Complexity and Social Entrepreneurship: A Fortuitous Meeting

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This paper looks at how ideas, constructs, methods and insights coming out of the sciences of complex systems can be applied to the study of social entrepreneurship. At present, there is no theory that seeks to define social entrepreneurship in complex system terms nor how such a redefinition might contribute to greater positive social outcomes of these kinds of programs. To remedy this, we propose ways that complexity theory can be used to develop useful, and we hope, what is ultimately, a more practical theory. In particular, we explore how complexity ideas might be used to develop a robust theory of social dynamics and of how the mechanisms of social entrepreneurship might be better understood as a practical approach for generating well-defined positive social outcomes. After describing various possibilities, some hopeful thoughts on the future of the field are offered.

There is nothing more practical than a good theory.

Kurt Lewin

Introduction: Leveraging resources for a world in need

With 2.7 billion people across the world subsisting on only two US dollars or less per day and countless others barely managing to get through extremely challenging circumstances on a day-to-day basis, the need for powerful and scalable social initiatives cannot be overemphasized. In a reaffirmation of the 1970 General Assembly Resolution that wealthy nations pledge 0.7% of their Gross National Product, the United Nations launched the "Millennium Pledge" to eradicate poverty by 2015 and to tackle pressing social issues in such areas as education and health care (Millennium Project, 2006). As a result, in 2006 alone, donor nations provided

more than $104 billion (in US dollars). However, despite the major investments of time, money, goods, supplies, and other resources provided by development and aid agencies as well as government and other organizations, large scale foreign aid programs have had only mixed success. Some have made spectacular gains, particularly in the health care arena, while others have failed to make a difference, having been hampered by the enormity of the need, the income and resource inequality, armed conflict, natural disasters, poor policy decisions, bureaucratic inefficiencies, corruption, mismanagement, and other factors.

In response to critics of these programs (see, e.g., Easterly, 2006), smaller-scale *social entrepreneurship* efforts have emerged expressing a concomitant shift in approach from "doing onto others" to "helping others do onto themselves." This approach is *partnership* based; usually, *multi*-partnerships among funders, government agencies, the social entrepreneurs themselves, the clients served, and diverse community members (for more on success and failure in cross-sector partnerships, see, Seitanidi in this issue). Partnerships that develop between the targeted group and social entrepreneurs provide input about the group's own needs within the context of their social mores and cultural values, thus enabling the targeted groups to take a more active role in problem identification, policy decisions, and implementable solutions.

As the papers of Massetti, Seitanidi, and Trexler (in this volume) demonstrate, these social entrepreneurial initiatives possess, to one degree or another, their own unique structures with regard to their profit vs. nonprofit orientation, their market-driven vs. socially-driven missions, their organizational configurations in that they can be standalones or spin-offs of larger entities, and so forth. For example, *social enterprises* focus on social missions, and reinvest earnings rather than obtaining op-

erating capital through philanthropic donations (Markoff, 2008). Although social entrepreneurship initiatives have made a tangible difference within their communities as evidenced, for example, by the cases described in this paper, much more needs to be done if human organizing efforts and forms are to keep pace with the ever increasing need.

Inspiring stories alone do not a social entrepreneurial program make

Recently, many inspiring stories of social entrepreneurial ventures have appeared in print (see, e.g., Bornstein, 2004; Westley, *et al.*, 2007) or are being circulated around within the numerous conferences, associations and funding agencies that have sprung up around social entrepreneurship. These stories typically describe several important elements of each of the programs:

- The pressing social/community needs that prompt and are addressed by the project;
- The founders and leaders of the programs, particularly in regard to their overcoming a set of challenges (sometimes of enormous difficulty) standing in the way of getting the program off the ground and continuing to be able to accomplish its mission;
- The varied internal, i.e., organizational, resources that had to be culled and brought together to become functional in the first place;
- The multifarious external issues and resources, i.e., governmental, political, corporate, and environmental, that have to be mastered during the origination and ongoing activities of the program.

These stories make inspiring reading primarily because of the worthwhile nature of the mission, the seemingly heroic actions and capabilities of the founders, and the tension and then resolution inherent in the dynamics of the narratives. In sum, these stories are packaged as heroic quests in which the entrepreneurs are seen as overcoming one obstacle after another on the way to their Quixotic objectives.

Yet, at the same time, in reading these many stories of social entrepreneurial programs, it has struck the authors of this paper that in spite of their inspiring nature, there is a noticeable lack of a conceptual/theoretical framework for understanding the dynamics of social entrepreneurship. Certainly, there have been attempts to place social entrepreneurship into an economic framework by depicting it as a key builder of *social capital* (see, e.g., Beinhocker, 2006). Moreover, there are many articles relating social entrepreneurship to social policy and similar matters. Nevertheless, there is no clear cut, explicit general understanding of the *systemic* dynamics involved in how social entrepreneurial ventures come into being, develop, and succeed (or not).

In this paper, we suggest that one remedy for this gap is to approach social entrepreneurship from the perspective of complexity science. Indeed, this is not a very far reach since it became evident to the authors early on in their examination of social entrepreneurial literature that complexity dynamics were written all over the social systems dynamics of these types of programs (a foreshadowing of this perspective can be seen in the classic paper in this issue). In particular, complexity ideas are evident during all aspects of social entrepreneurial programs, from establishing rich social networks, through the dynamical systems by which they operate, all the way to the emergence of dramatic social and community innovations.

