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Knowledge as Enablement: Additional Perspectives Influenced by Complexity

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Abstract

This article is prompted by a book called *Knowledge as Enablement: Engagement Between Higher Education and the Third Sector in South Africa* (Erasmus & Albertyn, 2014). *Knowledge as Enablement* emphasises that purposefully directed knowledge can contribute to the generation of mutually beneficial, transformative outcomes during community–university partnerships. The book introduces the notion of *complexity* but provides no specific examples about how complexity influences engaged scholarship or enablement. Drawing on theory and case material that relate to complexity, this article aims to open a conversation about how complexity can contribute to engaged scholarship and enablement. It is suggested that confronting complex challenges using engaged, action-oriented research techniques requires many of the enablers identified by Erasmus and Albertyn (2014). However, some additional enabling layers associated with complexity can be considered. These layers include: (1) roles and responsibilities, focusing on leadership, participation, and praxis; (2) working with complex adaptive systems, including systemic change, sensemaking, and attractors; and (3) identifying and responding appropriately to multi-ontology knowledge contexts.

Keywords: Attractors, community engagement, community–university partnerships, complex adaptive systems, multi-ontology knowledge frames, sensemaking

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Introduction

Knowledge as Enablement: Engagement Between Higher Education and the Third Sector in South Africa (Erasmus & Albertyn, 2014) reflects on engaged scholarship, knowledge, and the co-generation of mutually beneficial outcomes through community–university partnerships (for a critical subultern perspective see Harley & Butler, 2015). The edited collection focuses on the "principles and practices of enablement through reciprocal knowledge sharing and collaborative building and utilisation of knowledge between the third sector of society and higher education institutions" in South Africa (Albertyn & Erasmus, 2014, p. 22).[1]

Knowledge as Enablement also aims to "create a 'buzz' in the landscape around the potential of this knowledge partnership to provide a generative space for knowledge production and innovation" (Albertyn & Erasmus, 2014, p. 22). The rationale for this is that "both the third sector and the Higher Education Institution (HEI) partners need knowledge and novel ideas to solve *complex* [emphasis added] problems in society and enable people, institutions and communities to change conditions in their everyday world" (Albertyn & Erasmus, 2014, p. 28) (, citing Filstad and McManus, 2011). Despite the observation that sometimes problems are complex, there is no explanation as to what, specifically, this complexity represents—and the implications for engaged scholarship or enablement. This article aims to contribute to the platform that *Knowledge as Enablement* has provided by introducing additional theoretical layers from the perspective of complexity, supported by case material from the Limpopo Province, South Africa.

The article is structured in the following way: the main enablers that are highlighted in *Knowledge as Enablement* are introduced. Complexity, including complex adaptive systems, is presented before the case study is described. The ensuing discussion provides additional insights about enablement in the context of complexity and engaged scholarship. This includes (1) roles and responsibilities, focusing on leadership, participation, and praxis; (2) working with complex adaptive systems, focusing on systemic change, sensemaking, and attractors—including tentative links to teachable moments; and (3) identifying and responding appropriately to multi-ontology knowledge contexts.

Knowledge as Enablement

Knowledge as Enablement emphasised the importance of social change and transformation over purely theoretical academic work. For example, de Beer argued that:

> *Enabling knowledge refers to the process of sharing, generating and transforming knowledge, while enabling knowledge (with a different emphasis) refers to the outcomes or impact of a kind of knowledge that is not simply abstract and theoretical but one that enables local change and transformation. (2014, p. 133)*

Enabling knowledge is practice-based, developed in context and spans multiple disciplinary boundaries. Typically, it is associated with "Mode 2 knowledge, which is knowledge not just for its own sake, but for the sake of social change and transformation" (de Beer, 2014, p. 133).

Knowledge as Enablement is split into three sections—"Conceptual Positionings," "Focus on the Third Sector," and "Case Studies and New Approaches"—presenting the reader with a broad spectrum of frustrations, hopes and aspirations, mechanisms and methodologies relating to enabling knowledge. The gist of the book is that knowledge, per se, does not necessarily facilitate change and social

1 The "third sector" is broadly defined by Albertyn & Erasmus, 2014, p. 25 as the "civil society sector" in relation to "knowledge economy collaboration between higher education and the public (first) and private (second) sectors."

transformation. It is argued that for knowledge to contribute to change and social transformation, particular forms of knowledge must be purposefully enabled in order to achieve sustainable, mutually beneficial outcomes. The purposeful *enablement* of knowledge includes incorporating a host of factors into the knowledge project, which often entails some institutional "risks" (Erasmus & Albertyn, 2014, p. 24). These factors include, inter alia, visions for a more engaged future (de Beer, 2014; Magaiza, 2014)—in spite of the structural constraints that frustrate efforts to grow engaged activities in South Africa (Erasmus, 2014; Pienaar, 2014), an improved understanding of the reality and functioning of the third sector (Ellis & van Rooyen, 2014; Hellmuth, 2014; Kaars & Kaars, 2014), and at the level of operations, a focus on reciprocal relations (Hammett & Vickers, 2014) and knowledge sharing (Venter & Seale, 2014).

