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Informed Systems

Organizational Design for Learning in Action

Mary M. Somerville

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Foreword

As formats, creators, vendors, and publishers proliferate in the twenty-first century, traditional assumptions, workflows, and expectations are shattered in academic libraries. Consequently, Digital Age workplaces require professionals capable of radical and rapid reinvention. In contrast, traditional library work was by and large consistent and unchanging, governed by established organizing principles and practices administered by an entrenched hierarchy "often bearing more resemblance to a medieval caste system than to a modern, agile organization" (Gandel, 2005). This professional legacy exacerbates workplace challenges, prompting the question: How can we design robust organizations that anticipate unprecedented user expectations and enable nimble employee responsiveness within a complex and disrupted ecosystem?

In recognition of this twenty-first century dilemma, the "informed learning" approach was adopted in the Auraria Library at the University of Colorado Denver in 2008. Collaborative design practices were simultaneously introduced to reinvent organizational structures, processes, services, and roles that must evolve to accommodate epochal changes in scholarly communication and higher education environments. Building on insights gleaned from organizational "co-design" projects initiated 5 years earlier at California Polytechnic State University, library leaders advanced comprehensive initiatives for reorganizing, rethinking, and retooling. Unabashedly, they eliminated traditional roles as mediators of a print-focused, highly controlled environment—which no longer exists. Over time and with practice, library staff members assumed new work that enlivened and engaged them. As chronicled in the chapters that follow, legacy workplace assumptions were reinvented through systemic leadership processes, collaborative design tools, and enabling professional practices grounded in "informed learning," which uses information to learn.

Now, 6 years later, established new "habits of mind" animate a vibrant organizational learning environment, activated by information experiences and guided by systems practices that characterize the Informed Systems approach. Mental models changed from conceptions of "library as warehouse" to "library as learning space." "Systems thinking" replaced "silo thinking." "Just-in-time" patron-driven acquisitions replaced "just-in-case" collection development traditions. A single search box on the library Web site now offers a Google-like advanced search—enhanced by "value added" faceted search features—of all owned and licensed text, video, and image content. Such transformation in thinking and doing relies on exercising evidence-based decision-making fueled by participatory action research "with and for" (Somerville, 2009) campus stakeholders. Ultimately, it also depends on shared recognition that, to create information-rich learning environments for others, library staff members first have to design and activate information-rich learning experiences for themselves.

Therefore, staff members co-designed a robust learning environment, technology-enabled and inquiry-inspired, to enrich workplace learning conditions and advance organizational learning capabilities. Fortified by robust library-campus learning partnerships, "learning-in-action" experiences heighten appreciation among library staff members for the scholarly and creative "jobs-to-be-done" (Chad, 2013) within and across disciplines. Such "first-hand" knowledge, when thoughtfully considered through newly established workplace practices for reflection and dialog, moves librarians' work well beyond traditional roles such as "sitting at the reference desk" (Somerville & Schader, 2005). The new work-to-be-done readily acknowledges emergent cross-functional workplace priorities to assess, adopt, and refine Web-scale discovery services, "software-as-a-service" models, and researcher acceleration tools for discovery, delivery, and usage of ever-expanding licensed, owned, and open access content. These technological innovations must necessarily be well integrated into researcher workflows and well supported by researcher services. Such ambitious aspirations, facilitated by enabling organizational learning systems and associated professional information practices, generate continuous workplace improvements using information and technology to learn.

Informed Systems: Organizational Design for Learning in Action presents and illustrates a transferable approach for catalyzing informed learning experiences within a contemporary workplace environment. As readers will discover, this information-activated and systems-enabled approach for "learning the way" can redirect organizational outcomes and reinvent workplace processes to revitalize "work-life" experiences. Distinctive Informed Systems elements include participatory action research initiatives that provide content for organizational learning, collaborative evidence-based decision-making processes which guide learning to use information, and inclusive participatory design processes and associated professional practices that animate, enable, and perpetuate "learning-in-action."

Antecedent thought from Informed Learning theory (Bruce, 2008) and Soft Systems Methodology (Checkland & Poulter, 2006), which require and inspire using information to learn together, ensure sound theoretical and methodological underpinnings. Upon this foundation, ideas harvested from organization, leadership, design, systems, and learning literatures magnify the transformative potential of purposefully connecting information and learning. The "information resilient workers" (Lloyd, 2013) characteristic of an informed learning organization quite naturally create new ways of seeing, being, acting, and knowing. This transformation in collective understanding in turn organically fosters, harnesses, and amplifies creative capacity and workplace innovation.

In these ways, Informed Systems offers a holistic "learning-in-action" approach for navigating the pervasive uncertainty and disruption characteristic of our times. Participatory design of learning systems and generative experiences ensure nimble workplace responsiveness guided by agile leadership processes that activate systems thinking, animate reflective dialog, and catalyze organizational inquiry. Adoption of this imminently flexible "forward thinking" and "evidence-based" approach encourages adaption that acknowledges local values, contexts, and purposes.

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Denver, Colorado, USA
November 5, 2014

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Preface

Informed Systems: Organizational Design for Learning in Action is a response to a critical question for every leader in today's digital organizations and workplaces: "How can we design robust organizations that anticipate unprecedented user expectations and enable nimble employee responsiveness within a complex and disrupted ecosystem?" Somerville's response, Informed Systems, is the outcome of a sustained search to build libraries as learning organizations in a period of escalating technological change. It is also the outcome of an extended journey of linking and interweaving research with practice.

Throughout this journey, which Somerville shares in a deeply personal way, she integrates research frameworks and best practices from organizational development, systems science, and information science disciplines into contemporary professional practice and leadership process. Described outcomes range from modest refinements of traditional organizational responses and workplace learning, to the radical reinvention of facility design and professional aspirations. Shared leadership experiences reveal how Informed Systems depend upon collaborative information practices.

Creative and insightful interweaving of theory and practice has made possible a volume that informs both a theoretical framework and a practical handbook for leadership and management in higher education institutions, information agencies, and all enterprises that value the role of information in becoming and being a learning organization. Although grounded in experiences within academic libraries, which are among the world's leading "digital age" enterprises, the approach is transferable to other settings.

