Von Krogh, G., Rossi-Lamastra, C. & Haefliger, S. (2012). Phenomenon-based research in management and organisation science: When is it rigorous and does it matter?. Long Range Planning, 45(4), pp. 277-298. doi: 10.1016/j.lrp.2012.05.001

Phenomenon-based research in management and organization science: When is it rigorous and does it matter?

Georg von Krogh, ETH Zurich[1]

Cristina Rossi Lamastra, Politecnico di Milano

Stefan Haefliger, ETH Zurich

"No phenomenon is a phenomenon until it is an observed phenomenon" Niels Bohr

Abstract: *Recently, the editors of* Long Range Planning *called for more phenomenon-based research. Such research focuses on identifying and reporting on new or recent phenomena of interest and relevance to management and organization science. In this article, we explore the nature of phenomenon-based research and develop a research strategy that provides guidelines for researchers seeking to make this type of scientific inquiry rigorous and relevant. Phenomenon-based research establishes and describes the empirical facts and constructs that enable scientific inquiry to proceed. An account of the study of open source software development illustrates the research strategy. Rigorous phenomenon-based research tackles problems that are relevant to management practice and fall outside the scope of available theories. Phenomenon-based research also bridges epistemological and disciplinary divides because it unites diverse scholars around their shared interest in the phenomenon and their joint engagement in the research activities: identification, exploration, design, theorizing, and synthesis.*

Keywords: Research methods, phenomenon-based research, organization theory, academic community, open source software.

[1] The authors would like to thank the editorial team for its extremely helpful feedback on multiple earlier versions of this manuscript. In particular, the authors would like to thank the reviewer with deep insights into the philosophy of science. We also appreciate the constructive comments made by audiences at WU Vienna, AoM, and EURAM. The Swiss National Science Foundation supported this research with grant number 100014_125513.

1. Introduction

Recently, several scholars have criticized the strong devotion to theory that they believe characterizes management and organization science (Hambrick, 2007; Helfat, 2007; Miller, 2007). Hambrick (2007, p. 1346) noted that too strong a focus on theory is likely to "prevent the reporting of rich details about interesting phenomena for which no theory yet exists" (Hambrick, 2007:1346). Phenomena can be defined as regularities that are unexpected, that challenge existing knowledge (including the extant theory), and that are relevant to scientific discourse. Thus, the aim of phenomenon-based research is to capture, describe, and document, as well as conceptualize a phenomenon so that appropriate theorizing and the development of research designs can proceed.

Although it has often been forgotten in the current debate on epistemology in our discipline, phenomenon-based research has a long tradition in management and organization science. As for well-known research on relevant phenomena, Bartlett and Ghoshal's work (1989) on transnational corporations was phenomenon-driven in the sense that the authors claim explicitly to have begun their process of inquiry by observing interesting phenomena and then identifying and describing their salient aspects. Bartlett and Ghoshal (2002) acknowledge that they do not believe "the transnational corporation really came out of any... literature" (p. 13) and have described their research as an act of hypothesis creation rather than of hypothesis testing. Acknowledging the great importance of Bartlett and Ghoshal's work to international management, Cheng (2007) noted that the phenomenon-motivated research of the former has yielded breakthrough knowledge and new theory (p. 29). Similarly, Lavie (2006) identified a phenomenon-driven approach in the rapidly evolving literature on alliance formation that had stemmed from the accumulation, proliferation, and significance of inter-firm alliances in recent years (p. 638). Cheng observes that traditional views of the firm such as the resource-based theory have limited explanatory power in accounting for the strategic behavior and performance of connected firms and suggests the need to integrate and extend them, adopting an overtly interdisciplinary approach. An additional example, the phenomenon of emergent strategy, led Mintzberg and colleagues to spend many years studying the patterns that were visible in streams of management decisions (Mintzberg, 1978; Mintzberg and Waters, 1985), and their work has profoundly influenced the field of strategic management.

Although expectations regarding the outcomes of phenomenon-based research are high, there have been few systematic analyses of possible strategies for ensuring that the rigor of this type of research matches that of other unorthodox research strategies.[2] What characterizes such strategies? Prior work has suggested that researchers need to formulate broad, open-ended research problems that are framed in "terms of the importance of the phenomenon and of the lack of plausible existing theory" (Eisenhardt and Graebner, 2007, p. 26). Because the researcher has no way of knowing what puzzling issues may emerge from observations, *a priori* hypothesizing regarding specific relationships among the variables may prevent the proper identification of the problem. Edmondson and McManus (2007) suggested that qualitative approaches should be used to address topics about which little or no previous theory exists because such topics concern new phenomena in the world (p. 1161). However, as the editors of LRP suggested in a recent article (Baden-Fuller et al., 2008), there is room for systematic work on the research strategies that can be used in phenomenon-based research. The current paper aims to close this gap in the literature by presenting a five-step framework for conducting such research. We illustrate the framework using the case of a prominent technological and social phenomenon: that of open source software (OSS).

In recent years, management and organization science have been heavily influenced by the emergence of several new phenomena that have attracted scholarly interest. Failures within corporate governance, the environmental impact of firm-level conduct, the rapid diffusion of social networking, and social entrepreneurship are telling examples of such phenomena. However, OSS has characteristics that make it an ideal illustrative example of the phenomena explored in phenomenon-based research. First, OSS is a wide-ranging phenomenon that affects many actors, including individuals, firms, and public institutions in such diverse areas as education, science, business, and public administration. Moreover, because of this widespread impact, many scholars and practitioners are likely to be familiar with OSS. Second, OSS has a long history as a social movement that began in the 1970s, and OSS has progressively evolved into a more commercially viable product (Fitzgerald, 2006). During the last decade, OSS attracted such unremitting scholarly interest that the scientific research has been able to characterize its evolution and social dynamics appropriately. Consequently, we can use OSS to document how phenomena emerge as objects of study in the

2 For example, action research discussed in Carr and Kemmis (1986) and McNiff and Whitehead (2006) or grounded theory discussed in Glaser and Strauss (1967) and Corbin and Strauss (1990).

social sciences. Third, the OSS case allows us to illustrate all five steps of the strategy we propose for conducting phenomenon-based research. As will be shown in greater detail, the scientific exploration of the OSS phenomenon was coupled with the continuous emergence of new puzzling issues. These issues engendered a wide variety of research problems that were investigated using diverse research methods. At every point in time, it was possible to document the existence of OSS-related research issues with scholarly investigations that were still in their infancy or other issues on which mature research had already been produced. Finally, OSS is a multi-faceted phenomenon that includes components that are of interest in various scientific disciplines. Our account of the study of OSS may make it easier to apply the research strategy and lessons learned from OSS to new multi-faceted phenomena.