The book is influenced by the observation that, globally, "the academy is slowly outgrowing the traditional view of scholarship for a richer view of academic work that is enhanced with civic engagement activities" (Bringle, 2014, p. 19). It is argued that the perception of the "needy community recipient" is outdated and that when confronting localised challenges, there is both logic and necessity to incorporate diverse community-based knowledge perspectives into the academic framework to ensure representative transformation (Bringle, 2014, p. 19). The edited collection emphasises that the context of engagement is problematic and that many factors—including complexity—influence the "landscape" that the engaged university has to traverse in order to achieve its "third function [of community engagement] alongside and integrated with teaching-and-learning and research" (Erasmus & Albertyn, 2014, p. 21). Despite the introduction of *complexity* at the beginning of the book, it is not explored further. In order to open a conversation about the potential of complexity to contribute to engaged scholarship and enablement, complexity is introduced here from a theoretical perspective—followed by case material from the Limpopo Province. The case material is then reexamined from the perspective of providing additional layers to the notions of engaged scholarship and enablement.

Complexity

Complexity is a relatively new Eurocentric construct that secured an influential foothold in the Western knowledge project after the publication of a groundbreaking article called "Science and Complexity" (Weaver, 1948). Weaver's position lauded the reductionist knowledge project that was consolidated just over three and a half centuries ago, marked by the publication of *The Principia: Mathematical Principles of Natural Philosophy* by Sir Isaac Newton in 1687 (1999). Despite Weaver's admiration for the reductionist approach to science, he argued that the levels of complexity would increase significantly and a new form of science would be required to capture and respond to those dynamics.

Since Weaver's insights, the influence of complexity has grown exponentially across many disciplines—with as many as 30 definitions being used today (Geyer & Rihani, 2010). Within this diversity, there are two dominant schools of thought. The first is the complexity science perspective, which emphasises that complex systems represent extremely complicated challenges catalysed by an increasingly interconnected world (Masys, Ray-Bennett, Shiroshita, & Jackson, 2014). This type of complexity is sustained by linear, causal chains of interactions between variables within closed systems. The second is the complexity theory perspective, which argues that complexity refers to "the nature of the problem *not* [emphasis added] the degree of difficulty" (Stirzaker, Biggs, Roux, & Cilliers, 2010, p. 600). This type of system is sustained by both linear and nonlinear interactions between—and within—open systems.

Complexity science and complexity theory

Complexity science is based upon the premise that at the core of complex challenges are significant variables that sustain the challenge. The interactions between the variables produce linear, cause–

effect outcomes that are predictable (Sarriot & Kouletio, 2014). These variables are discrete, but they are dominating factors that influence the identity and characteristics of a closed system. In these contexts, the role of the scientist is to delve into the complex challenge, or "causal thicket" (Wimsatt, 1994), then identify the significant cause–effect relationships that sustain the system. Once the variables are identified, reductionist methods are required to develop predictable strategies that can produce solutions to overcome the challenge (Wong, 2013). From the perspective of the scientific method, linearity enables predictions to be made about future outcomes. The predictive capacity of reductionist science is implicitly based on Newtonian principles associated with cause–effect relationships situated within stable contexts producing consistent outcomes—such as in a laboratory. This means that challenges situated within these types of context can be solved if predictable ameliorative strategies are developed and applied.

The principal distinction that complexity theory emphasises is that some complex systems are sustained by both linear and nonlinear interactions between—and within—intersecting, open systems, which can produce unpredictable outcomes. This means that complex systems that demonstrate nonlinear characteristics are qualitatively different to systems that are sustained by predictable, linear cause–effect interactions between variables. In turn, this has implications for the scientific method best suited to overcome, or reduce, the impact of challenges situated within this type of context. Complexity theorists argue that when nonlinearity exists within open systems, it makes the context inherently unstable and "prediction is more problematic" (Norberg & Cumming, 2013, p. x). Challenges situated within these types of systems do not have clear-cut solutions because future emergence within the system is unpredictable (Rittel & Webber, 1973). Despite the absence of a clear-cut solution to the challenge, it is possible to build resilience to reduce the impacts of the challenge—as climate change strategies are demonstrating (Lynam & Fletcher, 2015).

Building resilience to challenges that demonstrate linear and nonlinear characteristics requires both an ontological and epistemological shift from an exclusive reliance on reductionist methods of scientific enquiry to approaches that identify and respond to the unstable properties and characteristics of this type of complexity. This entails experiential sensemaking facilitation techniques that gradually influence, or alter, the interactions that sustain the challenge so that the emergent outcomes change (Snowden & Boone, 2007). Working with complex adaptive systems is one technique that has been shown to contribute to this (Paina & Peters, 2012).

