EXTREME TEAMING

Lessons in Complex, Cross-Sector Leadership

To all leaders of extreme teaming, especially those who led Projects Anna, Bianca, Fiona, Sofia, and Willa, and inspired us to write this book.

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FOREWORD

I had the privilege to teach at Harvard Business School with Amy Edmondson in the Technology and Operations Management (TOM) group 20 years ago. Amy was polishing off her research on psychological safety, examining a critical, but heretofore overlooked, factor that influenced the performance of work teams. That work would later establish her as a global management thought leader. Meanwhile I was down the hall performing the field research on companies like Xerox, IBM, Intel, Lucent, Procter & Gamble, and Genzyme that would culminate later in Open Innovation. At that time, we didn't seem to have much to say to each other, and so were friendly but distant colleagues. After all, it seemed that we were working on quite different problems, and investigating quite disparate phenomena.

I moved on to Berkeley from Harvard in 2003, and had the pleasure of watching my book *Open Innovation* (Chesbrough, 2003) develop into an important contribution to the study of innovation. But apart from saying hello to Amy at occasional academic conferences, things remained distant between us. Something happened fairly recently to change this state of affairs. Jean-François Harvey came to Berkeley a few short years ago as a visiting scholar. He was bright, well-trained, and full of ideas. While I learned a lot from him, he got infected with the Open Innovation virus during his time with me, and he is now pushing the open innovation concept forward in new and important ways. It is his insights, his energy, and his passion that have brought the work of two previously distant colleagues much closer together. One example of this comes from a very recent case study he conducted

with Amy (Edmondson & Harvey, 2016a), and the other comes from this new book.

Now that I see Amy and JF's latest work in this new book, it is now obvious to me that Open Innovation and the organization of teams have a lot of common interests. Amy's work on teaming as a process (not just as an entity), combined with her exploration of the ways in which people from different organizations come together to pursue a common project, has positioned her to make new contributions to my own field of innovation studies. For most of the innovating in Open Innovation is done not by single individuals, nor by entire organizations, but by groups of people working across organizational boundaries. If you want to move knowledge across boundaries, you need to organize, motivate, and coordinate people in groups. With this new book, innovation scholars will find a wealth of insights about the core innovation work activity that takes place in collaborative innovation initiatives across those boundaries.

With my colleague Marcel Bogers, I have recently modified my definition of Open Innovation as follows: "*…a distributed innovation process that involves purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model*" (Chesbrough & Bogers, 2014). This definition goes beyond the well-known phenomenon of knowledge spillovers long studied in the economics of R&D to purposive, intentional flows of knowledge of interest to management scholars. These intentional flows involve both flows of knowledge from outside the organization, or outside-in knowledge flows, and also flows from inside the organization to the outside, or inside-out knowledge flows. What Amy and JF's book reminds us is that we must look at the work of groups of people, if we are to understand these flows of knowledge.

One type of outside-in open innovation – so-called *crowdsourcing* – seeks to engage the problem-solving abilities of individuals located around the world. Crowdsourcing can take

the form of contests that post a perplexing problem on a website in the hopes of eliciting novel solutions from remote sources. NASA and Samsung come to mind: the first has established a partnership with a number of crowdsourcing platforms to reach outside-of-the-box ideas for some of its most pressing problems, while the second seeks innovative solutions for existing electronic products and technologies. Crowdsourcing can also be more playful and everyday, such as imagining a new burger for McDonald's or creating a new flavor for Lays potato chips.

Similarly, open-source software development allows individuals to write code remotely, offering modular elements that can be compiled and combined to create robust software programs. Contributors, motivated by everything from fame to fortune to altruism to learning, work autonomously to push the technical envelope. And this open approach is not limited to software. In the data center hardware industry, Facebook's Open Compute Project (OCP) has achieved some important breakthroughs and has mobilized knowledge from numerous external contributors. Indeed, by developing an initial proposal, contributing initial reference designs, and offering test deployments of OCP designs – all examples of inside-out open innovation – Facebook initiated and then subsequently orchestrated a lot of outside-in open innovation.

But what if a problem is inherently multidisciplinary and complex, a so-called wicked problem? If solutions require people to work interdependently across disciplines or locations, crowdsourcing is unlikely to work. And so, a new kind of open innovation is needed to bring together people from several organizations in projects targeting such challenges. This book looks at the behavior of humans in groups and teams at the core of these kinds of strategic, complex innovation projects.

