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An Ecological Process Model of Systems Change

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Abstract In June 2007 the *American Journal of Community Psychology* published a special issue focused on theories, methods and interventions for systems change which included calls from the editors and authors for theoretical advancement in this field. We propose a conceptual model of systems change that integrates familiar and fundamental community psychology principles (succession, interdependence, cycling of resources, adaptation) and accentuates a process orientation. To situate our framework we offer a definition of systems change and a brief review of the ecological perspective and principles. The Ecological Process Model of Systems Change is depicted, described and applied to a case example of policy driven systems level change in publicly funded social programs. We conclude by identifying salient implications for thinking and action which flow from the Model.

Keywords Systems change · Ecological principles · Process model · Theory

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Introduction

Coherent theoretical frameworks are invaluable aids for understanding and informing complex systems change efforts (Foster-Fishman and Behrens 2007a; Parsons 2007). As Krieger (2001) notes "adequate theory is a necessity, not a luxury … [for] it is theory which inspires our questions which enables us to envision [new and improved systems] … and which gives us the insight, responsibility, and accountability to translate this vision into a reality" (p. 674). It is important for systems change to use theory or explicit and well developed conceptual models.

Recognizing the need for reflection and development of systems change theories and frameworks, the *American Journal of Community Psychology* (*AJCP*) published a special issue in 2007 on theories, methods and interventions for systems change (Foster-Fishman and Behrens 2007b). In that issue, the editors (Foster-Fishman and Behrens 2007a) and other authors (e.g., Parsons 2007) challenged community scholars to continue developing and disseminating cogent and practical theoretical models for advancing systems thinking and systems change.

In this paper, we propose a framework that integrates ecological principles and accentuates a process orientation. We begin by defining systems change. Next, the ecological perspective used in the model is briefly described, followed by a discussion of the four ecological principles which provide the basic elements of the model. We then describe the Ecological Process Model of Systems Change. To demonstrate the application of the Model we draw on a case study of policy driven systems level change in publicly funded social programs (Peirson 2007). We conclude by contemplating implications for thinking and action which flow from the Model.

Defining Systems Change

In their call for contributions to the special issue of the *AJCP*, Foster-Fishman and Behrens defined systems change as "efforts that strive to shift the underlying infrastructure within a community or targeted context to support a desired outcome, including shifting existing policies and practices, resource allocations, relational structures, community norms and values, and skills and attitudes" (2007a, p. 192). Papers published in the special issue either used this definition (e.g., Durlak et al. 2007) or adapted it to align with their work (e.g., Christens et al. 2007; Foster-Fishman et al. 2007; Janzen et al. 2007). Foster-Fishman and Behrens' (2007a) definition of systems change is appropriate for the Model we propose. The revised version offered by Foster-Fishman, Nowell and Yang ["an *intentional process designed to alter the status quo by shifting and realigning the form and function of a targeted system*" (2007, p. 197, emphasis in original)] is also suitable for our case study. Below we offer some elaboration on these definitions and characterizations.

What is a system? A system consists of two or more entities, joined by some commonality, to form an organized structure which operates according to rules set out to address a higher order purpose (Battista 1977; van Gigch 1974). System components can comprise different entities including: concepts, objects, agents and institutions. Diversity also exists in the features linking system elements, for example: theory, function, funding source, client group, and space. System boundaries are established by applying inclusionary and exclusionary rules. However in "open" systems (which includes all social systems), these margins are permeable leaving it exposed to influences in the external environment (Kramer and deSmit 1977; van Gigch 1974). Order and predictability are produced in systems through hierarchies of authority (relative power) and/or function (sequenced/coordinated action) and are maintained by explicit and/or implicit rules regulating the nature of vertical and horizontal relationships and action. Through the synergistic unification of their elements, systems become more complex or achieve broader functions and objectives which could not be achieved by any element alone.

What is change? There are many synonyms of change including: transform, convert, shift, modify, adjust, alter, adapt and amend. Although these have slightly different connotations, they all invoke the notion of action and movement from one state of being to another. Hence, change refers to the process that occurs when an entity becomes something other than it was. Since change can encompass many representations (Corrigan and Boyle 2003; van de Ven and Poole 1995; Weick and Quinn 1999) it is helpful to identify the specific characteristics of

transformation. Foster-Fishman et al. (2007) highlight two useful dimensions of change:

- Nature—Is the change episodic (e.g., planned, externally-driven, time-bounded, problem-solution focused) or continuous (e.g., emergent, internally-pulled, incremental, protracted)?
- Degree—How big is the change? Is it a minor and incremental modification to existing practice/policy or a radical and disruptive shift in the status quo?

In addition to these dimensions, we offer further attributes of change:

- Purpose—What is the point or goal of change? What good will it serve?
- Scope—How far reaching is the change? What/who will it affect?
- Substance—What needs to be altered or done in order for the change to happen?
- Intensity—How consuming is the change? How much attention and effort will it take?
- Duration—How much time will it take to make the change?
- Permanency—How sustainable is the change? Will it be a temporary or reversible shift or a resilient and stable transformation?

What is systems change? When the concepts of *systems* and *change* are merged, the connotation becomes a process of transformation in the existing structure, function and/or culture of a system. With emphasis on the system as the level of analysis it is essential to differentiate changes that have broad relevance and implications for the system as a whole from changes occurring only within specific elements (Kelly et al. 2000). Furthermore, it is important to distinguish whether the systems change is "first-order" or "second-order" (Watzlawick et al. 1974). First-order change represents the natural progression of a system as it adapts to minor and mostly predictable challenges and events over time. The goals and/or impacts of such change do not alter the elemental structures, functions or culture of the system. In contrast and consistent with Foster-Fishman and Behrens' (2007a) definition, second-order change intentionally targets the status quo to transform or reframe fundamental system dynamics, structures, resources, rules, norms, and relationships.

The Ecological Perspective and Principles

The ecological perspective is a core and foundational aspect of community psychology's knowledge, research, and action (Barker 1968; Bronfenbrenner 1979; Christens et al. 2007; Foster-Fishman et al. 1999; Kelly 1968, 1971,

2006; Kelly et al. 2000; McClure et al. 1980; Moos 1973). Attending to relational, contextual and situational factors, the ecological analogy shifted the focus of inquiry and intervention from individuals to the interplay of macro, meso, and micro levels; people, settings and events; decisions, actions and impacts; research, policy and practice; social, political and economic forces; and historical, contemporary and visionary influences. Through this widened and compound perspective, individual, social, and system challenges and changes are viewed within synergistic and embedded contexts.

