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Abstract

Analyzing generative group activities against the backdrop of an increasingly connected world, this theory development paper introduces the concept of "generative collectives" as a new framework for classifying internet-based collectives and a novel theoretical lens for explaining why some internet-based groups are more generative than others. Generative collectives are groups of people with shared interests or goals who mutually engage in rejuvenating, reconfiguring, reframing and revolutionizing acts. We submit that any type of collective has the capacity to be generative; however, some collectives are more generative than others. We explore two core structural dimensions of generative collectives and provide a framework for classifying these collectives and their respective levels of entropy as a proxy for their collective generative capacity. Subsequently, we derive and illustrate four archetypes of generative collectives, which can help account for the varying levels of generativity in different groups. Finally, implications for future research and practice are discussed.

Keywords: Generativity, collectivity, creativity, innovation, entropy, distributed work

Introduction

The ubiquity of mobile computing has generated a worldwide integration platform for communication and collaboration that provides a space for universal compendia of ideas and an 'architecture of participation' (O'Reilly, 2004). Consequently, we witness a proliferation of group activities that occur via the internet both within and outside traditional organizations. Within traditional organizations, the internet enables members of the organization to interact, exchange knowledge, and share ideas within and across organizational boundaries. Outside the realm of organizations, the internet has enabled a whole range of collective activities, such as networking, friendship, sharing and co-creation, as well as the possibility to generate contributions and insights of all sorts from a very large and diverse group of people.

In this theory development paper, we introduce the notion of "generative collectives" to describe *groups of persons with shared interests or goals who mutually engage in rejuvenating, reconfiguring, reframing and revolutionizing acts*. Hence, we focus on those sets of internet-based collective action that relates to generative activities and creative outputs. Generative collectives are harbingers of creativity, innovation and change against the backdrop of a digitized and increasingly connected world. We assert that generative collectives are of interest because they provide insights into a distinctive set of dimensions of collectivity that fosters grassroots creativity and innovation, especially in dynamic, loosely structured and self-organized environments.

We submit that any collective has the capacity to be generative to some degree and refer to this quality as "collective generative capacity"; that is, *the ability of a generative collective to engage in acts of rejuvenating, reconfiguring, reframing and revolutionizing within a particular goal-driven context*. Nevertheless, the actual level of generative capacity of a collective—i.e. whether it is high or low—depends in a great part on its specific structural configuration. Consequently, we develop a framework for analyzing how and why some collectives are more generative than others, by building on two structural dimensions—temporal span and hierarchical span—that affect collective generative capacity. In this context, we introduce the concept of entropy as a proxy for collective generative capacity and argue that the level of entropy of a collective—which depends on its levels of temporal and hierarchical span—directly reflects its collective generative capacity.

In what follows, we first review a set of conceptualizations of collectivity and generativity in the social sciences to provide the theoretical background for our thesis. Subsequently we link the two domains of collectivity and generativity and provide a working definition of generative collectives. Then we move to the core of our analysis by focusing on two structural dimensions of collectives and by providing a framework for a classification of generative collectives and their respective levels of entropy, and hence, levels of collective generative capacity. Building on this framework, we derive four archetypes of generative collectives and illustrate each with a comparable vignette. We conclude with implications for theory and practice.

Theoretical Background

In this section, we summarize a set of foundational conceptualizations on collectivity and generativity from multiple social science disciplines to provide the theoretical background for a discussion of generative collectives.

Collectivity

Collectivity is defined generally as a state constituting an aggregated whole. A collective is a number of persons that are considered as one group that can be characterized by some sort of similarity among its members (Webster, 2009), such as akin attribute, shared interest or common objective. Collectives can range from small groups (e.g. work teams) to organizations, from ad hoc alliances to longstanding federations, and various instances of society at large. Moreover, the degree of collective engagements may range from lower-order collective action—based on shared memory, routines, and culture—to higher-order collective action—based on high-quality collective tacit knowledge and collective improvisation (Erden *et al.*, 2008).

The concept of *collective* is closely related to that of community, derived from the Latin word *communitas*, which broadly refers to joint possession or use, fellowship or organized society (Oxford Latin Dictionary). More specifically, a community can be defined as a unified body of individuals with a common (e.g. professional) interest, characteristic or location (Webster, 2009). Although the terms are often used interchangeably, the fundamental

difference between a collective and a community is that for the former all individuals are exchangeable, yet the members of a community are not, and hence the former is generally more fleeting and temporary, whereas the latter is more static and stable (Petersen, 1936). Furthermore, the term collective is broader as it encompasses groups of all sorts, ranging from more fleeting and temporary structures to more stable and permanent ones. Hence, in this paper we use the term generative collectives to refer to all kinds generative groups and argue that communities are just one instance of a collective.

Collectivity has been applied frequently in the context of the social sciences and humanities, as evidenced by the abundant illustrations in Table 1. The common denominators in all these conceptualizations are: shared interests or goals; collective activities and mutual engagements (e.g. exchanging ideas); and in more general terms the significance of groups or systems as meaningful units of analysis.

Table 1. Applications of collectivity concepts in various disciplines		
Theory	**Discipline**	**Collective feature**
Collective consciousness	Sociology (Durkheim, 1893)	A higher order consciousness shared by all members of (traditional) societies and is based on collective representations
Thought Collective	Philosophy of Science (Fleck, 1935)	A group of persons mutually exchanging ideas or maintaining intellectual interaction
Collective Unconscious	Psychology (Jung, 1953)	Encompasses archetypes—definite pre-existent forms in the psyche—that are shared and identical in all individuals.
Collective Action	Political Science, Sociology, Economics (Olson, 1965)	The pursuit of a shared goal or set of goals, or the provision of public goods by a group of people.
Collective Mind	Organization Science (Weick & Roberts, 1993)	A pattern of heedful interrelations of actions and collective mental processes of a group of individuals
Collective Intelligence	Communication Science (Lévy, 1994)	A shared or group intelligence results in enhanced intellectual performance.
Creative Collectives	Organization Science (Hargadon & Bechky, 2006)	Creativity is the result of the (re)combination of ideas from individuals with shared interests who jointly engage in creative collectives.