Edmondson and Harvey bring a new perspective to the field of open innovation with this book. Using their research into a handful of open innovation projects, they begin to identify what

project leaders can do to overcome the major hurdles that lie ahead.

In many ways, open innovation has a lot to do with team development and leadership. Connecting these streams of research appears important to develop knowledge that will help support the increasingly important cross-boundary collaborations organizations must engage in today. Team-based configurations have become so fluid that some have argued for the vanishing of corporations, with software that can now combine the gig economy model with artificial intelligence to assemble "flash teams."[1] Yet, these flash teams have their limits, and I doubt they can be successful without good leadership. We need to understand what leaders can do to make the most of the new forms of collaboration that attempt to create value and innovate rapidly in our increasingly complex world.

This book is timely. It is also incomplete: it opens up a new field of inquiry. It should resonate with both researchers and practitioners. Researchers can find a rigorous approach to qualitative research enabling both theoretically robust constructs and convincing empirical findings. Practitioners from diverse fields can find actionable insights that promise to improve the management of complex innovation projects across the permeable organizational boundaries that arise in this increasingly Open Innovation landscape.

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NOTE

1. Readers of a certain age might recognize an echo of an earlier trend, of the so-called virtual organization of the 1990s. David Teece and I sought to understand but also qualify the limits of what virtual organizations can do with our 1996 Harvard Business Review article, "When is Virtual Virtuous?" There we reminded readers that real organizations had an ability to orchestrate complex, systemic technologies in ways that virtual organizations could not. I suspect that these "flash teams" will follow a similar pattern to the virtual organization. They will perform important work, but will not supplant all the other types of teams, due to their likely inability to orchestrate the actions of disparate actors in complex, interdependent situations.

INTRODUCTION

Research on team effectiveness in the social sciences – notably, in psychology, sociology, and economics – is extensive and enduring. Teams fascinate scholars and practitioners alike because of their potential to achieve far more than the sum of what individual team members can do alone. Potential is not inevitability, however, and what it takes to achieve the desired synergy in teams remains a topic of considerable research. Achieving synergy requires integrating and leveraging diverse expertise and perspectives. Yet, the presence of diverse expertise and perspectives poses a barrier to doing so; people may not adequately understand each other's thoughts and ideas, and they lack the shared norms, values, or timeframes that facilitate interaction. Herein lies both the promise and the challenge of extreme teaming – project teams that cross disciplinary, organizational, and industry boundaries to innovate.

The late Harvard psychologist Richard Hackman, a preeminent scholar of team effectiveness, conducted numerous quantitative studies to pinpoint features that influence team performance, and this work provided foundational insights (e.g., Hackman, 1983, 1990; Hackman & Morris, 1975). The basic theoretical framework employed is an input-process-output model, in which a set of inputs such as task design or organizational support give rise to certain behavioral and interactional processes, which lead to various performance outputs. Decision-making, conflict-resolution, and information-management are some of the important processes Hackman and his colleagues studied. Factors that shape these processes (inputs) included variables at the individual, group, and

organizational levels. For example, individual factors include members' skills, group factors include the size of the team, the team task, and the clarity of the team's goal, and organizational factors are such variables as access to resources and a supportive environment. Inputs and team processes both give rise to team outputs. The most obvious of these is team task performance, but Hackman (1990) conceptualized team effectiveness as more than task performance, identifying three vital dimensions of effectiveness. The first, the extent to which a team's work satisfies the needs of its customers, is what most managers would expect to matter, and is fundamentally about performance. The other two are a team's ability to work well together in the future (a kind of team-level learning outcome) and individual team members' satisfaction with the team experience (an individual level job satisfaction variable). The essence of the theory is that well-designed teams will be more likely to have desired processes and outcomes. In short, well-designed teams perform well.

Hackman identified three essential defining features of a team. First, teams have clear boundaries that distinguish members from non-members. Second, members are interdependent in working toward a common goal, such that they are collectively responsible for what they produce together. Third, teams are relatively stable entities, giving members the opportunity to learn how to work well together (Wageman, Hackman, & Lehman, 2005). Although teamwork and collaboration are needed in settings other than within formal teams, it is helpful to distinguish between these phenomena and actual team structures, as well as between groups and teams. Organizations encompass many kinds of groups, but Hackman proposed reserving the term "team" for groups that meet these three criteria. Others have proposed that teams be defined by the sense of identity that derives from being part of a group: a self-conception that is shared by members and gives rise to a self-inclusive category that causes them to identify with the group (Tajfel, 1978; Tajfel & Turner, 1986). Unclear social

identity, or multiple social identities, can be detrimental to team performance (Brewer, 1996). We concur with this perspective, but see shared identity as an emergent state, rather than a defining criterion and structural input.

