


Systems and Complexity Thinking to Master Leadership Challenges in Interprofessional Health Professionals Education

Daniel J Pesut¹ , Linda A Headrick², Eric Holmboe³ and Shirley M Moore⁴

¹University of Minnesota School of Nursing, Minneapolis, MN, USA. ²University of Missouri School of Medicine, One Hospital Drive, Columbia, MO, USA. ³Milestones Development and Evaluation Officer at the Accreditation Council for Graduate Medical Education, Chicago, IL, USA. ⁴Frances Payne Bolton School of Nursing, Case Western Reserve University, Cleveland, OH, USA.

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ABSTRACT: The purpose of this article is to propose that knowledge, understanding, and application of systems and complexity thinking can improve assessment, implementation, and evaluation of interprofessional education (IPE). Using a case story, the authors describe and explain a meta-model of systems and complexity thinking to support leaders in implementing and evaluating IPE initiatives. The meta-model incorporates the use of several important, interrelated frameworks that tackle issues of sense making, systems, and complexity thinking as well as polarity management at different levels of scale in an organization. Combined, these theories and frameworks support recognition and management of cross-scale interactions and help leaders make sense of distinctions among simple, complicated, complex, and chaotic situations among IPE issues associated with healthcare disciplines within institutions. The application and use of Liberating Structures and polarity management practices enable leaders to engage people and gain insight into the complexities involved in successful implementation of IPE programs.

KEYWORDS: systems thinking, leadership, complexity, liberating structures, health professions education, interprofessional health education, polarity management, panarchy

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CORRESPONDING AUTHOR: Daniel J Pesut, University of Minnesota School of Nursing, 301 Oak Grove St. Unit 409 Minneapolis, MN 55403, USA.
Email: dpesut@umn.edu

Introduction

Healthcare has struggled to realize the potential and promise of interprofessional education (IPE). In part, this is due to significant challenges in the IPE needed to prepare health professionals for that work. IPE is when two or more professions learn with, from, and about each other to improve collaboration and the quality of care.¹ In his chapter, “Reforming Medical Education: Confessions of a Battered Humanist,” Dewitt C. Baldwin described waves of increasing and fading interest (“boom or bust”) related to support and leadership in IPE. He noted that these efforts “remain to be fully realized after over half a century.”²

Interprofessional health professions education planning, delivery, and evaluation are complex. Thus, linear models of thinking and action have limited success in bringing about needed change. In dealing with complexity, Jennifer Berger Garvey suggests there is a need to ask different questions, seek multiple perspectives, and see and think with a systems thinking mindset.³ Robert Kegan and Lynn Lahey⁴ note that in complex organizations there is an immunity to change. Established systems seek to protect, defend, and conserve themselves. To create transformational change leaders must develop a systems and complexity thinking mindset.

IPE occurs within a complex adaptive system, defined as “a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are

interconnected so that one agent’s actions change the context of other agents.”^{5,6} How might a systems and complexity thinking mindset influence and inform leadership strategies to support more effective IPE initiatives? Are there other theories and frameworks one can combine to appreciate and manage the complexities of IPE efforts? We propose, describe, and discuss how Liberating Structures (LS) and other concepts conceived and derived from systems and complexity theory can support leadership development and positively influence change and transformation related to IPE initiatives.

Interprofessional Education: Challenges of the Past and Hopes for the Future

One early effort was the Interdisciplinary Professional Education Collaborative (IPEC) that was a 1993 to 1999 demonstration project on IPE in quality improvement sponsored by the Institute for Healthcare Improvement and the Health Resources and Services Administration/Bureau of Health Profession.^{7,8} IPEC started with 4 sites and grew to 10, each involving learners from, at a minimum, health management, medicine, and nursing. In 2002, a review of the literature on health professions education in quality improvement included lessons from their experience and highlighted the following challenges to interprofessional learning in quality improvement, mirroring the challenges reported for IPE in general.