However, one major assumption—the heroic leader—dominates the field and we believe this assumption has been standing in the way of theoretical progress. Anchoring on this assumption has the affect of limiting the application of complexity theory's constructs and methods to social entrepreneurship. Namely, the presumption that the chief driver of success in such programs lies in the stipulated special "heroic" attributes of their founders stands in opposition to a complex systems framing of the process wherein it is the nonlinear interdependencies inherent in the system that are crucial and not any single actor. But before we can proceed with examining social entrepreneurship with a complexity lens, it is necessary to first unpack the "hero/heroine" mythology dominating social entrepreneurial narratives.

Moving beyond the hero/heroine mythology

One salient feature of the narrative content of social entrepreneurial programs is the heroic stance of the leader. This status is usually heightened by a description of some sort of special charisma possessed by the founder which serves to attract and motivate his/her "disciples" or "acolytes" (for a description of this phenomena in leadership studies in general, see Plowman & Duchon, 2007). One example is the dramatic account of the *Associação Saúde Criança Renascer* ("The Association for Rebirth in Children's Health" recounted in Bornstein, 2004) that was founded in 1991 in Rio de Janeiro, Brazil, by the Pediatrician Vera Cordeiro.

Dr. Cordeiro discovered to her dismay that certain children kept returning to the hospital within months of their previous stays with the same health problems as they had before, and *Renascer* was founded to reduce the recidivism rate of these children. It is important to note that *Renascer* was started at the Hospital da Lagoa, an upscale community built-up around a beautiful central lagoon in Rio surrounded by the beautiful green mountains of what is appropriately called *Rio de Janeiro: Cidade Maravilhosa* (The Marvelous City of Rio). The recidivism rate, though, was not that of the children who lived in Lagoa itself but instead was coming from the children who had come to the hospital from the squalid conditions of the numerous slums called *favelas* that compete for land all over Rio with the wealthy communities. One side of a mountain with spectacular views of the tropical South Atlantic beach may have a huge *favela* of up to 200,000 people while the other side of the mountain is dotted with million dollar (US) plus homes. The extreme contrast between the two is demonstrated in the remarkable disparity existing on either sides of one of the main roads that forms a boundary between the wealthy neighborhood of Gavea and its gang-led *favela* neighbor Rocinha: there is a 9-fold difference in employment; a whopping 17-fold difference in income; and a 13-year difference in life expectancy (*The Economist*, 2007)!

Similar to other accounts of other social entrepreneurial programs, the development of *Renascer* as a vital social enterprise went through various stages of viability. Thus, Dr. Cordeiro had to convince her colleagues, appropriate the necessary resources from the hospital, enlist the aid of medical, nursing, and ancillary support personnel, and convene numerous meetings of interested parties to garner their help. Moreover, it soon became obvious, particularly to Dr. Cordeiro herself, that the program had to directly reach out and intervene in the family life of the *favelas* where the children inevitably returned after their treatment at the hospital or the clinic. At first, this outreach to the *favelas* included creating treatment plans which involved the children's mothers and families in health education, utilizing the skills of numerous care givers who would go into the favelas, providing medical education, establishing antiseptic conditions, and addressing a host of other health related matters. Soon, though, it became apparent that the program would have to do more than focus on health issues alone.

As others joined the group, both professionals and volunteers, and as an actual center with its own physical location was set-up, *Ranascer* expanded into other areas outside of health care per se such as social conditions and employment that were found to be of crucial importance in the children's health. As a result, job training was instituted as well as the establishment of small businesses in the *favelas* involving dress making, crafts, and cooking. These were intended to broaden the spectrum of opportunities that were available to the families as well as start to make *Renascer* self-sustaining.

Another important growth spurt occurred as *Renascer* managed to enlist the help of consultants from both the prestigious McKinsey Consulting Group in São Paulo as well as the accounting firm of Arthur Andersen (remember this was pre-Enron!), only 5 hours away from Rio by car. These advisors not only helped put *Renascer's* financial house in order, they also helped it garner additional funding from the local and federal governments but eventually they helped it win a substantial cash

award from Ashoka, a foundation which for twenty years has been identifying and funding social entrepreneurial projects throughout the world. As of this writing, *Renascer* has scaled outward with many other hospitals in Rio, São Paulo, and Recife where it is stimulating the creation of similar programs.

There's no doubt that the story of the creation of *Renascer* and its replication in other locales in Brazil is a very inspiring one. But inspiration alone is clearly not enough. Important questions need to be asked about what exactly it was that has made Renascer such a resounding success. One approach is to emphasize the "heroic, charismatic leader" perspective which is quite obvious in the way the inspiring story is told. For example, this stance is clearly demonstrated in the words of Odilon Arantes, the Head of the Pediatric Ward at the Hospital da Lagoa: "Here I can say with absolute assurance that the main element for *Renascer's* success was Vera…" (Bornstein, 2004: 145). Yet, Dr. Cordeiro herself places the reason for *Renascer's* success on how she "had brought people together…it was their collective energy that made it all happen" (Bornstein, 2004: 145).

