COMPLEXITY SCIENCE

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Measuring Contributions to Society

COMPLEXITY SCIENCE:

A CONCEPTUAL FRAMEWORK FOR MAKING CONNECTIONS – DENVER

Prepared for the Piton Foundation
by
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This paper proposes a conceptual and empirical methodology to measure the success of Making Connections – Denver, a multi-year initiative funded and sponsored by the Piton Foundation and the Annie E. Casey Foundation. The Foundations are interested in assessing progress toward the creation of the environment and conditions in which: (a) organized power flourishes and (b) the lives of vulnerable children are improved in selected Denver communities. Ultimate success is evidence of a self-organizing, healthy community long after the initiative itself has ended.

The paper is organized as follows. Part I presents a brief overview of Making Connections – Denver with a focus on the unique nature of the project, its objectives, agents, guiding principles, vision of success, and research demands. Part II is a proposed conceptual framework for the evaluation strategy drawn from complexity science. The framework provides a basis for how to think about systemic change, which in this context includes individual, community, and institutional transformation. It is argued that a complex systems approach will most closely match the initiative's guiding principles and the long term objectives.

Part III is a proposed three-fold approach to measuring the efficacy of Making Connections – Denver to include: (a) a standard impact evaluation, (b) an indicators assessment of program outcomes, and (c) a complex systems evaluation. Together these methods will shed light on the process within which organized power flourishes in Denver, for whom, and in what context.

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I. OVERVIEW

Below is a brief overview of the Making Connections – Denver initiative. The information serves as a backdrop to craft an evaluation strategy that is consistent with the initiative's theory of change, meets the needs of the communities in which the Foundations are working, and promotes a culture and community of learning.

Aim

The aim of the Making Connections – Denver initiative is to create the environment and conditions in which: (a) organized power flourishes and (b) the lives of vulnerable children are improved in selected Denver communities. In the words of the project principals:

> "Making Connections – Denver strives to put in place the tools and pathways necessary to reach an eventual creation of a synergistic system of self-perpetuating individual and systemic transformation, internally driven by community, and independent of the Annie E. Casey Foundation Making Connections initiative. In other words, the community's internal capacity to heal, to improve itself, and to resist negative forces survives the initiative itself" (Bailey 2002a).

Agents/Stakeholders

The agents (or key stakeholders) invested and actively involved in the initiative include: the Annie E. Casey Foundation, The Piton Foundation, individual residents/citizens and their families, and selected public and private institutions operating in the Denver communities participating in the initiative.

Guiding Principles

To ground the initiative, which is admittedly broad and bold in scope, the stakeholders established a set of guiding principles (Bailey 2002b). The principles are as follows:

1. We believe in the Promotion of Human Dignity.
   Communities will promote human dignity and respect, protect basic human rights, and prevent exploitation of its members.

   We commit to:
   a. Strengthen families' right to raise their children without fear, intimidation, or humiliation based on identity or poverty.
   b. Formulate resident agendas that promote dignity and basic human rights, and prevent and address exploitation.
   c. Organize residents and others working together across racial, cultural, age, gender, language and class boundaries.
   d. Strengthen authentic, deep relationships that are safe and supportive of personal and community healing.

2. We believe in Equalization of Power.
   Residents will accumulate and express collective, inclusive and responsible power for the improvement of their families and communities.

   We commit to:
   a. Create opportunities for residents and other leaders to develop, practice and refine leadership skills and capacities.
   b. Constantly broaden and deepen resident involvement.
   c. Acknowledge the importance of learning and opportunities to learn, and honoring the different learning styles reflected in community, to achieve community change.
   d. Strategically collect and use data and other information for planning and decision-making.
   e. Insist that resident organizations are democratically controlled.
   f. Build a sustainable, organized power base.
   g. Formulate a resident agenda that measurably improves the quality of life for families and children in multiple ways.

3. We believe in Transformed Organizations and Institutions.
   Residents will effect transformative and sustainable change in community organizations, public and private institutions, and their communities.

   We commit to:
   a. Insist upon the responsible use of power to influence and support the community's agenda.
   b. Provide opportunities to build sustainable relationships between families and individuals to each other and the organizations that serve them.
   c. Support resident access to and influence on decision-making processes of organizations and institutions that affect their families' economic and social well-being.
   d. Increase or redirect public and private resources to reflect resident priorities.
   e. Promote the primacy of resident power in matters affecting their communities.

