospire* program was a success, too. It resulted in six promising projects for Merck KGaA's pipeline:

- A new innovative preclinical assay system to assess compounds early on in discovery for side effects profile,

- Two highly innovative new technologies for formulation of poorly soluble compounds,
- A new highly innovative protein engineering technology for improved biological drugs,
- An innovative medical device in the OTC field, and
- A new probiotic product in the OTC field.

Typical annual project budgets were ~1M€ per project in the central *Innospire* incubator. Average projected running time from project inception to expected product launch is about four years. Total project attrition rate according to data collected so far is 33%. Termination in most cases occurred during or right after the first year.

Up to now, >20 patents have been submitted based on work done within the *Innospire* projects. A first product launch took place in2012 with three more product launches scheduled for 2013, all derived from projects initiated in 2010 and more down the road based on the 2011 idea call. The total business volume that the new business ideas represent is currently estimated to be several hundred millions of Euros in total.

e) What Happened to Non-Selected Ideas?

While 'survival of the fittest' was a key driver in the success of the *Innospire* process, Merck KGaA proactively managed the possible disappointment of employees whose ideas did not succeed in advancing through the process. To avoid such disappointment to contaminate the success of the project, three strategies were followed. The first was to encourage employees whose ideas did not pass a certain milestone to join their colleagues and help them improve their own ideas.

The second was to conduct several follow-up analyses of the non-chosen ideas to select additional ideas that could be followed-up directly by the business units. Dozens of ideas were taken up by Merck KGaA's business units either directly after idea submission or

after the innovation marketplace without going through the bootcamp process. In addition, in 2010, Merck KGaA decided to re-evaluate the ideas submitted in 2009 and, again, many additional promising projects were initiated. In retrospect, we conclude that an idea pool is never really completely harvested and while one needs to apply stringent criteria to be able to focus on the breakthrough ideas with higher business potential, it is crucial to manage disappointment of employees with non-chosen ideas and avoid losing good ideas due to too stringent filtering.

The third strategy involved giving visibility to idea owners and signaling care, by offering them the possibility to have their idea forwarded directly to the evaluation team of their own business unit, guaranteeing the process was transparent and fair. This proved very important for the reputation of the process and recruitment of idea owners in subsequent editions.

f) External Recognition of the Innospire Process

In the meantime Merck KGaA's *Innospire* program has received considerable external attention and recognition. For example in April 2012, Merck KGaA received the prestigious *2012 BioIT World Best Practice Award*[13], in the category of knowledge management, for the capacity of *Innospire* to "mobilize the innovation potential of all Merck KGaA employees for generation of new innovative products." An *Innospire*-derived product for formulation of poorly soluble compounds has been honored with the CPhI (Convention on Pharmaceutical Ingredients) 2012 Innovation Award[14]. These results demonstrate that a formalized process aimed at promoting grassroots innovation can contribute to mobilizing the full innovation potential of employees, boost the passion, competence, autonomy and relatedness and improve pharmaceutical firms' innovation pipelines. In addition, the concepts of self-

[13] Established in 2003 by Bio-IT magazine, the World's Best Practices Awards recognize "organizations for their outstanding innovations and excellence in the use of technologies and novel business strategies that will advance biomedical and translational research, drug development, and/or clinical trials", see http://www.bio-itworld.com/2012/04/25/bio-it-world-announces-winners-2012-best-practices-awards.html.

[14] http://www.cphi.com/pharma-awards.

assembling teams, the wisdom of the crowds approach and the survival of the fittest philosophy add new innovative approaches for managing discovery portfolios (Betz, 2011).

5 DISCUSSION

5.1 SUMMARY OF KEY FINDINGS

In this paper, we offer a conceptual and theoretical framework to help pharmaceutical firms structure their grassroots innovation programs. Our framework is grounded on self-determination theory (Ryan and Deci, 2000), and posits that (i) the integral mechanisms in grassroots innovation programs (idea sourcing, team formation, team/idea selection and training and coaching of participating employees) and (ii) key identified dimensions of management support (resource allocation, visibility of involvement, tangible incentives and facilitation of a supportive organizational structure and tolerance for failure) need to be geared towards boosting employees' intrinsic motivation for grassroots innovation. Our key findings are as follows.