Phenomenon-based research is of great interest and importance for several reasons. In the social sciences, as in science, new phenomena that require explanation are continually appearing. The resulting research problems stimulate investigations that are interesting in their own right, rather than being mere opportunities for theory testing (Hacking, 1983; Simonson et al., 2001). Phenomenon-based research supports a general tendency on the part of the top-tier journals in our field (e.g., *Academy of Management Journal*, *MIS Quarterly* or *Organization Science*) to publish research that is relevant (Vermeulen, 2007; Fendt et al., 2008) and interesting (Bartunek et al., 2007) and that has a significant impact on managerial decisions (Pfeffer, 2007).

Phenomenon-based research represents an important early phase within scientific inquiry. In seeking to account for complex phenomena, researchers avoid beginning their analyses with the *a priori* formulation of hypotheses. No currently available theory has sufficient scope to account for the phenomenon or the relevant cause-and-effect relationships associated with it, and no research design or methodology is considered superior to others as a means of exploring different aspects of the phenomenon. Initial studies generate insights based on exploratory work, yielding data and research strategies that inform subsequent research designs. Therefore, the lack of appropriate theory generates attempts to make sense of preliminary results and data. A long period of observation of the phenomenon must often transpire before theorizing can proceed. Observing phenomena creates new research problems and constructs that later form the foundation for the development of new theories (see Colquitt and Zapata-Phelan, 2007). This mode of scientific inquiry

may generate breakthrough knowledge that reshapes the scientific discourse in management and organization science.

Furthermore, phenomenon-based research promises to help researchers to overcome the relevance-rigor divide that has been much debated in management and organization science (see Kharuna, 2007; Davies, 2006). Straub and Ang (2008) suggest two causes for this divide. First, researchers have been unable or unwilling to transform academic knowledge into actionable, pragmatic knowledge that is useful to practitioners. Second, strong adherence to established theories has made researchers inept at uncovering problems that are of interest to practitioners or at developing solutions to those problems (Hambrick, 2007: 1346). Sarah Rynes has observed that publication policies that favor theory development and testing create a lack of incentive for academic researchers to study "important or emerging phenomena that cannot be linked to the current theoretical frameworks" (Rynes, 2007: 1380; see also Raelin, 2007; Vermuelen, 2007). Nevertheless, notwithstanding the few rewards for relevance within the academic system, phenomena rank highest in terms of practitioner interests. As early as 1993, Daft and Lewin observed that "the cataclysmic changes occurring in the environment of organizations call for research that does not presume to test normal science hypotheses" (Daft and Lewin, 1993: ii). To help managers succeed in a continually evolving and complex world, Daft and Lewin proposed that scholars begin searching for and investigating important phenomena.[3]

This paper is organized as follows. In the next section, we characterize phenomena and phenomenon-based research in management and organization. In section 3, we propose a strategy for researching phenomena, which we illustrate with research on the phenomenon of OSS. Finally, we discuss the implications of our work and conclude.

2. Characterizing phenomena and phenomenon-based research in management and organization science

The *Oxford English Dictionary of Current English* presents a broad definition of phenomena: a phenomenon is "a. a particular (kind of) fact, occurrence, or change as perceived through the senses or

[3] The debate between the "design" and "process" schools of strategy formulation is a telling example of the rigor vs. relevance trade-off (see e.g., Mintzberg, 1990). The debate was sparked by the lack of empirical data on how strategy is actually made, which led Pascale's case study of Honda's entry into the US market (1984) to attract a great deal of attention.

known intellectually; b. especially, a fact or occurrence the cause or explanation of which is in question."[4] The last part of the definition suggests that a perceived "fact," occurrence, or change may run counter to existing knowledge. Certainly, the emergence of new phenomena is crucial in any science. As Herbert Simon observed, the "real world" generates basic research problems (Simon, 1967, p. 5). This idea echoes the longstanding view articulated by Auguste Comte that phenomena are starting points in the process of building scientific knowledge. In Comte's view, the term "phenomenon" can be used to refer to all possible subjects of observation, facts ("*faits*") that should be explained by science (Comte, 1855). However, phenomena also challenge beliefs that are commonly held within scientific discourse, thus creating tension with existing knowledge, leading to multiple, conflicting interpretations. In the philosophy of science, phenomena occupy a middle ground between theory and data in that facts about data serve as evidence of a phenomenon (e.g., specific melting point measurements, the data, lead to insights about the true melting point of lead, the phenomenon), and the general theory must account for the phenomena (Bogen and Woodward, 1988). Furthermore, we follow Apel (2011: 34), who defines a phenomenon as a contextual concept within a scientific practice that is both potential evidence for and an object of explanation of further scientific claims.

Phenomena undoubtedly have different features, depending on the scientific field into which they fall. From the natural to the social sciences, phenomena increase in complexity and decrease in generality (Heilbron, 1990). At one end of the spectrum, Comte envisioned the simplest physical phenomena, e.g., the rolling of a ball down a hill before it stops at a certain point, the explanation for which is provided by a mathematical formula with general validity. At the other end of the spectrum are social phenomena, which are complex and less general, reflecting dynamic processes. Human beings learn, modify behaviors, and create norms and rules for self-governance (Little, 1991). Any clear-cut distinction between the social and natural elements of a phenomenon risks being misleading. For instance, phenomena in management and organization science have been defined as quasi-natural (McKelvey, 1997, p. 353) with both a social and possibly a natural dimension: they result from human intentionality and from natural causes that are independent of individual behavior. Hence, in studying such phenomena, scholars may need to take into

4 The NASA Science Glossary defines a phenomenon as "a fact or event of scientific interest susceptible to scientific description and explanation," while in popular usage, the word signifies an extraordinary event.

account not only natural forces but also people's intentions, intuitions, and interactions as observed at the level of the individual, group, organization, industry, or society and as related to the shape, functioning, and processes of organizations.

Two main observations should be made about the social dimensions of phenomena. First, phenomena in management and organization science are idiosyncratic (Lincoln, 1985), multi-causal (Reed and Hughes, 1992), and chaotic in nature (Thiétart and Forgues, 1995). Like all social phenomena, these phenomena have unique characteristics that make it difficult (if not impossible) to approach them in a reductionist manner. Indeed, each individual element influences the whole system and must be understood in that way (Daft and Lewin, 1990, p. 3). Second, phenomena in management and organization science often become apparent through the reflections of scholars (Lewis, 2000) working from multiple perspectives on complex, variable-rich, and changing aspects of the world. "The perspectives differ with regard to the social phenomena they study and the processes by which they claim that construction occurs (Leonardi and Barley, 2010: 2)." Therefore, phenomena pose challenges that impact the mode of scientific inquiry used to examine them. Our central argument is that research on a phenomenon includes such activities as distinguishing, exploring, designing, theorizing, and synthesizing, taking into considerations facts and occurrences that are complex, ambiguous, and contradictory. At the outset, no research design appears dominant. Scholars should aim to reduce the equivocation caused by the "existence of multiple and conflicting interpretations about an organizational question to be asked and corrections to be made" (Daft et al., 1987, p. 357). Scholars cannot rely on extant theories, and the application of theory-driven research designs, even if they are related to the phenomenon, may result in the advancement of the established and favored theory rather than an enhanced understanding of the phenomenon under study (Cheng, 2007: 28). Traditional, hypothesis-testing strategies fail to create new knowledge about novel phenomena. Hence, these strategies may be abandoned in favor of open-ended research problems (Daft et al., 1987) to be answered by identifying new concepts and new variables that represent them. A mix of research methods is often required for such work, and as Daft and Lewin (1990, p. 6) suggest, such methods often depart from conventional approaches.[5]