Vision of Success

The vision of success for the initiative includes the following:

1. Providing the space and capacity for individuals and institutions to grow, develop leadership skills, and exert new-found power.

2. Creating a healthy synergy between the respective agents that increases each other's effectiveness in reaching the aims of the initiative.

3. Helping individuals in the selected communities develop the ability and political will to sustain a healthy community long after the initiative itself has ended.

Research Demands

The vision demands an innovative, creative, and rigorous approach to evaluation. The agents will not be satisfied with the results of a standard impact evaluation. The agents will not be satisfied with a set of short-term successes at the expense of the long-term well-being of program participants. The agents are thinking on a grand scale out of a deeply rooted desire to help the individuals who live in the selected Denver communities develop a shared agenda for change.

Methodologically, the first charge is to track how organized power comes into being. The second charge is to identify the mechanisms necessary to ensure that organized power is sustained after the initiative itself has ended.

Hence, as requested, FLYNN RESEARCH proposes the following conceptual framework—based on complexity science—within which the agents can explore the intricate parts of the system they are helping to build, monitor key patterns, and track trends over time.

II. COMPLEXITY SCIENCE AS A CONCEPTUAL FRAMEWORK

To our knowledge, there is no ready off-the-shelf research methodology in the social science literature designed to meet the unique research demands of this initiative. We suggest building a customized methodology that draws on the extant literature on measuring success and adds the most recent thinking from complexity science to capture both the static and dynamic nature of the initiative.

Complexity science provides a valuable conceptual framework from which to consider the short-term and long-term efficacy of the Making Connections – Denver initiative. The science builds on general systems theory as developed over the past 60 years by natural and physical scientists. Complexity science advances the notion that all systems exhibit complex behaviors. In order to gain a deeper understanding of how a system behaves, one must examine the complex web of inter-relationships and inter-dependencies among its parts (or elements).

Complex systems thinking has motivated scientific inquiry into a host of subjects ranging from chaos, to relativity, evolution, cosmology, quantum physics, black holes, and game theory. Most recent inquiries apply complexity science to the fields of industrial organization and management through the lens of complex adaptive systems and the social (or human) sciences through complex evolving systems described below.

In the end, complexity science allows us to understand ourselves, our minds, and our human place in the larger scheme of things. Systems thinking also holds great promise for alternative ways of organizing living systems.

General Systems Theory

General systems theory was formally proposed by biologist Ludwig von Bertalanffy in the 1940s as a reaction to reductionism in the sciences. Rather than reducing an entity to the property of its parts, system theory looks at the relations between the parts that in turn connect to a whole.

Bertalanffy (1968) described general systems theory as a science of wholeness whereby "the whole is more than the sum of its parts" as follows:

> *Entities of an essentially new sort are entering the sphere of scientific thought. Classical science in its diverse disciplines, be it chemistry, biology, psychology or the social sciences, tried to isolate the elements of the observed universe—chemical compounds and enzymes, cells, elementary sensations, freely competing individuals, what not—expecting that, by putting them together again, conceptually or experimentally, the whole or system—cell, mind, society—would result and be intelligible. Now we have learned that for an understanding not only the elements but their interrelations as well are required.*

Researchers at the University of Michigan and the Mental Health Research Institute furthered our understanding of general systems thinking in the 1950s. Seminal works were published by scholars such as psychologist and medical doctor James G. Miller, game theorist Anatol Rapoport, economist Kenneth Boulding, physicist John Platt, chemist Richard L. Meier, anthropologist Margaret Mead, and others.[2]

Systems Theory

The transdisciplinary study of the abstract organization of phenomena, independent of their substance, type, or spatial or temporal scale of existence. It investigates both the principles common to all complex entities, and the (usually mathematical) models that can be used to describe them.

Source: Cambridge Dictionary of Philosophy.

At its inception, systems thinking provided an antidote to the ever-increasing specialization in modern science—necessitated by the enormous amount of data and growing complexity of techniques within every field—which tend to isolate scientists from each other. Pioneers in the field believed that with a common framework, scientists could better communicate their findings and build upon each other's work.