Most research on teams and teamwork focuses on the design of teams, including studies of structural inputs like team size, composition, and task. Although some team research is conducted in laboratories, much of it examines real teams in real organizations. Some perspectives emphasize processes, and process interventions related to coaching and facilitation, such as training individuals to operate in complex team environments (Cannon-Bowers & Salas, 1998), or focus on team norms and climate, including psychological safety (Edmondson, 1999).

One important area of study is team leadership, which has gained considerable attention over the past two decades as a vital force in helping teams achieve their potential. Most of the this literature examines how leaders influence the performance of groups that are reasonably stable performance units with clearly defined boundaries, that is, teams that meet Hackman's team-defining criteria. The kinds of teams studied in the field range from home improvement store teams (Chen et al., 2007), to financial services teams (Schaubroeck et al., 2007), customer services teams (Wageman, 2001), and more. The advantages of stable teams with clear boundaries and consistent membership have been well documented; members of such teams can leverage long-lasting relationships and contextual knowledge to communicate and execute effectively (Griffith & Neale, 2001; Lewis, 2004). Nonetheless, fewer teams in today's dynamic workplaces are stable or clearly bounded (Mortensen, 2014; O'Leary, Mortensen, & Woolley, 2011). Many teams change fast and members have little time to establish shared understanding about tasks, context, or each other (Wageman, Gardner, & Mortensen, 2012).

Recent work, therefore, has shifted to include a different perspective on teamwork in organizations, one that includes the

interpersonal interactions taking place in shifting groups of people working collaboratively toward shared goals. This perspective calls attention to *teaming* as a process – rather than teams as entities (Edmondson, 2012) – and requires research to understand what leaders can do to support teamwork in shifting configurations and contexts, including teamwork that brings people from different organizations together on a novel project.

FROM TEAMS TO TEAMING

Recognizing that a great deal of collaborative work in organizations occurs outside of formal teams, recent work has employed a "teaming" perspective on managing interdependent work, which emphasizes the processes of teamwork rather than the structures (Edmondson, 2012). Teaming takes various forms. To begin with, stable intact teams are often tasked with carrying out interdependent work that requires back-and-forth ("reciprocal") coordination to do it well (Thompson, 1967), and one can reasonably call that highly interdependent coordination a form of teaming. This form is the one that has received most of the attention in prior literature, and our understanding of how such teamwork is reasonably well established.

Second, in addition to coordination that occurs within stable teams, teaming in today's workplaces occurs in fluid configurations as well. In some cases, people serve on multiple teams at once and thus confront the need to manage the various relationships they encounter in these different groups (Mortensen, 2014). In other cases, people work in hyper-fluid or extremely temporary team-like arrangements, such as in a hospital emergency department, where each patient is treated by a newly formed small team of professionals, involving various hand offs, where the teams convene and disband constantly (Valentine & Edmondson, 2015). A small but rapidly growing literature is examining such teams.

A third form of teaming, which we believe is also on the rise, involves people coming together from diverse backgrounds and organizations to address a complex and usually novel problem (Edmondson & Harvey, 2017). Such situations bring people together who are not only diverse in expertise but also are employed by different organizations. This book is focused on understanding both the challenges and the opportunities presented by such cross-sector teaming arrangements, which present an extreme form of teaming. For instance, in the economic development context, experts in agriculture, economic development, finance, marketing, supply chain management and project management from Coca-Cola, the United States Agency for International Development, the Inter-American Development Bank, and the nonprofit organization TechnoServe teamed up on an ambitious project to improve 25,000 Haitian mango farmers' business practices and double their income (Edmondson & Harvey, 2016b). This third form of teaming often stems from necessity to tackle complex, multifaceted problems. The success of these projects depends on learning – that is, on the ability to adapt rapidly and efficiently to new knowledge. In the absence of past experience and knowledge, such projects must make recourse to learning to shape their responses to threats and opportunities. Each project participant lacks not only a body of project-specific knowledge but also contextual knowledge about viable paths to success. As a result, such projects shift rapidly in ways that are difficult, or even impossible, to predict.