Complex adaptive systems

A complex adaptive system is most readily associated with complexity theory and demonstrates "predictable patterns . . . created by emergent system behaviours, or the *aggregation* [emphasis added] of individual agent behaviours" that influence outcomes (Sarriot & Kouletio, 2014, p. 270). Agents in these systems are considered to be anything that influences the system—such as rumour, gossip, competing value systems, knowledge systems, motivation, and human behaviours (Anderson, Crabtree, Steele, & McDaniel, 2005). The interactions of the agents generate patterned—but not entirely predictable—emergent outcomes. The indeterminacy of the outcome is because some of "the interactions are nonlinear, and minor changes can produce *disproportionately* [emphasis added] major consequences" (Snowden & Boone, 2007, p. 71; also see Lorenz and the butterfly effect, 1972), Figure 1.

Figure 1: Disproportionately Large Impacts Catalysed by Small Influences

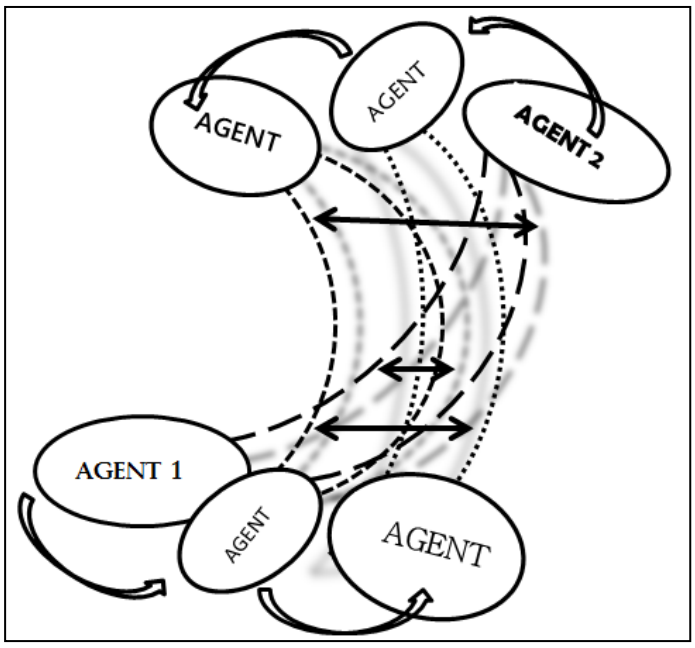


Figure 1 is a representation of the way in which a complex adaptive system can produce a disproportionate change. If there is a small change in the feedback between Agent 1 and Agent 2, it could influence the entire system in unpredictable ways because the feedback cuts across all of the feedback loops that connect the agents—as the evolutionary process of zoonosis (disease passed from animals to humans) demonstrates (Sharp & Hahn, 2011). Working with these types of systems requires being aware of the unpredictability, but simultaneously being aware that systemic patterns do emerge that can be used to facilitate processes of social change and transformation (Stacey, 2003).

Managing complex adaptive systems

Managing complex adaptive systems requires a multi-ontology fusion of both complexity and conventional reductionist forms of science (Snowden, 2005). This is because:

- As a complex adaptive system changes, it is plausible that some of the nonlinear aspects of the system develop linear, causal relationships between dominant variables. This provides an opportunity to respond to these aspects of the challenge using conventional reductionist scientific methods.
- Some elements of the complex adaptive system remain nonlinear—hence unpredictable, yet patterned—so it is necessary to work with the discrete interactions and feedback from the relationships of the agents within the system to increase resilience to the challenge (Sturmberg & Martin, 2009).

Both management strategies work in complementary ways to build resilience to the challenge identified within a complex adaptive system. This approach to building resilience to a complex challenge was the basis of the case material presented below.

Case material from the Limpopo Province, South Africa

The case study is based on a transdisciplinary design that has been reported on by Burman and Aphane (2016a). Four aspects of the case study will be highlighted in order to develop the additional layers that working with complexity can add to *Knowledge as Enablement*. The relevant aspects include the

ambition of the partnership in order to provide context, the intervention framework that was applied, the methodology, and relevant findings.