The product of inquiry into phenomena is far from becoming formal theory (Blau, 1970), but this

5 For instance, the authors suggest examining outliers rather than central tendencies, claiming that there is no such thing as the "average" organization.

approach to research is a prerequisite. Management and organization science scholars are growing increasingly aware of the prominent role of novel phenomena in advancing the discipline, but there is limited discussion of the merits of phenomenon-based research and of the proper ways of conducting it. A first step in this direction is to more thoroughly explore the characterization of a phenomenon. As Stephen Cole (1992) suggests, advances in scientific knowledge should always be examined against the backdrop of the interests, work, and organizations of the scientists who create them. Thus, it is also useful to consider the scientific study of phenomena in association with the formation and growth of the scientific community and to consider the taxonomy of phases connoted with its discovery and growth. We turn to this taxonomy next.

Growth of scientific interest in a phenomenon

A phenomenon can be more or less significant in the eyes of the beholder. Thus, it is difficult to identify objective or reliable criteria for judging the significance of a phenomenon. However, phenomena exist with significances that derive from their *generality*: whether they are characteristic of a population. For example, in management and organization science, industry representatives, experts, commentators, and observers often gauge the extent to which phenomena impact the status quo of firms, markets, industries, economies, and society at large. Significance can refer to the impact of a phenomenon on these objects or units of analysis and can be identified using several questions. For instance, does the phenomenon change the ways in which goods and services are produced and exchanged within markets and industries? Does it enable the use of new technologies or alter existing technology? Does the phenomenon yield new institutions or change existing institutions in society, affecting firms, universities, or government agencies and possibly challenging explicit and implicit social and legal norms (Hodgson, 2006)? Does the phenomenon impact society as a whole by making everyday life better or worse—for example, by allowing people to access a range of goods and services at different prices or to interact in different ways? Most generally, the extent to which a phenomenon is deemed significant by an observer will depend on the extent to which it has evolved to affect people, groups, and institutions. However, a phenomenon can also derive its significance from its *uniqueness*: by challenging prevailing knowledge regarding the possible states of the world. Siggelkow (2007) uses the metaphor of the "*talking pig"* to refer to phenomena that attract scholarly interest because of their uniqueness. Another example is that of so-called Black Swans (Taleb, 2007), which are rare, high

impact, and predictable in retrospect. As the author writes, "First, it is an outlier, as it lies outside the realm of regular expectations, because nothing in the past can convincingly point to its possibility. Second, it carries an extreme impact. Third, in spite of its outlier status, human nature makes us concoct explanations for its occurrence after the fact, making it explainable and predictable (Taleb, 2007)." We propose that the significance of a phenomenon in management and organization science grows with the interest it generates in a scholarly community. We can distinguish three growth phases in the scientific study of a phenomenon. Agreement about the current state of the research in a particular area may vary across the community of scientists, but the volume of studies carried out will increase and lead to growth—if not necessarily in terms of the results, then certainly in terms of interest and attempts at advancing scientific knowledge.

Embryonic phase

In its embryonic phase, a phenomenon that is new to the scientific field needs first to be singled out against the backdrop of other known phenomena. Technologies and processes emerge, and individuals and groups display behaviors that, if continued or reinforced, could become important to our knowledge of management and organization. The phenomenon may be path-dependent, and early events, actions, or decisions may shape its subsequent evolution (e.g., Arthur, 1989). During this embryonic phase, if the impact of the phenomenon is deemed "potentially significant," a small group of scholars may develop an interest in understanding it[6] and reporting on it, even if their initial curiosity may be restrained by strategic considerations. The process of choosing research problems can be likened to investment (see Bourdieu, 1988): scientists can invest their knowledge, experience, time, and effort in different research directions, and focusing on unexplored topics is risky.

On the one hand, the likelihood of success for scientists focusing on new phenomena may be low. It may be difficult to obtain funding because funding agencies generally tend to reward proposals that focus on normal science, rather than on new phenomena (Campanario and Martin, 2004, p. 422). Scientists may also encounter difficulty publishing in mainstream journals if their research centers on new phenomena. Although top-tier management and organization journals have reaffirmed the need to open our field to new ideas (Daft

6 However, this is not always the case. Hamel and Prahalad (1994) suggested that the scholarly community is too preoccupied with theory and research methods and forgets to identify and research emerging, significant phenomena.

and Lewin, 2008, p. 177), journal reviewing can be biased against controversial or novel findings, and articles that agree with received wisdom may perhaps be easier to accept than those that challenge dominant beliefs (Pfeffer, 2007: 1337). Finally, those who focus on unexplored phenomena run the risk of remaining isolated within their communities. Isolation is highly disadvantageous because science is an increasingly "social enterprise" (Penrose and Katz, 2004) in which scientific collaboration plays a crucial role (Hackett, 2005).

On the other hand, if the ideas of a researcher about a new phenomenon are correct, the returns can be extensive. Scientists experience a trade-off in their choices regarding their research subjects. A conservative research strategy involves the incremental advancement of established knowledge and is associated with a high likelihood of publication and funding success but with modest returns on investment in terms of the visibility of the research. However, the puzzling character of phenomena, which cannot be adequately addressed using extant knowledge, may boost the motivation of scientists and encourage early engagement. Early engagement may be a prerequisite of successful research, and it may therefore be important for researchers to identify, explore, and describe significant phenomena as early as possible. The benefits of early detection include improved observations of the phenomenon's antecedents and the opportunity to identify characteristics of the phenomenon as they unfold.

In the embryonic phase, efforts are uncoordinated and are often duplicated (Gilbert, 1977, p. 276). A crucial element of this phase is the development of a new language and new terminology through which scholars can express and exchange their ideas. Common language provides the basis for the emergence of a distinctive identity shared by the members of the scientific community (Nag et al. 2007, p. 938) and enables scientists consolidate their interest in the phenomenon by developing constructs and shared ways of discussing it.