Bertalanffy would be pleased to see researchers from an array of backgrounds applying the laws and principles of general systems theory today. Pioneering work is evident in several fields of study ranging from thermodynamics, chaotic dynamics, artificial

[2] See Umpleby and Dent (1999) for an in-depth history of general systems theory.

intelligence, and neural networks, to computer simulation, operations research, psychology, sociology, anthropology, economics, and industrial organization.

Complex Adaptive Systems

Complex adaptive systems thinking is an application of general systems theory. It is premised on the understanding that all systems are complex. In order to grow and thrive, systems must self-adapt using feedback received from its internal and external environment.

Principles

Complexity scientist Kevin Dooley (2002), identifies three principles that typify complex adaptive systems. First, control and order are emergent, not predetermined. Peter Allen uses Origami as a simple, but elegant, example of the emergent property as follows:

> *From a single sheet of paper, a whole series of different objects can emerge, with different emergent attributes and functions, possibly operating together as part of an interacting whole. A reductionist (scientific) analysis of the paper tells us little of interest. What matters is the emergence of new forms with novel features and properties which requires exploration and imagination.*

Second, a complex adaptive system's history is irreversible. Third, a system's future is often unpredictable.

Free market economies provide a clear example of a complex adaptive system. First, individuals who voluntarily interact within a market system develop their own rules of the game to guide exchanges. The manner in which exchange transpires is not predetermined, but emerges based on the rules of the game. Second, markets cannot undo what has been done. Can you imagine a world of business devoid of the lessons learned from the wildly successful Wal-Mart style of market capitalism even if the firm were to close its doors? Third, despite the most sophisticated analysis of expected future costs and benefits, a firm faces risks that are unpredictable in a healthy market system. Witness the collapse of Enron, WorldCom, and other major corporations in 2002-03.

Other examples of complex adaptive systems include ecologies, weather, traffic, social organizations, cultures, social movements, and group dynamics.

Schema

Agents or players in a complex adaptive system develop interpretive or action rules known as 'schema' in the lexicon of complexity science. Schema are:

- based on biased or incomplete information,
- observer dependent, and
- possibly contradictory.

Moreover, schema exist in multitudes, compete for survival, and define how an agent interacts with other agents surrounding it.

The transformation that occurs within a healthy complex system occurs through random or purposeful mutations characterized as non-linear. Such change makes the agents more robust, reliable, and/or adaptive and over time induces long-term memory in the system.

Application to Organizational Change

Systems theory allows for a radical new way of thinking about organizations, one that focuses on dynamic interconnectedness and wholeness. Regardless of the particular type of system or the nature of the component elements, similar general system laws seem to apply and shed light on the nature of a complex organization.

For example, businesses use complex adaptive systems thinking to become more successful in competitive markets. Many hire experts in complexity sciences to help navigate the new terrain of global competition and develop more open systems where ideas, creativity, and information can flourish. The aim is to improve the bottom-line of maximizing profits by allowing individuals within the system to reach their potential, bring their best ideas to market, enhance efficiency, and minimize costs.

The application of systems thinking to organizations begins with the premise that all organizations are complex. Organizations are complex because people constituting organizations are complex.

To understand and assess organizational complexity, one looks at the amount of differentiation that exits within different elements constituting the organization (Dooley 2002). Organizational complexity is evident when ". . . it is no longer possible at any moment to connect every element with every other element" within a system (Luhmann 1995). The disconnect tends to grow as an organization becomes more diverse in its attributes. Attributes include, for example, professional specializations, structure, authority and locus of control, personnel policies, products, technologies, suppliers, entities, and geographic locations.

Organizational complexity is also a reaction to internal and external environmental complexity. Attributes associated with the internal environment might include processes and technologies unique to a particular organization. Attributes associated with the external environment within which an organization operates might include customers, markets, suppliers, and institutions.

Complexity science sheds light on how structures, organizations, institutions, and/or individuals evolve order and purpose over time in response to complexity. The science recognizes that:

- semi-autonomous organizational members interact at many levels of cognition and action,

- most organizational behavior is the result of numerous events occurring over an extended period, not a small number of critical incidents, and

- organizational members strive to make sense of their current perceptions in order to take effective action—within the complexity.