Certainly, Dr. Cordeiro's initiative, vision, courage, and influencing abilities were crucial factors at work in this example of a successful social entrepreneurial program. But emphasizing these personal idiosyncratic leadership traits leaves the researcher in a *cul de sac* with respect to further understanding. Such a perspective would have it that to begin a successful social entrepreneurial program, one simply must wait until a specially talented individual just happens to come along with the appropriate vision and magnetic charm. This is analogous to that stream of leadership research which stresses leaders' personal charisma, a conceptual dead end since it has not born out that charisma is necessarily an organizational success enhancer. This conceptual *cul de sac* assumes that unless a person born with or otherwise possessing the right combination of rare characteristics comes along at the right time in the right place, effective social entrepreneurial programs cannot really take root and succeed.

But just as in recent applications of complexity science to leadership studies where emphasis has shifted away from charisma and more to the establishment of social networks rich enough to bring about the emergence of innovation (see, e.g., numerous papers in Hazy, *et al.*, 2007), a similar vantage point can be utilized in understanding how social entrepreneurial ventures can rise and thrive. From such a complexity science based point of view, instead of focusing on the special attributes of a special person, attention is placed on the creation of information rich social networks, establishing conditions that foster the emergence of innovation, allowing for self-organizing social processes, connecting the internal dynamics of the enterprise to its many environments, and, in general, promoting networks where resonance and synchronization can take place among the interested parties (providers, funders, and clients).

We can see the potential of such a shift of focus by turning to another example of a successful social entrepreneurial program, this one from a very different part of the world, namely Poland in the 1990's after the collapse of the Iron Curtain and state run communist totalitarianism (Bornstein, 2004). In the early 1990s, the government of Poland stopped subsidizing collective farms with the unfortunate result that thousands thereby became unemployed and homeless. In the wake of this sudden transition in political economy, two psychologists, Tomasz Sadowski and his wife, purchased an abandoned schoolhouse. They renovated the house as a dwelling for themselves and their families as well as for homeless farmers. This group then started farming the land as a social entrepreneurial venue. By 2003 there were 20 such homes/farms with mature "mother" houses hatching new smaller homes and farms. Eventually these became known as the *Barka* Foundation for the Promotion of Mutual Help. All of the residents manage each home and farm with the assistance of *Barka's* staff.

Again, the success of the *Barka* Foundation could be taken as an indication of the charisma and influence of Tomasz Sadowski and his wife. Yet, the same problem exists with this judgment about *Barka's* success as with the emphasis on Dr. Cordeira's leadership prowess

in the case of *Renascer*: it is a narrative that neglects all the other diverse elements responsible for what took place. Like, *Renascer*, *Barka's* success has complexity science written all over it. As one resident put it, "We are all people with problems…[the] biggest miracle is that we sit at one table and talk with each other… at the end of the day I feel needed" (Bornstein, 2004: 203). The implications coming from this quote cannot but highlight the crucial role of the complexity-based notion of social networks and the rich interactions that can be generated from them. Or, as Sadowski himself said, "People told us that it wasn't possible to create such an inclusive feeling…there is nothing mysterious about it… The worst criminal doesn't believe things can be this way only because he has never come across these kinds of relationships…" (Bornstein, 2004: 203). Here we see evidence of not only richly interactive social networks, but the sense of possibility and thereby hope that comes from the complexity idea of emergence which we will say more about below.

The key role of social networks

Instead of asking what kinds of special charismatic traits the founders of social enterprises require, a complexity interpretation of social entrepreneurship shifts the conceptual focus to such questions as to what kind of networks (or in mathspeak "graphs") are useful for what kinds of activities and accomplishments. A social network is composed of persons linked together in some fashion. The persons are called nodes and the linkages are termed edges.

Different types of networks or graphs have different patterns in the distribution of nodes and linkages. Thus, there can be hub networks (as in many airline travel routes with a hub city), random networks (where linkages are added randomly), small world networks (the famous six degrees of separation networks), and so-called scale-free networks (Barabási, 2002) which exhibit a power law signature in the distribution of nodes and linkages so that there are just a few nodes that have the preponderance of linkages, a midsize number of nodes have less linkages and most nodes have very few linkages.

The lawyer and network modeling researcher, Gregory Todd Jones (2007), has shown how different types of networks evoke different levels of cooperation. For example, scale-free networks may not be ideal for eliciting large scale cooperation since many persons are left out of the rich connectivity within the social network. If the social network, however, is identified as a scale-free one, then actions can be taken to make it more inclusive by intentionally connecting the "outlier" or marginalized persons.

Or, in the case of another type of network, the small world network, sometimes all that is required for establishing connectivity among all the persons in a social network is just adding a few more connections between the right people. Even in a so-called random network where new connections are added at random, there eventually can be the emergence of what's called a "giant cluster" in which, with an average of only one connection per node, all nodes can become connected thus allowing for information flow throughout the network. Indeed, having everyone connected in such a fashion may bestow the kind of information flow that is a success factor for a particular program. The ramifications of these different types of social networks for social entrepreneurial programs are indeed significant since the above remarks from both *Renascer* and the *Barka* Foundation demonstrate the undeniable role of social connectivity in their respective programs' successes.

Social connectivity, rich information, and network dependent learning

Another crucial aspect of social networks is their capacity to be information rich or, to use an analogy, their bandwidth. According to Gulati (1999), networks that develop across organizational boundaries provide opportunity sets that can ultimately influence a firm's strategic direction, or in our case the strategic direction of the social entrepreneurial venture. As firms share information across boundaries, the resulting social networks serve as a mechanism for the exchange of *rich* information. For example, these social networks enable firms to obtain knowledge about available resourc-

es or regulatory requirements, or to learn of opportunities to forge new alliances. Sometimes, however, social networks constrain the amount of available opportunities and information. This occurs when the networks are not sufficiently broad or diverse, or when the networks themselves restrict access to specific information.