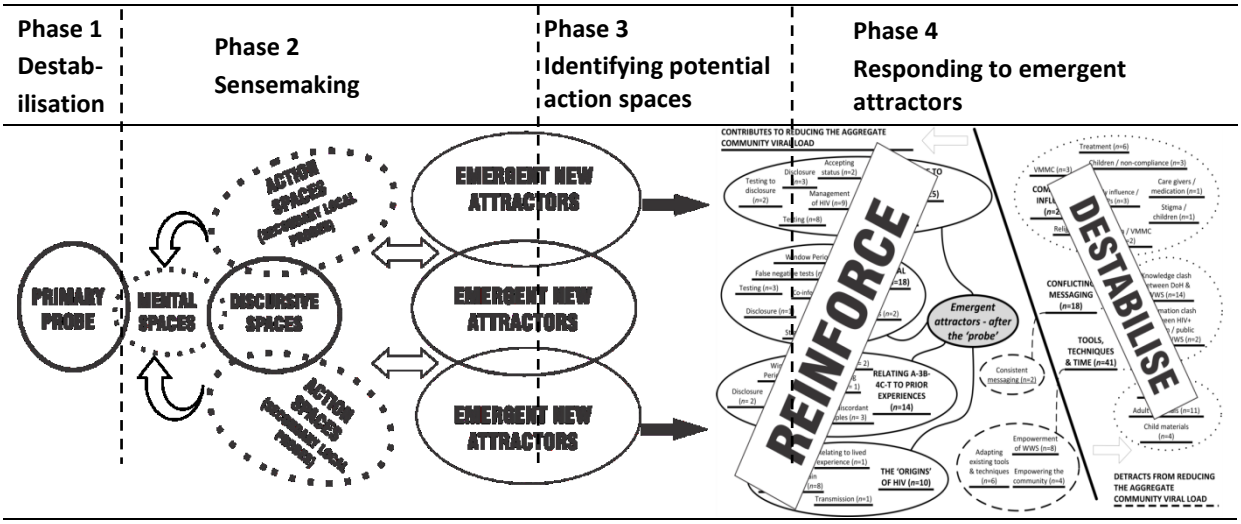
The engaged partnership

The community partner is a not for profit organisation called the Waterberg Welfare Society (WWS, http://www.waterbergwelfaresociety.org.za/) that focuses on HIV/AIDS and wellness in a deep rural community in the Limpopo Province. The community partner identified a challenge that they considered to be complex. The challenge was the confusions that their outreach teams were experiencing amongst the broader community with the now outdated "Abstain, Be Faithful, Condomise" (ABC) prevention campaign. ABC was promoted internationally by the United States' President's Emergency Plan for AIDS Relief (PEPFAR) between 1992 and 2010 (Hardee et al., 2013). The community partner explained that although the ABC campaign had now been superseded at national level by "combination prevention interventions to achieve the long-term goal of zero new HIV and TB infections" (South African National AIDS Council, 2012, p. 39), the legacy of ABC influenced the local HIV/AIDS context in adverse ways. The participants explained that it was necessary to overcome the ABC-legacy and develop improved strategies to reduce the impact of HIV/AIDS in their area.

The intervention design

The implementation framework (Figure 2) is designed to alter the dynamical interactions between the agents in the system using facilitated experiential sensemaking techniques (Burman, Aphane, Mtapuri, & Delobelle, 2015).

Figure 2. The Implementation Framework (based on Burman & Aphane, 2016a, p. 14)



Significant emphasis was placed on influencing the systemic relationships and feedback that were generating the complex ABC-legacy challenge that the community partner wanted to alter. The phases that constitute the framework are described below.

Preparation

Prior to beginning the implementation the partnership agreed an "end-condition" ambition for the initiative (Burman & Aphane, 2016a, p. 95). The expression, end-condition, was considered appropriate because when working with complexity it is not possible to predict what will emerge. In

this instance, the agreed end-condition ambition of the partnership was to reduce the aggregate community viral load.[2]

Phase One: Destabilisation

The purpose of the primary probe is to exploit the unstable nature of a complex adaptive system by introducing stimuli that destabilise the system further. The reason for deliberately destabilising the system further is that this can catalyse opportunities for change that can be adapted into resilience strategies. In this case study, an educational package called A-3B-4C-T[3] was used to destabilise the HIV/AIDS system in which WWS work. The focus was to critically reexamine the ABC-legacy from a biomedical and social determinants of health perspective (Burman et al., 2015). The purpose of this educational probe was to catalyse new frames (Goffman, 1974) in order to prompt the participants to consider new options for future social practices.

Phase Two: Sensemaking

During this phase, if the probe has been effective, the participants begin a process of "unlearning" their existing associations with the challenge, and gradually begin experimenting with new working practices (Rogers et al., 2013, p. 1). This is a process of self-organised sensemaking (Dervin, 1998; Weick, 1995) as the participants incorporate aspects of the probe into their existing knowledge base. This phase is similar to adult, or transformative, learning and praxis associated with Freire (1973) and Fals-Borda (1987).

Phase Three: Identifying potential action spaces

Phase Three involves identifying the emergent issues that begin to influence the complex adaptive system. In the language of complexity, these emergent issues are called "attractors" (Pincus & Metten, 2010, p. 364) which represent themes, or concepts, that make collective sense to people and influence "patterns of behaviour . . . which are never exactly repeated but are always similar to each other" (Stacey, 2003, p. 24). Predicting whether or not attractors will emerge after a destabilising probe is impossible. However, if new attractors do emerge, the likelihood is that they will reflect local nuances—including local knowledge systems, norms, values, metaphors, and idioms (Cameron & Deignan, 2006)—because they develop through cognitive processes such as selective attention (Klein, 2008) and sensemaking (Dervin, 1998; Weick, 1995) during experiential learning processes (Wals, 2007). From the perspective of the intervention design, attractor sites also represent potential teachable moments (Buchbinder, Wilbur, Zuskov, McLean, & Sleath, 2014).