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- Competing academic calendars and schedules
- Differences in language
- Differences in routine methods of work
- Differences in academic policies (eg, grades vs pass/fail)
- Variation in learners' age, education level, and clinical experience
- Already over-crowded curriculum
- Complexity of design, requiring considerable faculty commitment and time
- Discipline-specific processes for faculty recognition and rewards

In 2009, the IPEC was established “to advance substantive interprofessional learning experiences to help prepare future health professionals for enhanced team-based care of patients and improved population health outcomes.”⁹ This group published the first set of core competencies for interprofessional collaborative practice in 2011.⁹ Today this organization includes 21 health professions organizations.⁹

Twenty years after the end of the initial IHI-HRSA IPEC experience, interest in IPE is more widespread. But challenges remain, demanding considerable organizational commitment and investment to sustain IPE.^{10,11} As a result, IPE remains on the periphery of most learners' health professions education experience. We propose that the challenges of IPE are explained, managed, and positively influenced using a systems and complexity thinking mindset. As shown in Figure 1, we propose a meta-model of complex systems thinking to support leaders in implementing IPE initiatives.

The meta-model combines the use of 4 important frameworks to guide leaders in choosing and applying LS.¹² LS are a set of 33 structures for facilitating meetings and conversations to analyze, evaluate, and create innovations in health professions education. LS are simple social techniques that distribute participation more widely within groups while surfacing existing difference and variation.¹³ Use of these social techniques, strategies, skills, and tactics requires risk taking and leadership development. We argue that leaders can positively influence IPE efforts with the application of systems and complexity thinking theories and frameworks and LS practices. Consider the following story about Dr Mark Johnson.

A Case Story

Mark Johnson, associate professor of Medicine, was invited by the Dean of the Medical School to lead a campus-wide committee charged with designing innovative approaches to IPE for his university. The university recently completed a strategic plan that includes a goal to “become known across the world as a leader in interprofessional health professions education.” Because of his reputation and work on the social determinants of health with faculty from the schools of nursing, medicine, social work, and anthropology, Mark was nominated to lead this committee. Over the past decade Mark's campus embraced

the concept of IPE and has yet to fully realize the promise and potential of interprofessional learning among the health professions. Issues related to academic schedules, financing, and variations in accreditation criteria challenged the aspirations of a fully collaborative IPE model. Mark believes that there has been less progress in IPE than is desirable.

Mark is reflecting on how he can support the development of IPE in the complex academic environment of his university. He realizes that there is high variance in the types and levels of expertise among the members of the university community regarding IPE. Each profession brings its own language, focus of scholarship interest, and education traditions. There is great variability among faculty regarding their experience and knowledge of collaboration across disciplines. Each discipline has its own tradition about how education and professional development should occur as part of the work world, and each university department has its own norms and expected roles regarding participation in IPE. He realizes there is need for scalable models of IPE that are less expensive and more effective. Mark is aware of the university's struggle to embrace interprofessional activities, while still strengthening its disciplinary bases. Mark has recently been participating in a leadership development program and has decided that his appointment to this IPE committee is a good opportunity to apply information he has learned about leading transformative change.

Mark is considering models and methods to inform his own leadership strategies and guide the committee in its work to achieve an integrated IPE model. His experience is that siloed planning among the professions is a significant barrier and will not achieve the partnership, collaboration, or collective impact needed to reach the university's goals. How can this committee engage the larger campus community in these changes? How can Mark build on previous success of his IPE efforts? He wonders if there are new models of IPE efforts as the field of leadership development has evolved. How might the past inform his thinking about a more desirable future?

The transformation of IPE to prepare learners with the competencies needed for successful interprofessional practice requires creating desired futures rather than fixing the past. Mark recalls the work of Chris McGoff who notes there is a difference between change and transformation.¹⁴ McGoff suggests change focuses on fixing the past and transformation is the creation of a desired future. McGoff contends change is the work of managers and transformation is the work of leaders. What strategies can leaders use to move from change to transformation? Mark decides that he would like to encourage the use of systems and complexity thinking and new ways to engage people to support transformative change. Mark recently attended a workshop that presented concepts, principles, and practice of LS.^{15,16} LS are new ways of interacting and engaging people in ways to share and spread ideas, knowledge, experiences, and challenges as well as reveal, discover, generate, develop, or improve opportunities, obstacles solutions and ideas.