Employees' entrepreneurial spirit, business skills and competences and sense of autonomy were clearly boosted by the *Innospire* process. The capacity of the *Innospire* program to promote networking, and connect employees at different hierarchical levels and from different divisions and regions (i.e. increasing their relatedness) proved a crucial aspect of the process and a strong motivator for future participants. These findings are in line with self-determination theory, which defends that intrinsic motivation is promoted when employees' intrinsic needs for competence, autonomy and relatedness drive intrinsic motivation.

Certain design choices in a grassroots innovation program help satisfying these innate human needs. First, it is important to promote a self-selection mechanism that attracts the most intrinsically motivated employees to the program. Second, it is important to facilitate the formation of self-assembled teams. Third, idea champions have to successfully recruit

team members to be able to proceed in the program, which works as a "survival of the fittest" mechanism capable of filtering out ideas whose owners are unable to garner sufficient support from intrinsically motivated colleagues. Fourth, it is crucial to offer professional training and coaching in order to boost participants' business skills and competences and increase their possibilities for networking. Fifth, senior management needs to show significant support to the process, in terms of devoted resources, visibility of involvement, facilitation of external support and tolerance for smart failures. We believe that to achieve sustainable success, grassroots innovation programs need to be *structured* as a *formal process* that simultaneously addresses the three fundamental human needs of autonomy, competence and relatedness/networking. In *Innospire,* self-assembling teams proved crucial to boost participants' autonomy and relatedness/networking. Innovation bootcamps were pivotal in the development of participants' market and business-planning competences and capacity. Last but not least, the corporate culture needs to be ready for a grassroots innovation program such as *Innospire*. This was the case at innovation-oriented Merck KGaA.

5.2 Future Research on Grassroots Innovation

The literature on grassroots innovation processes is still nascent and, therefore, there are several promising research directions in this topic.

First, future research could focus on conducting large-scale empirical work to generalize the ideas proposed in this chapter. Research focusing on multiple firms, multiple countries and even industries is particularly welcome. Such research efforts would benefit from extensive primary data collection – for instance, self-reported data (on intrinsic vs. extrinsic motivation and on competence, autonomy and relatedness/networking perceptions) – across a sufficiently large sample to allow empirical generalizations of the current chapter's findings.

For instance, cross-firm or cross-industry research could focus on the interaction of culture and process. Obviously, the extent to which a company has a culture of innovation is

an important moderator on the success and design of a structured process such as the one described in this paper. For instance, from our experience at Merck KGaA, we found that it is crucial for such a program to be tailored to the company's culture, to ensure a smooth buy-in throughout the organization, including acceptance of the program by middle management.

Besides corporate culture, large-scale empirical work could focus on cross-national differences in the implementation and consequences of grassroots innovation. Prior research suggests that national culture can strongly affect innovation outcomes (Tellis, Prahbu, and Chandy, 2009) and employee and managerial behaviors in an organization (Hofstede, 2001). For instance, *power distance* – the extent to which less powerful members of an organization accept or even expect that power is unequally distributed (Hofstede, 2001) – is typically much higher in Asian countries than in Western European nations or in the United States. It may be that grassroots innovation processes need to be implemented differently in more hierarchical societies, when compared with less hierarchical societies. The fourth author has observed such differences in roll-outs of grassroots innovation in continents as diverse as Asia (China), North America (US, Canada and Mexico) and the Middle East. But if cross-national research could uncover such diverse mechanisms in a more formalized and quantitative manner, this would be a valuable addition to the literature.

Second, our SDT-based framework focuses mostly on employee motivation as the key success driver in grassroots innovation. Future research could study other factors that may influence the success of grassroots innovation programs. In particular, it would be important to study the antecedents and consequences of employee disappointment triggered by not being selected to proceed to the next step in the process. We have discussed Merck KGaA's strategies to manage possible disappointment among employees whose ideas did not advance beyond a certain milestone in the *Innospire* process. Future research could identify alternative mechanisms to deal with such disappointment and test which are the most effective ones.