In short, conceptualizations of collectives and communities denote that there is something transcendent about collectives and their respective processes of dealing with ideas and knowledge, which cannot be achieved by any one individual in isolation. Yet, in effect, individual cognition and actions are essentially constitutive of collective cognition and activities. This assumption lies at the core of our discussion of generative collectives; however, before we continue the discussion of the characteristics and idiosyncracies of generative collectives, let us first examine the concept of generativity in more detail.

Generativity

Generativity refers to the ability to originate, produce or procreate. The concept of generativity has been used effectively in multiple disciplines, for example: generative capacity (Gergen 1994), generative metaphors (Schön 1979), generative inquiry (Zandee 2004), and generative fit (Avital and Te'eni 2009). An overview of the different uses in various social science disciplines is provided in Table 2, as adapted from Avital and Te'eni (2009) and extended[1] for the purpose of this paper. The common denominators in all these conceptualizations are the drive to

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[1] With the notions of generative building (Kornberger & Clegg, 2004), generative learning (Yorks, 2005) and generative fit (Avital and Te'eni, 2009)

revitalize or rejuvenate; the production of novel configurations and new possibilities; as well as an attempt to challenge the normative status quo.

Table 2. Applications of the generativity concept in various disciplines		
Theory	**Discipline**	**Generative feature**
Psychosocial generativity	Psychology (Erikson, 1950)	A focus on productivity and creativity; the drive to <u>rejuvenate</u> and to <u>reproduce</u>
Generative grammar	Linguistics (Chomsky, 1972)	A finite set of rules that generate <u>infinite</u> syntactical configurations.
Generative metaphor	Organization science (Schön, 1979)	A figurative description of social events by which we gain new perspectives and <u>reframe</u> attitudes and behaviors
Generative capacity	Social psychology (Gergen, 1994)	The ability of the individual to <u>challenge the status quo</u> and to <u>transform</u> social reality and social action.
Generative schemes	Architecture (Alexander, 1996)	A set of simple instructions that allows anyone with basic skills to create a well-constructed artifact and gives rise to <u>infinite</u> variations.
Generative inquiry	Social studies (Zandee, 2004)	A recurring, reflective hermeneutic process that generates theoretical quantum leaps and offers a <u>revitalization</u> or <u>reframing</u> process of our epistemic stance.
Generative buildings	Organization science (Kornberger and Clegg, 2004)	An undefined space that invites its inhabitants to (ab)use and <u>(re)define</u> space in <u>infinite</u> ways.
Generative learning	Educational science (Yorks, 2005)	A form of learning that is necessary for <u>transformational changes</u> in practice, assumptions, and interpretive schema.
Generative fit	Information systems (Avital and Te'eni 2009)	An aspect of a system that enhances one's generative capacity; one's ability to produce <u>novel configurations</u>.

Source: Avital and Te'eni (2009) (adapted and extended)

In our attempt to conceptualize generative collectives and differentiate between different levels of collective generative capacity, we primarily build on the notion of *generative capacity*[2], which comprises one's ability to produce new configurations and possibilities, to reframe the way we see and understand the world and to challenge the normative status quo in a particular task-driven context (Avital and Te'eni 2009), i.e. one's ability to generate creative ideas that lead to innovation or produce overall value. In this paper, we extend the currently common conceptualizations of generative capacity beyond its original focus on the individual[3] and direct our attention toward the generative processes that occur within and between collectives.

Based on the theoretical insights from this section, several motifs of collectivity and generativity are identified and summarized in Table 3 as follows, which jointly provide the foundation for our conceptualization of generative collectives below.

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[2] Generative capacity is inherently linked to creativity, yet, for a discussion of the fundamental differences between creativity and generative capacity, see Avital & Te'eni (2009)
[3] The notion of generative capacity has its origins in psychology and hence does not consider the collective as a unit of analysis.

Table 3. Common themes of collectivity and generativity	
Collectivity	▪ *Shared* interests or goals ▪ *Collective* acts ▪ *Mutual* engagement, interaction, and exchange
Generativity[4]	▪ Producing new or altering existing configurations and possibilities (*rejuvenating* and *reconfiguring*) ▪ *Reframing* the way we see and understand the world ▪ Challenging the status quo (*revolutionizing*)

Generative Collectives

Building on the common themes of collectivity and generativity as described in Table 3, we provide the following working definition of *generative collectives: a group of persons with shared interests or goals who mutually engage in rejuvenating, reconfiguring, reframing and revolutionizing acts*. As aforementioned, albeit some collectives are more generative than others, we submit that any type of collective has the capacity to be generative. We refer to the capacity of a collective to be generative as *collective generative capacity: the ability to engage in acts of rejuvenating, reconfiguring, reframing and revolutionizing within a particular goal-driven context*.
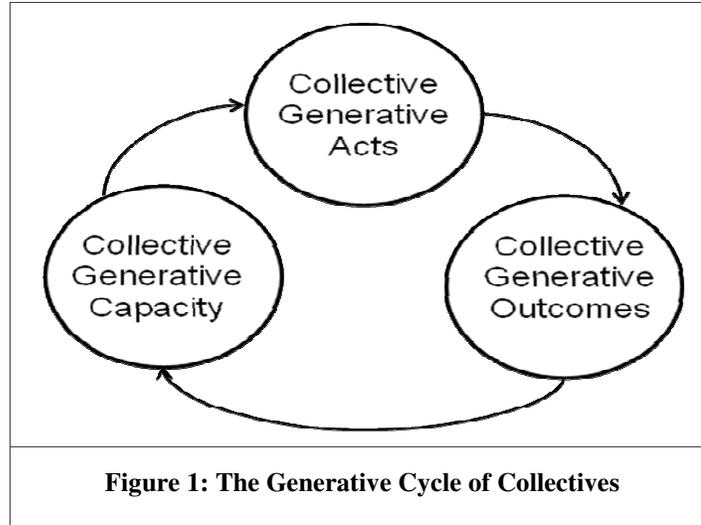
We consider collective generative capacity to be a *trait* of a collective and the seed or root-cause of generative outcomes (Avital and Te'eni 2009). In this context, a trait is a habitual pattern encompassing both behavioral, cognitive and affective elements, which is relatively stable over time, differs among collectives—i.e. some collectives are more generative than others—and influences behavior and action. The generative capacity of a collective is based on the generative capacity of the individuals making up the collective; however, because it stems in part from the inherent relationships and interactions in a collective, it is greater than the mere sum of those individual generative capacities. Like any trait, collective generative capacity can be absent or present, weak or strong, and thereby affects the actual generative acts and outcomes of a collective.