An alluring aspect of the ecological perspective is the inclusion of principles adapted from the field of social ecology. Describing *interdependence*, *cycling of resources*, *adaptation* and *succession* as principles of development in organizations and communities, Kelly (1968) proposed their use as a guide for planning, implementing and assessing social interventions (see Table 1). These four principles are the main elements in our Model of systems change.

Kelly et al. (2000) have since offered an elaboration of the ecological perspective that expands the conceptual tools for analyzing social systems and designing preventive interventions. Eight concepts are grouped under two categories that define *what* constitutes a system (Structures: Personal Resource Potentials, Social System Resources, Social Settings, System Boundaries) and *how* the system operates (Process: Reciprocity, Networking, Boundary Spanning, Adaptation). A full comparison of Kelly et al.'s Structure-Process framework to our Model is beyond the scope of this paper. However, it is important to highlight some intersections. There are clear links between the two

frameworks in terms of system resources, adaptation and system boundaries. In their descriptions of system boundaries, boundary spanning, networking and adaptation Kelly et al. emphasize the influence of ongoing formal and informal social and resource exchanges between systems and their 'mother-systems' (higher-order) and 'sister-systems' (adjacent) which can present both levers and constraints for functioning and change. This idea is consistent with our (re)presentation. Perhaps the most important congruence is the shared focus on process. Kelly et al. promote using this concept to analyze the actions that allow system structures to be created, used or altered and to explore how people interact within these structures. For us, building the notion of process and the sense of movement (e.g., progression, iteration, feedback) into our framework was the key to transforming a cluster of sensitizing concepts (Patton 2002) for understanding social contexts into a cogent and practical model for understanding systems change.

Indeed, the four original ecological principles are reflected in systems change initiatives and they have been used as analytic tools for understanding and explaining community-based phenomena. A pioneering example is Kelly's (1979) research exploring the interdependence of individuals and organizations, in particular examining the adaptive behaviours of adolescent boys in high school environments to help identify appropriate preventive interventions. In another study, Speer and Hughey (1995) invoked the principles to enhance ecological sensitivity in understanding individual empowerment and organizational power in community organizing. Other scholars and change-agents have also drawn upon the principles,

Table 1 Descriptions of Kelly's four ecological principles

Principles	Descriptions
Interdependence	Interdependence is the basic axiom of any ecosystem. This principle focuses on the reciprocal connections between entities and functions within a system. Change or movement in one component will affect the properties of other components or the relationships between them. A corollary of this principle is the emphasis on the system as the level of analysis rather than on its component parts
Cycling of resources	Cycling of resources focuses on the identification of system resources and the ways in which they are created, distributed, used, exchanged, managed, conserved and transformed. Consistent with a strengths-based orientation, this principle emphasizes the potential and proactive characteristics of the system that can be used to achieve desired ends
Adaptation	Adaptation draws attention to the ongoing transformation that occurs within systems, focusing on norms, values, processes, demands, options and constraints, and how these qualities influence or are influenced by the behaviours and coping strategies of system agents. This principle focuses on understanding how systems respond, positively, negatively or neutrally to: internal shifts (e.g., in membership, alliances, culture), external forces (e.g., economic recessions, technological advances), crises (e.g., pandemics) and opportunities (e.g., election/appointment of new leaders)
Succession	Succession emphasizes the progressive yet capricious nature of change within systems over time. Through a longitudinal lens this principle reveals and reflects on the perpetual and uneven shaping and re-shaping of a system. Considering historical forces, factors and events helps inform an understanding of the current state of the system, while providing the basis for anticipating the pace and direction of future change

although selectively and/or implicitly, to inform system change analyses and actions (e.g., Emshoff et al. 2007; Ford 2007; Foster-Fishman et al. 2007; Suarez-Balcazar et al. 2007; Tseng and Seidman 2007). All the same, we wonder how often the principles, as an integrated foursome, are explicitly, deliberately and effectively used by planners, implementers and evaluators, particularly when pursuing second-order system transformations. To extend the analytic potential and power of the principles, in the next section we offer a practical framework for systems change that incorporates, relates and animates Kelly's ecological quartet.

An Ecological Process Model of Systems Change

The Ecological Process Model of Systems Change was derived from research that explored implementation of a complex, episodic (policy driven), systems change in publicly funded children's and developmental services in one Ontario (Canada) community (Peirson 2007). In this case study, Kelly's (1968) four ecological principles were used as sensitizing concepts (Patton 2002) within a multi-disciplinary framework. Subsequent thinking about the concepts in relation to implementation stimulated the idea that forming an analytic structure around the principles would be useful for understanding systems change. Figure 1 illustrates how the principles work in tandem and across time. Though we describe the components of the Model separately, the principles depend and iteratively

build on one another to create a comprehensive and synergistic framework for describing, understanding, planning, implementing and assessing systems change efforts.

Reflecting insights from soft system methodologies (Checkland 2000) and consistent with Foster-Fishman et al.'s (2007, Fig. 2) proposed model of systems change, the Ecological Process Model reinforces systems change as a multifaceted, messy, problematic, subjective and iterative process (rather than as a simple linear trajectory connecting intervention to outcome). Focusing on the end state of transformation tells us what changed and if the objective was achieved, but does not reveal how the change was made or identify what or who frustrated, mediated or facilitated movement toward the goal. An advantage of the Model is that it can be used retrospectively to examine the transformation process or it can be used in real-time to increase awareness and proactive anticipation of potential levers or barriers of systems change. Another advantage of the Model is that it can be applied across the ecological spectrum (Bronfenbrenner 1979) to any system where second-order change takes place (e.g., families; service teams; workplaces; communities; health care, education, employment and welfare systems).