Interesting research directions include framing effects in feedback communication and how to ensure that evaluations are perceived as fair by all participants. Experimental studies or multiple case-study analyses could help highlight these issues.

Third, one of the central tenets of SDT is that competence-enhancing mechanisms are pivotal to boost employees' intrinsic motivation and the success of grassroots innovation. At *Innospire,* innovation bootcamps played a key role in boosting employees' capacity to transform their ideas into full-fledged business plans. Yet, recent research shows that coaching and training in the early stages of idea generation is also very effective in enhancing creativity and ideation (Burroughs et al., 2011). It would be interesting for future research to test the extent to which a training program during the ideation phase can help improve the quality of the ideas submitted. Also, would a program focused on promoting competence alone (e.g. customized training programs on innovation and entrepreneurial thinking) be beneficial for companies which may find they are not ready for a full-fledged grassroots innovation process?

Fourth, despite the growing popularity of innovation tournaments and games (see e.g. Terwiesch and Ulrich, 2009), future research should also investigate some drawbacks of *gaming* mechanisms in innovation. For example, in crowd-voting mechanisms, after a few employees make their evaluations of other ideas public, several others may tend to disregard their private information and simply *follow the herd* (Bikhchandani, Hirshleifer, and Welch, 1992). Yet, more scientific scrutiny is needed to understand the prevalence and magnitude of these effects and help firms improve their voting and selection mechanisms.

Fifth, we have studied one formalized approach to grassroots innovation. However, many of the examples discussed in this chapter depend on informal drivers of grassroots innovation, such as a company's overall bottom-up culture (e.g. Google, 3M) or the introduction of less formal processes (e.g. GSK's Spark Network). Given their prevalence and mixed results

(Birkinshaw, Bouquet and Barsoux, 2011), future research should document the drivers of success in *informal* grassroots innovation processes.

Sixth, firms are also increasingly interested in implementing *open innovation* models, such as Procter & Gamble's famous *Connect and Develop* approach (Huston and Sakkab, 2006) or Cisco's I-Prize (Jouret, 2009). Such models look for new ideas outside the boundaries of the firm, i.e. next to suppliers, academia (scholars or even students), government, research institutions, clients and even competitors. Future research could study how firms can implement structured processes such as the one discussed in this chapter with the goal of finding ideas outside the company's boundaries.

Seventh, in order to boost internal validity, the causal mechanisms depicted in our conceptual framework should be explored in a controlled setting. That is, it would be very interesting to devise laboratory (or field) experiments where the actual causal mechanisms of interest can be tested. Such proof of causal mechanisms may prove to be very challenging, but highly rewarding.

5.3 Future Research on Grassroots Innovation in the Pharmaceutical Industry

There are also several interesting avenues for future research on specific applications of grassroots innovation in the pharmaceutical industry. First, it is important to study to what extent grassroots innovation is better attuned to promote radical breakthroughs or more incremental innovations.

Second, it would be interesting to quantify whether the benefits of grassroots innovation are more important for certain therapeutic categories that may demand closer contact with customers. For example, do pharmaceutical firms need to be closer to the consumer when engaging in innovation in targeted therapies or diagnostics? If yes, it would be interesting if future studies could test whether grassroots innovation processes can be particularly effective in more customer-oriented innovations.

Third, pharmaceutical industry's blockbuster innovation model is prone with risk and uncertainty. Could the wisdom of crowds' philosophy behind grassroots innovation, reduce some of this risk and make innovation outputs more predicable? How should pharmaceutical firms combine bottom-up and top-down innovation philosophies in a new model combining closeness to the customer, employee motivation and entrepreneurial spirit and strong strategic fit and leadership?