Growth phase

As scientific interest grows, the phenomenon becomes more visible to a larger academic community. The phenomenon "solidifies" as uncertainty about the regular qualities of the phenomenon decreases. This effect, in turn, is observed as facts or occurrences at the individual, group, organization, industry, society or technology level reveal the shape, functioning, and processes of management and organizations. In addition,

the facts and occurrences that are discovered may become more intertwined, indicating the complexity of the phenomenon. The causes of or explanations for these facts and occurrences are repeatedly called into question. The discrepancy between a phenomenon and the available theory can pique the interest of a growing number of scholars who will multiply their attempts to capture various aspects of the phenomenon using a variety of research designs. Through these processes, the emerging characteristics of the phenomenon will be compared with new and existing theoretical frameworks and concepts. A small circle of interested scholars may evolve into a scientific community: a group of scholars who identify themselves as such, who interact and who are familiar with each other's work (Cole, 1983, p. 130). Kuhn (1970) acknowledges that a community may form around a theory, a phenomenon, or a class of problems. However, according to Kuhn, whereas members of a scientific community have typically undergone similar educations and professional initiation (Kuhn, 1970, p. 177), phenomenon-based research may tend to attract scientists with shared interests and different training.

Mature phase

In its mature phase, the study of a phenomenon reaches a level of consistency in which regularities encountered in the previous phase become predictable. Thus, distinct classes of characteristics emerge that reveal the richness of this multifaceted phenomenon. Scholars become aware that some aspects of the phenomenon are more challenging and deserve more attention, which encourages them to develop an increasing variety of research designs, methods, and explanations. The scientists investigating the phenomenon may acquire tenured positions at major universities (Stinchcombe, 1994) and may succeed in procuring regular financial support (White et al., 2004) through successful grant-bidding. These researchers may also establish new associations, conferences, journals (Sarafoglou and Paelinck, 2008), and PhD programs. Over time, the phenomenon gradually merges with other known scientific phenomena, disciplinary bodies of knowledge, and methodological perspectives. This disintegration may result from the interplay of two tendencies. As the complexity of the phenomenon increases, its multifaceted characteristics may lead to the emergence of competing regularities, rather that one major set of regularities. However, phenomena in management and organization science also "vanish" or go out of fashion in the sense that their significance as perceived by organizations and other actors may wane, or their occurrence may become an

integrated, normal part of organizational functioning. In the former case, competing notions, interests, and research agendas are expected to become more prominent. Strong emergent but competing regularities can be understood as new phenomena in the embryonic phase of study. Certain scientists may find that their research reveals unexplored problems and start to investigate them, making contested observations and using different research designs and methods. This brings us full circle to the first phase of another phenomenon (Gilbert, 1977, p. 276). The social facts and occurrences that originally gave rise to an embryonic form of scientific inquiry no longer "surprise" scientists or management practitioners and tend to become a normal part of a functioning organization.

So far, we have outlined the growth of scientific interest in a phenomenon in management and organization science coupled with some of its underlying social dynamics. Next, we turn to a strategy for phenomenon-based research and illustrate its use based on the case of research in open source software.

3. A strategy for phenomenon-based research

The academic research on the OSS phenomenon can be used to develop a research strategy with specific activities and goals that can help researchers to conduct rigorous and relevant research on phenomena. Traditionally, knowledge creation in management and organization science begins with theory formulation, which is followed by the development, implementation, testing, and analysis of models. These activities, in turn, help researchers to identify implications and remaining questions. Before this "normal science" process can begin, researchers who are conducting phenomenon-based research must distinguish the phenomena from other facts and occurrences. Our account of research on OSS introduces each research activity in context and makes it possible to identify more general research goals for each activity.

The current success of OSS stems from the long history of the free software movement, a social movement that began within the hacker culture of the 1970s and received formal support from the Free Software Foundation, which was founded by Richard Stallman in 1985 (DiBona and Ockman, 1999; Himanen, 2001; Stallman, 2002). The evolution of the social movement stirred the interest of a community of scholars who pursued research on OSS during the last decade and have achieved a level of shared understanding of the phenomenon. The development of several institutional arrangements that support the

exchange of ideas and discussions among scholars favored the growth of this community (see Price, 1963; Crane, 1972; Verspagen and Werker, 2003). First, in 2000, an Internet platform was established by Eric von Hippel and Karim Lakhani at the MIT Sloan School of Management.[7] Via this platform, interested scholars could register, publish their papers (including work in progress), discuss their projects, and make announcements. At the end of 2008, the platform featured two active mailing lists and 320 contributions from more than 350 authors. Second, a number of special conferences and workshops were organized,[8] and important management and organization conferences devoted sessions to OSS, including the Academy of Management, Strategic Management Society, and the HICCS, INFORMS, DRUID, and EURAM conferences. Third, in 2001, special issues on OSS-related topics started to be published by journals with high impact in the field, including *Information System Journal* (2001 and 2002), *Research Policy* (2003), *Management Science* (2006), *Journal of Management and Governance* (2007), and *Information Economics and Policy* (2008).

To illustrate the phenomenon-based research strategy using the OSS case, we highlight the salient scholarly work on OSS in a matrix (Table 1). Whereas the rows are labeled with the five activities included in phenomenon-based research (distinguishing, exploring, designing, theorizing, and synthesizing), the columns indicate the growth phases in the scientific study of the phenomenon (embryonic, growth, and mature). Linking the phases and research activities, Table 1 illustrates each activity with specific examples of contributions that tackled puzzling issues that emerged during the evolution of the OSS phenomenon as a subject of academic inquiry. Consequently, Table 1 presents a synthetic, informative image of the research on OSS and can also be used as a template for organizing scholarly work on other phenomena.

Two points of clarifications are important. First, the phases of the phenomenon are socially framed by the scientific community (Hargrave and Van de Ven, 2006). Certain scholars may perceive a phenomenon as embryonic, whereas their colleagues may describe it as mature. The phases in themselves can thus be an object of inquiry, (e.g., Nakakoji et al., 2002). Secondly, although the states are by definition sequential, the five research activities are not. Variations in the activities, both within and across phases, help to formulate

7 The platform is no longer online and was located at http://opensource.mit.edu.

8 The first edition of the International Conference on Open Source Systems was held in Genoa, Italy, in 2005 and repeated in Como, Italy in 2006, in Limerick, Ireland in 2007 and in Milan, Italy in 2008.

new research problems and to promote an understanding of the phenomenon that extends beyond the interpretative lens and the research designs currently being used. Consequently, one research agenda may include projects that explore new facets of the phenomenon after theorizing or distinguish new concepts after having synthesized prior work. Combining the states and the activities into a matrix may gloss over the subtleties of diverse research agendas and influential developments in the field. However, this synthesis also makes it easier to understand the direction of the discourse within the community, which is depicted as an arrow in Table 1.