The Ecological Process Model shares a number of features with other systems change frameworks and analytic structures presented in *AJCP*'s special issue. For example, like Foster-Fishman et al. (2007) we begin our Model by establishing system boundaries which involves identifying the focal problem and the affected system. Consistent with our use of the *cycling of resources* principle, Tseng and
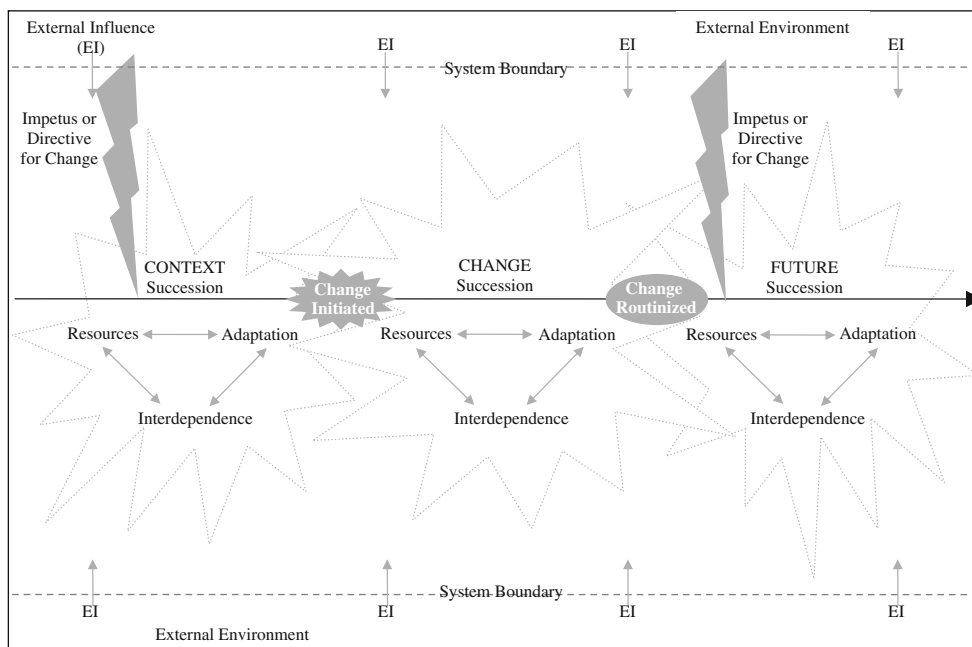

Fig. 1 Ecological process model of systems change

Seidman's (2007) framework for understanding change in youth-oriented social settings draws attention to the types of resources used to achieve goals (they specify: people, space, time and money) and considers how these assets are organized and allocated across the system. Also like the Foster-Fishman et al. (2007) and Tseng and Seidman (2007) frameworks, our Model incorporates feedback loops to emphasize the dynamic interplay of the principles and the iterative nature of systems change. Furthermore, Ford's (2007) emphasis on time and distinguishing consecutive stages of change in his analysis of capacity building within a community policing organization is comparable to our tripartite delineation of the succession principle.

What is unique about our Model is the explicit incorporation of all four ecological principles. To our knowledge no one has similarly knitted these concepts together to address systems change. Another distinctive feature of our framework is its process orientation which is reinforced by the designation of three categories of succession (i.e., context, change and future) and the iterative cycling of the other three principles within each stage of succession.

Defining the Problem and Establishing System Boundaries

We concur with Foster-Fishman et al. (2007) that the first step in understanding and changing systems is to identify the problem that requires intervention. Sounds simple enough, yet this can be a challenging proposition. As Checkland (2000), Christens et al. (2007) and Foster-Fishman et al. (2007) have argued, social problems have no singular etiology, definitions or solutions. Instead social problems are complex, multiply rooted and uniquely perceived, encountered and experienced by different stakeholder groups. This diversity is recognized within the value base of community psychology which uses action principles to support inclusive, collaborative and bottom up processes to negotiate shared understandings of problem situations and to find mutually agreeable interventions. The combination of voice and choice becomes a powerful lever for implementing and effecting change (e.g., Campbell et al. 2007; Janzen et al. 2007). Then again, the 'community psychology way' is not standard practice. What is more likely is the explanation of problems and the directions for change are controlled by privileged stakeholder groups that possess greater shares of economic, political and/or social power. Those in the power-position might sometimes get it right, but if they are inconsistent or too distant from the views of other affected groups, then systems change efforts run the risk of encountering subversive or outright resistance.

Once the problem and the perspective have been decided the next task is to identify its location. Many social problems are so widespread and deeply rooted that it would be impossible or unwieldy to intervene on all fronts. Establishing boundaries for intervention is a way to articulate the scope. With reference to Fig. 1, defining system boundaries involves a decision regarding what/who lies between the horizontal dashed lines (i.e., the elements/agents that will implement and/or undergo change) and what/who lies beyond (the external environment). Defining system boundaries can be as subjective as defining the problem situation. As above, it is possible that hegemonic forces will step in and dictate the intervention landscape. However we concur with Foster-Fishman et al. (2007) that this process should offer the opportunity for inclusion of, and negotiation among, multiple stakeholders that represent a range of problem-relevant system layers, niches, organizations and actors.

In Fig. 1 the system boundary lines are dashed to represent the permeable border between the system and its external environment. As noted earlier, open systems are never impervious structures; they are inherently connected and susceptible to the world around them (Kelly et al. 2000). Arrows cut through these lines symbolizing the potential for external factors, forces and events to penetrate the system and influence the dynamics, resources and/or directions of change.

Impetus or Directive for Change

The *impetus or directive for change* is the force that stimulates reformative planning and action. Change may be pushed onto a system by its external environment (e.g., new legislation, economic up/downturns, new technology or evidence, disease outbreaks, influx of immigrants) or pulled from within by internal system desires, demands or dynamics (e.g., strategic priority setting or reorganization, new leadership, service reduction/expansion). In either case, action alters the existing system since the desired outcome or state of affairs cannot be achieved through the status quo. In addition to variation in the stimulus source, the drive for change may be reactive or proactive. Crises and other unpredictable events (e.g., Hurricane Katrina, SARS or H1N1 outbreaks, labour strikes) can compel reactive changes in the routine functioning of communities, healthcare organizations, education systems and the like. Anticipated events (e.g., succession of political leaders, closure of a neighbourhood school) may also require systems change but these often allow time to engage in proactive problem-solving and planning. Finally, the Model does not assume that the desired outcome or end state of system change is fully articulated or decided at this point. In some cases the strategies for, and results of, change may be clear and specific at the outset. In other cases the transformative process may be used to define or even

redirect the course and/or consequences of change (Parsons 2007). And, as Tseng and Seidman (2007) suggest, desirable outcomes of change may also be moving targets that get assessed at particular moments in time and may be revised as the larger process unfolds.