Overall, research focused on grassroots innovation in large corporations is scarce. This paper provides an early in-depth study based on theoretical derivation and an in-depth case study of one process at one firm. Clearly, there is room for a multitude of future contributions in this area, with high dual impact to both academia and business.

REFERENCES

Abbey, A. and J.W. Dickson. 1983. "R&D work climate and innovation in semiconductors." *Academy of Management Journal* 26(2):362–368.

Amabile, T.M. 1997. "Motivating creativity in organizations: On doing what you love and loving what you do." *California Management Review* 40(1): 39-58.

Amabile, T.M. 1996. Creativity in Context, 2nd Ed. Boulder, CO: Westview.

Anand, N., H.K. Gardner, and T. Morris. 2007. "Knowledge-based innovation: Emergence and embedding of new practice areas in management consulting firms." *Academy of Management Journal* 50(2): 406-428.

Baer, M., G.R. Oldham, and A. Cummings. 2003. "Rewarding creativity: When does it really matter?" *The Leadership Quarterly* 14: 569–586.

Barringer, M.W., and G.T. Milkovich. 1998. "A theoretical exploration of the adoption and design of flexible benefit plans: a case of human resource innovation." *Academy of Management Review* 23(2): 305-324.

Betz, U. 2005, "How many genomics targets can a portfolio afford?" *Drug Discovery Today* 10(15): 1057-1063.

Betz, U. 2011. "Portfolio management in early stage drug discovery – a traveler's guide through uncharted territory." *Drug Discovery Today* 16(13/14): 609-618.

Bikhchandani, S., D. Hirshleifer, and I. Welch. 1992. "A Theory of Fads, Fashion, Custom, and Cultural Change in Informational Cascades." *Journal of Political Economy* 100(5): 995-1026.

Birkinshaw, J., C. Bouquet, and J.-L. Barsoux. 2011. "The 5 myths of innovation." *MIT Sloan Management Review* 52: 52-59.

Birkinshaw, J., and P. Robbins. 2010. "Ideas at work: Sparking innovation." *Business Strategy Review* Q2: 7-11.

Burgelman, R.A., and L.R. Sayles. 1986. *Inside Corporate Innovation: Strategy, Structure, and Managerial Skills*. New York, NY: Free Press.

Burroughs, J.E., D.W. Dahl, C.P. Moreau, A. Chattopadhyay, and G.J. Gorn. 2011. "Facilitating and rewarding creativity during new product development." *Journal of Marketing* 75(July):53-67.

Camacho, N., I. Verniers, C. García-Pont, and S. Stremersch. 2012. *Alcatel-Lucent: Marketing the Cell Phone as a Mobile Wallet.* IESE Case Study M-1279-E, January.

Cohen, W.M., and D.A. Levinthal. 1990. "Absorptive capacity: A new perspective on learning and innovation." *Administrative Science Quarterly* 35(1): 128-152.

Collins, M.A., and T.M. Amabile. 1999. "Motivation and creativity." In *Handbook of Creativity,* R.J. Sternberg (Ed.), pp. 297–312. Cambridge, England: Cambridge University Press.

Condry, J. 1977. "Enemies of exploration: Self-initiated versus other-initiated learning." *Journal of Personality and Social Psychology* 35:459-477.

Damanpour, F. 1991. "Organizational innovation: A meta-analysis of effects and determinant and moderators," *Academy of Management Journal* 34(3): 555-590.

Deci, E.L. 1975. *Intrinsic Motivation.* New York: Plenum.

Deci, E.L., and R.M. Ryan. 1985. *Intrinsic Motivation and Self-Determination in Human Behavior*. New York: Plenum.

Deci, E.L., R. Koestner, and R.M. Ryan. 1999. "A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation". *Psychological Bulletin* 125(6): 627-668.

Deci, E.L., and R.M. Ryan. 2000. "The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behavior." *Psychological Inquiry* 11(4): 227-268.

Demerouti, E., A.B. Bakker, F. Nachreiner, and W.B. Schaufeli. 2001. "The job demands–resources model of burnout." *Journal of Applied Psychology* 86: 499–512.