Somerville provides guidance in transforming personal and organizational information and learning experiences, within virtual and physical spaces, through innovative management and leadership practice. She offers detailed exploration of strategies for building professional practices grounded in workplace experiences of using information to learn. Throughout, chapter illustrations provide snapshots of core concepts and design elements. Appreciative inquiry and action learning shape practice as she brings together ideas associated with informed learning and soft systems to advance the process of designing, building, and transforming learning organizations.

Detailed discussion reveals the many ways in which academic libraries and other information and knowledge organizations might embark upon sustained and sustainable journeys of cultural change and workplace transformation. Somerville also reveals how more ambitious learning outcomes require the reinvention of business models and associated practice, which Informed Systems accommodates through process and activity models reflecting informed learning intentions. Practical examples illustrate the efficacy of co-designing information experience infrastructure to positively influence

appreciative inquiry, decision-making, and informed learning among members of workplace learning communities.

Throughout, Somerville reveals her journey of creative leadership development in designing enabling organizational learning environments, which she envisions as "enabling contexts that foster the creation of new knowledge". She concludes that the ultimate purpose of Informed Systems is "…to enable collaborative design of enabling conditions for learning," making possible informed learning in the workplace. Because *Informed Systems* reveals the potential contribution of a focus on informed learning in the workplace, it is not only a practical tool. It is also a major step forward in the reconceptualization of workplace information literacy and its relevance to organizational transformation.

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Acknowledgments

Informed Systems reflects a synthesis of collaboratively created research results and "lessons learned" with my international research partners, Professor Anita Mirijamdotter, PhD, Linnaeus University, Sweden, and Professor Christine Bruce, PhD, Queensland University of Technology, Australia. They have served as both thought partners and organizational consultants. In addition, University of Colorado Denver colleagues serving as Associate Library Directors since 2008 have advanced Informed Systems outcomes amplified through dialog and reflection. These Auraria Library colleagues include Marical Farner, PHR, Associate Director of Administrative and Technology Services; Denise Pan, MLS, Associate Director of Technical Services; and Cynthia Hashert, MLS, Associate Director of Education, Research, and Access Services. Since I initiated employment in 2008 at the University of Colorado Denver, my understanding has also been enriched by experiencing the professional variation in leadership styles among the University of Colorado Denver Associate Vice Chancellors, most especially, Marguerite Childs, MPA; Regina Kilkenny, PhD; Brenda J. Allen, PhD; Carolyn North, PhD; and Laura Goodwin, PhD.

My appreciation for variation in "lived experiences" in "life-worlds" has benefited immensely through awareness of indigenous perspectives on what is experienced as information and how it is experienced, how information is present or appears, and its role and influence. Major contributors include, but are not limited to, Ben Sherman, Oglala Lakota (Sioux) Nation, South Dakota; Deborah Esquibel Hunt, PhD, Cherokee Tribe of Northeast Alabama; and Lloyd Colfax, Makah Nation, Washington State. As these tribal members reveal the life-worlds of their American Indian communities, I learn to experience the interdependence and interconnection among people, plants, places, and, ultimately, the universe. As my awareness grows, I (re)learn to better care for those relationships. In a highly complementary fashion, through collaborative collection curation projects with Chicano/Chicana community members, I learn that memories and artifacts of "cultural significance" shape their interpretations and narratives of the past and present and thereby inform their social constructions of the future. Tony Garcia, Magdelena Gallegos, and Daniel Salazar continue to further my evolving appreciation for the community contexts, concepts, and truths of Displaced Aurarians. Throughout, Dana EchoHawk, MA, has served as guide, translator, colleague, and friend on this journey into ways of knowing.

Now genuine inquiry, intense curiosity, and novel insights from a new generation of University of Colorado Denver "discovery partners" accelerate collective shared leadership and informed learning aspirations. These co-designers of generative information experiences, enabling technology systems, and shared governance processes include Niraj Chaudhary, MS, Head of Information Technology; Neena Weng, MLS,

UX Specialist, Web Project Coordinator, and Web Developer (aka UX Specialist/Information Architect/Web Development Geek); Amanda Burch, MLS, Learning Spaces Technology Manager; and Sommer Browning, MLS, Head of Electronic Access & Discovery Services. Their accomplishments extend the foundational efforts of California Polytechnic State University collaborators who introduced the signature "library as laboratory" element to collaborative evidence-based decision-making. These pioneers include Professors Erika Rogers, PhD, Retired; David Gillette, PhD, Director, Liberal Arts and Engineering Studies Program; and Franz Kurfess, PhD, Professor, Computer Science and Software Engineering. In addition, Susan Elrod, PhD, Interim Provost and Vice President for Academic Affairs, California State University, Chico, introduced generative "relational information literacy" classroom activities which explicitly engaged both disciplinary domain content and professional inquiry practices and thereby anticipated the emergence of Informed Systems processes.

Other significant collaborators over the years include Hilary Hughes, PhD, Senior Lecturer, Queensland University of Technology, Brisbane, Australia; Barbara Schader, MLS, Associate University Librarian for Collections & Scholarly Communications, University of California Riverside, USA, Retired; Zaana Howard, PhD, Lead, Huddle Academy, Melbourne, Australia; Maureen Sullivan, MA, Maureen Sullivan Associates, Annapolis, Maryland, USA; Malia Hollowell, MA, Founder, Playdough to Plato, Seattle, Washington, USA; Helen Partridge, PhD, Pro-Vice Chancellor, Scholarly Information & Learning Services, University of Southern Queensland, Toowoomba, Australia; Catta Torhell, MLS, Library Director, Linnaeus University, Sweden; Niki Chatzipanagiotou, MSc, Doctoral student, Department of Informatics, Linnaeus University, Sweden; Gordon Yusko, MLS, Assistant Director, Irving K. Barber Learning Centre, University of British Columbia, Vancouver, Canada; and Marita Holst, PhD, Project Manager, Centre for Distance-Spanning Technology, Luleå, Sweden. Plus, I am blessed to have a robust "thought partner" in the academic publishing industry: Lettie Y. Conrad, MA, Executive Manager, Online Products, SAGE Publications Inc., Los Angeles, California, USA. Without the enthusiastic engagement and active participation of these individuals in my "sense making" and, ultimately, "knowledge making," this book would not have been possible.