Research Strategy \ Phase	Embryonic	Growth	Mature
Distinguish	1: Hacker culture, motivation 2: Narratives, ethnography 3: Stallman, 2002 Raymond, 1999	1: Innovation theory, collective action theory 2: Conceptual, new concepts 3: von Hippel&von Krogh, 2003a	1: Coordination, governance 2. Ethnography, case study 3: Shah, 2006; O'Mahony&Ferraro 2007
Explore	1: New metrics (e.g. LOC, email counts) 2: Descriptive and inductive statistics 3: Koch&Schneider, 2002	1: Platform strategy, software architecture 2:Archival data 3:West, 2003	1: Motivation and performance of developers 2: Survey 3: Roberts et al., 2006
Design	1: Helping behavior in user community 2: Opportunistic approach Lakhani&von Hippel, 2003	1:Access to very large repository (e.g. SF.net) 2: Shared infrastructure and service to researchers 3:van Antwerp&Madey, 2008	1: Developer skills and project performance 2:Advanced modeling techniques 3: Giuri et al., 2008
Theorize	1: Incentives to contribute to OSS 2:Abductive theorizing 3: Lerner and Tirole, 2002	1. Motivations of OSS developers 2: Survey 3: Hertel et al., 2003	1: Code reuse in OSS 2: Deductive using survey 3: Henkel&Sojer 2010
Synthesize	(not applicable because premature)	1:Agenda setting and legitimization 2: Review and conceptual contribution 3: Dalle et al., 2008	1: Comprehensive or topic-specific reviews 2: Review, edited volume 3: Feller et al., 2005

1: Topics 2: Research designs 3: Exemplary contribution(s)

Table 1: Phenomenon-based research strategies given the growth phases of research on OSS

Distinguishing

When the study of the phenomenon was still in its *embryonic* phase, some of the founding figures in the OSS movement were the first to *distinguish* its key features against the backdrop of existing software development practices (Raymond, 1999; Stallman, 2002; Himanen, 2001). These founding figures were computer scientists (e.g,. Richard Stallman, Eric Raymond, Bruce Perens, and others: see DiBona and

Ockman, 1999),who championed the values of the *hacker culture* and who wanted to preserve the freedom of developers to share software code uninhibited by intellectual property considerations. In his seminal contribution, *"The cathedral and the bazaar,"* Eric Raymond (1999) acknowledged the peculiarity of OSS developers' motivations and highlighted the differences between the traditional, centralized mode of software development often found in firms in the software industry and the decentralized development process for OSS. The OSS movement was presented as a singular *democratic* and *hierarchy–free* movement formed by eccentric software developers coding on a voluntary basis in their spare time[9]. Furthermore, as the OSS movement gained momentum among software developers and users, it became clear that the phenomenon it represented deviated sharply from established theories and findings on innovation in many fields, including management and organization science. Von Hippel and von Krogh (2003a) observed that innovation in OSS could be explained neither by a traditional private-investment model of innovation incentives nor as part of the collective action approach to innovation. The authors developed the private-collective innovation model, which contained elements of both private investment and the collective action model (p. 209). The phenomenon was predicted to be growing and to have far-reaching implications for organization science.

Distinguishing in the mature phase of research mainly focused on the organizational structures and routines within OSS communities, and thus the concepts at play became more granular. For instance, Shah (2006) analyzed the effect of governance structures in OSS communities, and O'Mahony and Ferraro (2007) identified emerging forms of governance in Debian GNU Linux. Drawing on years of their own research on the phenomenon and on research by the community of scholars, these authors were able to identify a number of relevant concepts related to communication routines, coordination mechanisms, and governance structures within OSS projects. The use of these well-understood concepts in empirical studies may have linked the phenomenon to other emerging phenomena, as discussed above. In this study, Raasch et al. (2009) build on

[9] It is worth noting that the strong ideological orientation of these early writings was fated to bias the future research in the field. The *hacker culture* nourished several myths about OSS that may have hampered research and favored the investigations of certain themes to the detriment of others. Raymond's work gave rise to a lively research stream on the motivations of OSS developers, whereas the superiority of the OSS programs over their proprietary equivalents or the democratic organization of OSS communities were rarely questioned. Thus, it took time for the academic community to become aware of the growing importance of firms' presence in the movement and of the hierarchies in OSS communities (O'Mahony and Ferraro, 2007).

the concept of "free revealing" innovation-relevant information (Harhoff et al., 2003), develop the idea of open-source innovation and explore its applicability in domains beyond that of software.

The first activity in phenomenon-based research involves giving the phenomenon an identity by distinguishing it from other occurrences. Researchers engage in a differentiation process that emphasizes the peculiarities and other distinctive characteristics of the phenomenon (see also Merton and Storer, 1973). These conceptual boundaries make it possible to identify instances of the phenomenon. At the outset, a phenomenon is typically defined in terms of what it is not (Lewis, 2000, p. 762). An example of this is Bartlett and Ghoshal's distinction between the transnational enterprise and other international organizations.

Developing various concepts and choosing between them creates distinctions and is a key part of phenomenon-based research. As researchers start to gather data about the phenomenon and the associated facts and occurrences, they may also change the concepts that allow them to make those distinctions. The amended concepts, in turn, may guide the search for new data. Conceptualizing allows the exploration of the phenomenon. Concepts can be understood as a filter through which data are selected (Bettis and Prahalad, 1995). However, a filter may not fit the emerging data, and existing concepts may need to be rejected or stretched or new concepts developed. As a vehicle for distinguishing phenomena from other occurrences, concepts change in two directions. First, they may become more granular and diverse as research progresses through the data collection process. Second, they may expand or contract depending on what data the researcher uncovers. As indicated in the last section, concepts need to be developed around the phenomenon rather than around the theory. Their purpose is to help researchers to filter data and devise a description of the phenomenon.

Exploring

As the distinction process proceeds and as new scholars enter the community and investigate the OSS phenomenon, new metrics evolve that favor the identification of more accurate or adequate observations. New measures, survey questions, frameworks of reference, and observations that are deemed salient sharpen the definition of the OSS phenomenon. For example, scholars studying motivations for engaging in Open Source activities needed indicators that would capture the efforts of participants participating in open source projects. Initially, effort was proxied by the numbers of communications sent to

a mailing list and the numbers of lines of code written (Koch and Schneider, 2002). However, although these measures indicate effort levels, more fine-grained concepts can be used to filter the data. For instance, one might distinguish between developers (who contribute code) and other participants (lurkers and other mailing list participants; see, for instance, Nonneke and Preece, 2000; Spaeth et al., 2008). The fine-grained concepts also filtered out contributions of real importance to the design of the technology per se. Although some developers write highly efficient software, with few lines being used to solve complex tasks, other developers may need to use more lines of code to complete the same task. Moreover, certain parts of a design may be more important than others in ensuring that the software works. Thus, a number of authors (e.g.. Dalle and David, 2004; Baldwin and Clark, 2006) introduced measures of software architecture for OSS that identified more or less important components of the designs, and different levels of contributor effort could be assigned to them. In a similar vein, West (2003) studied the software architecture of a number of large hardware and software firms to understand the use of OSS as a component of hybrid platform strategies.

During the growth of scientific interest, the authors apply complex psychological measures, ranking the developers and their degree of effort on a project (Roberts et al. 2006). These exploration efforts have also intensified communication between scholars. The FLOSSMetric project (Gonzalez-Barahona, 2009) collected and shared data on software development within OSS projects and provided institutional support for examining problems specific to industry applications of OSS. The project published detailed information about OSS-related practices used by small and medium-sized firms.[10] The specific goal of facilitating the industrial use of the research findings on OSS indicated more mainstream theorizing: it was assumed that practitioners would generally be interested in OSS and would integrate OSS-specific results into their organizational and managerial routines.