Dougherty, D., and C. Hardy. 1996. "Sustained product innovation in large, mature organizations: Overcoming innovation-to-organization problems." *Academy of Management Journal* 39(5): 1120-1153.

Eisenberg, R., and J. Cameron. 1996. "Detrimental effects of reward: Reality or myth?" *American Psychologist* 51(11): 1153-1166.

Fisher, C.D. 1978. "The effects of personal control, competence and extrinsic reward systems on intrinsic motivation." *Organizational Behavior and Human Performance* 21: 273-288.

Gagné, M., and E.L. Deci. 2005. "Self-determination theory and work motivation." *Journal of Organizational Behavior* 26(4): 331-362.

Garnier, J-P. 2008. "Rebuilding the R&D engine in Big Pharma." *Harvard Business Review*, May: 69-76.

Gassmann, O., and G. Reepmeyer. 2005. "Organizing pharmaceutical innovation: From science-based knowledge creators to drug-oriented knowledge brokers." *Creativity and Innovation Management* 14(3): 233-245.

Gibbons, R., and K.J. Murphy. 1992. "Optimal incentive contracts in the presence of career concerns: Theory and evidence." *Journal of Political Economy* 100(3): 468-505.

Grant, R. 2008. "The future of management: Where is Gary Hamel leading us?" *Long Range Planning* 41: 469-482.

Griffin, A., and J.R. Hauser. 1996. "Integrating R&D and marketing: A review and analysis of the literature." *Journal of Product Innovation Management* 13: 191-215.

Gumusluoglu, L., and A. Ilsev. 2009. "Transformational leadership, creativity, and organizational innovation." *Journal of Business Research* 62: 461-473.

Gupta, A.K., S.P. Raj, and D. Wilemon. 1986. "A model for studying R&D-marketing interface in the product innovation process." *Journal of Marketing* 50(2): 7-17.

Hamel, G., and B. Breen. 2007. *The Future of Management.* Harvard Business School Publishing, Boston, MA.

Hofstede, G. 2001. *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*, 2nd ed. Sage, Thousand Oaks, CA.

Hornsby, J.S., D.F. Kuratko, and S.A. Zahra. 2002, "Middle managers' perception of the internal environment for corporate entrepreneurship: Assessing a measurement scale," *Journal of Business Venturing* 17: 253-273.

Huston, L., and N. Sakkab. 2006. "Connect and develop: Inside Procter & Gamble's new mode for innovation." *Harvard Business Review*, March, 1-9.

Huy, Q. N., and H. Mintzberg. 2003. "The rhythm of change." *MIT Sloan Management Review*, Summer: 79-84.

Jouret, G. 2009. "Inside Cisco's Search for the Next Big Idea." *Harvard Business Review*, September 43-45.

Jung, D.I. 2001. Transformational and transactional leadership and their effects on creativity in groups. *Creativity Research Journal* 13(2): 185-195.

Jung, D.I., C. Chow, and A. Wu. 2003. "The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings." *Leadership Quarterly* 14: 525–544.

Kahn, W.A. 1992. "To be fully there: Psychological presence at work," *Human Relations* 45: 321–349.

Kelley, D.J., L. Peters, and G.C. O'Connor. 2009. "Intra-organizational networking for innovation-based corporate entrepreneurship." *Journal of Business Venturing* 24: 221-235.

Knight, K.E. 1967. "A descriptive model of the intra-firm innovation process." *The Journal of Business* 40(4): 478-496.

Kriegesmann, B., T. Kley, and M.G. Schwering. 2005. "Creative errors and heroic failures: Capturing their innovative potential," *Journal of Business Strategy,* 26(3): 57-64.

Kuratko, D.F., J.S. Hornsby, D.W. Naffziger, and R.V. Montagno. 1993. "Implementing entrepreneurial thinking in established organizations." *Advanced Management Journal* 58(1): 28–33.