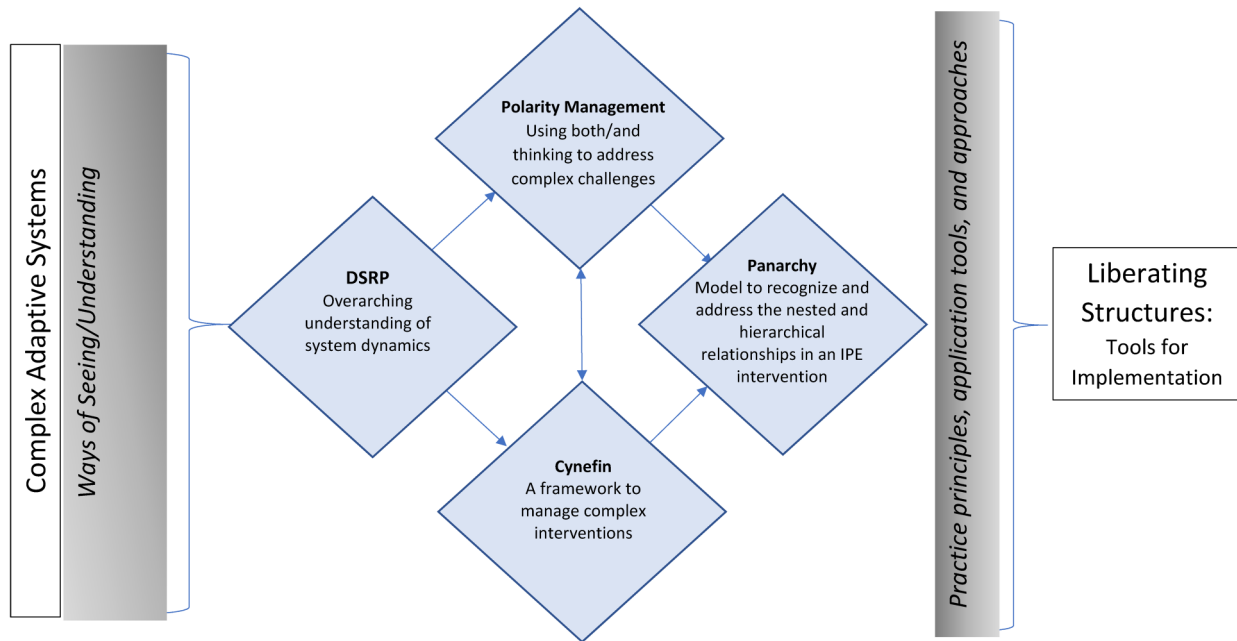


Figure 1. A meta-model of systems thinking for leading IPE initiatives. Interprofessional education initiatives require leaders to use complex adaptive systems thinking in their implementation. The DSRP (differences and distinctions, systems dynamics, relationships, and perspectives) framework is a logical starting point for an IPE leader to assess the state of the complex system (s)he will be introducing an IPE intervention. The leader can next use polarity management to identify the essential poles of challenge (eg, individual vs team roles) concomitantly with the Cynefin framework to recognize where key aspects of the intervention fall in the simple to complex situational spectrum. The reflection and planning phase should end using Panarchy to distill the anticipated effects from and impact of the intervention on the nested, interdependent relationships within a system. Investment in using these interrelated frameworks will help the leader choose the most effective liberating structure tools to support the implementation of the IPE initiative. Abbreviations: DSRP, distinctions, systems, relationships, and perspectives; IPE, interprofessional education.

Systems and Complexity Thinking: Theory to Practice

Cabrera et al¹⁷ suggest the essential elements of systems thinking involve understanding distinctions, systems, relationships, and perspectives (**DSRP**). **Distinctions** involve difference between and among things and ideas. Making distinctions involves attending to differences between identity and other—what something is and is not. **Systems** are composed of parts and wholes. **Relationships** include attention to actions and reactions. **Perspective** includes focusing on a point and having a view. Systems thinking is one way to tackle the complexities of health professions education. It is also useful to appreciate and evaluate situations as simple, complicated, complex, and chaotic and weave sense making into leadership practices. DSRP thinking helps leaders make finer distinctions and appreciate the system implications and consequences of actions and reactions that are likely to influence relationships based on individuals' perspectives and points of view.