In these types of projects, people work together temporarily, spanning boundaries that include expertise, function, organization, and sometimes industry. The newly formed teams must develop *in situ* – that is, in a specific context where leadership plays an important role. Many such teams face highly novel challenges and therefore must learn quickly and effectively to succeed. Through field research studying several such extreme cases of

teaming, we hope to provide insights and new directions to further this stream of research to contribute both to theory and practice.

EXTREME TEAMING FOR INNOVATION

Edmondson (2012) emphasized the importance of understanding and enabling teaming processes to complement the extensive research on team structures. We build on this prior work to elaborate the phenomena and leadership functions associated with effective teaming on innovation projects that span occupations, organizations, and industries. We refer to this type of cross-boundary collaboration as *extreme teaming*. Considerable research has investigated cross-functional teams, especially in the context of new product development and other innovation work (e.g., see Edmondson & Nembhard, 2009 for an exploration of the challenges and opportunities such teams face). Other work has examined the challenge of teaming across boundaries between hierarchical levels (e.g., Nembhard & Edmondson, 2006). Both kinds of cross-boundary teamwork are challenging, but extreme teaming takes these challenges to a new level.

Innovation is essential for staying relevant in today's challenging, fast paced environment. Few industries remain untouched by dynamism, uncertainty, and turbulence. The list of once-successful organizations that are no longer in business today – outpaced by more innovative rivals – is long and growing. In almost every industry, the demand for innovation is thus intensifying (Teece, 2012). Increasingly, companies must tap into ideas that are generated outside their organizational boundaries and find themselves collaborating to develop new products or services (Chesbrough, 2003) and even in exploiting them through open business models (Chesbrough, 2006a). The goal of extreme teaming is usually related to this impetus. By assembling groups of people with various backgrounds, those driving extreme teaming hope to set the

stage for complex problem solving and innovation that affects more than one organization. How to do this well, especially facing ambitious goals and timelines, is a question of importance for both research and practice. This book thus builds on prior research to improve understanding of a particular type of teaming and to suggest new ideas for future research and practice. Our primary goal is to shed light on the leadership practices that help a group of individuals with very different backgrounds (notably, occupation, organization, and industry) develop into a high performing, albeit temporary, team. In short, we hope to explain how extreme teaming can be nurtured, despite its inherent challenges.

As business ecosystems evolve in ways that force organizations to become more fluid and flexible (Tucci, Chesbrough, Piller, & West, 2016), people working on innovation often move across contracts, projects, departments, and organizations (e.g., Hargadon & Bechky, 2006; O'Mahony & Bechky, 2008). A rise in project-based organizing has been noted across the public and private sectors alike (Hobday, 2000; Wheelright & Clark, 1992). When projects are the primary unit for execution and exploration of innovation work, fluidity of roles and tasks often follows (Bechky, 2006). Some projects are long in duration, going on for years, as in certain new product development projects and most construction projects. Others are very short, as in most patient-care teams, some task forces, event planning groups, and more. As more and more people work in multiple teams, projects, departments, or organizations, often simultaneously, it is important to understand the processes and practices that enable teaming across not just departmental but also organizational and industry boundaries.

A growing portion of the innovation landscape requires organizations to work beyond their usual disciplinary or organizational boundaries, including a growing number of projects that bring people together from multiple organizations to work together

(Ferraro, Etzion, & Gehman, 2015; Senge et al., 2008). Because leadership plays out in social or organizational settings (Pettigrew, 1992), and its effectiveness depends on fit with the situation or context (Fiedler, 1967), we need to know more about leadership in such contexts to better deal with its associated technological uncertainty (Fleming, 2001), coordination costs (Cummings & Kiesler, 2005), and logistical challenges (Lingo & O'Mahony, 2010).

The central message in this book is that extreme teaming is as challenging as it is necessary and, therefore, that leadership is vital to doing it well. We present qualitative research on a handful of cases of extreme teaming (complex cross-industry innovation projects) as a starting point for understanding the leadership functions that enable success in such challenging endeavors. This research does not allow us to draw firm conclusions about cause and effect, but rather to open a new area of study by observing some common practices shared by a diverse set of projects in extreme contexts. This research will also help in developing precise contextualized recommendations for leading extreme teaming. Most of the past research on team leadership has been in the context of leading stable, bounded teams rather than the more complex work arrangements created by extreme teaming. Leadership theory on how leaders tackle the challenges of teaming in newly formed, temporary work groups that span diverse skill sets and organizations is limited. Our work in this book takes a small step toward developing this theory; we hope that the leadership functions we describe will help those in the trenches to lead successful extreme teaming in innovation efforts around the world.