Context Succession

The principle of *succession* reminds us that history contextualizes and influences unfolding developments. Change represents a disruption or intervention in system activity. Since what leads up to change is part of the change, a key point of departure for any transformative effort is an examination of the system expected to undergo change. This prelude is an important step as it can produce information about the system that will help anticipate and manage the needs, obstacles and facilitators of change (e.g., Campbell et al. 2007; Suarez-Balcazar et al. 2007).

An *ecological assessment* of the context can inform decisions regarding the form, extent and intensity of change required to move the system to the desired state. Such assessments can also help identify "apparent" and "below the surface" elements that could be subsequently leveraged to activate and advance change (Foster-Fishman et al. 2007). Aside from the points we raise below, a number of authors have presented methods, frameworks and question lists that would be useful for conducting and/ or sensitizing ecological assessments. For example, Luke (2005) describes four statistical methods for assessing context: multilevel modeling, geographic information systems, social network analysis, and cluster analysis. The Kelly et al. (2000) framework highlights a number of connected system concepts including structures and processes; values, norms and roles; and entry, socialization and development. Foster-Fishman et al. (2007) suggest an extensive list of guiding questions for identifying and examining system norms, resources, regulations, operations (power and decision-making) and interdependencies. Furthermore, two special issues of the *American Journal of Community Psychology* have focused on theories and methods of ecological assessment (Shinn 1996) and social ecological approaches (Lounsbury and Mitchell 2009).

As illustrated in Fig. 1, generating contextual awareness is accomplished by invoking the other three ecological principles. To begin, the principle of *interdependence* helps illuminate the system's existing configuration and relations and leads to questions such as:

- What elements (e.g., teams, organizations, regions) make up the existing system?
- When, why and how were these elements brought together?
- How are they connected and with what strength?

- When and why do they interact?
- What formal and informal power structures operate within the system?
- How are elements accountable to one another?
- What external connections influence elements' participation in the system?

Answers to these questions help delineate the system's boundaries, discern the maturity of the system, raise awareness of conditions that maintain reciprocal connections between elements, and provide insights regarding alliances and conflicts, formality and informality, and so on.

Inspection of a system's *resources* (e.g., human, fiscal, technology, space, equipment, time, knowledge) is another prerequisite. Before change efforts are advanced, it is important to identify the quantity and quality of available resources and to understand how they are organized, distributed and used across the system (Kelly et al. 2000; Tseng and Seidman 2007). Likewise, it is necessary to recognize resource deficits that hinder or prevent functioning within the current system as these gaps might pose significant obstacles for change. Furthermore, given that systems may be more resource-rich than they appear, identifying and leveraging "untapped resources" (Kelly et al. 2000), "surplus energy" (Katz and Kahn 1978) and "deep, below the surface elements" (Foster-Fishman et al. 2007) is wise. Last, this taking stock of the system's resources will highlight whether they are sufficient for change while sustaining system survival.

The principle of *adaptation* prompts an examination of how the system and its elements respond to change. It addresses questions such as:

- Is change a regular or unusual system dynamic?
- Are system agents comfortable with and motivated by innovation or are they unsettled or fatigued by the prospect of change?
- Have agents/agencies typically cooperated with or resisted major alterations to their structures, functions and/or culture?
- How flexible are the system's elements? Are they easily modified or inherently stable?

Understanding agents' patterns of behaviour, habitual reactions, and coping styles may produce insights about the adaptive potential of the system that can be used to inform proactive or pre-emptive strategies to counter potential resistance and support the implementation, management and sustainability of change.

While each principle highlights salient system features and aspects of change, they are interdependent. Similar to feedback loops in other models of systems change (e.g., Foster-Fishman et al. 2007; Tseng and Seidman 2007) in

Fig. 1 the bi-directional arrows linking the principles signify their synergy (reciprocity is also noted under *change succession* and *future succession*). For example, a director (*resource*) who demonstrates leadership and enthusiasm for quality improvement may inspire cooperative behaviours in staff (*adaptation*) which in turn may strengthen interdivisional relations and fortify linkages with partner organizations (*interdependence*). Alternatively, reductions in government funding (*resource*) may increase the potential for agency amalgamations or closures (*interdependence*) inciting apprehension and provoking competition among system agents (*adaptation*).

Some instances of systems change may be orderly and predictable, but we suspect most cases are not. The "explosion" symbols in Fig. 1 surrounding *context*, *change* and *future succession* illustrate the volatility and "disequilibrium" (Parsons 2007) that often characterize transformative processes. Some aspects of change may be rapid and others painstakingly slow, some may be smooth and others chaotic, and there will likely be successes and setbacks.

Initiation of Change

The solid star in Fig. 1 between *context succession* and *change succession* represents the initiation of transformative efforts. In some cases the commencement of change comes from a particular and recognizable event. In other cases overlapping decisions and activities make it difficult to pinpoint the juncture making it more reasonable to consider the onset of change as a natural progression of action (rather than occurring at a precise point).

Change Succession

Change succession draws attention to the dynamic evolution of a system from a previous state to an identifiably new state. Depending on the extent and intensity of the change, this process may take weeks, months or (more likely) years (Kelly 2007). At this point the Model focuses on the active stage of transformation which plays out in the synergy of *interdependence*, *resources* and *adaptation*. As a transformation progresses and the nature and demands of the change become apparent, there may be much iteration of the principles (indicated by the bi-directional arrows in Fig. 1). Constant vigilance is crucial. At any point, shifts in relations, resources or behaviours/attitudes may create challenges or present opportunities that must be reactively or proactively addressed to achieve the objectives of change.

A direct feature or indirect outcome of systems change is an alteration in the *interdependence* of the system's entities, agents and/or functions. Planners and implementers need to redesign the organization of the system to support the desired ends of change. During this process elements may be realigned, added and/or eliminated and these shifts may be gradual or swift, simple or complex, contested or accepted. The principle of *interdependence* asserts that altering any system element will impact other components (Kelly 1968). Changes may result in unanticipated and potentially costly consequences elsewhere in the system if the social and structural relationships between elements are not well understood (Foster-Fishman et al. 2007). Thus, it is imperative that restructuring efforts anticipate reverberations and ensure the on-going integrity of the system as a whole.