M.M. Somerville

Introduction

1

A dozen years ago, in 2003, I assumed a management role in an academic library, after 10 years of professional experience in arts administration. Over the course of the first week, I observed that library activities continued, undisturbed, despite my presence as the new department supervisor. From my office window, I had a clear view of the reference collection, reference desk, and instruction classroom. I saw that librarians were regularly reporting for shifts on the desk and sessions in the classroom. I also saw groups of students walk into the classroom every hour and leave 50 min later. Occasionally, I saw individuals approach the reference desk, typically exchanging only brief comments with librarians before departing.

1.1 Early beginnings

My observations occurred after a decade of employment outside the library and information science field. So, although I had served as a reference and instruction librarian for more than a decade after graduating from library school, I realized that much—including the advent of the Internet—had changed since 1992 when I transitioned from library science to arts administration. Therefore, I was uncertain how to interpret my observations of reference activities and instruction services at California Polytechnic State University (Cal Poly) in San Luis Obispo. As a recently appointed Assistant Library Dean, I was also keenly aware of my mandate to expand the role of public service librarians within the library and across campus. However, I had no sense of how to accomplish that aspiration. You might say that I started the job with a "blank slate." So I had to depend on improvisation to determine what to do and how to do it. The stakes were high: we had just received word of an imminent library budget cut and faced the threat of further reductions unless the library demonstrated increased value to the campus.

Many people who have studied improvisation have noted that the guiding principles of "improv" are useful not just on stage but also in everyday life. As television host and actor Stephen Colbert said in 2006 in a college commencement address: "Well, you are about to start the greatest improvisation of all. With no script. No idea what's going to happen, often with people and places you have never seen before. And you are not in control. So say 'yes.' And if you're lucky, you'll find people who will say 'yes' back" (Colbert, 2006).

Happily, that was my experience at Cal Poly. With no idea of what was going to happen, amidst people and places that I had never seen before, I commenced and new colleagues said "yes." To begin, I considered what might be culturally feasible and politically viable in that particular environment. I recalled the institution's distinctive "learn by doing" philosophy, which included a senior capstone project requirement

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for graduation. Reflective of the "can do" attitude among settlers during the American expansion westward in the second half of the nineteenth century when the campus was founded, the project engaged students, working in teams, on projects with practical implications. So in a similar fashion, I initiated "learn by doing" among library professionals and paraprofessionals, with the aim of enhancing the contributions and visibility of the public services unit in the core teaching and research activities of the University. And that is how my journey toward integrating "informed learning" (Bruce, 2008) and systems thinking into professional practice began.

In this introductory chapter, I recall my experiences from 2003 to 2006 as an organizational leader purposefully exploring how to use information and technology to learn. By way of illustrating the power of these intersecting ideas, I reveal my progressive understanding of the relational nature of information and learning, derived from personal observation and external evaluation, including what it means for how I work and how I lead. Throughout, I convey my colleagues' increasing engagement with participatory design and organizational learning. Illustrations showcase the potential of an emergent systemic approach, now named Informed Systems, to evolve professional library and information science roles that seize new opportunities within dynamically changing higher education and scholarly communications environments. These foundational experiences produced professional insights that guide evolution of organizational leadership philosophies and practices.

1.2 Learning our way to change

To begin, then, at the beginning: at California Polytechnic State University, my leadership mandate was to better integrate library expertise, resources, and facilities into curricular activities well aligned with the Cal Poly "learn by doing" philosophy. This distinctive teaching style can be traced to the University's land grant agricultural beginnings, which emphasized practical professional learning outcomes. So it made good sense to apply this approach within the academic library as we were "learning our way to change" (Davis & Somerville, 2006). Also, I felt fairly certain that I could easily identify teaching faculty members interested in using the "library as lab." This proved to be the case. As a consequence, my library colleagues and I had the opportunity for several semesters, beginning in spring 2004, to serve as clients for faculty-supervised student projects.

In a human–computer interaction course, students produced design recommendations for a new library Web site interface (Somerville, 2009a). In another course, students studying information architecture generated user-centered ideas to better integrate digital collections, digital tools, and virtual services into a library research portal (Somerville, 2009b). In a third course, computer science students created a prototype of an interactive data visualization application for more effective collection management (Rogers, 2005). This software solution preceded commercial software solutions by more than a decade. Reflective of the polytechnic curricula, research methods included conducting paper-and-pencil surveys, facilitating focus groups, creating user

personas, building three-dimensional (3-D) prototypes, conducting usability tests, and using data visualization techniques.

Over several semesters, librarians also worked with faculty and students in a multi-disciplinary interactive media course to invent a new form of cinema (Somerville, 2009c) within a 3-D cinema theater designed and constructed within the library. Student projects employed a wide range of disciplinary research approaches, including technical writing, media theory, architectural design, and project management. Full realization of this immersive environment ultimately involved professors from new media, architecture, and computer science. (For more information, see Attachment 1.1.) Through these various learning activities, my colleagues and I learned to *work with and to learn from* individuals and groups in various disciplinary traditions (Somerville, 2009d).

Workplace learning opportunities next extended to sponsorship of graduate library science students' research studies, for which the library offered financial and logistical support. The organizational learning benefits far exceeded these "costs." One especially intriguing study engaged a graduate student, Clarence Maybee, in a process of "finding out" about present and potential users' needs and preferences (Somerville, 2009e). His interviews with 19 Cal Poly students representative of the campus population employed a qualitative research approach (phenomenography) that explores experience, focusing on the variation or different ways of experiencing a phenomenon. Student subjects were asked: "How do you use information to complete class assignments?" "How do you use information outside of your coursework?" "Tell a story of a time when you used information well." "Describe your view of someone who used information well." "Describe your experience using information" (Maybee, 2006).

Transcriptions of the recorded interview data enabled interpretative analysis of the aggregated data to assign "emergent categories" descriptive of students' varying ways of experiencing information usage and its advancement. Results revealed three primary ways in which undergraduate Cal Poly students conceptualized information and its usage: "sources"—in which information use is seen as finding information located in information sources; "processes"—in which information use is seen as initiating a process; and "knowledge base"—in which information use is seen as building a personal knowledge base for various purposes (Maybee, 2006). These findings revealed variation in information experiences that furthered librarians' commitment to "find out" even more, this time from professorial points-of-view.