Social networks serve another function; they also facilitate the development of network dependent learning. Learning takes place within two primary contexts, individually and, most importantly from a complex systems view, within a social connectivity framework. The latter perspective posits that learning is a nonlinear multi-level emergent property of the collective that occurs as individuals interact with others and with their environment in a group or networked setting. Thus, learning can emerge from micro-enactments between individuals or groups (Silberstang & Hazy, in press; Hazy & Silberstang, in press) as well as from macro system-wide interactions as many different levels simultaneously coevolve.

Social entrepreneurship thrives on the learning emerging from macro-system interactivity since such learning facilitates the identification of goals and the attainment of desired outcomes under conditions of environmental uncertainty. Social value is created as shared information is channeled to enhance capabilities and mobilize resources. This information is path-dependent, another complexity notion; that is, it is based on the history and the direction of the information flow, the number of nodes, and the frequency and amount of information. As resources, capabilities and competencies are aggregated within a social connectivity network, the super-additive effect gives rise to an increasingly dynamic and complex social network (Dagino, 2004).

Agent Based Models that examine the emergent properties of networks computationally can be developed to simulate the emergence of learning within these networks at the systems level as well as at the micro-enactment level. Doing so enables models and theory to coevolve (Yuan & McKelvey, 2004). Models could be designed to depict different scenarios in which the flow of information constrains or facilitates social entrepreneurial activities and outcomes within hierarchical and heterarchical social networks, as described below.

Heterarchy

Social networks can also be roughly divided into those that are *hierarchical*, that is, with information predominantly flowing from the top downward as in typical management pyramids, or *heterarchical* where the information flows in lateral directions. Hierarchy and heterarchy also refer to how command and control is exercised in complex systems, either top-down command and control in the first case or distributed command and control in the second (Hazy, *et al.*, 2007). Most social entrepreneurial programs express a heterarchical control network with a free flow of lateral information. This is mainly because the founders tend to see themselves as equal in status even if certain members possess higher levels of expertise and credentials. This can be seen clearly in the cases of both *Renascer* and the *Barka* Foundation where traditional hierarchical relationships have been largely replaced by heterarchical ones, e.g., medical or psychological specialists unusually involving themselves not just hierarchically but heterarchically and thereby laterally interacting with nurses, home health educators, social workers, volunteers, and farmers.

This kind of heterarchical cooperation was also one of the keys to Brazil's unique ability to hold in check a potentially devastating aids epidemic in the 1990's (Westley, *et al.*, 2007). A concerted and cooperative heterarchy of clinical specialists, clergy, community activists, and volunteers of all stripes and colors made their rallying cry a dedication to ensure that resources for prevention and treatment would be made available to all citizens without regard to their socioeconomic levels. The result was that, whereas in 1990 Brazil had twice as many cases of HIV/AIDS as South Africa, by 2007 it had reduced the rate of infection to only 0.6% and is now seen as a model for the rest of the developing world.

Heterarchy fosters the kind of cooperative and collective spirit which typifies social entrepreneurial enterprises. Heterarchy

is also expressed in the process of *co-creation*, where those served become active partners in the generation of ideas and solutions (Prahalad, 2006). The shift from the leader's early vision and direction to the deployment of heterarchical cooperation enables the further generation of ideas and a democratization and deployment of the leadership process as it occurs within emergent events. This doesn't, however, obviate the need for strong leadership and designed infrastructure, but it puts the latter into a different context of operation. In this respect, leaders are enablers of change, not by their special charisma, but by creating conditions that allow for the emergence of new ideas and approaches, an approach that is called generative leadership (Hazy, *et al.*, 2007).

The perspective of complex adaptive systems

The image of networks of heterogeneous agents interacting with one another immediately brings to mind the complex adaptive systems approach to complexity science. Although this approach has many aspects and has been well described elsewhere (see for example, Hazy, *et al.*, 2007), it is sufficient for our purposes to note that the complex adaptive systems approach focuses on interactions among semi-autonomous actors and seeks to understand the emergence of adaptive structures from these interactions. Thus, intuitively it is an approach that seems to offer great potential for this field.

In fact, all three of the case studies papers in this issue use the complex adaptive systems approach to analyze social innovation in different ways. Seitanidi (this issue) describes the dynamics of a cross sector partnership in the UK by looking at interactions at the individual, organizational and societal levels of analysis. Tapsell and Woods (this issue) describe social innovation among the indigenous people of New Zealand by looking at the heightened complexity inherent in the interaction between the older and the younger generations of Maori. Finally, Donnelly-Cox and Rhodes (this issue) explore the plight of human rights defenders around the world by focusing on the program of Front Line centered in Ireland, that

was formed to support their needs. These latter authors also use the fitness landscape metaphor (Kauffman, 1993) to explain the success of this venture.

One of the most intriguing aspects of complex systems is the implicit assumption that the patterns that emerge at a higher level of scale are difficult to predict. And yet, it is often these higher level performance variables in which we are interested, particularly in relationship to social problems under study because of the adaptive potential of these performance variables. That is where the term "complex adaptive systems" comes from, this emphasis on how emergence fosters greater adaptability. This is especially important in social entrepreneurship where we look to complex adaptive systems mechanisms like those described above to somehow impact larger scale variables such as poverty, disease, climate change, and as in the Brazilian case, recidivism in childhood illnesses within populations. We turn to these macro-scale issues next.