Complexity thinking requires a move away from linear cause and effect models of analysis and planning and embraces understanding of the difference between and among issues that are simple, complicated, complex, chaotic.¹⁷ The Cynefin Framework¹⁸ is a useful sensemaking tool for leaders to process relationships between and among simple, complicated, complex, and chaotic situations. Three fundamental principles of the framework are (1) embrace messy coherence; (2) enable descriptive self-awareness and self-discovery; and (3) attune

to timing and flow. The framework sorts the issues facing leaders into 5 contexts defined by the nature of the relationship between cause and effect. Four of these—simple, complicated, complex, and chaotic—require leaders to diagnose situations and to act in contextually appropriate ways. The fifth context applies when it is unclear which of the other four contexts is predominant. Using the Cynefin framework can help leaders sense which context is apparent and how best to negotiate and apply the preferred leadership and management style. The framework suggests that the ordered world is the world of fact-based management; the unordered world requires pattern-based management. Complex and chaotic contexts are unordered—there is no immediately apparent relationship between cause and effect, and the way forward is based on understanding emerging patterns. The very nature of disorder makes it particularly difficult to recognize when one is in it. Therefore, multiple perspectives compete for attention, dissenting leaders argue with one another, and discord rules. Being aware of the differences between and among simple, complicated, complex, and chaotic situations helps determine leadership actions and interventions. We believe the Cynefin Framework helps describe and differentiate contextual issues in IPE which are complex and may even be chaotic. Complexities inherent in IPE are not problems to be solved but are polarities to be managed.

Polarities are interdependent pairs that need each other over time to gain and maintain performance.¹⁹⁻²¹ Every team or

organization must learn to manage the energy in polarities such as stability-change, global-local, mission-margin, team competency-individual competency, and part-whole. Because polarities are interdependent, neither is enough alone. Polarity thinking is about “both-and” and invites a move away from “you are wrong, and I am right” thinking to “we are both right,” in complex situations. This kind of systems and complexity thinking supplements traditional problem solving (either-or) thinking and acting. There are multiple polarities in health professions contexts.²²⁻²⁵

One example of a polarity in IPE occurs in the assessment of interprofessional teamwork. Does a training program assess everyone, just the team, or both? Are interprofessional teamwork abilities only a function of the “whole,” or do effective interprofessional teams need individuals with a certain type and level of abilities? Using polarity thinking, we would argue it is a “both/and.” You simply cannot populate an interprofessional team with a bunch of traditionalists and expect it to function effectively.^{26,27} However, we also know that simply putting a group of smart people, defined by the traditional metric of knowledge, does not work either.²⁸ What effective interprofessional teams need are individuals with strong interpersonal communication and listening skills, and the ability to function as both leader and follower depending on the team’s situational needs. Delivering IPE by default requires an interprofessional leadership team that should embrace the developmental process for everyone and the team. As Richard Hackman²⁹ observed years ago, effective teams meet both team and individual outcomes. Specifically, the product of the work meets or exceeds the standards of those who receive, review, or use it. Members become increasingly competent in working together as a team and members’ personal growth and wellbeing develop because of their team experiences. Thus, it makes sense for training programs that look to improve interprofessional teamwork assess both individual and team-wide outcomes.

Another example on a more macro scale is the inclusion of requirements for IPE by various accrediting bodies within the health professions. A common polarity is the tension between assurance policies (eg, often seen as “mandates”) versus policies designed to support and drive continuous quality improvement. For example, the Accreditation Council for Graduate Medical Education includes standards in its common program requirements for interprofessional teamwork (ie, an assurance type policy), but guides the assessment of individual learners’ abilities in interprofessional teamwork through competency milestones designed to drive improvements in curriculum and assessment for interprofessional teamwork and care.³⁰ The paradox in all the various health professions’ accreditation requirements, whether from an assurance or continuous quality improvement perspective, is that such requirements stay within the single profession. Mark and his interprofessional team will need to address these issues of local interprofessional teaching and assessment while concomitantly attending

to profession-specific accreditation requirements. In addition to viewing his multilayered challenges through a systems and complex thinking dynamic lens there are cross-scale interactions embedded in nested panarchy dynamics. The authors believe leaders need to pay attention to panarchy principles as they craft their strategic planning efforts.