Dooley concludes that when environmental or organizational complexity is low, there is little incentive for learning. When complexity is high, individuals are barraged with demands and tend to shut down in order to save their energy for emergencies. When complexity is moderate, learning is maximized.

Several lessons can be garnered from the literature on complex adaptive systems. First it allows us to focus on the interplay between a system and its environment plus their co-evolution. Moreover, complexity adds the dimension of time to the system theory literature, allowing us to observe change as it transpires.

Second, the science acknowledges that emergent phenomena have a life of their own with their own rules and may be quite complex (highly varied and differentiated). Specifically, a self-organizing system is one that undergoes a process "whereby new emergent structures, patterns, and properties arise without being externally imposed on the system. Not controlled by a central, hierarchical command-and-control center, self-organization is usually distributed through the system" (Goldstein in Zimmerman, Lindberg & Plsek 1998, p. 270).

Third, organizational behavior within a complex adaptive system is the result of numerous events, rather than a few critical incidents that can be benchmarked. *Hence, the way we study organizations should be re-considered.* "Now, most methods try to identify key turning points to understand an organization's history. Complex adaptive systems thinking suggests that key innovations occur during a longer gestation period of seemingly random events" (Dooley 2003).

Complex Evolving Systems

Complex evolving systems research applies the lessons learned from complexity science to social (or human) systems. The general principles underlying systems theory and complex adaptive systems apply to complex evolving systems. The task is to identify those characteristics that are relevant to the social system being studied.

Researchers at the Complexity Research Programme of the London School of Economics are exploring the application of complexity science to social systems and organizations (see Mitleton-Kelly 2003). Their hope is to understand more fully how complex evolving systems act; how co-evolving within a social ecosystem creates improvements; and how to apply the principles of complexity to the management of organizations.

If we base our inquiry on the premise that organizations by their very nature are complex evolving systems, we can apply the general principles or characteristics of complexity

science to the study of complex human behavior. The London School of Economics identifies these principles as follows:

- Connectivity and Interdependence: Complex behavior arises from the inter-relationships, interactions, and inter-connectivity of elements with a system and between a system and its environment. A complex evolving system is able to adapt and evolve and thus create new order and coherence.

- Co-evolution: One domain or entity changes in the context of the other(s) within an ecosystem (rather than in isolation).

- Dissipative Structures: Ways in which open systems exchange energy, matter, or information with their environment and which when pushed 'far-from-equilibrium' create new structures and order.

- Exploration-of-the-space-of-possibilities: To survive and thrive an entity needs to constantly explore its space of possibilities and to generate variety.

- Feedback: Positive, reinforcing feedback drives change. Negative, balancing, moderating, or dampening feedback maintains stability in a system.

- Self-organization, Emergence and the Creation of New Order: Complex systems exhibit self-organizing order spontaneously, a condition necessary for evolution. Emergence of new order requires a system acting as a whole, not the assembly of elements.

- Chaos and Complexity: Chaos allows for order to co-exist with disorder through iteration. Complex systems are capable of evolving without cycles of interactions by changing the rules of interaction.

- Self-similarity: Repeated properties or similar characteristics that exist within a system but at different levels and scales.

While in agreement on the basic principles of complexity science to illuminate how organizations (or other human systems) evolve, the researchers stress the value of taking into consideration the cultural, social and technical conditions that facilitate the running of a system—known as enabling conditions (or infrastructure) unique to each organization. To quote:

> *Enabling conditions are suggested using the principles of complexity. Complex systems are not 'designed' in great detail. They are made up of interacting agents, whose interactions create emergent properties, qualities, and patterns of behavior. It is the actions of individual agents and the immense variety of those actions that constantly influence and create emergent macro patterns or structures. In turn the macro structure of a complex ecosystem influences individual entities, and the evolutionary*

process moves constantly between behaviours and emergent structures, each influencing and recreating each other.

A central conclusion of the research conducted at the London School of Economics is that a key role of enabling infrastructures is "the provision of space, both in the metaphorical and actual senses. A good leader provides psychological space for others to learn, but also physical space and resources for that learning to take place."