Dynamical systems and attractors

The very notion of social entrepreneurship and its focus on accomplishing a set of social missions puts the emphasis on outcomes, social outcomes, and not so much on the systems' dynamics nor even on the individual entrepreneur. This is ironic since, as we pointed out above, it is the latter who often gets the attention. Importantly, the socially desirable outcomes are understood as intentional ones (albeit, perhaps not well understood) and not simply emergent patterns. This means that in social entrepreneurship projects, both the intended and the emergent outcomes must be taken into consideration when evaluating the potential of projects. This is also true when evaluating their resulting success or failure. To paraphrase a medical heuristic, an organizing principle in social entrepreneurship must be: first, do no harm. Given the potential for unintended consequences, this is not a trivial notion.

The difficulty, of course, is determining what this all means in a complex systems context. As the cases described in this issue make clear, the mechanisms whereby desired

outcomes result from highly interdependent actions in a complex environment generate an exceedingly difficult space within which individual agents are required to navigate. Thus, important dual considerations become i) determining the desired outcomes and, ii) organizing disparate interdependent activities among interconnected and interacting agents who come together to achieve the desired *and predicted* outcomes.

There is a rich history and research precedent for analyzing outcomes of social events such as epidemics and conflicts using dynamical systems methods, another element in the repertoire of the study of complex systems. This approach involves framing a problem or situation in the context of variables of interest and making assumptions about how these change with respect to one another and over time. The sum total of all possible combinations of these variables and their rates of change is represented in a *state space* and the subset of combinations which are found to represent the system as it iterates through time form what is called the *orbit* in the case of a single system and a *phase portrait* in the case of a family of similar systems with different initial conditions.

For interested readers, Epstein (1997) describes several classic examples of dynamical systems models as applied in biological and social situations. One that might be familiar to readers is characterized by the Lotka-Volterra system that describes predator-prey dynamics. In this model, the birthrate of the prey can be seen to have a varying affect on the populations of both predator and prey leading to a rich family of systems each with different dynamics. In contrast, the Kermack-McKendrick epidemiology model looks at infection rates of the susceptible, infected and recovered elements of a population to track the progress of an infectious condition. This model has also been used to study the adoption of an ideology within a population.

For years, these analytical approaches have been used successfully in exploring nonlinear affects associated with problems in epidemiology and in conflict analysis. More recently, Agent Based Modeling (ABM) techniques have been applied to these problems in ways that augment and expand analytical results derived from solving equations by including affects that cannot be modeled in differential equations, for example, the impact of heterogeneous agents and stochastic processes. These techniques have also begun to provide insights in leadership in complex systems (Hazy, 2008).

The point is that complex nonlinear relationships among independent variables, system parameters and dependent outcome variables can be explicitly modeled using these techniques. These analytical and agent-based approaches are likely to become increasingly important in an emerging systemic theory of social entrepreneurship and its practices. As an example, in the Brazilian case of *Renascer* described above, recidivism rates could be considered using dynamical systems techniques. For example, an epidemiology model could be modified to predict rates of recidivism in relation to unemployment, per capita income and economic conditions, etc. These models can be combined with empirical studies to begin to understand more deeply how changes to one factor might ripple through the system of interacting variables to impact desired outcomes.

As economic entrepreneurs have learned in a business context, analysis before action can greatly increase the likelihood of success while also limiting downside risk. At present, there is no analytical tool-kit for the social entrepreneur that is analogous to the economic models that are the bread and butter for economic entrepreneurs who are intent on building wealth for themselves and their investors. Part of the reason is that the problem of *social value creation* is even more complex than that of shareholder wealth creation because the variables of interest are harder to define and are also more numerous, a subject to which we now turn.

Dynamical systems and social entrepreneurship

When it is social outcomes that are anticipated from entrepreneurial activities like those described in this issue and elsewhere, the dynam-

ical systems that are used must adequately capture the social phenomenon of interest. This includes the ancillary affects which, although not directly relevant to the outcomes modeled, may in complex settings offset the overarching social benefits of the projects under analysis. This is a clear point of departure from pure economic entrepreneurship.

In the latter case, the dynamical systems of interest generally take the form of micro-economic models such as discounted cash flow analysis where maximizing shareholder value is the sole outcome of interest. Complex as these models are, collateral effects on other social outcome measures are largely ignored. For example, in traditional accounts of economic entrepreneurship, the exploitation of natural resources or of the labor force, and the impact of entrepreneurial firm growth on other firms and on the industry is outside the scope of analysis. What is important in these models is a singular outcome that benefits a single constituency, the owners of capital.

For the social entrepreneur, such a single-minded focus would be unacceptable. Harmful collateral effects negate the organizing principle of doing no harm, and may create conditions that result in the failure of the program, and most importantly, harm its constituents. It would be meaningless to improve recidivism in *Renascer* if that result had come at a cost of an increase in mortality due to infectious diseases contracted at the clinics, for example. Interactions among outcomes can be as important as the outcomes themselves. For social entrepreneurs, this is a *significant* point of departure from their economic entrepreneur colleagues who might actually celebrate the demise of the incumbent companies with whom they compete and even the inevitable layoffs that accompany their troubles.