Panarchy theory is a system thinking adaptation of ecological and complexity theories used to explain and explore the process of adaptation and change within ecological or sociological systems.³¹ Panarchy theory describes systems as having 5 interrelated components: holarchy, scale, time, cycles, and cross-scale dependency.^{32,33} First, holarchy emphasizes that all systems are complexly nested in other systems. Each component impacts and relates to all the other components. Second, systems are scale dependent, with all sizes existing concurrently (small to big—microscopic to cosmological). Third, time is a discrete and diverse variable and influences the dynamics of the systems evolution. Fourth, attention to cycles requires understanding 4 stages of adaptation in all systems: growth, conservation, release, and reorganization. Finally, there are cross-scale dependencies between and among the variables in a nested hierarchy of system dynamics.³⁴

An example of applying panarchy theory to IPE is recognizing that different disciplines in the health professions involve a complex web of unique disciplinary requirements regarding policies and procedures for recognition, accreditation, and certification. These requirements vary at a local, state, regional, and national level. Figure 2 illustrates specific nested levels to consider about IPE. Nested levels relate to the personal and professional identities of the learners, the dynamics of interprofessional teams, department and school dynamics, university, and healthcare organizations, accrediting bodies, industry, and regulations, as well as governmental laws and policies.

Panarchy theory suggests resilience is essential for effectively functioning systems. Seven principles support resilience.³⁵ The principles include maintaining diversity and redundancy, managing connectivity, managing fast and slow cycles of variability and feedback, fostering complex adaptive systems thinking, encouraging learning, broadening participation, and promoting distributed governance systems in and across organizations. All health disciplines strive to develop resilience in the education and development of students working their way through programs. IPE success depends on diversity of thought, and lifelong learning in the context of rapidly changing healthcare contexts. What holarchies exist in health professions education? How are disciplines in the health professions affected by nested cross-scale interactions? How might time as a variable be a factor in system dynamics? At what stage of adaptation are different disciplines in the growth, conservations, release, and reorganization dynamic?

If leaders were to apply the DSRP Systems thinking theory and the Cynefin Sense Making Framework, they are likely to identify polarities to manage which are nested in cross-scale