Staff and leaders of Making Connections – Denver in their infinite wisdom incorporated this important aspect of space in their conceptual design of the initiative. Indeed the first step in the process (discussed further in Section III) is creating space in which organized power flourishes. This means keeping "external forces at bay [to] allow communities the space to develop their own sense of identify, their own understanding of the work ahead, and the strength to take on that work" (Bailey 2002a).

In the end, the principals believe that given the space and capacity to grow, organized power transforms both individuals and systems through relationship, leadership, skill development, and the shared acquisition and expression of power. These and other principles underlying the Making Connections – Denver initiative and complex evolving systems thinking appear to reinforce each other nicely.

III. PROPOSED RESEARCH METHODOLOGY

Below is a proposed three-fold approach to measure the overall short and long-term impact of the initiative to include: (a) a standard impact evaluation based on the experimental design model, (b) an indicators assessment of program outcomes, and (c) a complex systems evaluation. Together these methods will shed light on the process within which organized power flourishes in selected Denver neighborhoods, for whom, and in what context.

Time and resource constraints may limit the Foundation's ability to implement all three approaches initially in which case FLYNN RESEARCH recommends dropping the impact evaluation for reasons articulated in the following discussion.

Standard Impact Evaluation Approach

Standard impact evaluation research is based on the clinical trials model developed by biological scientists in the early part of the 20th century. In order to test, for example, how a cell responds to a given stimulus, scientists start with two identical cells and assign the treatment to one cell and leave the second cell (i.e., the control group) untreated. In this way, the relative impact of the treatment is measured with empirical certitude.

When applied to the social sciences, the approach assumes that researchers can establish a controlled experimental setting in which otherwise similar people are randomly assigned to either receive services (i.e., the treatment group) or be denied services (i.e., the comparison group). After some period of time, each group is compared along a set of

identical measures to determine the degree to which the program yields statistically significant, favorable impacts.

The U.S. Government uses random-assignment impact evaluation research to assess the value of a number of publicly funded social welfare programs.[3] Congressionally mandated experimental design evaluations of the Head Start program, for example, consistently demonstrate statistically significant short-term and long-term benefits. The government reports higher test scores of participants in grades one and two (relative to non-participants) and reduced grade repetition throughout elementary and secondary levels. By the time participants are in their early twenties, they earn significantly higher wages than their counterparts in the labor market and are twice as likely to still be in school or to have ever attended college.[4]

More recent studies have further advanced the research methodology and tested programs' theories of change by nesting impact evaluation models. For example, the 2002 U.S. Department of Health and Human Services-sponsored evaluation found evidence that participation in the Early Head Start program statistically lowered the aggressive behavior of children by age 3 and that lowered aggression is related to greater parental warmth and less spanking at age 2 (DHHS 2002).

Such empirical findings are used to justify reauthorization of government programs, guarantee continued financial support for successful programs, and/or encourage program re-design when deemed necessary. Social scientists rely on scientifically based research to establish causality (i.e., if A then B) and to generalize the results (i.e., 'what works') to a broader population. Most studies are peer reviewed to enhance reliability.

The downside of experimental design evaluations, however, is that the research usually costs tens of millions of dollars and involves the work of dozens of research scholars over several years. Hence the per capita cost of administering welfare programs has increased considerably over the past decades.[5]

A second concern is the potential for class action lawsuits filed on behalf of subjects who were exposed to unnecessary risk either as participants or non-participants in such studies.

A recent well-publicized law suit halted a $17.9 million impact evaluation of the Job Corps program conducted by Mathematica Policy Research for the U.S. Department of Labor (Price 1999). The study was stopped in 1998 on the grounds that government

[3] For example, Head Start, Early Head Start, Aid to Families with Dependent Children, Temporary Assistance to Needy Families, Job Training Partnership Act, Job Corps, Comprehensive Child Development Program, and No Child Left Behind.

[4] See NBER's Working Paper No. 8054 (December 2000) by Garces, Thomas, and Currie for a good summary of the impact evaluation literature and CSR's 1985 report on the Head Start program.

[5] The U.S. Administration on Children, Youth, and Families (1999) reports that the per capita cost of the Head Start program rose from $1,000 in 1966 (in 1999 dollars), to $4,000 in 1971 and $5,400 in 1999.

officials skirted federal law by failing to subject the study's methodology to public review. The plaintiff's lawyer compared the Job Corps experiment with the Tuskegee study in which researchers withheld treatment from 399 black men infected with syphilis. It was argued that both studies harmed the research participants.