Figure 1 below illustrates the generative cycle where collective generative capacity promotes collective generative acts of rejuvenating, reconfiguring, reframing, and revolutionizing, which subsequently results in collective generative outcomes, such as novel configurations or possibilities; new ways of seeing and understanding the world; and a changed normative status quo. In turn, collective generative outcomes affect the future potential of a collective to be generative, that is, collective generative capacity.

Highly generative collectives are inherently affect-laden environments, where collective cognitive processes and emotional experiences are closely intertwined (Amabile *et al.* 2005). Consequently, highly generative collectives are characterized by a positive, open, participatory, and people-centered culture in which more individuals than ever can participate, share, collaborate and generate. In other words, they provide a space in which people with different geographical, cultural, or occupational backgrounds come together to exchange their personal interpretations of a situation, reflect upon them, engage in dialogue about them, construct them through artifacts, and inform action with them (Boland *et al*, 1994). Consequently, collective generative capacity emerges from the synergetic and dialectical combinations of individual minds—i.e. heterogeneous knowledge sources—through communal sensemaking, shared cognitive processes, conflictual negotiation and collective improvisation (Erden *et al.,* 2008).

Collective generative capacity *elicits* generative activities of all sorts—i.e. a wide array of creative, innovative, and transformative activities—which can stem from multiple faculties of the collective mind (Weick and Roberts, 1993), both cognitive and affective. Collective generative capacity denotes imagining, creating, challenging, and changing the status quo.

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[4] The terms "generativity" and "generative capacity" have been used interchangeably in this context.

Figure 1: The Generative Cycle of Collectives

Moreover, collective generative capacity is not based on an interpretation and understanding of the world in terms of *what is* or *what should be*, but rather in terms of *what could* or *what may be*, that is, in terms of envisaging future possibilities. Whereas focusing on the past is limiting, a focus on the future is enabling, liberating and invigorating. It is from this collective positive orientation toward the future that the inspirational and imaginative energy emerges, which leads to emancipating and ingenious actions.

Additionally, a collective focus on potentialities is inherently linked to change; hence, it involves a positive belief in the ability of the collective to act together and make a difference (Surrey, 1991). Yet this positive, transformational energy only exists as a consequence of the relational character of highly generative collectives. In other words, highly generative collectives are characterized by power through connection—group empowerment—as opposed to power over. Group empowerment and high-quality connections mobilize the energies of everyone involved and create a pulsating, vibrant aliveness (Dutton, 2003) that results in passionate moments of ingenuity and revolutionizing.

In this paper, we focus on variations in the generative capacity, and hence generative output, of collectives that can be attributed to their respective structural dimensions. In other words, we argue that there are distinct structural configurations that can help to distinguish high-generative collectives from low-generative collectives. In what follows, we describe those underlying structural dimensions and examine their relation to collective generative capacity. Specifically, we focus on two structural dimensions—temporal span and hierarchical span—by which we can classify different collectives, provide a framework for plotting different collectives that we can use for comparing their varying potential for generativity through levels of entropy, and finally propose four archetypes of generative collectives.

Two Structural Dimensions of Generative Collectives

When studying generative collectives, two structural dimensions of collectives are essential for understanding the relation to collective generative capacity, namely a temporal span and a hierarchical span. With that respect, it is important to note that these two structural dimensions can be attributed to any type of collective.. However, here we focus on the critical role of these two structural dimensions in relation to collective generative capacity.

Temporal Span

We can classify collectives based on their *temporal span*; hence, we can identify more stable collectives and more transient collectives (Fleck, 1935). More stable collectives emerge through repeated bonding and thus become more organized, often develop fixed routines and formal rules, and consequently practical performance takes precedence over creative tendencies (Fleck, 1935). These more stable groups can be referred to as generative communities, because their members are not easily exchangeable and they breed a certain sense of exclusiveness through

membership. On the other hand, more transient collectives can be fortuitous and thus may form and dissolve at any moment. However, they still trigger a certain mood toward engaging collectively in activities; that is, people still feel connected and motivated to act together. In fact, their known transient nature stimulates concerned people to engage expeditiously at their best, while they last.

An analysis of online collective engagements reveals examples of both stable generative communities and transient generative collectives. For instance, Wikipedians or Linux developers, in particular those that represent the core contributors, are members of more stable *generative communities*, where people contribute and interact over an extended period of time, where the community becomes more organized, and where rules and routines emerge from this continuous interaction and increasing organization. In contrast, the online protests during the 2009 Iran elections and the heated online debates during the U.S. health care reform bill in 2010 are both examples of fortuitous and transient *generative collectives*, where people unite into a collective at one point in time in order to pursue a shared goal, but separate in the next moment, when much of the heated controversy dissolves.

Hierarchical Span

We can also classify collectives based on their *hierarchical span*. Studies of the general structure of internet-based collectives, and perhaps collectives of all kinds, reveal that their general structure encompasses a small esoteric circle and a larger exoteric circle, each consisting of members of the collective and forming around a shared interest or goal (Zhang and Storck, 2001). For instance, online collectives such as Wikipedia or Linux are made up out of a relatively small core group of frequent contributors—the esoteric circle—and a much larger peripheral group of sporadic contributors[5] or mere users.

Subsequently, whether or not the collective is organized in a hierarchical fashion, depends on the interplay between the esoteric 'elite' and the exoteric 'mass' (Fleck, 1939). If the elite occupy the stronger position, they often distance themselves from the crowd and develop a strong set of rules that restrains the behavior and actions of the masses. Consequently, the collective as a whole displays more conservative and rigid tendencies due to its more hierarchical structure (Fleck, 1935). For instance, the Open Source movement and Wikipedia are examples of more hierarchical online collectives.