1.3 Literature-based scientific learning model

An opportunity for "finding out" arose during my consultation with a genetics professor, Susan Elrod, as she developed a pedagogical "literature-based scientific learning" model (Elrod & Somerville, 2007a). Her idea emerged out of growing awareness of the "relational approach to information literacy" (Bruce, 1997a) developed by Christine Bruce and her colleagues in Australia and advanced by Clarence Maybee in his study at Cal Poly. This holistic framework represents a way of understanding the relationship between people and the phenomenon of information literacy or how

people experience information literacy. It recognizes aspects of learning to use information, including but not limited to information sources, information use, and information management. This conception acknowledges that information experiences, encountered within sufficient context to activate—and then extend—prior understanding are catalysts for learning.

In response to this emergent school of thought, the "literature-based scientific learning" model recognizes that "information literacy is necessarily demonstrated in a context and within a domain of content" (Catts, 2004). So in keeping with the tenets of relational information literacy, Elrod's pedagogical approach provides "an intellectual framework for recognizing the need for understanding, finding, evaluating, and using information. These are activities which may be supported in part by fluency with information technology, in part by sound investigatory methods, but most importantly through critical discernment and reasoning" (Lupton, 2004).

When this teaching method is implemented in a classroom setting, undergraduate students are immersed in the cultural traditions of scientific inquiry, i.e., generating scientific knowledge within a community of scholarly practice. The issues of intellectual property, authenticity, and provenance, which distinguish the evidence-based scientific method, become an integral part of the course learning experience. Students' knowledge production capabilities are simultaneously furthered through advancement of disciplinary mastery and information competence during designed activities that engage students in scientific learning. Prior understanding is activated and extended for "information novice" undergraduates, in a constructivist fashion, through experience with primary literature research practices, scientific scholarly communication traditions, and knowledge generating cultures (norms, behaviors, and structures). In addition, student inquiry is catalyzed by active engagement with original experimental data published in peer-reviewed scientific literature.

With the aim to explicitly simulate the scientific discovery process, the literature-based scientific learning model also seeks to operationalize the promise of transformational learning theory (Cranton, 2002). It recognizes that students are more likely to learn when the following elements are present in an environment that encourages active inquiry and considers multiple perspectives:

> *An activating event sets the stage for cognitive dissonance wherein learners identify discrepancies between what they know and what they are learning.*
>
> *Dialogue processes enable students to identify and articulate their current assumptions as well as changes in their assumptions and understanding.*
>
> *Active discourse promotes consideration of other evidence and alternative perspectives to revise assumptions and construct knowledge.*
>
> *Continued learning experiences test assumptions and encourage reflection to further understanding within extended disciplinary contexts.*

So, reflective of scientific inquiry practices for using information to learn, students were introduced to case studies that activated reconsideration of their conceptions through engagement with original research data mined from the published literature.

Case studies began with presentation of the historical and scientific context within which researchers were working at the time. Then selected highlights from seminal papers introduced students to experimental procedures and scientific data, discussed within the context of other important research within the discipline at that time. Guiding questions aided student and instructor assessment of learners' knowledge of case study concepts, understanding of case study content, and capacity to construct new knowledge.

> *Through this knowledge-focused inquiry process, students 're-experienced' scientific inquiry and discovery as the original 'first thinkers' experienced it. They experienced for themselves how the original question was framed and reframed as information was revealed and reported over time. In line with relational information literacy precepts, students experienced disciplinary information in a variety of ways. … By interacting directly with primary information, students gained experientially based appreciation for scholarly creation and dissemination processes. And, because of their information expertise (i.e., knowledge of information structure and document access), librarians became essential partners in these 'human-information interaction' encounters, in sharp contrast to the more typical professional focus on human-computer interaction.*
>
> *Elrod and Somerville (2007b)*

In addition to formative and summative assessments of the information competence assignments, students also completed an anonymous self-assessment survey exploring their holistic experiences. Findings revealed that when learners are guided through the experiential practices for scientific inquiry, they learn to integrate and internalize emergent knowledge. As they extend their "information world" beyond the classroom and the textbook, they assume responsibility for self directed learning through using information to learn. In addition, as student advance experiential understanding of scientific knowledge production, dissemination, and usage, they become more conversant with the discipline, "learning to know" (Elrod & Somerville, 2007c).

1.4 Learning our way to action to improve

Similarly, through our experiences of working as learning partners with professors and students, my colleagues and I gained heightened appreciation for disciplinary frameworks of ideas, areas of concern, and methodologies of inquiry. We gained first hand understanding of the kinds of knowledge, research, questions, studies, and activities that characterize various disciplines and academic fields. We learned that variance in research approach produces variety in professional practices (Lant, 2001), including judgments on what are important questions and what is authoritative evidence. (For more information, see Attachment 1.2.)

We learned to talk about how information and knowledge comes to be created, discovered, analyzed, and evaluated, as we moved our sights to the meta level at

which "information about information" became a shared topic of collegial discourse and reflection. You might say that earlier we were standing at the gate, serving as "gatekeepers of information." Now we passed through the gate and entered the world of information exchange and knowledge creation. In so doing, we came to better understand how knowledge is produced and disseminated and thereby became better able to accompany campus constituencies on their polytechnic knowledge explorations.

Meanwhile, as former reference and instruction librarians' roles were reinvented (Somerville, Mirijamdotter, & Collins, 2006) and they became "embedded" (Dewey, 2004), several paraprofessionals' work ended abruptly as the library initiated "shelf ready" book processing and decommissioned media circulation services. In response, displaced staff members volunteered for reference desk duties earlier assigned to librarians. This was deemed appropriate based on the results of a transaction analysis study, focused on reference desk queries, which I initiated soon after my arrival at Cal Poly. The findings revealed that most reference desk questions were directional or technical and could be satisfied by well-prepared staff members or graduate students. Therefore, librarians abandoned desk duties to assume higher-level research and teaching opportunities.

Although there was ample "evidence" to justify these reassignments, we recognized a still greater opportunity for holistically "rethinking what we do and how we do it" (Somerville, Schader, & Huston, 2005a). So with the aim of reaching shared agreement on new roles and relationships for librarians and paraprofessionals, I introduced Appreciative Inquiry. These intentional conversations sought to positively build on our recent experiences, working as learning partners with faculty and students, which extended our perceptions about what to study, as well as how and with whom to work.