Distinction and exploration are related activities. Once a phenomenon has been distinguished from other occurrences and described using specific concepts, researchers can explore the phenomenon further. The exploration process begins with the intensification of data-gathering within or outside the concepts that describe the phenomenon. Outside data are important because they shows the limits of the concepts and the

10 See URL: http://guide.conecta.it/index.php/5._Best_practices_for_FLOSS_adoption

boundaries of the phenomenon. Exploration proceeds best through the relatively unrestricted gathering of primary data on the phenomenon (e.g., through interviews) as well as through the use of secondary data (e.g., news reports or online sources). In grounded theory, scholars have proposed that data gathering should continue until theoretical saturation has been reached (Glaser and Strauss, 1967). This saturation happens when the benefits of additional data gathering become marginal because the analysis tends to confirm working constructs or emerging theoretical links. However, exploration is slightly different in phenomenon-based research. Here, the purpose is to create concepts that serve as an efficient filter in data gathering. One critical question that can help a researcher choosing whether to continue the data gathering process is the question of whether the concepts being used allow insight into the phenomenon by distinguishing relevant data from non-relevant data. Thus, researchers should consider what the data that have been filtered out indicate about the limits of the phenomenon and whether the concepts should be stretched to include new data.

Designing

In research on OSS, scholars have developed a wide variety of research designs based on original and highly specific sources of data. OSS development usually relies on computer-mediated communication and online repositories of software code that produce a very large amount of data—in many cases, millions of lines of code or hundreds of thousands of messages. Because the code was publicly available and the software development process was transparent to external observers, researchers were able to extract technical data from the code base of projects hosted in online repositories and from project mailing lists used by developers to coordinate their efforts. The availability of information is a distinguishing feature of the OSS phenomenon that has been heavily exploited in many studies (Koch, 2008 and Den Besten et al., 2008), and as scientific knowledge about the phenomenon grew, this feature of OSS allowed for the use of advanced modeling techniques, such as econometric models with large samples (Giuri et al., 2008) or social network analysis (Oh and Jeon, 2007; Kuk, 2006).

Research on OSS developers and projects employed opportunistic design in the embryonic phase. Lakhani and von Hippel's (2003) seminal work showed people's motives for contributing, sometimes even anonymously, and helping beginners in the Apache project. This work did not exclusively employ research

designs related to motivational psychology (e.g., the inventory of items employed in the questionnaires was not necessarily used in prior research), but it revealed intriguing insights about the phenomenon. Aware of the growing interest in the phenomenon within a global community of scholars, researchers working with Greg Madey at the University of Notre Dame in Indiana succeeded in providing access to the Sourceforge database for academic purposes (van Antwerp and Madey, 2008). Access to developer and project demographics, including information about project maturity, prompted new research designs and facilitated further theorizing (Comino et al., 2007).

The adoption of OSS by firms widened the scope of the appropriate research designs and the sample strategies used by organization and management scholars who often borrowed them from other disciplines. Examining the application of OSS in the business models of software firms using a large sample, Bonaccorsi et al. (2006) identified a common practice in the Italian software industry. OSS became more widely adopted and gained acceptance as a standard approach to managing business processes. Insights into the phenomenon of OSS expanded the extant scientific knowledge in management and organization science (O'Mahony and Bechky, 2008) and had implications for management teams, which learned from established insight into how OSS communities work (Dahlander and Magnusson, 2008).

Activities 1 and 2 lead to new concepts, information, and interpretations. As the researcher gradually develops an understanding of the phenomenon, s/he may recognize the need for new research designs. Within a classical deductive research strategy, the designs would follow from the theory formulation process. However, given the emergent nature of the phenomenon and the data, the research design in this case evolves from attempts to answer broad questions: "What is the nature of this phenomenon?" and "How can this phenomenon best be researched?" At this stage, researchers may choose not to attempt to build theory but may instead elect to report on the phenomenon. The types of data and concepts gathered indicate what alternative research designs may help researchers who study the phenomenon. For example, phenomena may produce a host of qualitative or quantitative data. In some instances, designs that produce qualitative data will be more important in the early phases of the research. Alternatively, a design that produces quantitative data may help to validate a new observation and make it possible to triangulate the findings against qualitative data. Concepts may need to be "stretched" or replaced such that they will be consistent with both

qualitative and quantitative data. Furthermore, it may be necessary to gather cross-sectional or longitudinal data to ensure a filtering capacity that changes over time.

Phenomenon-based research designs can be opportunistic because they are not initially guided by theory or, more specifically, the development of inductive theory. Additionally, the phenomenon under study may be evolving, and certain aspects of the phenomenon may only be able to be studied at one particular point in time. Opportunistic research designs provide unprecedented insight into the phenomenon and the dynamics of social practice. However, such research also limits the depth and scope of the data gathered and the extent to which the concepts used to describe the phenomenon can work actively as a filter. Opportunistic research is important for advancing scientific knowledge of a phenomenon because it can reveal insight into how the phenomenon can best be researched. Therefore, accompanying work that reviews and evaluates research designs used (alongside substantial contributions to the evolving theory) is even more imperative to the rapid advancement of research than is the case in traditional hypothesis testing.

Theorizing

During the embryonic phase of the research, Lerner and Tirole (2002) were puzzled by the voluntary contributions of developers to the OSS community's common pool of code and knowledge. Hence, the authors developed an economic model for explaining the behavior of OSS developers using traditional cost-benefit analysis. The argument of Lerner and Tirole is built mainly on economic reasoning. The authors applied a set of concepts and assumptions related to the rationale of OSS developers from economic theory to their work on the phenomenon. Moreover, as the phenomenon and the research emerged together, alternative theories were presented that comprehensively addressed the motivation of OSS developers. Concepts such as intrinsic motivation or sense of community belonging were borrowed from the psychological and sociological literature, thereby enlarging the disciplinary lenses used in the inquiry. Hertel et al. (2003), advancing knowledge of the phenomenon in its growth phase, combined two theories to explain the motivation to contribute to OSS. These theories were Klanderman's resource mobilization model (Klandermans, 1997) and models of individual motivation on teams adapted to virtual work.

Shah (2006) developed a theory inductively, showing that the motivation of developers evolves differently in gated and open source projects. As mentioned in the last section, an inductive approach is

particularly appropriate for examining phenomena that are poorly understood, a point that O'Mahony and Ferraro (2007, p. 1083) make explicitly. However, these authors built on insight into the phenomenon presented in earlier work and thus were able to refine their research problems using concepts such as that of varying community types or communication behavior. Henkel and Sojer (2010) used a deductive approach to examine predictions from the software reuse literature in the context of OSS. David and Rullani (2008) built on a rich body of literature on the roles of OSS developers in their study of innovation processes in OSS development. All of these authors learned from earlier research designs and used concepts in their research that had been established in the context on the phenomenon.