In contrast, if the masses occupy a stronger position, the elite often strive to preserve the assurance and support of the masses, resulting in the development of ideas and progress. Here, control does not reside in a centralized actor but rather emerges from the decentralized interactions of all actors involved, thereby leading to a democratization[6] of the innovation process (Von Hippel, 2005; Yoo *et al.*, 2009). Moreover, coordination is not based on the top-down prescription of rules, processes, and responsibilities, but rather arises from the collaborative activities of everyone involved and their use of artifacts and representations as mechanisms for coordinating distributed and diverse knowledge resources (Hutchins, 1991, 1995). Examples of more lateral structures are online social networks, such as Facebook and MySpace, as well as microblogging services such as Twitter.

To summarize, not only is a deeper analysis of these two structural dimensions—temporal span and hierarchical span—relevant for understanding the diverse dynamics of structure that we witness in generative collectives, it can also and more importantly account for their varying levels of collective generative capacity. In the next section, we harness these two structural dimensions—temporal span and hierarchical span—to construct a framework encompassing four archetypes of generative collectives and their respective levels of entropy; hence, collective generative capacity.

A Framework for Classifying Generative Collectives

The temporal span dimension and the hierarchical span dimension form together a space that represents or maps the level of entropy that can be attributed to a collective. The level of entropy is used in this context as a surrogate for collective generative capacity, and hence can be applied to account for differences in collective generative capacity

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[5] This is the core idea underlying the concept of the Long Tail (power law distribution)
[6] Yoo (2009) uses the term polyarchy in this context (Greek: *poly* means many, *arkhe* means rule) to describe a form of government in which power is vested in many persons, of whatever order or class (Webster, 2009).

by benchmarking and classifying collectives according to their structural configurations vis-à-vis these two dimensions.

Generativity and Entropy

In order to link the structural dimensions to the varying levels of collective generative capacity, we use the metaphor of 'entropy'. In the context of thermodynamic systems, entropy variation refers to changes in the status quo of a system and represents a measure of molecular disorder that is associated with fluidity, malleability, and spontaneity (Webster, 2010). In a similar vein, we use the term entropy to refer to the amount of randomness, disorder, or chaos that underlie the degrees of freedom and inherent agility of a collective, and argue that it is a proxy for collective generative capacity as it reflects the ability to rejuvenate, reconfigure, reframe and revolutionize.

We submit that the extent of temporal span and hierarchical span are closely related to entropy. The lower the temporal span and the lower the hierarchical span the higher the level of entropy. Thus in highly transient and highly lateral, i.e. in less structured, collectives, entropy will be high. On the other hand, in highly stable and highly hierarchical, i.e. highly structured, collectives, the level of entropy will be low. This conceptualization is consistent with macrosociological systems theory which uses the term entropy as a measure of the decomposition or decay of social structures—i.e. of increasing disorder and disorganization—and the resulting trends toward anarchy (Swanson *et al.*, 1997). In short, a system with a low degree of order has high entropy, and a system with a high degree of order has low entropy.

In a similar fashion to the way information entropy in Information Theory holds that the entropy—i.e. uncertainty or randomness—of an event is positively related to the amount of information it will contain (Shannon, 1951), we argue that the entropy of a collective is positively related to its generative potential and the likely amount of generative output. When a structure is less solid and relations between elements of the structure are less clear—due to a highly transient and highly lateral, hence, highly *entropic*, nature of a collective—the generative capacity of that collective becomes enhanced. In short, what we refer to as the ability to rejuvenate, reconfigure, reframe and revolutionize—collective generative capacity—is greater when entropy is high.

## *From Structure to Entropy to Generativity*

The framework as illustrated in Figure 2 below encompasses the two aforementioned structural dimensions of generative collectives and displays varying levels of entropy—as a proxy for collective generative capacity—corresponding to different structural configurations alongside these two dimensions. Although the figure might suggest bipolar dimensions, stable versus transient and hierarchy versus lateral, in essence we should think of the two structural dimensions—temporal span and hierarchical span—as continuums. By plotting different collectives according to their unique structural characteristic, we can delineate associated levels of entropy, hence, collective generative capacity.

Based on this framework, we derive the following two propositions:

> **Proposition 1***: Temporal span of a collective has a negative effect on its level of entropy, and hence, on its collective generative capacity*

> **Proposition 2***: Hierarchical span of a collective has a negative effect on its level entropy, and hence, on its collective generative capacity*

Jointly, these propositions suggest that more stable and hierarchical structures result in more rigid and solid structures that are more difficult to reconfigure and reshape. In contrast, more transient and lateral structures result in more flexible and liquid structures that are easier to reconfigure and reshape.

Figure 2: Generative Collective Framework
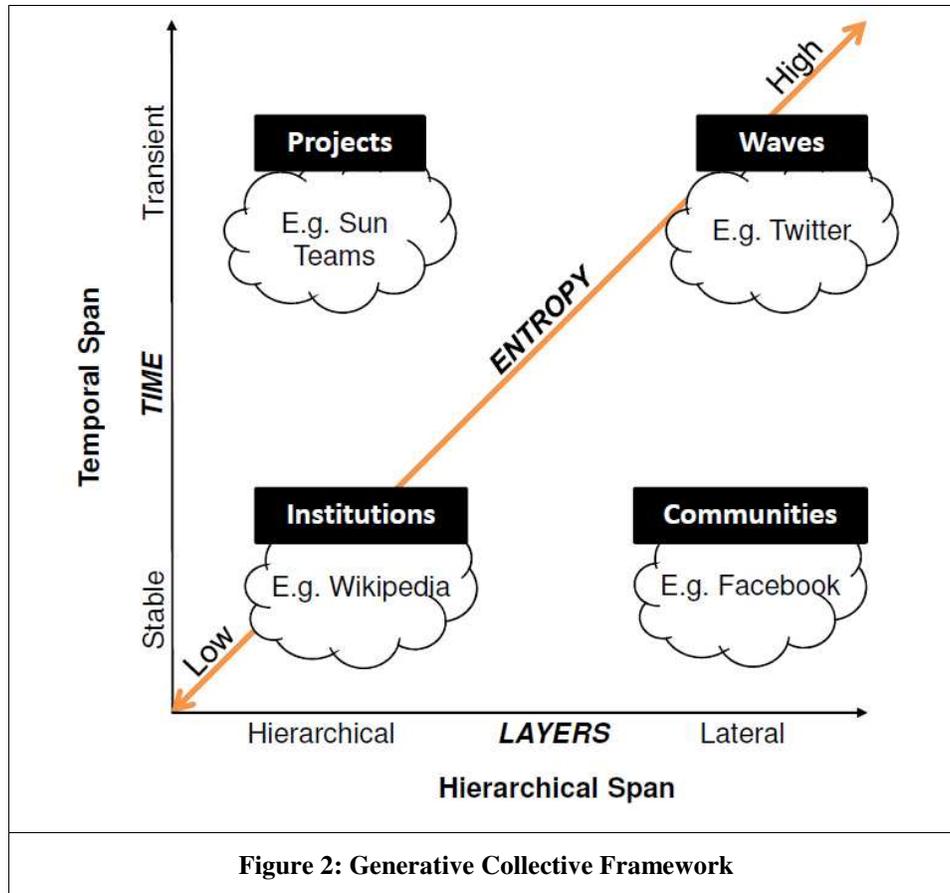
Four Archetypes of Generative Collectives