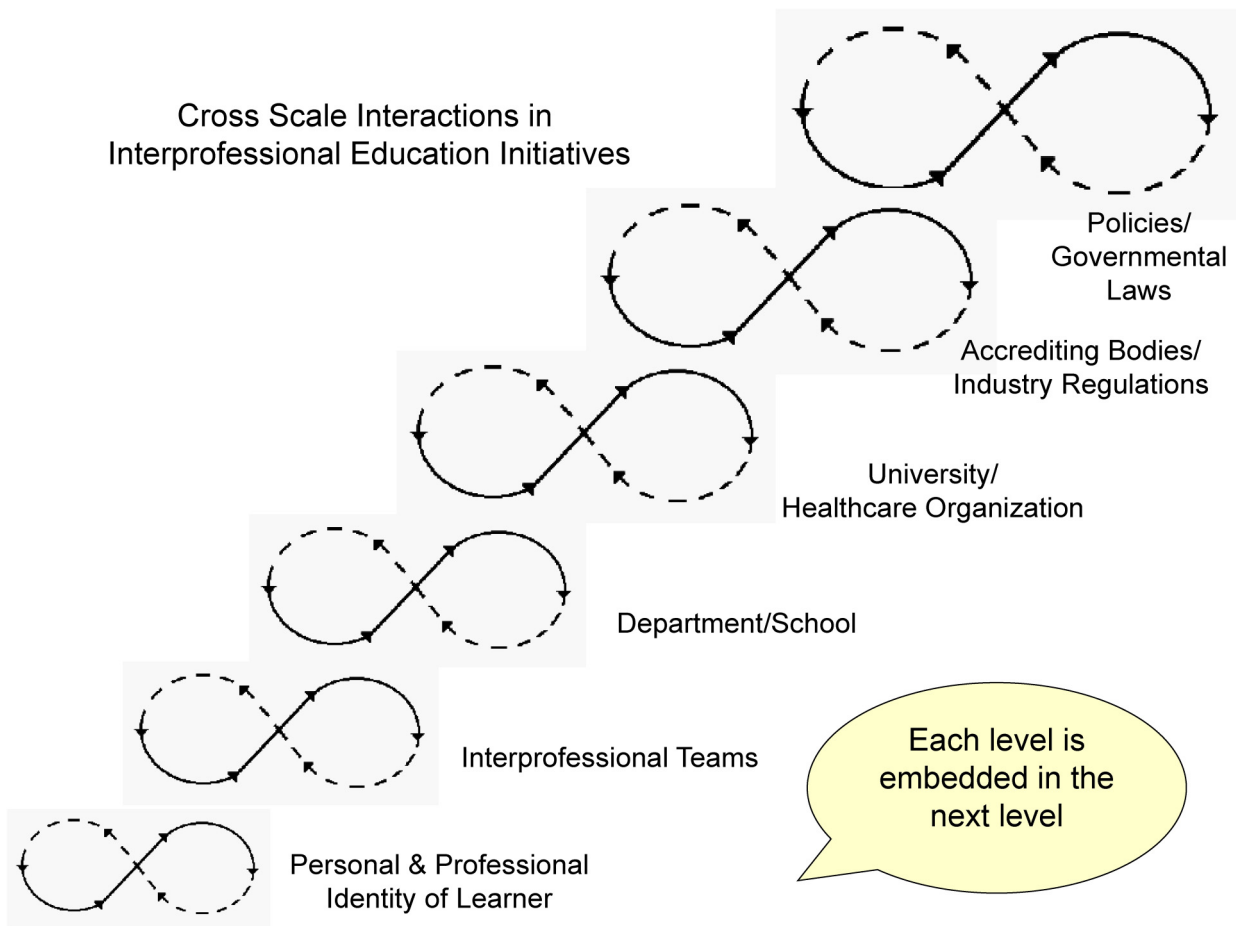


Figure 2. Cross scale interactions in interprofessional education initiatives.

interactions in panarchy-like systems. How might leaders begin to use distinctions, system dynamics, relationships, and perspectives as well as insights related to complexity and cycles of panarchy adaptations and polarity thinking to support their leadership initiatives? How might Mark use systems and complexity thinking and the principles of polarity management and his knowledge of panarchy to create transformative change? How might leaders engage people and help them develop systems and complexity thinking skills? The advantages of using these theories and frameworks are increased appreciation of the complexity dynamics involved in leadership and the opportunities to understand how complex dynamics influence action and decisions related to desired outcomes. The disadvantage of this approach is there is much to learn about how these theories and concepts relate to each other in the context of real-world challenges.

Liberating Structures: Social Practices to Support Transformational Leadership of IPE Education Initiatives

LSLS are social practices that make it possible to benefit and master systems and complexity thinking—to help patterns emerge from the interactions among the parts of a complex

system. LS make use of the following principles of practice: (1) include and unleash everyone, (2) practice deep respect for people and local solutions, (3) build trust as you go, (4) learn by failing forward, (5) practice self-discovery within a group, (6) amplify freedom AND responsibility, (7) emphasize possibilities, (8) believe before you see, (9) invite creative destruction to enable innovation, (10) engage in seriously playful curiosity, and (11) never start without clear purpose(s).³⁶ An especially useful resource at the LS website is the Liberating Structures Selection Match Maker.³⁷

As Mark contemplates the challenges of his new role, he begins to explore LS to help him navigate his leadership challenges. He scans the Liberating Structure Selection Match Maker, and one liberating structure jumps out to him: Purpose to Practice. Purpose to Practice helps clarify the 5 essential elements for a resilient and enduring initiative by making explicit the purpose of the initiative, the principles, or rules of engagement, who the participants will be, and what structures and practices must be in place to ensure success.

Mark invites the planning committee to an initial meeting and introduces the Purpose to Practice Liberating Structure.³⁸ The goal of the purpose to practice LS is to have stakeholders participate in the design of their new initiative to

specify its five essential elements: purpose, principles, participants, structure, and practices through the five iterative phases of the process that include answering questions about why the work is important to individuals and the larger community. Mark invites his committee to develop principles to accomplish the work and identify who needs to be included for the work to be successful. The group then discusses how best to structure and organize the work so control is shared throughout the systems and levels involved. Finally, the group discusses what practices are going to accomplish the defined IPE purposes identified.

Mark realizes people want to take responsibility for certain IPE projects and so he continues using LS to fashion the future working agenda for his planning committee. Open Space Technology seems to be the next logical LS structure to use as Mark maps out his future meeting agendas. The Open Space Technology³⁹ liberating structure helps people on his committee co-create agendas and discussion topics for action and development.