Phase Four: Responding to emergent attractors

At this point in the intervention, a series of attractors have been identified. Some of these attractors are relatively easy to work with and others are outside the immediate influence of the partnership. At this stage, there is still no clarity about which attractors should be focused on to maximise the impact of the intervention. Identifying attractors with maximum utility requires that "leaders patiently allow the path forward to reveal itself" (Snowden & Boone, 2007, p. 73) by focusing attention on some of the attractors—depending on the resources available to the partnership. This entails developing strategies to either reinforce the attractors that contribute to the agreed end-condition, or dampening

2 The expression "aggregate community viral load" was invented because WWS have multiple departments that all work towards reducing the impact of HIV/AIDS in their area. It is now scientifically established that a fully suppressed viral load significantly increases wellness and reduces the chances of transmitting the HI virus to virtually zero (Rodger, Bruun, & Cambiano, 2014; Tanser, Barnighausen, Grapsa, Zaidi, & Newell, 2013,). Because the project was focusing on social outcomes, rather than individual outcomes, the metaphor served to represent any action, or activity, that reduced the aggregate community viral load.

3 For full details see http://www.comminit.com/hiv-aids/content/new-3b-4c-t-hiv-prevention

the impact of the attractors that detract from it. This process begins by applying safe-fail pattern management facilitation techniques to test how the impact of the different attractors can be maximised until successful, high impact, replicable strategies have been developed (Dickens, 2012).

Method

Prior to implementation, ethical clearance was approved by the University of Limpopo's Turfloop Research and Ethics Committee. In order to identify 12 WWS participants who would attend the training and follow-up interviews, a nonprobability expert sampling technique was applied. The criteria for selection included: each participant had a minimum of one year of professional experience working in the realm of HIV/AIDS, and would be available to participate in both the training and the follow-up interviews. Over a 10-month period after the training, 15 dual moderator, semistructured group discussions were undertaken using a combination of local languages—Sepedi and Setswana—and English. The discussions focused on how the A-3B-4C-T educational package was influencing the activities at WWS and how their clients were responding. The narratives were translated and back translated twice before being coded using the computer software, NVivo 10. The coding was done using a qualitative technique called causal layered analysis (CLA) that includes both a grounded theory and a thematic content analysis (Bishop & Dzidic, 2014). After the coding was completed by the university team, the findings were presented to the participants at a participatory workshop to ensure trustworthiness.

Relevant findings

Using the CLA technique, the following emergent attractors that contributed to the end-condition of the project were identified: HIV/AIDS no longer being perceived as a "Death sentence," but a chronic condition; the viral load; relating A-3B-4C-T to prior experiences; and the "origins" of HIV. The attractors that were identified that detracted from achieving the end-condition included alternative narratives about HIV/AIDS from within the community, and a need to develop and consolidate new tools and techniques to reduce the impact of HIV/AIDS in their locality.

The community partner reported that some of these attractors were associated with new social practices emerging within the broader community, which suggested there was movement from conceptually reframing the ABC-legacy challenge (Phases One and Two) towards changes in social practices within the community (Phase Four). The dominant attractors influenced the following social practices, as displayed in Table 1.

Table 1. Attractors Identified by the Partnership (adapted from Burman & Aphane, 2016a)

Changing social practices associated with the attractors	Attractors			
	Death sentence → chronic	Viral load	Origins of HIV	Relating A-3B-4C-T to prior experiences
Encourages testing (*n*=11); including Window Period (*n*=18)	✓	✓		✓
Encourages disclosure (*n*=7)	✓	✓		✓
Accepting status (*n*=3)	✓			✓
Understanding serodiscordant couples (*n*=5)		✓		✓
Messaging to community (*n*=11)	✓			
Easy to explain to the community after A-3B-4C-T (*n*=8)			✓	

These four attractors are currently being developed into tools and techniques that can be applied within the broader community. The partnership will continue to promote these attractors during 2016 and their influence will be monitored and evaluated.

Discussion

The findings demonstrate localised shifts in some social practices associated with the HIV/AIDS environment within which WWS works. These shifts reflect the way in which the community partner has made sense of a rational, linear educational package as they applied aspects of it to their work environment. The intervention has involved many of the factors that Erasmus and Albertyn (2014) and their coauthors associated with enabling knowledge to be activated, adapted, and incorporated into new social practices. The enabling factors include participation, trust, reciprocity, mutual and continuous learning and unlearning, as well as dialogue. However, there are three nuances that are highlighted and reflected on.