As the phenomenon evolves, scholars progressively learn to judge the extent to which it overlaps with or deviates from extant theories. Theorizing about the phenomenon can occur via three main paths that all aim to shed light on the multiple facets of the phenomenon. Specifically, scholars can build theory on the phenomenon by 1) referring to extant theories, even to highlight what the phenomenon is not; 2) adapting, modifying, or combining extant theories; and 3) inductively generating new concepts and theories. Although the third of these activities may be common in the embryonic and growth phases of a phenomenon, there are three main differences between theorizing in phenomenon-based research and the inductive theorizing described by Glaser and Strauss (1967). First, phenomenon-based research considers both inductive and deductive theorizing as viable approaches to theory building. The use of one or the other may be justified based on the phase of the research and the particular needs of the scholars conducting the distinguishing and exploring processes. Second, the proposed theoretical concepts are not usually grounds for generalizations, not even to the phenomenon itself, given its social dynamics. Third, as previously noted, phenomenon-based research encourages interaction between design and theorizing. As phenomena evolve and theories develop, the research design may need to be adapted, as well. It should be noted that there may be numerous instances of design and theorizing, which presents a challenge insofar as urgency often creates a need for opportunistic research designs intended to ensure the "real-time" capture of certain aspects of the phenomenon.

Synthesis

During the growth phase for the OSS research, a number of the aforementioned journals published special issues that reviewed the relevant literature on the phenomenon in an effort to help guide future

research. During the embryonic phase synthesis, however, synthesis does not appear to be an appropriate strategy. Von Hippel and von Krogh (2003b) helped to synthesize the previous work on the phenomenon by sorting that research into three areas within management and organization science: the motivations of OSS contributors; governance, organization, and the process of innovation in OSS projects; and competitive dynamics enforced by open source software. The recent special issue of *Information Economics and Policy* contributes to the debate on strategies for exploring and designing by specifically addressing the empirical study of open source software. The editors of this issue (Dalle et al., 2008) liken the production of OSS to open science (Dasgupta and David, 1994) and collaborative peer production (Benkler, 2002; 2009; Lessig, 2008; Den Besten and Dalle, 2008) and synthesize the issues surrounding the topic of sustainability in the practice of OSS development. There were also a number of edited and authored books that reviewed earlier work and proposed a future research agenda for scholars. For instance, Feller et al. (2005) aimed to shed light on multiple theoretical and empirical aspects of the phenomenon (p. 12). Fogel (2005) focused on the open source development process to provide useful insight to managers who wished to run their own open source project.

The current research on OSS explores the various new and challenging avenues for research that have branched out progressively as new and interrelated patterns have emerged, posing challenges to phenomenon-based research strategy. In other words, what research in the mature phase considered the unique phenomenon of OSS has become standard practice for firms, and new phenomena have emerged that build on the existing work. Hence, synthesis here also involves the exploration of new questions during the embryonic stages of research. For instance, although the involvement of firms in OSS projects is currently a generally accepted fact (Capra et al., 2011), research about OSS entrepreneurship is still in its infancy (Dahlander and Magnusson, 2008; Gruber and Henkel, 2006; Alexy, 2008). At the same time, scholars are becoming increasingly aware that more attention should be paid both to the impact of firms on OSS communities and vice versa (O'Mahony and Bechky, 2008). An increasing number of contributions now focus on the economics and innovation performance of OSS firms (Dahlander, 2007; Stam, 2009; Piva et al., 2010), and scholars interested in organizational design have begun to explore how firms should organize internally to interact effectively with OSS communities (Colombo et al., 2010).

As the phenomenon evolves, gains significance, and attracts interest, considerable opportunities develop for work that synthesizes the increasing amount of academic research output. Synthesis is a prerequisite for future research on the phenomenon. Synthesis decreases the risk that numerous scattered contributions will lead to slow scientific progress, fragmented insights, or the repetition of flawed research designs across studies. As part of a research strategy, synthesis is also important for assessing whether continued research on a phenomenon is warranted; for example, the researcher might consider whether knowledge about the phenomenon is gradually becoming integrated with the established wisdom in the field. It also helps to assess whether new theorizing and research designs are making substantial or marginal contributions to the understanding of the phenomenon. The main challenge of synthesis is the need to remain theory and design neutral. Neutrality is important because synthesis is intended to provide insight into the phenomenon as a whole, rather than as a set of separate, compartmentalized units that include facts, occurrences, or concepts.

Table 2 summarizes the research goals for each of the research activities in a phenomenon-based research agenda. It is likely that exploratory work will dominate as long as the majority of scholars perceive the phenomenon to be in an embryonic state. Synthetic work may follow later when scholars agree that the body of research on the phenomenon should be summarized and evaluated. Activities 1-3 constitute the core of phenomenon-based research, whereas the fourth and fifth activities are in some sense less particular to this kind of research and pave the way for more conventional research approaches.

Research activities	*Research goals*
Distinguish	• Bracket peculiarities encountered against existing body of knowledge • Describe context in broad cultural terms • Identify inadequacy of given body of theory and knowledge in the field • Identify relevant concepts for study
Explore	• Intensify data gathering inside and outside the focal concepts • Generate more solid concepts that can serve as filter for further data gathering • Concepts serve to distinguish relevant from irrelevant data to describe the • phenomenon
Design	• Experiment with alternative research designs • Employ opportunistic research designs that expand or collapse concepts to take into account the dynamics of the phenomenon
Theorize	• Distinguishing the phenomenon from existing theories • Expand, adapt, modify existing theory • Generate new theory inductively • Iterate with new research designs to build theory
Synthesize	• Review existing studies and research designs • Assess whether more research on the phenomenon is warranted and making significant or marginal contribution • Establish overview of phenomenon by remaining design- and theory-neutral • Begin to generalize to management and organization theory

Table 2: Phenomenon-based research strategy: activities and goals

4. Conclusions and implications for future research

The target of phenomenon-based research is the early capture of a phenomenon as necessary for theoretical work and the development of effective research designs. However, this approach is a notably forgotten step in management and organization science. Although important contributions to our discipline began here, many authors claim that we have become theory-driven and thus tend to forget how to view a phenomenon in its totality. Phenomenon-based research can never replace traditional theory-building and testing, but it can complement that approach. In relentlessly pursuing an improved understanding of a phenomenon, researchers and practitioners may value insights more than the choice between quantitative or qualitative methods. Moreover, scholars struggling with specific research problems may be able to identify solutions by studying phenomena that are new to the scientific community, rather than solely focusing on existing research objects. Even when they are working on different problems in different fields, scholars

benefit from exchanging knowledge about phenomena that are of common interest.