In the competitive world of business, what matters is one's firm's survival and this is defined by marketplace and financial success. Shareholder value is a locally defined variable. What goes on around the firm in the broader society can be ignored if it doesn't impact the focal firm. In contrast, as a general matter, the social entrepreneur does not have the luxury of this type of single minded focus on a well-de-fined and locally controlled outcome. Instead, by definition, social value is broader in scope because it impacts the entire social environment. In this sense it is a system variable at a societal level.

Stability and attractors in dynamical systems

The preceding discussion has thus far ignored the important idea that dynamic stability is possible in nonlinear systems and this stability can be usefully described using the notion of dynamical attractors. One of the perplexing—and also generative—attributes of nonlinear systems is the existence of positive or amplifying feedback. Indeed, this can be observed in the business context. The fact that wealth grows in relation to its size (i.e., wealth grows exponentially via reinvested returns combined with an ongoing return on investment) is the underlying "big idea" behind the generation of global and domestic economic growth.

On the other hand, unbalanced amplifying feedback can lead to uncontrolled divergence in the system's dynamics (the familiar feedback from electronic amplifiers when an open microphone is pointed toward the speaker is an example of this) that cause nonlinear systems to be unstable except under certain parametric conditions. It is the relatively rare, well-tuned situations of stability or near stability in a dynamical system that are of most interest to researchers and practitioners. Stability in one form or another makes a level of predictability possible. Conditions of stability and near stability are characterized by convergence toward *attractors* in state space.

Convergence toward attractors

Dynamical systems are in general nonlinear, one aspect of which means that they can pass through regions of stability and instability. For example, an organization might maintain relative stability in employment levels and funding for a period of days, weeks or months, while looking further out, for years or for decades, for example, the apparent stability that is perceived close at hand cannot be assumed to continue. Alternatively, assuming the addition of a few more employees might not upset the stability of the system, whereas doubling in size may have a dramatic affect.

Sometimes, in fact, dynamical systems can be extremely hard or even impossible to predict because of certain mathematical reasons. Yet, it can be such points of unpredictability that some interesting dynamics—including processes of emergence that are discussed in more depth in the next section—can be observed to occur. Nevertheless, dynamical systems are also characterized by the existence of *attractors* defined as subsets of state space where the systems' dynamics can become "trapped" within the attractor (Hirsch, *et al.*, 2004). In other words, an attractor is a set that in some sense "attracts" all nearby solutions; although the specific solution may not be predictable, one can predict that the system's behavior will remain close to the attractor. That is, the system will remain trapped within what has been called an *attractor cage* where the changing states of the system remain constrained within a subspace. Thus, the continued behavior of the system within the attractor subspace is reasonably predictable.

Activities—actions and choices by individuals and groups—that occur in organizations whose dynamics are constrained within an attractor cage are said to operate within a *convergence context.* Social entrepreneurship projects often operate in this way, particularly when resources are scarce and increased efficiency is required. For *Renacer* in Brazil, relative stability within the center, once it was set up, was a key enabler of success. In a different example, in their studies of generational conflicts among the Maori in New Zealand, Tapsell & Woods (in this issue) describe the elders among Maori as supporters of stability; in effect they operate within a convergence context. As such, considerable time is spent navigating state variables of culture and dampening change.

As is discussed in the section on emergence, when local dynamics are pushed further afield, however, beyond a threshold of requisite complexity, instability is a very likely result. But instability in this context may be just what's needed since deep-rooted change can result from it.

Generative dynamics and divergence within attractors

In their study of a Mission Church in Texas, Plowman, *et al.* (2006) observed the regeneration of a community in decline. What had been a traditional affluent church community became, over the course of several years, a socially active community service organization that ran soup kitchens and neighborhood clinics. This transformation of Mission Church was serendipitous, but this does not have to be the case. Surie and Hazy (2006) described an intentional regeneration of an Indian manufacturing firm by using complexity ideas to explain the interaction dynamics that led to the regeneration of a small domestic company into an international player in automobile manufacturing.

What is common in these stories is the presence of divergent dynamics within what are otherwise converging actions within an attractor cage. In the case of the Indian company, partnerships with foreign firms were used to expand the firm's internal capabilities, but it also began to expand its aspirations. Before the expansion described in the case, the dynamical system for the Indian company operated in a very narrow market with limited and well identified local customers. It thus had a relatively simple attractor cage, particularly with respect to its markets. As foreign partnerships became more common, the potential of expanding markets entered the dynamics of the company. In other words, the relative stability for the firm that resulted from its attractor declined (i.e., it became less stable) due to a new divergence along the dimension of market potential. What had once been thought to be a clearly understood relatively fixed market variable became increasingly differentiated as new possibilities such as regional, national and various international markets became distinguishable from each other. This increasing differentiation and segmentation of markets is in stark contrast to the organization's prior perceptions where "market" simply meant and continued to mean "current customers". These expanding possibilities increased the complexity of its attractors. Eventually the company found new markets and a new identity (Surie & Hazy, 2006).