A second example from the National Institutes of Health faulted Mount Sinai School of Medicine and City University of New York for subjecting children to a level of medical risk not allowed under federal regulations (Weiss 1999). The study involved elementary-age children with attention deficit hyperactivity disorder who were taken off their medications and subjected to brain chemistry tests without prior information on the foreseeable risks and discomforts. Mount Sinai's federal license to conduct human research was subsequently restricted.

These examples illuminate the serious legal and ethical implications of evidence-based evaluation research, be it in the physical or social science arena, and the need for heightened accountability. More fundamental, however, is the question as to whether or not random selection was the only method that would put the key findings beyond dispute in the cases sited. The simple answer is no; an array of solid research methodologies now exists to assess outcomes and impacts. The following discussion highlights two such alternatives.

Indicators Approach

The restructuring of the social science research industry over the past decade has affected the research craft itself in ways that contribute to the creation of new knowledge about human behavior. Today there is an increasing citizen-client demand for social and economic research products that add meaning to everyday life. Advances in sophisticated computing capabilities in the 1990s make it possible for social scientists to respond in turn with innovative and rigorous approaches to research (Flynn 2000).

A host of interesting measurement projects are under way to expand our knowledge about socio-economic issues. These projects include living wage campaigns used in grassroots community and labor organizing efforts; statewide initiatives for grading schools used by citizens, teachers, taxpayers, and business; tools to measure the efficacy of nonprofit organizations, and neighborhood indicators projects (Flynn & Hodgkinson 2002; Sawicki & Flynn 1996).

One of the key methodological shifts over the past decades has been the supplementation of standard index analysis with indicator analysis to describe specific results or qualities associated with social, environmental, and/or economic well-being. Indicators allow citizens to unpack the existing warehouse of information on conditions in the United States and augment standard statistical systems with measures of variables deemed most important at a given point in time.

Indicator analysis allows for the assessment of economic progress in communities, which has not traditionally been the focus of government-sponsored empirical research. Community indicators projects have begun in over 200 communities throughout the

country to collect and monitor trends. These projects are well-conceived and grounded in a clear understanding of the issues that need attention and resolve. The information collected and analyzed is used as a feedback mechanism to devise strategies for improving quality of life. Most of these projects are privately funded by foundations.

When first introduced, community indicator projects were marginalized by mainstream researchers on the grounds that the research methods were not sufficiently rigorous. The thinking is changing, however, in large measure because our national statistical accounts have failed to pick up on the nuances of our ever-growing, complex, evolving economy. Hence, there is a growing interest in more sophisticated, disaggregated measures of well-being that can be monitored consistently over time.

In a recent address at the Federal Reserve System's Community Affairs Research Conference in Washington, D.C., Dr. Alan Greenspan praised the work being done to develop objective and quantifiable standards to assess community economic development programs. He concluded by saying, "Ultimately, such research is the only means for determining whether we are making advances in overcoming failures in distressed neighborhoods and improving access to economic opportunities for traditionally underserved populations. I applaud your efforts and look forward to learning of your future progress" (Greenspan 2003).

Over the past decade, the Piton Foundation has built a formidable neighborhood indicators database system to collect, track, and analyze progress toward stated social and economic goals. The database is being augmented to include information particular to the short-term and long-term objectives of the Making Connections – Denver initiative.

Building on the Foundation's long-standing history of indicator analysis, the database will serve as a well-spring of information to measure outcomes and impacts. The indicators will also serve as milestones or markers along the way to allow the agents to make mid-course corrections and changes necessary to ensure the long-term success of the initiative.

Systems Approach

A third approach to measuring the efficacy of the Making Connections – Denver initiative is a systems approach based on complexity science (see Section II above). The central tenet of systems thinking is the notion that human beings live and operate within a network of systems. The more complex the system, the harder it is to navigate one's course. From a program perspective, the same premise holds. The more complex the community, institutions, and/or organizations within which a program operates, the harder it is to predict and measure set goals. Hence standard tools of measurement—be they impact evaluations or indicator analysis—will not adequately capture the complexity of the system or reveal what makes a program successful.