To initiate an experiential process of "building upon what we know" (Somerville, Huston, & Mirijamdotter, 2005a) about working in new ways, I engaged 14 librarians and paraprofessionals in discussions, based in appreciative inquiry principles, practices, and processes, to stimulate thinking and rethinking (Sullivan, 2004). (For more information, see Attachment 1.3.) Thought questions explored "the best of what is" with the intention to discover "what could be" by surfacing affirmative memories and cultivating aspirational intentions. For instance, I asked:

> *What are your strengths? In what ways do you contribute your best? What is your value to the organization?*
>
> *What do you appreciate most about this library organization? In what ways does it excel?*
>
> *Recall a time in your experience with this library when you felt most effective and engaged. Describe this. How did you feel? What made this situation possible?*

This readiness activity required recall of "life giving" workplace experiences, long forgotten, and generation of aspirational visions, lying dormant. It thereby stimulated reconsideration among long-time employees about how they could best contribute to changing organizational priorities.

1.5 Systems thinking practice

To further appreciation for the larger organizational context, I next invited a Swedish research professor, with expertise in social informatics, to facilitate organizational redesign workshops. I knew that Dr. Anita Mirijamdotter's inclusive coaching philosophy, based in Scandinavian social democratic traditions, would resonate well with the campus populism values and labor union culture. This proved to be true throughout her 3-year facilitation of collaborative design and iterative evaluation of organizational systems.

Mirijamdotter introduced co-workers to systems ideas through learning experiences that continued to encourage broader frames of reference. She guided participants through soft systems methodology (SSM) learning processes, developed by Dr. Peter Checkland at Lancaster University in England. At its inception over 40 years, the methodology was envisioned for "one-time use" to design organizational systems. More recently, the methodology has been used for a variety of learning purposes that benefit from rich and nuanced information sharing among workplace participants holding multiple perspectives. You might say that this takes systems thinking out of the "consultant's toolbag" and places learning tools in the hands of organization members.

SSM provided a guiding framework for learning to redesign work roles and tasks that considerably extend participants' interactions based on their perceptions of enlarged boundaries of concern and influence (Mirijamdotter & Somerville, 2009a). A number of SSM information visualization tools and dialog processes are available. In this case, Mirijamdotter choose tools that advance systems design projects and introduce systems thinking processes into ongoing workplace practices.

Initial design activities engaged participants in drawing a "rich picture" to represent collective perceptions of the current situation. As Checkland explains of this approach, "the aim is to capture, informally, the main entities, structures and viewpoints in the situation, the processes going on, the current recognized issues and any potential ones" (Checkland & Poulter, 2010a). This thinking and learning activity recognizes that

> *The complexity of human situations is always one of multiple interacting relationships. A picture is a good way to show relationships; in fact it is a much better medium for that purpose than linear prose. Hence as knowledge of a situation was assembled—by talking to people, by conducting more formal interviews, by attending meetings, by reading documents, etc.—it became normal to begin to draw simple pictures of the situation. These became richer as inquiry proceeded, and so such pictures are never finished in any ultimate sense. But they were found invaluable for expressing crucial relationships in the situation and, most importantly, for providing something which could be tabled as a basis for discussion. Users would say: 'This is how we are seeing your situation. Could we talk you through it so that you can comment on it and draw attention to anything you see as errors or omissions?'*
>
> *Checkland and Poulter (2010b).*

The "rich-picture" approach proved to be more useful than prose because it could lead to a better-than-usual level of discussion. The picture represented "a whole system."[1] It also displayed the multiple relationships and interactions present in the "snapshot" of the situation. Because the situation was bound to change as the intervention progresses, it proved useful to continually produce such pictures as an aid to thinking, to capture evolving impressions and insights.

In Figure 1.1, interactions between librarians and paraprofessionals were seen as interconnected and complementary. To better communicate their contributions

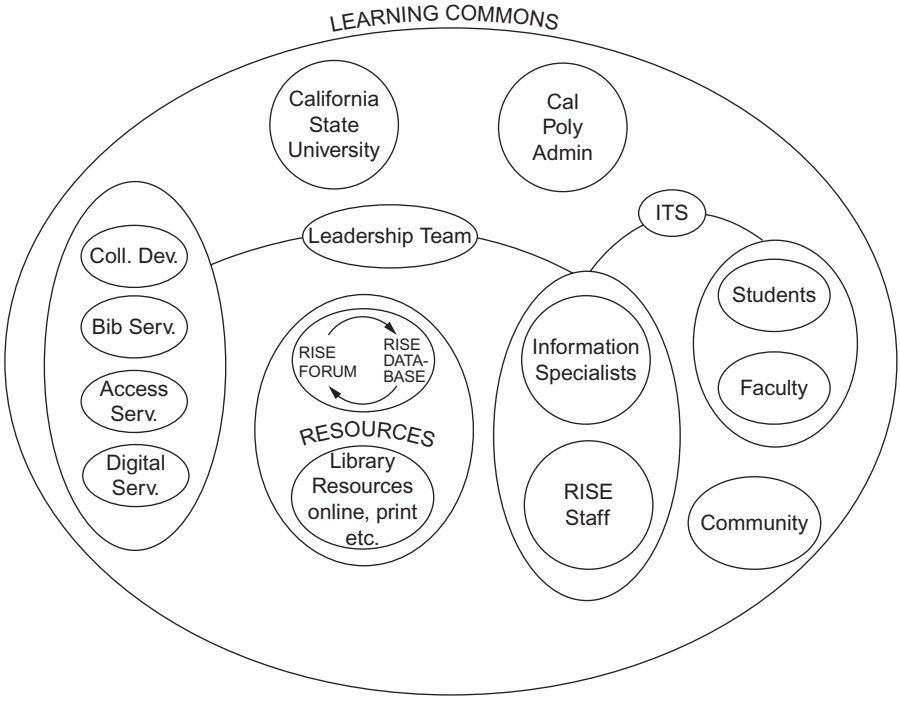

Figure 1.1 Interactive processes of the academic library within the university and university system.
The figure was originally published in Somerville (2009).