Roles and responsibilities and enablement

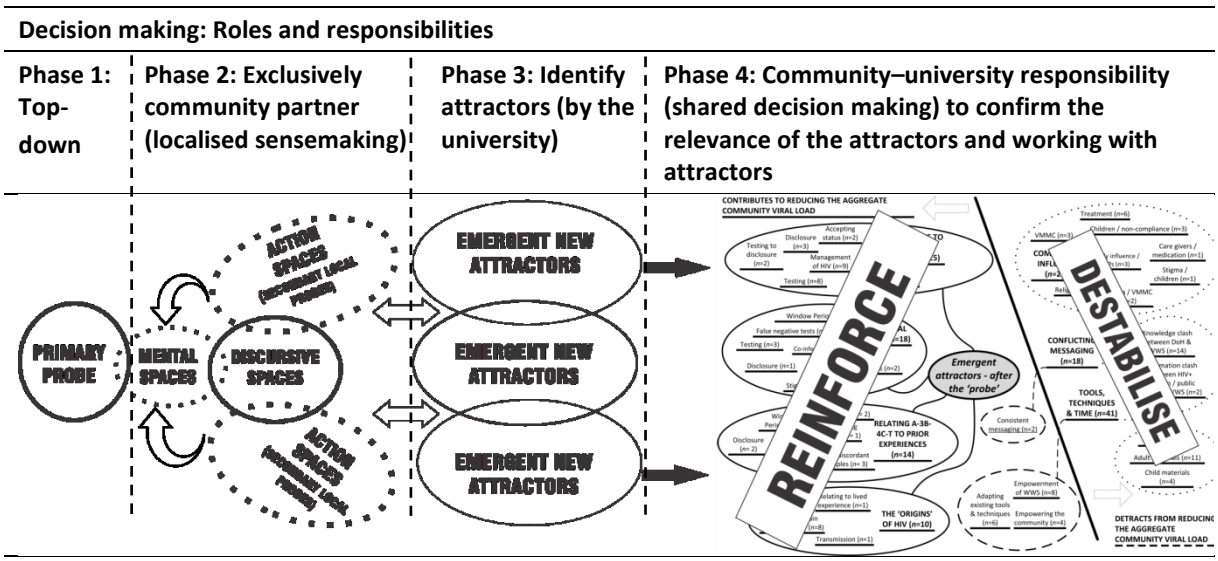
The outcomes of the intervention relied as much on decisive leadership and dialogue as it did on participatory processes. All were important, but reifying participation over other management strategies would have detracted from the ambition of the project. It is thus suggested that clearly defining the roles and responsibilities—rather than automatically falling back on the populist default setting of participation—within engaged partnerships could contribute to enablement when working with nonlinear complexity. In what follows, three examples are provided about how the partnership organised the roles and responsibilities during the implementation phases. The roles and responsibilities assigned to each partner were based on intuition about the skills, knowledge, and insights each partner could bring to the intervention. Many of the chapters in *Knowledge as Enablement* emphasise the importance of participation if beneficent outcomes are to be achieved. The implementation framework that was developed places greater emphasis on leadership, dialogue, and participation between the partners, rather than participation per se. For example, the educational probe, Phase One, was introduced in a top-down manner (see Figure 3). The probe is designed to stimulate the participants to consider new frames to critically reexamine the challenge at hand (in this instance, the ABC-legacy). Beginning this process through inclusive participatory processes would have detracted from the impact of the probe. There was dialogue between the partnership leadership, but

it was not inclusive—and yet it contributed to destabilising the system sufficiently to catalyse opportunities for social change.

Phase Two was undertaken exclusively by the community partner, with the university partner deliberately not influencing the outcomes. This is necessary if the emergent attractors are to reflect the local context. Interference by the university team at this stage would almost certainly have produced attractors that were influenced by the university's perception of the challenge. This could have jeopardised the outcomes of this phase because the university does not play a day-to-day role in the praxis between WWS and the broader community, and is thus unable to contribute with locally relevant inputs. If organic attractors that reflect the local context are to emerge, the community partner must take full responsibility for this phase.

In Phases Three and Four, different sections of the partnership took a lead, but the partnership maintained regular dialogue throughout. For example, in Phase Three, the university component of the partnership identified emergent attractors using the CLA technique. The findings were then presented to the community partner in order to determine the validity and relevance of the analysis from their perspective. Once the community partner had verified the relevance of the attractors, decisions were made about the attractors that would become the focus of Phase Four.

Figure 3. Roles and Responsibilities Assigned During the Implementation Framework



Working with complex adaptive systems and enablement

Working with complex adaptive systems assumes the context can be characterised as being both unstable and unpredictable. This requires a specific management response—which has implications for the type of enablement required to facilitate emergence of mutually beneficial social transformation in nonlinear, complex situations. Some suggestions as to the dominant enablers are presented below.

Sensemaking and enablement

Knowledge as Enablement makes no reference to sensemaking. Phase Two of the framework that was applied to counter the ABC-legacy does involve sensemaking. Sensemaking has been explored from an organisational perspective, most notably by Weick (1995) and, at an individual level, by Dervin (1998).