OVERVIEW OF THIS BOOK

Crossing the conceptual and physical boundaries between organizations heightens the already well-recognized challenges of cross-disciplinary work. Understanding the interpersonal and technical

dynamics of extreme teaming is thus an important new area for research and practice. How do diverse groups of people come together to accomplish challenging innovation goals, requiring them to master new content, build new relationships, and integrate their ideas and expertise to produce high-value output? This book explores these questions in three parts to offer new directions for scholarly research and practical application.

Part I elaborates the need for extreme teaming, describing how business environments are evolving to make teaming across boundaries an important new activity for success. It also describes what makes this so difficult to do, and what insights can be drawn from prior work on leadership theory in the context of teams and teaming. Chapter 1 opens with a powerful illustration of extreme teaming to motivate our explanation of why organizations increasingly face the need for cross-boundary teaming. The chapter reflects the shift underway from a focus on business industries to a focus on innovation systems. We also explain why teams are the performance unit *par excellence* for innovation. Chapter 2 considers the main leadership theories that have been developed over the past few decades. One stream of research emphasizes leadership functions (rather than traits or other attributes), and we explain why this is the most appropriate approach to inform the activities of those leading cross-boundary teaming projects. We stress the need for a taxonomy centered on the extreme teaming context. Chapter 3 synthesizes team development and team diversity research to reveal the essential challenges to extreme teaming from both an interpersonal and a technical perspective. We explain why gaining additional insight into these dynamics is essential for managers who lead extreme teaming efforts. These three opening chapters thus set the stage for our study of extreme teaming in a variety of complex, cross-sector innovation projects.

Part II presents the findings from our multiyear study of extreme teaming in a set of remarkably varied industries. Our case-study approach used qualitative analyses of a series of

unusual experiences of extreme teaming to develop a set of four interdependent leadership functions fostering extreme teaming and innovation results. These leadership functions are presented in Chapter 4: Build an Engaging Vision; Chapter 5: Cultivate Psychological Safety; Chapter 6: Develop Shared Mental Models, and Chapter 7: Empower Agile Execution. Each of these chapters opens with a brief story from one of our case studies to illustrate the leadership function elaborated in the chapter and to offer an in-depth account of the practices it entails.

In Part III, we discuss and extend the implications of our findings. Chapter 8 pulls the four leadership functions together to explain the overarching framework and rationale for their use as a system of leadership practices. We also explain how this framework contributes to leadership theory and practice. To foster extreme teaming, leadership can – and must – motivate people to extend themselves in these challenging tasks. Leaders also must enable this work by removing the natural, very real, barriers to collaborating across boundaries. At the same time, leaders must help teams overcome both the interpersonal and technical challenges of extreme teaming. These dual challenges give rise to a 2x2 matrix outlining the four leadership functions we described in Part II. Chapter 9 concludes with suggestions for future research stemming from our findings, and how team-diversity and team-leadership scholars may develop studies that inform the practice of managers involved in extreme teaming efforts.

CHAPTER TAKEAWAYS

- An input-process-output view of team performance has dominated the literature on teams and team effectiveness. The theory posits that teams will perform well if they are well designed.

- Well-designed means a clear boundary, a shared goal, an interdependent task, some stability, appropriate composition for the task, and adequate resources. Correspondingly, the research on team effectiveness has tended to study teams as reasonably stable performance units with clearly defined boundaries.
- More and more teams today do not qualify as "well-designed" according to traditional definitions – because of the shifting nature of the work, not because managers have failed to do their jobs.
- Business ecosystems change rapidly and people from different occupations and organizations increasingly move from project to project, and collaborate in temporary, team-based arrangements with fluid membership.
- This new reality calls for additional emphasis on teaming as a process rather than teams as entities.
- Teaming is a dynamic activity; teams are bounded entities. Teaming is largely determined by the mindset and practices of teamwork, not by the design and structures of effective teams.
- Extreme teaming refers to cross-sector collaboration. Increasingly, companies tap into ideas and skills outside their organizational boundaries. By assembling groups of people with various backgrounds, extreme teaming sets the stage for complex problem solving and innovation that affect more than one organization.
- The goal of this book is to shed light on the leadership practices that help a group of individuals with very different backgrounds (notably, occupation, organization, and industry) develop into a high performing, albeit temporary, team.