Systems thinking encourages us to understand how a given system works and at the same time how our small piece fits in the whole. The approach also helps us process the never-ending flow of information that enters our psyches daily. When information overload

hits, we tend to focus on small areas and lose site of the whole. Thinking more systemically mitigates against feeling overwhelmed and leaves us in a better place to observe key elements within the system that may be critical to the system's survival.

Comparison of Impact and Systems Evaluations

An evaluation effort that is grounded in systems thinking would be set up differently than a standard impact evaluation. Table 1 highlights some of the key similarities and differences. The distinction is made for the benefit of social scientists overseeing human service program evaluations. The analysis is over-simplified in order to tease out the key elements that differentiate a systems-driven evaluation process from an impact-driven process.

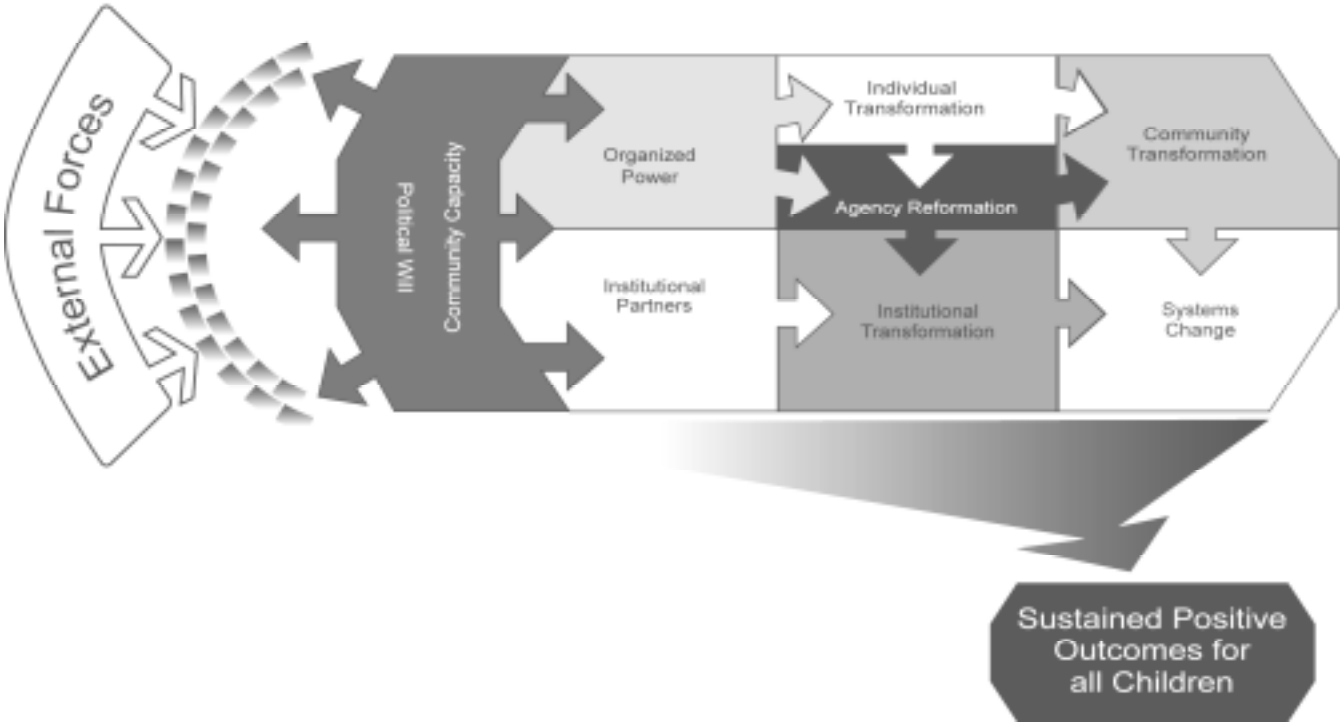
Table 1
Comparison of Impact and Systems Evaluations

Research Steps	Impact Evaluation	Systems Evaluation
Step 1	Design empirical model	Design conceptual model
Step 2	Develop research tools	Set-up feedback system
Step 3	Collect data	Track transformation
Step 4	Conduct analysis	Observe emergent patterns
Step 5	Test model	Test model
Step 6	Report findings	Revise conceptual model

Source: FLYNN RESEARCH 2003.