During the process of transformation tangible and intangible *resources* may be added to, reallocated within and/or removed from the system. For example, funds may be awarded or clawed back, staff may be hired or laid off, technology may become outdated or be updated, training may be required, tools may need to be developed, and agencies may co-locate or negotiate joint purchasing agreements. Implementing agents will need to carefully consider what resources are necessary to effect and manage the demands of change while ensuring sufficient resources are reserved to support continuing system functions. Highlighting the notion that resources are *cycled,* not static inputs of change, this principle also reinforces the need to monitor the evolution of system assets, strains and gaps. Drawing on the notion of "capital," Tseng and Seidman's (2007) framework for understanding social settings also accentuates this principle, considering how the conceptualization, availability and organization of resources can be both targets and levers of systems change.

A number of questions inform the identification, distribution, introduction and significance of resources for change, for example:

- Are new resources provided in a single booster or as part of a long term strategy?
- Will resources be used to build system capacity to sustain new functions after initial investments are depleted?
- If resources needed to maintain system survival are rerouted to support change efforts, will this leave the system vulnerable to unanticipated and unintended consequences that may ultimately hinder the transformation?
- Will resources be diffused across the system or concentrated in particular elements?
- Are new resources created or identified through the process of change?
- Will resource requirements remain constant or vary over the course of implementation?
- If the quantity and flow of resources into, out of, or within a system are altered, will this invoke power

dynamics (e.g., territoriality, pressure politics, strategic negotiations, compliance mechanisms) among entities/ agents that need to be anticipated and addressed?

The final question hints at issues that are a key concern for the next principle.

The principle of *adaptation* draws attention to how the system responds to and contends with change. Evolutionary science tells us that organisms must cope with change or face extinction. This is true even for social systems. However, while biological scientists can forecast the pace and direction of change in natural communities, in social communities the dynamic complexity of human agency leads to less certain prediction. Systems change invokes higher order analysis, but it is important to remember that social systems are constituted by individuals who are purposeful, reflective and discretionary beings and these subjective qualities will have direct and indirect impacts on transformative efforts. In addition to human dynamics, the principle of adaptation looks at how the processes and resources of the system are modified to accommodate the change. Resonating with the *succession* principle, it is important to understand that adaptation is a process—it does not happen overnight. The rules, resources and expectations imposed on a system may be abruptly altered, but it may take considerable time and several attempts for people to change their beliefs, develop vocabulary, foster linkages, learn new behaviours and revise or create needed tools.

Routinization of Change

Over time the system adjusts to the change; what was once new and unfamiliar becomes part of everyday business (signified by the solid oval shape in Fig. 1). Like the onset of a transformation, it may be difficult to isolate when a change becomes routine. This may be easier when change is episodic, time-bounded and focussed on problem-resolution versus when change is continuous and incremental (Foster-Fishman et al. 2007). Routinization signals the end of additional change efforts, but as Schneider (1982) points out this "does not mean that change no longer occurs; it simply means that the implementation phase has given way to what might be better identified as normal operating procedures" (p. 717). When sufficient time has passed to allow the change to take hold, it is then reasonable to conduct an outcome evaluation to determine if the alteration resulted in the intended effect.

As depicted, the Model assumes that (a) the system has transformative capacity (the principles are sufficient and in harmony) and (b) no internal or external forces halt the change. The alternative scenario [i.e., conditions (a) and/or (b) are not met] would be that the transformation is discontinued before reaching the point of routinization. In this instance the next component of the Model, *future succession*, would consider potential repercussions of termination and anticipate new prospective drivers of systems change.

Future Succession

The third iteration of the *succession* principle focuses on the *future* and considers the prospective status of the change as well as the continued evolution of the system. If the change is evaluated, the results (functioning as a new *impetus or directive for change*) could directly influence the future of the initiative. Positive outcomes (e.g., greater consistency across services, reduced wait times) may support continuation of the change; negative outcomes (e.g., reduced productivity, increased health risks) may prompt termination; and process evaluation findings may offer recommendations for reformulating the initiative (e.g., integrating teams, reducing communication barriers). However, many changes are never formally evaluated; the nature of their future existence will depend on a host of proximal and distal factors. Stability in both internal and external dynamics may allow the system to continue to operate as transformed (e.g., re-election of a government, long-term core funding, effective staff retention policies). Alternatively, external forces or internal shifts in the system's resources, linkages and/or adaptive capacity could constrain or enrich the initiative or compel its dissolution (e.g., significant increases in utility charges, a large cohort of retirees, advancements in technology, new professional partnerships, aggressive lobby campaigns).

Social systems may be stable in the short term, but future change is inevitable, whether incremental or swift, minor or monumental, planned or unplanned, externally driven or internally pulled. The horizontal arrow running through the middle of Fig. 1 symbolizes the progressive and open-ended nature of systems evolution. The future state of the system provides the new *context* that must be understood to move forward with subsequent iterations of change.

Table 2 offers a synopsis of key questions or issues elicited by the components of the Model.

Putting the Model into Action Using a Case of Policy Driven Systems Change in Publicly Funded Social Programs

This section draws on a real-life instance of policy-driven systems change in publicly funded social programs in Ontario, Canada (Peirson 2007) to demonstrate how the

Table 2 Questions/issues elicited by elements in the ecological process model of systems change