Thus, we can summarize the key concepts of this article as follows. First, one debate in management and organization science is whether the field should embrace plural paradigms, as are often found in complementary and/or competing theories and methods (van Maanen, 1989; Pfeffer, 1993). The call for more phenomenon-based research implicitly requires "paradigmatic pluralism" because scientific knowledge will advance in close relation to the phenomenon. When many new phenomena are discovered, knowledge creation increases. By experimenting with research activities related to the study of a phenomenon, one can develop a pragmatic phenomenon-based research strategy. The identification of a scientific phenomenon in its multi-faceted and dynamic aspects and the iterations between research activities unite scholars in the search for better data, more fitting data filters (concepts), and innovative research designs that may cut across epistemological divides. One cautionary note that emerges from the OSS case is that early work that represents the views of practitioners in the field may not employ balanced modes of scientific inquiry in the early stages, due to well-intending but subjective ideological bias (Fitzgerald, 2006).

Furthermore, when many phenomena are discovered, research design flourishes. We have argued in this paper that innovative research designs may be necessary to make phenomena researchable. The implications of this argument are not trivial; researchers may need to draw upon methods from adjacent fields and disciplines in developing the design of their research. For example, to research the links between organizational form within software development and the evolution of OSS, MacCormack et al. (2006) used design structure methods that had been developed in computer science. Such a technique holds particular challenges; it can create the need to cooperate with researchers from different disciplines, to formulate shared research problems, or to scrutinize data gathering and analysis procedures using standards from several scientific disciplines. Although this interdisciplinary nature will add uncertainty to any research project, it also greatly enriches our own discipline. Our experience as researchers of OSS confirms that the theoretical positioning of the work may create additional challenges, due to unresolved questions regarding the transferability of theory from established contexts to the phenomenon. These challenges may result in the need to revise the entire research design during the review process. Researchers may want to expend additional effort justifying and outlining the underlying theoretical assumptions that motivate their specific

research design when studying a phenomenon so that editors and reviewers appreciate the differences created by the context and recognize that they need to learn more about the phenomenon.

Social integration may be a norm rather than an exception in phenomenon-based research. The emergence of new communities of scholars can reveal commonalities between researchers across disciplines and institutions that were not obvious before their common interest in the phenomenon developed. As observed in OSS research, a phenomenon can unite scholars via source texts, shared platforms, and conferences. Eventually, the community of scholars that drives scientific inquiry on the phenomenon may redraw institutional boundaries, perhaps integrating their various academic disciplines to a certain degree.

In the natural sciences and engineering, there are several outstanding journals that openly encourage interdisciplinary work, including *Nature*, *Science and Physical Review Letters*. In our own field, many journals are open to interdisciplinary contributions, as well. However, rather than explicitly encouraging interdisciplinarity, *Long Range Planning* has positioned itself as embracing phenomenon-driven research that involves work across fields and disciplines. This seems to be a productive approach insofar as it focuses on the object of the research rather than its process and outcome. Indeed, the position *of Long Range Planning* is unconventional, inspiring, and interesting, and we are sure that it will greatly benefit our field.

Managers engage in deeply embedded practices that are often not apparent to researchers examining a particular phenomenon. However, if it is performed well, phenomenon-based research can have implications for practice. To search for relevant data on a phenomenon using innovative research designs can generate relevant problems without sacrificing rigor. As previously discussed, rigor in phenomenon-based research can require not only adherence to disciplinary tools for evaluation but also a willingness to change the definition of rigor in a particular context as scientific knowledge about the phenomenon accumulates. One implication of this requirement is that results and their quality may be judged by practitioners and scholars using standards whose evolution may outpace the publication speed of management journals. It pays for researchers working on novel phenomena to evaluate and reference unpublished work and, toward this end, to rely on platforms that make early manuscripts available. In the OSS context, the platform referenced above deserves credit for its function in this regard and should serve as a template for facilitating research on new phenomena.

In sum, in our view, phenomenon-based research should aim to produce scientific knowledge and research practices that enable scholars to think, talk, and write about a phenomenon. Approaching a phenomenon in a systematic way enables researchers to distinguish aspects of the phenomenon, propose and select theories, and conduct research using various types of research designs. Synthesis is essential to achieving the level of understanding of a phenomenon that can allow scholarly exchange to evolve. A phenomenon-based approach to scientific inquiry may help to reconcile long-lasting epistemological divisions within management and organization science. Judging by the number of papers published in journals indexed by Thomson Reuters Journal Citation Reports, the discipline has expanded far more than adjacent such disciplines as economics, sociology, and psychology over the past 50 years (Rynes, 2007). In the 1970s and 1980s in particular, this growth was coupled with a raging debate about the epistemological and ontological foundations of organization and management science (see, among others, Burrell and Morgan, 1979; Hinings et al., 1988; Reed, 1988; Jackson and Willmott, 1987), which led assumptions, theories, and methodological approaches to be questioned as well (Hatchuel, 2001; Hambrick, 2004). Starting in the early 1990s, various scholars began to comment that these divides should come to an end because they were threatening knowledge creation within the discipline (Gordon, 2001). Burrell (1996) argued that management and organization science had become a "tower of Babel" of fragmented explanations, and Pfeffer (1993) lamented that the discipline had reached no consensus about its most significant research issues. In this debate, it may be important to return to the study of relevant phenomena. For example, McKelvey (1997) proposed a scientific-realistic approach to inquiry. In this approach, scientific progress stems from theory testing and falsification, from the inductive development of new theories (Churchman, 1971; Seth and Zinkhan, 1991) for previously unexplained phenomena, and from the "abductive" (Peirce, 1992) expansion of existing knowledge to include such phenomena (Hunt, 1991).

When the aim is to convey insight into research on a phenomenon by cultivating a phenomenon-based research strategy, the research path may exhibit a number of the idiosyncrasies of the phenomenon itself. The strategy proposed may provide guidelines for research on current and future phenomena and may be further refined and validated through additional use and methodological discourse, respectively. In presenting this strategy for phenomenon-based research, we hope to contribute to such a discourse. Table 2

suggests a set of specific goals for each research activity involved in the study of a phenomenon. These goals have specific methodological implications: for instance, concepts may be used to filter data, and iterative approaches to research design may be employed. Understood as a link between the general theory and the data, phenomena play a critical role in our field by encouraging researchers to conduct rigorous studies that, in turn, may reveal concepts and encourage theorizing in management and organization science more generally. Hence, as Apel (2011) suggests, phenomena act both as potential evidence and as a basis for further theorizing within scientific practice.

Future research should address the question of when a phenomenon is "ripe" for research. Researching a phenomenon in the early phase entails high risk, especially when researchers are unsure about the sustainability of the phenomenon. However, engaging in such work at an early stage can produce generous returns. Embarking on OSS research in 2000 was clearly risky. However, the phenomenon offered unusual data transparency, and because the scientists employed rigorous and increasingly sophisticated research designs, their work revealed theoretical tensions and yielded new insight into relevant research questions in several fields.

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