A systems approach is based on a conceptual model, rather than an empirical model (Step 1). The Piton Foundation, for example, has developed a conceptual model to reflect the theory of change undergirding the Making-Connections – Denver initiative (see Figure 1). The model describes the environment and conditions within which participants believe organized power flourishes in communities.

Figure 1:



While not an empirical model in the tradition of social science research, it is possible to develop an empirically-based feedback system to track activities within each element of the model (Step 2). Data sources include, for example, automated diaries, flexible evaluation pool, story circles, and so on developed for the Making Connections – Denver initiative.

Once the feedback system is in place and data or information begin to be recorded, participants have an opportunity to track transformation, be it individual, system, community, institutional (Step 3) with an eye toward spotting patterns (Step 4). The patterns will help reveal the degree to which the conceptual model adequately tracks change in a given setting, time and space (Step 5) and may lead to revision or adaptation (Step 6).

Noted organizational theorist/practitioner, Margaret Wheatley, argues for a systems approach to understanding living systems (Wheatley 2002; Wheatley & Kellner-Rogers 1999). She questions our society's "number mania" and drive toward standardization through traditional measurement exercises. She argues that numbers often fool us into

thinking we understand what is real or that somehow collecting such measures will elicit the qualities we value.

Measurement vs. Feedback

Measurement	Feedback
One size fits all	Context dependent
Imposed; criteria are established externally	Self-determined; systems choose what to notice
Information in fixed-categories only	Information accepted from anywhere
Meaning is pre-determined	System creates own meaning
Prediction; routine are valued	Newness; surprise is essential
Focus on stability & control	Focus on adaptability & growth
Meaning remains static	Meaning evolves
System adapts to the measure	System co-adapts

Source: Wheatley and Kellner-Rogers, 1999.

Wheatley makes important distinctions between research that seeks to measure living systems and research that seeks to elicit feedback about living systems. Measurement exercises, for example, apply one size fits all methodologies, whereby feedback is contextually dependent. Measurement is imposed on a system via criteria that are externally established, whereas feedback is self-determined. Measurement focuses on stability and control; feedback focuses on adaptability and growth.

The feedback concept is easy to grasp given that we are surrounded with vital feedback mechanisms that tell us about the broader system within which we live each day. Take, for example, a thermostat, which provides ongoing feedback to our heating/air conditioning systems when the temperature falls above or below the desired level. Monthly bank statements are also feedback mechanisms, which show account balances and the comparison between one's budget and actual expenditures. Both examples underline the importance of receiving accurate feedback to ensure our environmental and financial health, respectively.

Wheatley concludes that if we understand the role played by feedback in living systems, we can develop measurement processes that support the behaviors that engender vitality and adaptability of an organization, community, and/or institution.

Wheatley's message seems to resonate with the guiding principles of the Making Connections – Denver initiative. The Foundations want more than numbers. They want to explore and understand what happens in community that enables organized power to thrive. Creating a healthy feedback system from which to observe patterns may be the logical first step.

IV. CONCLUSIONS

Employing a systems approach to measuring the efficacy of the Making Connections – Denver initiatives seems to serve the project well on several fronts. First, it recognizes and honors the guiding principles of the project, which were informed by discussions with the various stakeholders, including donors, citizens, community representatives, staff members, and project volunteers.

Second, the proposed methodology allows the stakeholders to test new ways of interacting with each other that are unscripted. No one quite knows how best to empower citizens in the selected Denver communities to become politically active, economically self-sufficient, and raise strong healthy children. In the true nature of complexity theory, the systems approach will allow good ideas, programs, and structures to emerge while the initiative is being introduced in the community. A system designed with permeable boundaries allows new and surprising information to enter as needed. The approach will also put in place a feedback mechanism from which to learn from successes and failures along the way.

In the end, it is the strong desire of the staff that the advances made during the course of implementing the Making Connections – Denver initiative will carry on long after the Foundations are no longer involved. If a healthy, self-organizing, high-functioning, cooperative system emerges, the Foundations will have been successful in empowering the local community to meet its needs and to grow.

For further information or to provide feedback, please contact Dr. Patrice Flynn, an economist with FLYNN RESEARCH at 304-728-9499 and/or FLYNNRESEARCH.com.

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