Model elements	Questions/issues
Defining the problem	What is the problem that requires intervention?
	What are the root causes of the problem?
	Who participates in defining the problem and setting directions for change? Whose perspectives and experiences are taken into account?
System boundaries	What are the boundaries that define the system?
	What elements/agents make up the system that will implement and/or undergo change?
	Who participates in defining the system boundaries?
External environment	What higher-order and/or adjacent systems surround the system that will undergo change?
	How does the external environment interact with and influence the system that will undergo change?
External influences	What are the factors, forces and events in the external environment that have the potential to influence the dynamics, resources and directions of systems change?
Impetus/directive for change	What is the impetus or force that stimulates reformative planning and action?
	What is the stimulus source? Is changed pushed onto a system by its external environment or initiated by internal system desires, demands or dynamics?
	Is the drive for change reactive (crisis-oriented, unpredicted) or proactive (anticipated)?
	Does the directive for change specify strategies for and/or outcomes of change?
Context succession	What is the historical context of the system that will undergo change?
	What is the status of the system's interdependencies, resources and adaptive capacity leading up to the change?
	How does an ecological assessment of the system's context inform decisions regarding the form, extent and intensity of the change?
Interdependence (consider in the past/context, present/change, and future)	How is the system configured and how do system elements relate?
	What elements make up the system?
	When, why and how are these elements brought together?
	How are they connected and with what strength?
	When and why do they interact?
	What formal and informal power structures operate within the system?
	How are elements accountable to one another?
	What external connections influence elements' participation in the system?
Cycling of resources (consider in the past/context, present/change, and future)	What resources are available to and used by the system? How are system resources identified and distributed?
	Are there gaps, strains and/or untapped resources in the system that need to be filled, relieved and/or accessed?
	Are new resources for change provided in a single booster or as part of a long term strategy?
	Will resources be used to build system capacity to sustain new functions after initial investments are depleted?
	If resources needed to maintain system survival are rerouted to support change efforts, will this leave the system vulnerable to unanticipated or unintended consequences that may hinder change or even survival?
	Will resources be diffused across the system or concentrated in particular elements?
	Are new resources created or identified through the process of change?
	Will resource requirements remain constant or vary over the course of implementation?
	If the quantity and flow of resources into, out of, or within the system are altered, will this invoke power dynamics among entities/agents that need to be anticipated and addressed?
Adaptation (consider in the past/context, present/change, and future)	How do the system and its agents/elements respond to change?
	Is change a regular or unusual system dynamic?
	Are system agents comfortable with and motivated by innovation or are they unsettled or fatigued by change?
	Do agents typically cooperate with or resist major alterations to their structures, functions and/or culture?
	How flexible are the system's elements? Are they easily modified or inherently stable?

Table 2 continued

Model elements	Questions/issues
Initiation of change	At what point does the change process commence?
	Is the onset of change a recognizable event or is it situated amid overlapping decisions and actions?
Change succession	How does the system evolve from its previous stage (context) to an identifiably new state?
	How are the system's interdependencies, resources and adaptive capacity altered in the process of change?
Routinization of change	At what point does the change become part of everyday business?
	Is the routinization of change a recognizable event or is it embedded and unfixed in the process?
	Has there been sufficient time/activity to allow the change to take hold? When is it reasonable to initiate an outcome evaluation to assess change impacts?
Future succession	What is the prospective status of the change?
	Do evaluation results, internal system dynamics and/or external factors support continuation of the change, stimulate refinements, or provoke its termination?

Ecological Process Model may be used to understand and inform transformative efforts.

Defining the Problem and Establishing System Boundaries and Impetus or Directive for Change[1]

In the mid-1990s, consumers, providers and funders raised concerns that Ontario's services for children and people with developmental challenges were fragmented and not as accessible, flexible or responsive as they could or should be, leading to barriers and frustrations for clients. These criticisms and challenges gave policy makers an *impetus* to change the system. The explicit *directive for change* came as a policy framework entitled *Making Services Work for People* (MSWFP) (Ontario Ministry of Community and Social Services 1997). Similar to the examples of human service systems change described by Emshoff et al. (2007) and Foster-Fishman et al. (1999, 2007), the purpose of MSWFP was to lessen or eliminate existing obstacles and support the organization and delivery of a coherent, accessible and responsive set of services. To this end, the policy objectives called for the development and implementation of "system features" that pertained to coordinated service information, service integration, centralized access and intake, resolution of crises and complex cases, administrative efficiencies, and early intervention and prevention efforts.

The case study focuses on the nested hierarchical system (Parsons 2007) of government funded children's and developmental services operating in one community in

southern Ontario and within a region that adopted a unique implementation strategy compared to others in the province. Historically, the children's and developmental sectors were separate entities. Both sectors resided within the same government portfolio, but the various agencies had operated independently, conducted their own intakes, and made autonomous decisions regarding client access, priority status and secondary referrals. In effect, there was no "system of services." With the advent of MSWFP, new *system boundaries* were drawn, the two sectors and the existing agencies were functionally joined, and a new organization was added to assume responsibility for information, intake and other access features. In the case community, implementation was not situated within a stable or established system, rather it involved a process of forming new boundaries and redefining and building a system (Behrens and Foster-Fishman 2007).

The case study recognized the influence of events, decisions and conditions in the system's external political, social and economic environments. For example, some local directions and initiatives depended on agreements with other service systems under the jurisdiction of the same regional government (e.g., common intake tool, data management systems). Provincial variation in MSWFP implementation added another confounding dynamic as decisions and actions taken elsewhere were used by some stakeholders to challenge the unique local approach. In addition, service providers reported significant pressures as a result of competing policy expectations, legislative changes, and prevailing social and economic concerns influencing demands for services and the availability of resources. The political environment also took temporary hold of the change in its early stages when lobby groups convinced the provincial government to suspend implementation pending a review of the local decision making process.

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[1] We began our description of the model with Defining the Problem and Establishing System Boundaries followed by a discussion of the Impetus or Directive for Change. In this section we combine our presentation of these two elements to improve coherence and comprehension of the illustration.

Context Succession

While the original intent of the case study was to focus on the 2.5 year period when the system features were designed and put into practice, early into data collection we extended the timeframe to include previous stages of the initiative. This heightened our awareness of the context undergoing change and generated critical insights about some of the dynamics that characterized the unfolding process.

With respect to the principle of *interdependence*, although the children's and developmental sectors were covered by the same government department, they had historically operated separately. Each sector had been loosely coupled, remaining relatively autonomous in decision making regarding client access, intake and service delivery. Before MSWFP, agency interdependence had not been officially promoted and most agents and agencies had little or no experience working within a systems model. The policy did not mandate the integration of the two sectors but this was the strategy adopted in the case community. The implementation plan involved joining the children's and developmental sectors to form a single system of services and creating a new organization that would become the point of entry for all system services. In addition, the regional office insisted that all affected agencies participate and cooperate with the access organization to design and implement the system features (i.e., coordinated service information, single point of access, common tool for intake, case resolution mechanism, single agreement for services, administrative efficiencies).

To illustrate *cycling of resources* we consider the issue of funding. The policy stipulated that no new fiscal resources would be available for implementation. Reinforcing a preference for innovation over supplementation, the government explicitly tied improving children's and developmental services to finding better ways to allocate and use existing funds and other available system assets. Achieving the new service goal would involve setting appropriate priorities, ensuring the most efficient use of resources, and integrating services.