[1] "The core systems idea or concept is that of an adaptive whole (a "system") which can survive through time by adapting to changes in its environment" (Checkland & Poulter, 2010). So, for instance, if an organization is to survive, it requires *communication processes* (to know what is going on) and *control processes* (to adapt successfully to changes in the environment). An organizational system also contains sub-systems, so the idea of a *layered structure* is thus fundamental in systems thinking. Finally, a system must have some properties as a single whole, so-called *emergent properties*, that inform acting *purposefully,* "not simply acting by instinct or splashing about at random" (Checkland & Poulter, 2010). From this observation comes the idea of *treating purposeful action as a system*—i.e., a set of logically linked activities that constitute a whole—its emergent properties constituting its purposefulness. The activities concerned with achieving the purpose (the operations) are monitored against performance measures so that adaptive (control) actions can be taken if necessary, to make informed changes.

to the teaching and learning enterprise, librarians chose a new title—information specialists—and displaced staff members chose a new purpose—information and instructional services support. Participants renamed reference services as "Research and Information Services Education" (RISE). The group's drawing placed participants within an extended "learning commons" (Somerville & Harlan, 2008), which reflected growing awareness of a new learning space, in the design phase at the time, that would replace decommissioned audio-visual collection and circulation space in the library. (For more information, see Attachment 1.4.)

Interactive processes represented communication with others, near and far. For instance, group members acknowledged two-way communication with colleagues in bibliographic, digital, collection, and access services. They also recognized oversight responsibilities of the library leadership team and campus information technology services. Finally, the drawing acknowledged the library's presence on the California Polytechnic State University campus, one of 23 institutions within the California State University System. Because information specialists and support staff lacked direct experience with systems level administration, they did not draw arrows indicating interactions between these two entities. Rather, these entities are represented in the larger ecosystem are simply "there."

Within this "big picture" context, workshop design activities next turned to identifying the systems and relationships necessary for robust operations at the newly constituted reference services desk, renamed Research Information. Recalling insights from the reference desk transaction study, paraprofessionals knew that assignment inquiries were the second most common query category, after directional questions. Signage could address directional needs, so they focused their combined efforts on designing human- and technology-enabled systems and sub-systems to support their new roles as educational coaches. The resulting drawing acknowledges a sociotechnical system comprised of interrelationships between people and technology engaged in information capture and exchange.

Figure 1.2 illustrates paraprofessionals' conceptions of their interaction within a reinvented service in which they serve as "information and instructional service support staff" and academic librarians serve as "information specialists." The interaction was formalized in a proposed RISE workplace learning system. The change in terminology is significant: it replaced the traditional phrase "reference desk" which connotes esoteric scholarly consultation on bibliographic references and document access at a single physical service point within the library, characteristically delivered apart from the learning and teaching activities of the academic community.

The technology-enabled component of the RISE system is also significant, as it reflects both the need for a domain knowledge database of course assignments (RISE database) as well as continuous information exchange about local circumstances (RISE forum). The system drawing anticipates that the knowledge base would continue to grow as information specialists acquire, annotate, and contribute documents that enable information and instructional support staff to apply "solutions and strategies" at the newly constituted "research help" desk—a term recommended by student advisory committee members. Ongoing two-way organizational communication between information specialists and support staff acknowledges

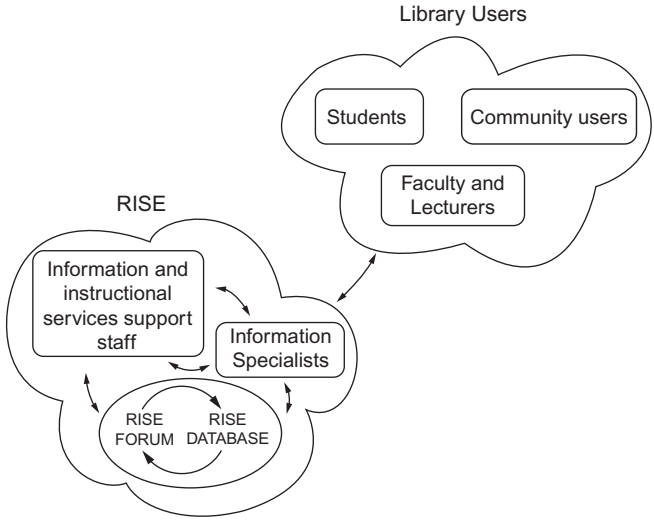

Figure 1.2 Interactive processes of the research and information services education system. The figure was originally published in Somerville (2009).

its informal occurrence throughout the workday as well as its formal enactment in weekly education sessions which anticipate students' assignment-based needs at the Research Help desk.

This outward looking, technology-enabled decision-support system presents a sharp contrast to traditional professional service models in which questioners were expected to come to librarians "sitting at the reference desk." Instead, librarian information specialists were to move beyond library walls to forge relationships that influence faculty members' assignments and thereby enrich students' learning experiences. In addition to coaching library staff members who assist students with their course assignments at points-of-need within the library walls, information specialists were also to design disciplinary web pages and identify digital learning objects that introduce academic information resources and search strategies. Finally, a "start up" virtual research "live chat" service provided 24/7 online advisement to students, any time, any place.

In these various ways, information specialists and support staff co-designed and co-created ideal systems and associated practices to express new expertise and growing confidence (Mirijamdotter & Somerville, 2009a). Computer programmers progressively customized system software to achieve desired functions and features based on interactive (two-way) evaluation feedback from RISE support staff. As the group supervisor, I ensured that the human (behavioral) design features were delivered through incorporating new work responsibilities and workflow requirements into professional and paraprofessional annual performance plans. To engender continuous (re) learning, I also used success stories about organizational outcomes that repositioned the library as a center for campus instruction to illustrate that people can improve problematical situations through "learning their way" to change.

1.6 Soft systems process outcomes

RISE system examples illustrate the efficacy of SSM design tools that, supported by dialog and reflection, advance information-focused and learning-centered activities. In this instance, iterative processes of finding out, modeling, comparing, and taking action identified two purposes for RISE systems. The first aim was to promote continuous information flow about local conditions, such as the status of a printer queue or problems with database access, which required library wide contributions from information technology, technical services, and public services members. These purposeful functions informed co-design of the RISE forum blog. A second system, the RISE database, provided domain knowledge to guide paraprofessional delivery of consultation service at the Research Help desk. The technology-enabled system required initiation of new professional practices for content development, as librarians added detailed annotations to assignments co-designed with faculty colleagues (Somerville & Vazquez, 2004). This new information practice, which required explicit declaration of learning outcomes, furthered consistent service quality in both the classroom and at the desk.