Building on the framework above, we can delineate four archetypes of generative collectives, which we refer to as institutions, communities, projects, and waves. These four archetypes are discussed in detail and illustrated with a comparable vignette as follows.

Institutions

The most stable and hierarchical form of generative collectives are institutions. Institutions, in the traditional sense, are structures that are self-organizing and self-regulatory, characterized by strong normative structures for governing cooperative human behavior through the formulation and enforcement of rules. The formation of institutions is often considered a case of emergence rather than an instance of deliberate organization.

In the context of internet-based collectives, we can identify what some refer to as global network institutions (Goldspink, 2007); volunteer networks composed of heterogeneous actors that self-organize and self-regulate and thereby give rise to and maintain an institutional form of collective which subsequently enables and restrains certain types of behavior.

Examples of these global network institutions are the Open Source movement and Wikipedia[7] (see Vignette 1). Within these global network institutions, sets of rules and norms emerge from the ongoing engagements of

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[7] It is important to note that although the Open Source movement and Wikipedia overall belong to the class of institutions, the community as a whole encompasses more transient project teams where people work together to accomplish one particular task. In case of the latter, we can account for these transient Open Source project teams through the project archetype.

volunteers in creating and maintaining the community in response to its exponential growth. Even though the rules and norms in these internet-based collectives may be primarily informal or soft in nature, relative stable and hierarchical structures of self-regulation emerge that enable and restrain the widespread collective engagement of large groups of people.

Institutions are characterized by relatively <u>stable and hierarchical structures</u> that result in relatively low entropy, and in turn, lower collective generative capacity. Therefore, institutions have a <u>lower</u> capacity for rejuvenating, reconfiguring, reframing, and revolutionizing.

Institution Archetype: Wikipedia

"Wikipedia*, the free encyclopedia that anyone can edit",* started from the concept of open editing and the aim of giving everyone access to the total pool of human knowledge through creating a free encyclopedia. In Wikipedia, the vast majority of edits (about 80%) are done by a very close-knit community of about 600 to 1000 volunteers who are in constant communication with each other (Wales, 2005). This tight community, which encompasses the core Wikipedians, self-monitors and monitors all the activities and edits that occur on the website. It is from the interactions and mutual engagements of these volunteers that a set of formal and informal rules and norms have emerged that provide the basis for a strong self-organizing and self-regulatory global network institution.

Hence, Wikipedia is characterized by a stable and hierarchical structure—with a small and stable esoteric community occupying a central and coordinating role in relation to the wider exoteric circle. This rather rigid and solid structure of Wikipedia has a negative effect on entropy, hence, on the ability to rejuvenate, reconfigure, reframe, and revolutionize.

Vignette 1: The Institution Archetype

Communities

Communities, as a second form of generative collectives, display a stable structure—in the sense of membership—yet, a generally lateral structure. The concept of community has a long history in the social sciences and emerged with Tönnies' (1988 [1887]) *gemeinschaft-gesellschaft* dichotomy, which primarily emphasizes the structural element of communities—and Durkheim's (1897) concept of communities, which also addresses processes of interacting and acting.

Most of the recent attention for communities has focused on the positive impact of community as an organizing form for knowledge sharing and innovation (Heckscher and Adler, 2006). However, these new internet-based forms of communities, while displaying some of the characteristics of traditional communities, depart from the *gemeinschaft* notion in some fundamental ways, namely they are highly dispersed and increasingly rely on technology for interacting rather than on face-to-face communication. Moreover, instead of focusing solely on the social, non-instrumental nature of community relations; it becomes increasingly clear that relations among members of modern communities can be simultaneously socially and economically valuable. Consequently, the term community no longer refers to small groups—*gemeinschaften*—but can be sustained by large groups of people (Brint, 2001).

In the context of the internet, the stable yet lateral structure of collectives that we refer to as communities is best embodied by social network communities, such as Facebook (see Vignette 2) and MySpace. These communities emphasize both social, cultural and affective benefits as well as more practical or material benefits that derive from networking.

Communities are characterized by relatively <u>stable, yet, lateral structures</u> that result in a relatively moderate level of entropy; and in turn, communities have a <u>moderate</u> capacity for rejuvenating, reconfiguring, reframing, and revolutionizing.

Community Archetype: Facebook

Facebook is a social network website that allows its users to freely create and update profiles, to add friends, join groups or networks, and to utilize many other applications. Communication with friends and other users can be done through private or public message or through a chat feature. "Facebook *helps you connect and share with the people in your life,"* hence it is evident that Facebook is primarily a tool for staying in touch with the people you study, work, or live with. Moreover, its privacy settings are by default restricted to users from the same network. Although Facebook networks change due to adding members (or perhaps deleting old members), the membership is comparatively stable.

Hence, Facebook is characterized by a lack of centralization and hierarchical layers, yet rather stable membership. Hence, Facebook has a medium level of structure which is related to a medium level of entropy, hence, a moderate ability to rejuvenate, reconfigure, reframe and revolutionize.

Vignette 2: The Community Archetype

Projects

Projects, as the third archetype of generative collectives display a transient, yet more hierarchical or centralized structure. Although the actual level of hierarchy and centralization will likely differ across projects, internet-based projects are usually organized around a few core members—project leaders—who occupy a central and leading role (Krishnamurthy, 2002).