For the Mission Church, the process was unintentional. Before the changes described in the case, the congregation was reasonably homogeneous, and thus it was undifferentiated along the dimension of affluence as everyone was relatively well off and did not require community services. As the new leadership loosened its constraining forces that held or "converged" the system inside its attractor cage, new, less affluent constituencies were allowed to enter the system, and these had divergent interests with respect to their personal and family needs. This was clearly illustrated when a group within the church opened a soup kitchen to support the homeless constituency, an action that introduced divergence along this previously unarticulated dimension of relative affluence (Plowman *et al.*, 2006). Thus, divergence was introduced into the attractor of the mission church. As a result, the attractor cage for the church became more complex (Plowman *et al.*, 2006). It remained within an attractor cage, and thus was convergent, but the attractor included divergent aspects for a while.

Lichtenstein and Plowman (in press) used the Mission Church study and two others to identify four stages of regeneration: a far-from-equilibrium state; amplifying actions; recombination/self-organization; and stabilizing feedback. We discuss this further on the section on emergence, but here it is important to note that what Lichtenstein & Plowman (in press) call a far from equilibrium state, we are calling *dynamics with requisite complexity* for reasons we describe later, and it is the presence of divergence along one dimension or another that leads to dynamics of requisite complexity in the system as a whole. Divergence results from repeated amplifying actions along certain dimensions while convergence occurs in the presence of stabilizing feedback that maintains the system within an attractor cage. It is under these conditions that new possibilities are discovered.

Thus, we say that social programs that occur under conditions of divergence along some dimensions within a complex attractor occur within a *generative context* for social entrepreneurship. In a generative context, something brand new and unexpected can happen; there is a potential for self-organizing that creates a new, previously unknown orderly regime. In other words, much of what Lichtenstein and Plowman described is directly implied by a dynamical systems framing of organizational life. It is necessary to talk for a moment about how systems under the tension and stress of simultaneous convergence and divergence maintain a sense of unity.

Unifying organizing dynamics across systems

The above illustrates the challenges inherent in complex dynamics. As things change, a sense of "unity" among disparate groups, some perhaps operating with incompatible attractors, must be maintained to hold a system together. The nascent clinic at the Mission Church might have been incompatible with the soup kitchens (Plowman, *et al.*, 2007), for example, leading to a crisis and potential split of the community into two. Unity had to be maintained.

The case of Front Line described by Donnelly-Cox and Rhodes (in this issue) makes this point. When Mary Lawlor left Amnesty International to found what became Front Line, the International Foundation for Human Rights Defenders, she left with her own skills, her network connections, and a substantial funding source, but little else in the way of organization. In our terms, initially, there was not an attractor toward which the activities of the organization would converge. Celebrities and other sponsors were used to gain publicity, but these participants were not permanent parts of the organizations. For participants to develop a sense of unity and purpose, conferences were arranged as platforms for discourse.

In our language, these events precipitated the formation of attractors in the short term as people joined forces to make the conferences work. Once each was over, however, many people went back to their normal daily lives. As such the Front Line organization itself needed to hang together as an entity even as event related attractors came and went over the years. This was a key challenge for Mary. According to her, a key enabler of success for the organization was remaining flexible enough so as to be able to respond to the changing needs of the individual human rights defenders. As she put it:

In any organization there is a constant expectation that we will do more and deliver more. As a result we have to grow our services and build our capacity to respond to peoples in need. The danger is that the growth, in budgets, supporters, and activity becomes an end in itself, divorced from the needs of the people we serve. The end game however, is our capacity to deliver the desired result of change for the people we were set up to help (Quoted in Donnelly-Cox & Rhodes, this issue, p. 38).

As Walter Buckley describes in the classic paper (in this issue), social systems are more complex that other systems because components change even as the system changes. This implies that in addition to simultaneously navigating both a convergent context and a generative context, there is also a *unifying context* to be considered when constructing a theory of how social entrepreneurship delivers positive social value.

Self-Organization, the dynamics of requisite complexity, and emergence

A glimmer of the importance of a complexity-based perspective can even be found among funders of social entrepreneurial ventures. Thus, in the recent application form for a grant from the heavily endowed Skoll Foundation (founded by one of eBay's first presidents, Jeff Skoll), one can detect the complexity laced concern about going beyond "equilibrium". According to the Skoll Application Form:

Equilibrium describes a stable state, generally economic or social, controlled by and benefiting established entities. The social entrepreneur sees the limitations of an existing equilibrium and offers a more efficient solution with the potential to benefit those not served by the existing model. Skoll is seeking social entrepreneurs who have created and are implementing new, large-scale approaches that can change the equilibrium by fundamentally transforming the lives of marginalized populations. The ultimate example of equilibrium change would be to eliminate a problem by solving its root cause or to create global impact by driving universal adoption of a new innovation by all others who address the same issue.

Going beyond equilibrium has become a central tenet in complexity science circles as understanding has developed about the dynamics of complex systems undergoing major transformation. In a stable or equilibrium state, differences and departures from equilibrium and the norm are washed-out rather than being the seeds of new order. Indeed, research into the phenomenon of self-organizing physical systems describes the formation of new structures with new properties under what Nobel laureate Ilya Prigogine called far-from-equilibrium (FFE) conditions. Self-organizing occurs when the system is outside the norm (or equilibrium) and random events are amplified into new patterns (Nicolis & Prigogine, 1989).

Because Prigogine was describing physical systems, far from equilibrium (FFE), had a well defined meaning in relation to thermodynamics. In social system, however, the notion of equilibrium is less well defined. Still, the idea of greater internal complexity implies that self-organization can remain a useful construct. Because of this, rather than FFE, we use the term *dynamics of requisite complexity*, to capture the idea that as certain parameters increase, the relative stability of the system is impacted often to the point where self-organization can occur. Thus, moving away from a system in dynamic stability towards a system operating within a complex attractor indicates the conditions necessary for social entrepreneurial programs to exhibit innovation.