The notion of sensemaking is defined by van Beurden, Kia, Zask, Dietrich, & Rose (2013, p. 78) as a "social process in which we make sense of the world, so we can act in it." In the context of working with nonlinear complexity, sensemaking involves combining collective "sensori-memorabilia" (Burman, Mamabolo, Aphane, Lebese, & Delobelle, 2013, p. 22)—a pluralistic combination of knowledge, experience, and collective value systems—and new frames to make sense of, and act in, situations that are characterised by unpredictability.

In nonlinear, complex situations, there is typically no clear cut solution—hence the necessity to build resilience. In the case study, the participants were provided with new knowledge during the training and they applied it as they thought best in their context. The emergent attractors that influenced changing social practices were both linear and nonlinear. What seems to have happened is that attractors emerged through a process of collective experiential sensemaking. Following the early sensemaking phase, WWS repurposed these attractors to build resilience to HIV-related challenges in their locality. The sensemaking component has enabled WWS and the broader community to make sense of the knowledge contained in the educational package and act on it. The authors acknowledge that this aspect of the framework requires further investigation to tease out the minutiae. Nevertheless, it does seem to suggest that sensemaking contributes to the process of co-generating enabling knowledge when working with nonlinear, complex challenges.

Attractors and enablement

The emergence of the attractors after the training poses an interesting question with regard to engaged scholarship and enablement. After the educational material had been presented, attractors emerged as the participants made sense of the new knowledge and applied it to their work. From the perspective of engaged scholarship, this process of autonomous praxis did empower WWS and the broader community to take selective ownership of—and act on—some of the knowledge contained in the educational package. From this platform, the partnership identified four attractors as the focus of Phase Four. However, from the perspective of theory, it is more problematic because (a) engaged scholarship is mostly unfamiliar with the specialist language of complexity and (b) there is no easy way to provide a bridge to transfer the attractor concept into the lexicon of engaged scholarship.

Some tentative comments are presented. The first comment is that a conventional pre- and post-test to evaluate the educational package at an individual level would have provided a very weak indicator of the potential of the knowledge to contribute to the agreed end-condition and social transformation. Second, there are similarities between the attractor concept and teachable moments (Cohen, Clarke, Lawson, Casucci, & Fiocke, 2011).

In health care, a teachable moment is an unexpected opportunity to promote wellness. For example, smoking cessation messaging is typically the domain of primary healthcare, yet it has been argued that hospital emergency departments provide unique and unexpected low-cost opportunities to promote awareness about the risks of cigarette smoking (Buchbinder et al., 2014). There is a consensus within the literature that has been reviewed that teachable moments are best identified in a top-down manner by the healthcare professionals (Cohen et al., 2011; Phelan, 2010). The case material provided above suggests that attractors emerged from the interactions of WWS and their clients. The noticeable difference between emergent attractors and teachable moments is that the didactic, individualistic teachable moment has been replaced with bottom-up acceptance—and incorporation of—emergent attractors into social practices. This suggests that attractors are derived from local historical frames and that they contain—and develop—unique meaning in a specific location that influences social practices.

The repurposing of the attractors by WWS, combined with the uptake of the attractors into social practices by the community, does suggest that the attractors influence enablement. However, further research is required to better understand these processes in the context of both engaged scholarship and HIV/AIDS.

Systemic change and enablement

From the perspective of de Beer (2014, p. 133), "enabling *knowledge"* refers to the relationships that facilitate a knowledge transformation process and "*enabling* knowledge" refers to the end product, or outcome. Likewise, Mode 2 knowledge generation refers to outcomes. Both implicitly refer to community transformation. However, in de Beer's formulation, the link between a bundle of inert knowledge and movement towards transformative social practices is ambiguous. From the perspective of the case material, the mediating link between rational knowledge—the A-3B-4C-T educational package—and altered social practices were emergent attractors that influenced the characteristics of the complex adaptive HIV/AIDS system that WWS works within. The attractors emerged through the culmination of the intersections of both linear, cause–effect variables and nonlinear, patterned interactions within the system. These attractors emerged organically from the community iterations after the A-3B-4C-T educational probe.

The linear attractors include: HIV gradually being perceived with the community as a chronic condition, rather than a death sentence; the importance of the viral load to wellness; and relating the learning from the A-3B-4C-T educational package to past experiences. There is a self-evident, rational logic to these attractors and they continue to influence the HIV environment within which WWS work. However, what is less evident is why—from a comprehensive educational package that delivered a broad overview of both medical and social determinants of health perspectives about HIV/AIDS—these particular linear attractors have become so influential.