Having no new funding presented a quandary for the case community given its decision to create an entirely new agency. To cover costs associated with the new agency (e.g., rent, salaries and equipment), the regional office planned to impose a one-time reallocation of 2% from all existing service agencies' annualized budgets. Many agencies contested this decision. Some agencies had already experienced financial cutbacks, cost increases, and high demands for services and any further reductions might lead to staff layoffs and the dilution and/or elimination of programs. When the fiscal demands of the local plan and the consequent burdens on agencies' budgets became more visible, the regional office successfully petitioned the government for additional implementation dollars which significantly reduced the amount reallocated from service agencies' budgets. No job or program terminations were explicitly connected to the redirection of funds to the access agency,[2] but to manage the reallocation some provider agencies reduced staff hours, some used attrition and realigned positions, and some observed service dilution and increased demands on staff time and skills. Although definitely a minority, a few providers thought a 0.9% base budget reallocation was a modest investment and a minor inconvenience for agencies that would receive gains in terms of system development.

Part of the MSWFP vision was to develop a unified and integrated system of services. However, providers were unaccustomed to thinking in terms of systemic resources. Instead of viewing the access agency and its functions as shared assets, many fixated on "their" organizational losses. Cleaving to individualistic or organization-centric mental models (Senge 1990) and suggesting an alternative social construction of the root cause of the problems (Checkland 2000; Foster-Fishman et al. 2007) (i.e., clients' access difficulties were the result of insufficient resources allocated to front line delivery to meet increasing demands for service[3]) these providers were not easily or quickly convinced of the rationale or merits of the new service strategy. In the early stages of the initiative, funding issues intensified providers' anxieties, escalated conflict between the regional office and service organizations, and set up relational barriers for the new access agency. The cost of the initiative was important, but it was also critical to understand how the strategies, sources and uses of funds (*cycling of resources*) impacted dynamics, relationships, assumptions, and expectations (*adaptation*).

The principle of *adaptation* is further reflected in stakeholders' responses to the community consultation process conducted to inform the regional office's implementation plan. Though several providers were appointed as members of the advisory panel and all agencies were given opportunities to make submissions, service organizations did not control this process or make the recommendations (Arnstein 1969). Many providers were disappointed, upset or angry about what they perceived to be a lack of genuine interest in their contributions about issues that could influence their day to day business. More frustration erupted when the final plan was released and the strategy did not appear to reflect their advice; their "social imaginations" (Christens et al. 2007) were not sufficiently

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[2] Creating a new organization also meant creating new jobs. Some of the access agency positions were filled by staff previously employed by the local children's and developmental provider agencies.

[3] Interestingly this was the same problem definition offered by service providers in Foster-Fishman et al.'s (2007) comprehensive community initiative example.

accounted for or captured in the resulting picture. For some providers, this experience roused suspicions, deepened resentment and triggered oppositional behaviours that distinctly impeded subsequent efforts to implement the policy (Sabatier and Mazmanian 1979). In what could be described as a call for soft systems methodology (Checkland 2000) some informants suggested that government officials should actively involve community members (e.g., providers, citizens) when defining problems, shaping solutions and negotiating conditions for change. It was also suggested community members be more proactive in contributing to the development and implementation of policy directions, similar to the political advocacy activities described by Janzen et al. (2007). In the case example, providers' concerns about the initiative and its implementation were gradually addressed through prolonged experience with strong and effective leadership, open communication, and ongoing opportunities to test relationships and work collaboratively in respectful, peer-controlled situations.

Initiation of Change

The point of change initiation (the solid star in Fig. 1) is somewhat arbitrary in this case study. It could have occurred for example when the policy was announced, when the regional office released its implementation plan, or when the access agency was being formed. Since our research focused on changes to the processes and tools for accessing services, we identified this juncture as the point when actions were commenced to operationalize and actualize these system features (i.e., single point of access and common tool for intake).

Change Succession

Our research focused primarily on the period that followed the launch of the new access agency in June 2000. By that point the physical structure was in place and staff had been hired, but the agency was not yet performing its mandated system coordination and access functions; the nature of these activities remained undefined. It was during this stage of change that the policy's abstract system features were operationalized, the methods and tools for implementation were developed, piloted and refined, and all children's and developmental service agencies were brought into the process.

Demonstrating the principle of *interdependence*, after the access agency assumed its gateway and coordinating functions the need emerged to establish new relational structures and roles. During the pilot phase, approaches to inter-agency interactions were leading to chaotic communication and resulting in inefficient and ineffective intake and referral practices. To address these problems every participating

provider agency designated one staff member to act as the primary contact for information sharing, reviewing completed intakes and problem-solving. Each of these provider liaisons was linked to a specific resource coordinator at the access agency who was responsible for providing information to all other resource coordinators regarding intake completion and referral procedures for their designated service organization. Assigning staff to this liaison role became routine practice as implementation moved ahead and additional provider organizations were brought into the centralized access system. Consistent with Foster-Fishman et al.'s (2007) case findings, establishing and improving system feedback loops was a critical lever for change advancement. Using liaison positions to streamline interactions and communication was not a revolutionary or radical strategy, but even this example aptly illustrates the complexity theory notion that systems change efforts must be able to "support zone[s] of activity that [are] far-from-equilibrium" that allow "subsystems [to] self-organize in creative ways guided by their own learning rather than predetermined plans or outcomes" (Parsons 2007, p. 407).

To illuminate the principle of *cycling of resources* we focus on technology developed to support the entry, retrieval and storage of client information. The expansion of system feature implementation increased intake and referral activities, in turn generating greater volumes of documentation. Resource coordinators were handwriting intakes (sometimes illegibly) and dealing with paper copies which was inefficient and required physical space for storage. In 2 years the regional IT system would become operational, but in the interim a basic electronic data management system was developed to support and standardize intake completion, improve comprehension, and relieve storage issues.