Emergence and social innovation

Indeed, one of the remarkable features of social entrepreneurial programs is their ability to prompt innovation. Therefore they must in some way or another partake of conditions of requisite complexity. In this context, another complexity construct turns out to be particularly pertinent to innovation, namely, that of emergence, which refers to the arising of novel patterns, novel structures, and novel properties in complex systems (Goldstein, 1999, 2006, 2007). Emergence in fact encompasses a wide variety of complex systems cutting across a wide variety of phenomena. The following list of what have been called emergent phe-

nomena gives some sense of just how wide-spread emergence phenomena are thought to be: life itself; consciousness; new speciation in evolution; multi-organisms; artificial life; the Internet; superfluidity and superconductivity; additional computational functionality; optimal options pricings; the perception of color; drug interactions; as well as emergent project teams and emergent leadership in organizations. And so now with justification we can add social-entrepreneurial projects to the list of emerging phenomena since they exhibit the same set of characteristics typifying such phenomena, namely, radical novelty, collectivity, unpredictability, and irreducibility to antecedent and lower level components.

One factor that is often seen in the emergence of innovation characterizing social entrepreneurial ventures is a recombination of already existing elements, e.g., the mixing of hierarchical levels, areas of expertise, differing perspectives, and so on. Indeed, combining existing order in new ways is a hallmark of the innovations exhibited in emergence. This recombination is along the same lines as how Kary Mullis, Nobel Laureate in chemistry for his invention of polymerase chain reaction (PCR), described the key to his scientific success: "In a sense, I put together elements that were already there, but that is what inventors always do. You can't make up new elements, usually. The new element, if any, it was the combination, the way they were used" (quoted in Sutton, 2002: 22). Mullis's description indeed hearkens back to how Thomas Edison described the art of invention, "To invent, you need a good imagination and a pile of junk."

An example of using what is already available but in new ways and combinations is recounted by Wesley, Zimmerman, and Patton (2007). The Canadian clothes designer Linda Lundström used her expertise in design along with her memories of growing up in Red Lake, a mining town in Northern Ontario with a sizable population of the native Americans who are now called "First Nation." Lundström remembers their crafts as well as the endemic racism. She has combined these into her work and by establishing the Kiishik Fund, a foundation that aims to educate children about the

First Nation's heritage through experiential classrooms where native language, art, and traditions are shared.

Concluding thoughts: Toward a hopeful future

What we have tried to offer in this article is the beginnings of an outline describing one more partnership involving social entrepreneurship, that between social entrepreneurship practitioners and interested complexity researchers and theorists. This type of partnership would enable the linking of site and issue specific knowledge and expertise with complexity theory models and applications. The resulting network of partnerships, comprised of the target population, practitioners, researchers, and theorists, when expanded to include other internal and external resources, such as donors, governmental agencies, and other networks, would form new basins of attraction from which solutions to pressing global needs could be addressed.

Working in consort, a Complexity and Social Entrepreneurship Partnership could join forces to develop and refine tools, strategies, policies, and methodologies; plan, implement, assess, improve, and duplicate projects; model alternate scenarios to account for varying conditions; coordinate knowledge and lessons learned; and create knowledge banks and real-time networks to build support and capacity within communities and throughout the world. This partnership can truly actuate the goal of "empowering people to make choices for themselves and their children" (Wolfensohn, 2005).

Furthermore, using increasingly sophisticated Agent Based Models to forecast the dynamics of success (utilizing input from the field and other heuristics, including knowledge gained from a networked heterarchy), it is likely we will realize gains in the field's general understanding of human interaction dynamics, and these may lead to even more sweeping system-wide changes. This two-pronged approach, where complexity informs social entrepreneurship practices and social entrepreneurship informs complexity will aid in

the development of a robust theory of social dynamics. To paraphrase Kurt Lewin, there is nothing better than a good theory with practical implications. As such, this fortuitous meeting of complexity and social entrepreneurship has the capability to change the lives of those most in need, and thereby change the lives of us all.

In this paper we provided a theoretical framework in which to understand the dynamics of social entrepreneurship within a complexity science perspective, and we described the confluence of these two frameworks. It is our intention to begin a serious and sustained dialogue within the social entrepreneurship and complexity communities in order to better understand and address fundamental issues related to *social value creation*. Accordingly, we believe that the convergence of these frameworks will result in the discovery of new possibilities, and the divergence dynamics inherent in this undertaking will result in the emergence of new and unexpected approaches to generating positive social outcomes, marshalling hope, and providing dignity to the disenfranchised.

Complexity science is well positioned to leverage gains, duplicate them (albeit in forms appropriate to the culture and situation) and develop maxims that enable scalability. The success of this fortuitous meeting of complexity and social entrepreneurship will become evident when the insights derived from complexity science have become a seamless part of the philosophy and tools of social entrepreneurs. This can only help social entrepreneurial ventures to develop, proliferate, and succeed. As a result, there will be additional support for the world's poor having "an opportunity to climb out of the poverty trap" (Prahalad, 2006: 99) and actively participate in building lives based on dignity and self-respect, where they can dare to dream, and where they are empowered to work hard—and are armed with the right tools—to make their dreams come true.

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