Lakhani, K.R., and B. Wolf. 2005. "Why hackers do what they do: Understanding motivation and effort in free/open source software projects." In *Perspectives on Free and Open Source Software,* J. Feller, B. Fitzgerald, S. Hissam, and K. R. Lakhani, eds. Cambridge, MA: MIT Press.

Miller, K.D., and E.W.K. Tsang. 2010. "Testing management theories: Critical realist philosophy and research methods." *Strategic Management Journal* 32: 139-158.

Munos, B. 2009. "Lessons from 60 years of pharmaceutical innovation." *Nature Reviews – Drug Discovery* 8(December): 959-968.

Nakata, C., and S. Im. 2010. "Spurring cross-functional integration for higher new product performance: A group effectiveness perspective." *Journal of Product Innovation Management* 27: 554-571.

Osborne, R. 2013. "Fresh from the biotech pipeline – 2012." *Nature Biotechnology* 31, 100-103.

Paul, S.M., D.M. Mytelka, C.T. Dunwiddie, C.C. Persinger, B.H. Munos, S.T. Lindborg, and A.L. Schacht. 2010. "How to improve R&D productivity: The pharmaceutical industry's grand challenge." *Nature Reviews – Drug Discovery* 9(March): 203-214.

Peters, T.J., and R.H. Waterman. 2004. *In Search of Excellence: Lessons from America's Best-Run Companies*. HarperCollins, New York, NY, First Published: 1982.

Pinto, M.B., and J.K. Pinto. 1990. "Project team communication and cross-functional cooperation in new program development." *Journal of Product Innovation Management* 7: 200-212.

Quinn, J.B. 1979. "Technological innovation, entrepreneurship, and strategy." *Sloan Management Review* 20(Spring): 19-30.

Roberts, E.B., and A.R. Fusfeld. 1981. "Staffing the innovative technology-based organization." *Sloan Management Review,* 22(3): 19-34.

Ryan, R.M., and E.L. Deci. 2000. "Self-determination theory and the facilitation of intrinsic motivation, social development and well-being." *American Psychologist,* 55(1): 68-78.

Schaufeli, W.B., and A.B. Bakker. 2004. "Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study." *Journal of Organizational Behavior* 25: 293–315.

Selznick, P. 1949. *TVA and the Grass Roots: A Study in the Sociology of Formal Organization*. University of California Press. Berkeley, CA.

Stremersch, S. 2008. "Health and marketing: The emergence of a new field of research."*International Journal of Research in Marketing* 25: 229-233.

Stremersch, S., and W. Van Dyck. 2009. "Marketing of the life sciences: A new framework and research agenda for a nascent field." *Journal of Marketing* 73(July): 4-30.

Stremersch, S., and A. Lemmens. 2009. "Sales growth of new pharmaceuticals across the globe: The role of regulatory regimes." *Marketing Science* 28(4): 690-708.

Sykes, H.B. 1992. "Incentive compensation for corporate venture personnel." *Journal of Business Venturing* 7: 253-265.

Terwiesch, C., and K. Ulrich. 2009. *Innovation Tournaments: Creating and Selecting Exceptional Opportunities*. Boston, MA: Harvard Business School Publishing.

Tellis, G.J., J.C. Prabhu, and R.K. Chandy. 2009. "Radical Innovation Across Nations: The Preeminence of Corporate Culture." *Journal of Marketing* 73(January): 3-23.

Verniers, I., S. Stremresch, and C. Croux. 2011. "The global entry of new pharmaceuticals: A joint investigation of launch window and price."*International Journal of Research in Marketing* 28: 295-308.

von Hippel, E. 2005. Democratizing Innovation. Cambridge, MA: MIT Press.

von Hippel, E. 1988. The Sources of Innovation. Oxford: Oxford University Press.

Wuyts, S., S. Dutta, and S. Stremresch. 2004. "Portfolios of interfirm agreements in technology-intensive markets: Consequences for innovation and profitability." *Journal of Marketing* 68(April): 88-100.

Zahra, S.A. 1993. "Environment, corporate entrepreneurship and financial performance: A taxonomic approach." *Journal of Business Venturing* 8: 319-340.