Recognizing that his IPE efforts are embedded in larger hierarchical structures, He takes advantage of his new knowledge about panarchies and uses the Panarchy Liberating Structure⁴⁰ to help his team understand the interdependencies of their work with other groups, departments, and institutional leadership. Each of these units, or levels within an organizational hierarchy, possess their own stage within an adaptive ecocycle (ie, growth, conservation, release, and reorganization) understanding these nested relationships will impact Mark's IPE transformation activities and plans. Marks' new IPE activity has its own ecocycle within the larger panarchy that will affect these other organizational units, at diverse levels of the panarchy. The ecocycle planning tool will help Mark's group see how their current stage interacts, influences, and impacts the higher level ecocycles that are trying to change.

As the group matured, the planning committee digs more deeply into their work; they begin to generate ideas about how to increase interprofessional learning university wide. As the conversations continue, Mark notices a trend: ideas met with a "yes, but" with faculty from each profession at one time or another expressing how they can't see "adding even one more thing" to their students' curriculum. Mark decided to use the TRIZ Liberating Structure⁴¹ to break the group out of this mindset. TRIZ opens opportunities for innovation by helping a group get past assumptions and behaviors that limit success. It is a brainstorming exercise around a startling prompt: "Make a list of all you can do to make sure that you achieve the worst result imaginable with respect to your top strategy or objective." With an explicit commitment to honesty, the participants ask themselves if they are doing anything like what is on the brainstormed list and generate ideas about what they might do instead. After an animated discussion peppered with nervous laughter, Mark's committee realizes that a major issue is the assumption of a zero-sum approach. That is

a belief that nothing new can be added unless something else is replaced hour-for-hour of student contact time. They next generated ideas for an alternative approach and agreed to look for shared areas of core content to improve if taught with an interprofessional approach, such as health ethics, quality improvement and patient safety, and social determinants of health.

Mark's committee decided to design an interprofessional course on health ethics. One of the challenges that arose early in the planning phase was finding a time to hold the course that would meet the needs of the different learners' schedules, a common challenge in interprofessional learning. Each profession has its own course requirements and long-established schedules that are difficult to change. Mark found that the faculty group expressed helplessness and little hope in changing the current schedule to fit in this new elective course. He decided that he wanted the faculty planners to think more creatively and feel empowered to manage this scheduling issue. He decided to introduce the 15% Solutions Liberating Structure⁴² activity in the next committee meeting to help the faculty planners discover and focus on what they had the freedom and resources to do now about this scheduling challenge. The 15% Solutions activity can reveal the actions, however small, that everyone can do immediately. At a minimum, these create momentum, and that may be effective.


The 15% Solutions get individuals and the group to focus on what is within their discretion instead of what they cannot change. With a simple question, the conversation changes to what solutions are possible to big problems often distributed widely in places not known in advance. At the next faculty committee meeting Mark suggests that the group take 20 min and engage in an activity focusing on the scheduling issue. Mark posed the following questions: "When it comes to scheduling courses, what is your 15%? Where do you have discretion and freedom to act? What can you do without more resources or authority?" He had each member of the planning committee generate his or her own list of 15% Solutions for 5 min, then share it with the group. Group members then asked clarifying questions of each other about the solutions generated and expanded on proposed ideas. Actionable ideas to address the scheduling issue that arose from the faculty committee included: (1) offering the course in a 2-day format, (2) inviting learners to join the planning committee to "co-create" the course, including scheduling, (3) holding a quick planning session with interested learners and have them suggest the best scheduling option, and (4) offer several sections of the course and have learners self-select their scheduled time.

Summary

Recognition of the importance of interprofessional care and IPE has a long history, yet implementation efforts have been difficult. Using a case story, the authors propose a meta-model that combines systems and complexity thinking concepts, principles, and practices to master leadership challenges in IPE.

The story highlights the use of DSRP theory, the Cynefin Sense Making Framework, principles and practices of polarity management and insights from the concept of panarchy to conceptualize issues and challenges associated with leading IPE efforts. The application and use of LS provides strategies and tactics to engage people in creative work to support transformative leadership efforts. It is essential that IPE leaders recognize that transformation requires attention to multiple iterative, cyclical processes. No single “tool” or theory is sufficient when embarking on system and complex changes that involve multiple individuals, groups, competing commitments and polarities at diverse levels of scale, in units, organizational structures and institutions. Persistence, patience, flexibility, and adaptability supports a leadership journey that has desired benchmarks, but not permanent ends. Successful leaders use systems and complexity thinking to create desired futures.⁴³

ORCID iD

Daniel J Pesut  <https://orcid.org/0000-0003-3400-6462>

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