As illustrated in Figures 1.1 and 1.2, SSM tools informed the design of requisite relationships and enabling systems and, as well, the design of "value-added" library services and curriculum integration. As a consequence, professors increasingly consulted with librarian subject specialists. As they co-created library research assignments through new learning partnerships, librarians gained deep knowledge about course learning outcomes, which both informed library instruction session content and enriched RISE database coaching notes, in a perpetual cycle of learning.

RISE staff members' working knowledge of research tools and strategies was also progressively extended through a series of disciplinary resource and research strategy workshops conducted by librarian information specialists. They offered their staff colleagues "active learning" practice interrogating academic databases to investigate difficult questions presented at the Research Help desk. Queries and "solutions" were recorded for subsequent referral in the RISE system forum and database. Continuous improvement of the technology and human system elements was ensured through an iterative SSM learning process.

As depicted in Figure 1.3, the SSM learning cycle characteristically begins with entering a situation deemed "problematical" and taking part in improving it. To find out how the situation is understood, the multiple worldviews among stakeholders must be explored. Oftentimes, this requires making "purposeful activity models" based on declared worldviews. These models can be used to raise questions about the situation, employing dialog, and reflection. The aim is to find accommodations among conflicting worldviews to allow "action-to-improve" that is both systemically desirable and culturally feasible. (For more information, see Attachment 1.5.) In order to realize the full efficacy of using information to learn in this way, leadership must sustain this cyclical learning process to enable continual iteration and thereby ensure sustained inquiry (Checkland, 2011).

A continuous cycle of "learning in action" to transfer "knowledge to action" incrementally advanced technical and social elements of the RISE forum and RISE database. Toward this end, in her role as an external evaluator, Mirijamdotter regularly

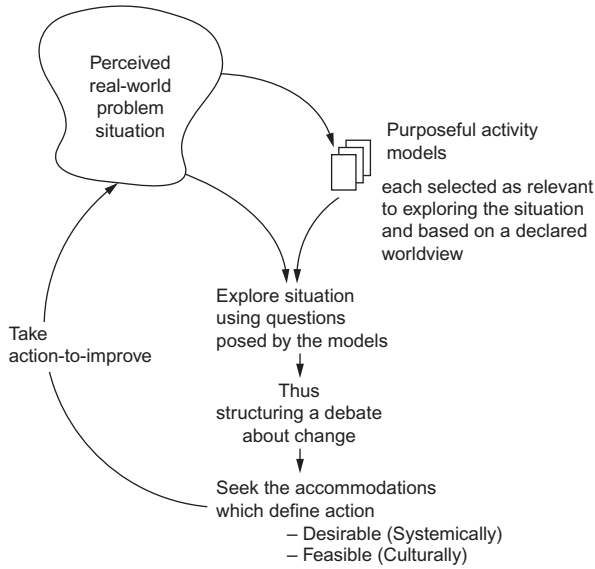

Figure 1.3 Soft systems methodology basic learning process.
The original figure was published in Checkland (2011). Reprinted with permission from Taylor & Francis. http://www.tandfonline.com.

solicited feedback (on site or via Web conferencing) about system functionalities and interface features. Concurrently, "the conditions for learning," which included well articulated strategies from information specialists for fulfilling research assignments, improved through regular formative evaluation.

> *Interactive evaluation requires conducting on-going data collection and interpretive analyses with the intention of applying resulting insights to improvement of specific situations. In the Cal Poly situation, the definitions and interpretations of evaluation criteria are increasingly focused outward, making complex and nuanced circumstances more intelligible for systems thinking practitioners. Interactive evaluation is also experienced as an opportunity to engage in conversations about 'the making of shared meaning' with users as well as peers for the purpose of stimulating new levels of insight and understanding.*
>
> *Somerville, Huston, and Mirijamdotter (2005b).*

For instance, paraprofessional staff used interactive evaluation to provide feedback on librarians' RISE education sessions and assignment coaching notes. In response, librarian instructors adjusted their instructional and advisement strategies, demonstrating the efficacy of learner-directed customization and refinement of information delivered for learning purposes. Over time, staff members increasingly directed the content and process of their own learning based on these interactive evaluation questions: "What do we know that is transferable to digital age research and

information services?" "What more do we need to know?" "And how do we choose to learn this?" (Somerville, Huston, & Mirijamdotter, 2005c).

This educational approach is readily transferable to planning user-centered initiatives, independent of particular circumstances. In this instance, these guiding questions also informed the new approach for service delivery at the Research Help desk: staff providers increasingly recognized and accommodated researchers' unique needs and personal preferences as they learned to recognize and exercise their own varying—situation specific—learning requirements. In addition, as these "habits of mind" were internalized among group members, their confidence, collegiality, and capacity were furthered, which fueled continuous improvements.

Longitudinal results from summative evaluations also revealed an unanticipated outcome of guided dialog and reflection during interactive evaluation: RISE staff members expressed growing awareness of the relationship between information and learning, prompted by regular attention to their own information experiences (Mirijamdotter & Somerville, 2009a). At the same time, "systems thinking" practice enlarged their scope of awareness and concern. As "locus of control" expanded, group members felt able to operate successfully within an expansive information universe, which both accelerated their own learning expectations and enhanced their student learning aspirations (Mirijamdotter & Somerville, 2009a).

The RISE example illustrates that a holistic learning process can support reinventing organizational purposes, priorities, processes, and relationships to transform established ways of working, communicating, cooperating, and interacting. Technology-enabled and human-activity RISE system elements also illustrate the efficacy of information-focused learning. The notion of "using information to learn" was characterized as a "relational approach to information literacy" (Bruce, 1997b) in 1997 and then renamed as "informed learning" (Bruce, 2008) in 2008. Upon this theoretical foundation, previous examples illustrate that learning-focused systems thinking tools can enable participatory design of supportive workplace infrastructure to further intentional information use, which constitutes the genesis of Informed Systems efficacy.

1.7 Learning organization design

Some guiding leadership principles for participatory design of organizational learning environments emerged from these experiences. First, leadership must energize the workplace environment, in order to catalyze reconsideration of legacy workplace assumptions in terms that transform both the nature of organizational work and the purpose of organizational information. This necessarily includes activating and extending prior understanding of employees' roles, responsibilities, and contributions, including recognition of "peak experiences" that transcend and thereby disrupt the mundane experience of unexamined day-to-day work life. Throughout, an appreciative lens, which magnifies possibilities for the expression of talent, serves to recalibrate (reset) the culture's "appreciative setting."