An example of the nonlinearity contained in the systemic change is the origins of HIV attractor. The origins of HIV attractor refer to zoonosis. During the training, a brief account was provided about how human immunodeficiency viruses (HIV) emerged from simian immunodeficiency viruses (SIV). Initially it was confusing why this attractor was having such an impact. Discussions with the community partner clarified that the importance of the origins of HIV relates to the local context and beliefs about how HIV originated. Locally, many people in the community believe that HIV is caused by issues relating to "ritual impurity," known as "*makgoma*" (Shirindi & Makofane, 2015, p. 942). This belief results in many people seeking alternative remedies for HIV/AIDS-related illnesses, whilst simultaneously rejecting medical options approved by the National Department of Health's guidelines. The nonlinearity of this attractor reflects the way in which this small aspect of the educational package has had a disproportionately large impact within the community.

Although insights into the processes that culminated in the emergence of the attractors are incomplete at this time, they may suggest the mediating link between inert knowledge contained in the A-3B-4C-T educational package and shifting social practices is related to the emergence—and social acceptance—of unique attractors through processes of experiential learning, sensemaking, and adaptation. This process demonstrates that it is possible to alter the properties and characteristics of a complex adaptive system in ways that contribute to social transformation. It has been argued that a similar process may have influenced the decline in HIV prevalence in Zimbabwe from 29% in 1997 to 16% in 2007 (Burman & Aphane, 2016b). Further research is required to clarify the particularities of the examples of systemic change that have been presented, but the findings do mirror the suggestion that "it is evident that the power of an intervention comes *not* from where it is targeted, but *rather how it works to create change within the system* [emphases added]" (Carey & Crammond, 2015, p. 9).

It is therefore suggested that when working with complex challenges, catalysing systemic change within nonlinear, complex systems could represent a form of enablement.

Multi-ontology knowledge frames and enablement

Building resilience to nonlinear, complex challenges involves managing both predictable linearity and unpredictable, nonlinear systemic interactions. This represents a multi-ontology knowledge context, with "ontology (the nature of the system) determin[ing] epistemology (the nature of possible knowing)" (Snowden, 2011, p. 143). What this implies is that when confronting nonlinear, complex challenges through community–university partnerships, the ontological basis of engagement is not a neutral, one-size-fits-all, context. Some challenges are situated within linear contexts, and some are situated within contexts characterised by both linearity and nonlinearity—and it is likely that these nonlinear contexts will increase (Masys et al., 2014; National Planning Commission, 2013; Taleb, 2007). It is therefore suggested that determining the ontological basis of engagement and responding appropriately, also represents another component of enablement.

Policy

This article draws attention to the importance of building resilience to complex problems in the context of engaged scholarship and enablement. In order to increase this type of resilience capacity, policy makers are urged to build on the existing expertise in the field of complexity and expand it to increase national resilience to challenges that demonstrate some nonlinear properties and characteristics. This focus can develop the capacity of the South African knowledge landscape to contribute to building national resilience to global challenges that are experienced locally through engaged scholarship and enablement.

Further research

Three areas for further research have already been identified, above. There are two other areas that require attention. The first is that there is a potential weakness in the sensemaking phase (Phase Two). This weakness reflects the way in which the attractors develop from the perspective of equality. This process of praxis may have the unintended effect of strengthening, or reinforcing, existing social relations within a community. This may disadvantage some community members. For example, from the perspective of gender, it may be that the emergent attractors disadvantage women's voices from being heard if the preexisting social relations reify male voices over women's. In this case study, there is no evidence that this occurred, but it does require further investigation. The second area of further research is to identify opportunities to replicate the framework in the context of a different type of complex challenge in order to improve the overall understanding about the processes involved.

Limitations

The case material that has been drawn upon is a nascent innovation and has yet to be replicated. However, despite the early stages of the project, the findings do offer an opportunity to open a conversation about how complexity can contribute to the enabling knowledge debate that Erasmus and Albertyn (2014) have initiated.

Conclusion

Knowledge as Enablement was introduced, followed by a theoretical statement about complexity. This was used to provide background information prior to presenting case material that included a framework for confronting nonlinear, complex problems through community–university partnerships. The framework was designed to build localised resilience to complex challenges in the context of

engaged scholarship. In this instance, the framework was applied to the ABC-legacy challenge that was identified by WWS. The discussion highlights how the learning from this process could add several conceptual layers to the notion of enablement. The first suggestion is that leadership, dialogue, and participation contribute to the process of praxis, which is an essential mediator of the framework design. In the context of nonlinear complexity, assigning distinct roles and responsibilities to different components of the intervention appropriately—rather than relying exclusively on participation—is a possible knowledge enabler. Second, working with complex adaptive systems opens three possible enabling frames. These include sensemaking, attractors, and systemic change that alters both the social practices within—and the context of—a complex adaptive system. Third, it is suggested that deliberately problematising the knowledge context prior to beginning an engaged intervention through the multi-ontology concept is a likely enabler of engaged outcomes. All of these possible enablers of knowledge could represent additional layers to the knowledge as enablement debate in the context of nonlinear complexity.

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