Projects are transient because they are established for a separate, concretely definable purpose, hence, a limited period of time. Due to the ubiquity of mobile computing and increasing connectivity, we witness the emergence and proliferation of dispersed, asynchronous, and virtual work. Virtual teams are an important new organizational form (Jarvenpaa & Ives, 1994). Virtual teams represent groups of geographically dispersed persons who work interdependently, but interact and collaborate across time, space, and organizational boundaries, using technology for producing a one-time organizational output.

In the context of the internet, the transient yet hierarchical structures that we refer to as projects can be well-illustrated through Sun Microsystems' "Sun Teams" (see Vignette 3).

Projects are characterized by relatively <u>transient yet hierarchical structures</u> that result in a relatively moderate level of entropy; and in turn, projects have a <u>moderate</u> capacity for rejuvenating, reconfiguring, reframing, and revolutionizing.

Project Archetype: Sun Microsystems' "Sun Teams"

Virtual Project Teams are primarily used by organizations to allow people who reside in geographically dispersed locations to work together toward a common goal. Sun Microsystems uses virtual "Sun Teams" for onetime projects, such as solving a particular problem or developing a particular product. In these teams, people communicate and collaborate through the use of technology (email, telephone or video conference calls, etc.). Because the team lasts for the duration of a single project, the "Sun Teams" are characterized by a transient structure. However, the different aspects of the project are organized around project team leaders and supervised by managers, hence, the structure is also hierarchical.

Therefore, Sun Microsystems' project teams involve a transient, yet hierarchical structure. This medium level of structure of the "Sun Teams" is related to a medium level of entropy and hence a moderate ability to rejuvenate, reconfigure, reframe and revolutionize.

Vignette 3: The Project Archetype

Waves

The most transient and lateral structural form through which generative collectives exchange ideas, maintain interactions and engage in action are waves (Majchrzak, 2008). Waves can be juxtaposed to the abovementioned forms of collective engagement, such as institutions or communities, which are generally more fixed in structure, duration, and membership. On the other hand, waves allow people to come and go, contribute and withdraw, whenever they feel like it in order to interact and exchange ideas, as enabled by the use of online and asynchronous media. A general example of a wave is Twitter (see Vignette 4).

We can distinguish two forms of generative acts within waves. First of all, generative acts or processes can be radical, where the values, assumptions, and outcomes are changed dramatically by the collective. These radical processes occur through *social tsunamis*—i.e. waves of large scale and disruptive social change. Social tsunamis occur through a series of generative waves that are caused when large numbers of people and ideas are rapidly mobilized. Due to the immense volumes of people, ideas, emotions and energy involved, the generative effects of tsunamis can be disruptive and pervasive. In this respect, the massive online protests following the 2009 elections in Iran or the heated online debates during the recent U.S. health care reform describe the type of radical collective engagement that we refer to as social tsunamis.

Second, generativity in waves can also take on a more incremental form, e.g. when generativity occurs through the step-by-step modification of ideas, value systems, products, and technologies, typically in the context of use. We refer to these incremental generative processes as *ebbs and flows*. Ebbs and flows involve more regular, predictable, and habitual fluctuations in generativity emerging from the continuous, serendipitous contribution of ideas that might trigger small alterations, but do not offset transformative changes.

Waves are characterized by relatively <u>transient and lateral structures</u> that result in relatively high entropy, and in turn, higher collective generative capacity. Therefore, waves have a <u>higher</u> capacity for rejuvenating, reconfiguring, reframing, and revolutionizing.

Wave Archetype: Twitter[8]

"What we have to do is deliver to people the best and freshest most relevant information possible. We think of Twitter *as it's not a social network, but it's an information network. It tells people what they care about as it is happening in the world.* (…) *Twitter is without a doubt the best way to share and discover what is happening right now."* (Evan Williams, co-founder)

Twitter encompasses a massive amount of users and traffic (in the form of tweets) and therefore may cause both radical social tsunamis as well as more regular ebbs and flows. Although senders can restrict delivery of tweets to their own circle of friends, Twitter is by default open access and so tweets are available for anyone to read. Because of its highly transient and highly lateral nature—i.e. low level of structure—Twitter is characterized by a high level of entropy, hence, the ability to rejuvenate, reconfigure, reframe, and revolutionize will be higher.

Vignette 4: The Wave Archetype

Finally, to summarize the insights from this section, Table 4 juxtaposes the four archetypes of generative collectives—institutions, communities, projects, and waves—and shows the characteristics of each archetype with respect to its two structural dimensions—temporal span and hierarchical span—and its respective levels of entropy, hence, collective generative capacity.

Table 4. Juxtaposing the Four Archetypes of Generative Collectives				
	Institutions	**Communities**	**Projects**	**Waves**
Temporal Span	Stable	Stable	Transient	Transient
Hierarchical Span	Hierarchical	Lateral	Hierarchical	Lateral
Level of Entropy	Low	Medium	Medium	High
Level of Collective Generative Capacity	Low	Moderate	Moderate	High
Example	Wikipedia, Open Source Movement; Other Global Network Institutions	Facebook; Other Social Network Communities	Sun Microsystems' "Sun Teams"; Virtual Project Teams	Twitter; Iran protests; online debates

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[8] In this context, it is important to recognize that what we refer to as collective generative capacity is the ability to rejuvenate, reconfigure, reframe, and revolutionize. We submit that this ability is higher in the case of Twitter, due to its high level of entropy, given its highly transient and highly lateral nature. This is not to say that all Tweets by definition are valuable, yet the generative potential for new configurations and possibilities, for renewed understandings, and for challenging the status quo is higher given its highly entropic nature.

Discussion

This paper provides two important contributions. First, by conceptualizing generative collectives, we provide a more general framework for analyzing, understanding, and classifying internet-based group activities of all sorts occurring in a wide range of collectives, from more stable structures such as online communities or global network institutions to loose, transient structures, such as virtual project teams and online protests. Second, by identifying the four archetypical forms of generative collectives—institutions, communities, projects and waves—based on two structural dimensions of generative collectives—temporal span and hierarchical span—we provide a framework for classifying such generative collectives as well as for assessing their levels of entropy, and hence, their collective generative capacity.

These insights are relevant to those who wish to study internet-based generative collectives of all sorts as well as to those who engage in the design of positive environments and tools that are conducive to collective generative capacity.