Adaptation was a prominent feature of this phase of the change. Designing and implementing the system features was an iterative and emergent process. The operational tools and protocols were formulated and reformulated through on-going consultations and negotiations between the access agency and service providers, as a result of trial and error, and in response to lessons learned during the piloting phase and further practical experience. The common intake tool was revised at least a half dozen times to incorporate providers' feedback, to be compatible with the interim data management system (and later the regional IT system), and to accommodate new government imposed requirements for children's services intakes. Similarly, consent protocols governing the transfer of completed client intake packages from the access organization to the provider agencies were amended and customized to satisfy each service agency. Moreover, as described above, the conduct and spirit of routine interactions between the access agency's resource coordinators and providers improved

when the liaison positions were established. Aside from understanding the objectives of change, system agents had to figure out what the access features would look like and how to put them into practice. These tasks demanded readiness, receptivity and perseverance to suitably adjust both the tools and procedures of implementation.

Similar to the policy reform studied by Schofield (2004), when MSWFP was introduced the majority of local agents and agencies had little or no experience working within a systems model. There was much "disequilibrium" (Parsons 2007) and uncertainty in the early days of implementation when relationships were being forged, accountability structures were unclear, cross-agency forums, committees and working groups were being assembled, terms of reference and agendas were being defined, and rules of engagement were being negotiated. Similar to Ford's (2007) lesson learned (about the importance of leadership skills, constancy and patience), in the case community persistence, leadership and experience/familiarity resolved many of the growing pains of "joint action" (Pressman and Wildavsky 1973). Though never described as ideal, the partnerships that evolved across organizations were instrumental levers for advancing decision-making and action. Orders from higher up forced the *interdependence* of system entities, but cooperation occurred through frequent and open dialogues among affected stakeholders and ongoing processes of collective learning and *adaptation*.

Routinization of Change

The point of routinization (the solid oval in Fig. 1), as discerned by our study, occurred when system feature implementation had transitioned into normal operating procedures, approximately 4 years after the design phase was initiated. However, while the single system of services and the system features had become the structure and substance of routine activity, many issues remained outstanding and efforts continued to improve the access mechanisms and enhance internal partnerships and external system linkages. The timeframe of our research precluded following the policy implementation process beyond initial operationalization efforts. Therefore we were unable to confirm whether this change had reached the point of completion or full routinization. Furthermore, while it was obvious that the system of children's and developmental services had been altered (e.g., the two sectors were joined, a new organization was created, and system features were designed and put into practice) we did not evaluate the extent to which the transformative efforts succeeded in achieving the specific objectives of change. To our knowledge, aside from the first author's dissertation (Peirson 2007), there have been no local or provincial evaluations of MSWFP implementation.

Future Succession

We did not study the MSWFP initiative after 2004; however three potential catalysts for further system transformation were on the horizon. Firstly, after 2 years in development the inaugural community service plan was about to be released and it was expected the regional government would use this report to inform decisions regarding future resource allocations and operations. Secondly, in fall 2003 there was a transfer of power in provincial government from the Conservatives who had released MSWFP to a Liberal administration which could result in policy changes. Thirdly, Liberal reforms created a new government department, the Ministry of Children and Youth Services. Developmental services remained under the jurisdiction of the Ministry of Community and Social Services, which introduced another layer of uncertainty. Determining if and how any of these events or other circumstances altered the system's course are questions for further research. Nonetheless, in 2010 the access agency remains open, its services continue to be provided to both children/youth and people with developmental disabilities, and the system features (e.g., coordinated information, single point of access, common tool for intake, complex/urgent case resolution) are still in operation. Despite this stability, the system has adapted to (and continues to encounter) fluctuations and challenges in both its internal and external environments [e.g., major leadership changes, economic recession, and pending legislation and transformation in developmental services (Ontario Ministry of Community and Social Services 2010a, b)].

Conclusion and Implications for Research and Action

Succession, *interdependence*, *cycling of resources* and *adaptation*; these four ecological principles were introduced to community psychology more than 40 years ago. The concepts have endured and taken together, as in our Model, they offer a useful tool for systematically considering the complex dynamics of systems change. Strategies for studying and advancing systems transformation require an understanding of the reasons for change, an orientation to the envisioned state, sensitivity to the historical and contemporary context, and attentiveness to the enactment of interdependence, resources and adaptation within the system over time. Approaching systems change with sound theory and strategic action plans may be the difference between potentially misguided leaps of faith or kneejerk reactions, and proceeding with stable confident steps along a visible path (Lewin 1951). If it matters where you end up, then it matters how you get there. Without sound theory to guide change, systems are at risk of drifting along without direction or destination (Reisman et al. 2004).

We believe the Ecological Process Model of Systems Change holds relevance and promise for both scholarship and practice. As a sensitizing framework (Patton 2002) the Model may be useful to researchers to guide exploration, enrich understanding and structure descriptions of systems change. In a similar way, the Model can help decision makers and field level agents attend to the diversity of issues that must be considered when designing, implementing and managing transformative processes. As an applied tool the Model serves to raise awareness of the reasons and objectives for change; increase familiarity with existing system attributes; prompt an assessment of system assets, opportunities, strains and gaps; stimulate proactive and pre-emptive planning; and reinforce continual monitoring and fine-tuning of the unfolding process. The Model could also be employed as an interpretive aid in mixed methods evaluation studies seeking to contextualize quantitative outcomes in light of knowledge gained about the conditions that constituted and surrounded the changes and how the system arrived at these ends. When studying transformations that did not progress satisfactorily or did not yield the desired changes, the framework could be used to detect if problems may have resulted from an imbalance in the ecological features [e.g., if too much emphasis was placed on restructuring the system elements (*interdependence*) and not enough attention was given to the subjective responses of system agents to relational shifts (*adaptation*); if new technology was introduced (*resource*) without a concomitant focus on developing staff expertise for its utilization (*adaptation*)]. Finally, the application of single theories is likely to produce only partial knowledge of dynamic and complex phenomena; a plurality of perspectives is needed to derive richer, textured and more complete understanding of such issues and events (e.g., Bennett 1997; Cooney 2007; DeMarco 2002; Sobeck 2003). Using the methodological device of theoretical triangulation, future research could identify complementary theories, models, and/or concepts [e.g., planned action and change management models (e,g., Beckhard and Harris 1987; Burke 2002; Kotter 1996; Lewin 1951; Quinn 1980; Sterman 2001; Waterman et al. 1980)] that can be combined with the Ecological Process Model to explore how these analytic elements can work in conjunction to generate more robust, sensitive and complete knowledge of systems change.

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