Challenges and future research

Our theoretical exploration of generative collectives suggests several avenues for future research. First, given the proliferation of internet-based collectives, we need to shift our focus from individuals or conventional organizational entities as the dominant unit of analysis to the *collective*. As many internet-based collectives do not have fixed or stable membership and do not constitute formal organizations, the relevance of these conventional units of analysis decreases. Adopting the collective as the core level of analysis in the study of internet-based group activities allows us to account for collective processes and outcomes in the light of changing individual contributions. Yet hereto we need to tackle important theoretical and empirical issues related to studying these aggregates of heterogeneous individuals who operate in digital, dispersed environments rather than the traditional bounded institutional spaces.

Second, in this paper we primarily emphasized a structural perspective on generative collectives; however, a complementary approach that offers a dynamic process view of generative collectives may reveal additional variables other than entropy for explaining and predicting different levels of generative capacity of different collectives. Future research work should aim to formulate methods and measurements for analysis of other variables and issues affecting collective generative capacity.

Third, if collective generative capacity is the collective trait that makes some collectives more generative than others, we should analyze the role of IT/IS in evoking and enhancing collective generative capacity. In other words, we need to turn to the question of how systems and tools can be designed as enablers of collective generative capacity and how generativity emerges from the interplay between people and IT/IS. For instance, we can recognize the potential role of IT/IS in affecting and altering the structural configurations of generative collectives; in evoking and encouraging collective generative capacity; and in supporting and enacting generative acts and outputs.

Fourth, in order to understand the complexities of these phenomena, we cannot rely on the dominant perspectives in IS research, characterized by a technical-economic or socio-political focus. Rather, we have to rely on an alternative perspective, the so-called third rationality (Kumar and van Dissel, 1998), in which collaborative *relationships* become the key concepts for analyzing and interpreting collective generative capacity. This opens the door to looking at generative collectives, not from the perspective of profit maximization or power and politics, but rather through a positive lens that focuses on the constructive dialectics between appreciative views of self, others, collectives, and future.

The above suggestions point to some relevant questions for future empirical research: What is the impact of generative collectives on organizational structures, strategies, and work processes? What new forms of products, services, and systems are enabled? What roles and relationships do various actors in the collective have and how does this structural orchestration affect generativity? On a more practical level, it will be valuable to provide companies with insights about how to assess and select the generative collective archetype that best fits their innovation strategy. Last but not least, based on our theoretical classification of generative collectives, we see the need for empirical data to validate our framework of four archetypes of generative collectives and the corresponding varying potential for generativity. In all these research questions, specific attention should be paid to the role of IT/IS.

Furthermore, empirically analyzing generative collectives requires researchers to adopt a process-oriented view and to be cognizant of the different levels of analysis involved when studying the complex interplay between collective and individual generativity. This suggests that future research on generative collectives needs to examine carefully the multiplicity of social actors involved, the heterogeneous materiality and contextuality of these processes, and their interactions over time. Hence, our research methods should be capable of dealing with large and complex sets of actors and data in largely the same way as generative collectives deal with large and complex configurations of people and actions. For instance, multiple level network analysis might prove useful in analyzing complex patterns, interactions, and processes emerging from collective generative capacity between heterogeneous and distributed individuals and collectives embedded in digital space (Monge and Contractor, 2003).

Given the pervasiveness of generative collectives, a thorough understanding of their structural characteristics and the effect hereof on generative processes and outcomes based on empirical research can provide useful insights into many relevant, but as yet unknown, issues of internet-based problem solving, learning, creativity, and innovation.

Conclusion

Building on theories of collectivity and generativity in the social sciences at large, we have developed a theoretical conceptualization of generative collectives. We submit that a generative collective is *a group of persons with shared interests or goals who mutually engage in rejuvenating, reconfiguring, reframing and revolutionizing acts.* Furthermore, we argue that each collective has the potential to be generative, yet, depending on their structural characteristics and idiosyncracies, different collectives will display varying levels of collective generative capacity; that is, the ability to engage in acts of rejuvenating, reconfiguring, reframing, and revolutionizing.

In this paper, we have proposed a framework for classifying generative collectives according to two structural dimensions—temporal span and hierarchical span—which construe their respective levels of entropy, and hence as per our thesis, their collective generative capacity. Based on this framework, we identified four archetypes of generative collectives: institutions, communities, projects, and waves. A deeper analysis of the framework and resulting four archetypes is relevant not only for classifying the different structures of collectives that we witness online, but also and more importantly for explaining why some internet-based collectives are more generative than others. These insights are relevant both for studying internet-based collectives as well as for designing and developing information systems and tools that are conducive to generativity.

Whereas generative collectives are inhibited in static, uniform, and highly organized structures for action and innovation, they thrive in fast-changing, diverse and loosely organized structures, that enable a fluid set of heterogeneous actors to rejuvenate, reconfigure, reframe, and revolutionize collectively.

References

Alexander, C. "The origins of pattern theory, the future of the theory, and the generation of a living world", *Keynote address at the ACM Conference on Object-Oriented Programs, Systems, Languages and Applications (OOPSLA),* San Jose, USA, 1996.

Amabile T.M., Barsade, S.G., Mueller, J.S., and Staw, B.M. "Affect and creativity at work," *Administrative Science Quarterly,* (50), 2005, pp. 367–403

Avital, M., and Te'eni, D. "From generative fit to generative capacity: Exploring an emerging dimension of information systems design and task performance," *Information Systems Journal*, (19:4), 2009, pp. 345-367.

Boland Jr, R.J., Tenkasi, R.V., and Te'eni, D. "Designing information technology to support distributed cognition," *Organization Science*, (5:3), 1994, pp. 456-474.

Brint, S. Gemeinschaft Revisited. *Sociological Theory*, (19:1), 2001, 1-23.

Brown, J.S., and Duguid, P. "Organizational Learning and Communities of Practice: Towards a Unified View of Working, Learning, and Innovation," *Organization Science* (2), 1991, pp. 40-57.

Chomsky, N. *Language and Mind*. New York: Harcourt Brace Jovanovich, 1972.

Collective. (2009) In Merriam-Webster Online Dictionary. Retrieved June 23, 2009, from http://www.merriam-webster.com/dictionary/collective, 2009.

Community. (2009) In Merriam-Webster Online Dictionary. Retrieved June 23, 2009, from http://www.merriam-webster.com/dictionary/community, 2009.

Durkheim, E. *De la division du travail social. Etude sur l'organisation des societes superieures*. Paris: Alcan, 1893.

Dutton, J. E. "Breathing life into organizational studies," *Journal of Management Inquiry* (12), 2004, pp. 5–19.

Entropy. In Merriam-Webster Online Dictionary. Retrieved April 30, 2010, from http://www.merriam-webster.com/dictionary/entropy, 2010.

Erden, Z., Von Krogh, G., and Nonaka, I. "The quality of group tacit knowledge", *Journal of Strategic Information Systems* (17), 2008, pp. 4-18.

Erikson, E.H. *Childhood and Society*. New York: W.W. Norton and Company, 1950.

Fleck, L. *The Genesis and Development of a Scientific Fact* (German original 1935, *Entstehung und Entwicklung einer wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv*), F. Bradley & T.J. Trenn (Trans.). Chicago, IL: University of Chicago Press, 1979 [1935].

Gergen, K.J. *Realities and relationships: Soundings in social construction*. Harvard University Press, 1994.

Goldspink, C. Normative self-regulation in the emergence of global network institutions: The Case of Wikipedia, *ANZSYS07*, Auckland, New Zealand, 2007.

Hargadon, A.B., and Bechky, B.A. "When collections of creatives become creative collectives: A field study of problem solving at work," *Organization Science*, (17:4), 2006, pp. 484.

Heckscher & Adler (eds.). *The Firm as a Collaborative Community*. Oxford, UK: Oxford University Press, 2006.

Hutchins, E. "The social organization of distributed cognition", in Resnick, L.B., Levine, J.M., and Teasley, S.D. (Eds.). *Perspectives on Socially Shared Cognition*, Washington, DC: American Psychological Association, 1991, pp. 283-307

Hutchins, E. *Cognition in the Wild*. Cambridge, MA: MIT Press, 1995.

Jarvenpaa, S., and Ives, B. "The global network organization of the future: Information management and opportunities and challenges", *Journal of Management Information Systems,* (10:4), 1994, 25-57.

Jung, C. G. *Two Essays on Analytical Psychology*. Translated by R. F. C. Hull. ("Bollingen Series," XX.) New York: Pantheon Books, 1953.

Kornberger, M., and Clegg, S.R. "Bringing space back in: Organizing the generative building," *Organization Studies*, (25:7), 2004, pp. 1095-1114.

Krishnamurthy, S. *Cave or community? An empirical examination of 100 mature open source projects*. Bothell, WA: University of Washington, Bothell, 2002.

Kumar, K., and van Dissel, H.G. "The Merchant of Prato--Revisited: Toward a Third Rationality of Information Systems," *MIS Quarterly,* (22:2), 1998, pp. 199-226.

Lévy, P. *L'intelligence Collective*. Paris: La Découverte, 1994.

Lipnack, J. and Stamps, J. Virtual Teams: Reaching across space, time, and organizations. New York: John Wiley, 1997.

Majchrzak, A. "Envisioning a Future Where We "Eat Our Own Dog Food": How to Support Collective Wisdom of the IS Crowd", *Sprouts: Working Papers on Information Systems*, 8(34), 2008: http://sprouts.aisnet.org/8-34.

Monge, P.R., and Contractor, N.S. *Theories of Communication Networks.* New York: Oxford University Press, 2003.

Olson, M. *The Logic of Collective Action*. Cambridge, MA: Harvard University Press, 1965.

O'Reilly, T. "The Architecture of Participation." On: http://www.oreillynet.com/pub/a/oreilly/tim/articles/architecture_of_participation.html, 2004.

Petersen, H. "Ludwig Fleck's Lehre vom Denkstil und dem Denkkollektiv", *Klinische Wochenschrift* (15), 1936, pp. 239–242.

Polyarchy. In *Merriam-Webster Online Dictionary*. Retrieved July 10, 2009, from http://www.merriam-webster.com/dictionary/polyarchy, 2009.

Schön, D.A. "Generative metaphor: A perspective on problem-setting in social policy," *Metaphor and thought*, 1979, pp. 254:283.

Shannon, C.E. (1951). Prediction and entropy of printed English. *The Bell System Technical Journal*, 30:50-64.

Surrey, J.L. "Relationship and empowerment", In: Jordan J.V., Kaplan, A.G., Miller, J.B., Stiver, I.P., Surrey, J.L., (eds.). *Women's growth in connection: writings from the Stone Center.* New York: Guilford Press, 1991, pp.162-80.

Swanson, G. A., Bailey, K. D., and Miller, J. G. "Entropy, social entropy and money: A living systems theory perspective," *Systems Research and Behavioral Sciences* (14:1), 1997, pp. 45-65.

Tönnies. *Gemeinschaft und Gesellschaft.* Michigan State University Press, 1988 [1887]

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

Wales, J. *On the Birth of Wikipedia.* On:
http://www.ted.com/talks/jimmy_wales_on_the_birth_of_wikipedia.html., 2005.

Weick, K., and Roberts, K. "Collective mind in organizations: Heedful interrelating on flight docks," *Administrative Science Quarterly* (38), 1993, pp. 357-81

Yoo, Y. *Open Innovation in a Digitized World*. On:
http://www.slideshare.net/yxy23yoo/open-innovation-in-a-digitized-world, 2009.

Yoo, Y, Boland Jr., R.J., Lyytinen, K, and Majchrzak, A. "Call for Papers. Special Issue: Organizing for Innovation in the Digitized World," *Organization Science*, (20:1), 2009, pp. 278-279.

Yorks, L. "Adult learning and the generation of new knowledge and meaning: Creating liberating spaces for fostering adult learning through practitioner-based collaborative action inquiry," *The Teachers College Record* (107), 2005, pp. 1217-1244.

Zandee, D.P. *A study in generative process: The art of theorizing*. Cleveland: Case Western Reserve University, 2004.

Zhang, W., and Storck, J. "Peripheral Members in Online Communities," in *Proceedings of the Seventh Americas Conference on Information Systems,* D. Strong and D. Straub (eds.), Boston, 2001, pp. 586-593.