Then, since learning is social, well-contextualized information that ensures meaningful "information encounters" must inform organizational dialog and reflection activities, supported by enabling systems and professional practices. In order to optimize the formal and informal conversations that represent "teachable moments" (Somerville, Schader, & Huston, 2005b), "thought leaders" must serve as collegial educators in order to cultivate generative "habits of mind" that advance collective understanding of the systemic complexities of the organization and its situation. Then learning activities can intentionally diagnose problems, identify consequences, and inform responses within an increasingly holistic context (Somerville, Schader, & Huston, 2005c). When systems design is paired with systems thinking, sustainable and transferable organizational learning outcomes emerge.

Cal Poly results also demonstrate that an information-focused, systems-centered, and technology-enabled conception of organizational leadership changes how co-workers think and what they think about, over time and with practice. More specifically, within a well-designed ecosystem capable of advancing informed learning and action taking to improve local situations, individuals learn to "see" the underlying context and assumptions for their decisions. This new "relational" understanding predisposes co-workers to adjust their assumptions and strategies as they learn to successfully navigate new situations, fortified by enabling systems and associated practices that catalyze and perpetuate information sharing for knowledge creation. They thereby learn to "become" what they seek to enable in others.

1.8 Outward looking and looking forward

After 3 years, organizational leadership was no longer a "blank slate" for me. My experiences illustrate that

> *holistic inquiry promotes better thinking about design, implementation, and evaluation of organizational systems and services and thereby improves alignment with the knowledge generation and dissemination purposes of the academic enterprise. In addition, SSM processes facilitate shared vision and purpose that informs new roles and responsibilities for cross-cutting teams. Its characteristic data-driven dialogue aligns intentions and actions among physically and dynamically changing work groups, so they can accurately anticipate critical indicators and develop proactive responses.*
>
> *Somerville, Schader, and Huston (2005d)*

These observations recognize the value of generating leadership capacity throughout the organization. While "shared leadership" aspirations are, admittedly, a marked departure from the genre of professional literature that extols the virtues of remarkable organizations led by charismatic individuals, "leading from wherever you are"

in the organization represents a much needed response to dynamically changing circumstances. This chapter, therefore, has chronicled "a story about using systems thinking as a pedagogical strategy to prepare long-time employees to reconsider traditional roles, increasingly evolving partnerships, in the 'classroom of the workplace'" (Somerville, Schader, & Huston, 2005e). Examples illustrate that when the workplace is framed as a learning environment, it can be experienced as an information rich venue for collaborative learning. "Using information to learn" (Bruce, 1997b) is at the heart of this approach to co-creating innovative ways of working, communicating, cooperating, and interacting to catalyze nimble, creative responsiveness at all organizational levels.

Although my colleagues and I lacked a perfect understanding of what was called "relational information literacy theory,"[2] because a robust theoretical framework was then unavailable, we persisted. We sponsored student-conducted and faculty-supervised projects from which we learned about variance in both disciplinary research experience and also individual information experience. We experimented with community-of-inquiry learning, modeled within SSM workshop activities and replicated in regular interactive evaluation. Over time and with practice, we also learned to collaboratively generate collective capacity to use information to learn through co-creating transformative information and learning experiences across virtual and physical spaces. External assessment confirmed that our advancement of professional knowledge and learning practices, expressed as "leading from the middle" (Somerville, Schader, & Huston, 2005f) through a signature "classroom of the workplace" (Somerville, Schader, & Huston, 2005e) approach, was transferable to new situations (Mirijamdotter & Somerville, 2009b).

Happily, as we were improvising in California, Christine Bruce was theorizing in Australia. In 2008, the Association of College & Research Libraries, a Division of the American Library Association, published Bruce's monograph, *Informed Learning*. The book offers ways for using information, creatively and reflectively, in order to learn in a variety of settings, including the workplace and the classroom. Two years earlier in 2006 in England, Peter Checkland co-authored *Learning for Action: A Short Definitive Account of Soft Systems Methodology and its Use, for Practitioners, Teachers, and Students*. This primer offers practical advice on implementing action-oriented systems design and active-learning workplace initiatives. These titles in combination offer valuable insights for co-designing workplace infrastructure to better enable using content, the information itself, and its context to learn. In the next chapter, I describe my progressive understanding of these topics in a review of contextualizing literature and associated developments.

[2] Following its introduction in 1997, the "relational information literacy" conception was further elaborated in Bruce's 2008 publication of *Informed Learning*. In response to worldwide attention to this new line of inquiry, a co-edited work, *Information Experience: Approaches to Theory and Practice*, was published in 2014 to disseminate theoretical enhancements and explore local applications.

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Informed systems genesis

2

2.1 A lifelong inquiry

"How can we design robust organizations that anticipate unprecedented user expectations and enable nimble employee responsiveness within a complex and disrupted ecosystem?" This question has engaged my attention for more than three decades, as I earned my doctoral degree and "moved up the career ladder" to assume increasingly influential leadership roles and organizational responsibilities. What was initially mere intellectual curiosity assumed a real urgency, as—"in the eye of the storm"—I increasingly experienced, full force, the turbulence necessitating re-vision and re-invention of library services, collections, and facilities. In addition, "lessons learned" from Cal Poly leadership experiences emphasize the critical importance of activating sustainable relationships among information, technology, and learning. In response, a more specific question emerged: "How might organizational leadership enable systems design processes and enact workplace learning practices?"

This inquiry continues to direct my professional research and practice. Therefore, the following chapter explores themes that connect people and ideas through using information to learn and using technology for learning. Insights from antecedent literatures sympathetic to these fundamental premises encompass systems design and design thinking, organizational leadership and shared leadership, organizational learning and knowledge creation, and action research and evidence-based decision-making, which together situate and enable workplace enactment of Informed Systems.

Selected publication highlights acknowledge that academic library organizations are living ecosystems that can adapt, change, and innovate to remain relevant to higher education constituencies and institutions. This "appreciative setting" reflects confidence that, as information and education professionals, we can learn to interact productively with other interrelated systems, including academic publishers, public policy makers, information technology experts, and more, beyond our organizational borders. Readiness depends on continuous review, refinement, and renewal of workplace knowledge to ensure organizations poised for action amidst disrupted "ecologies" (Garcia-Marco, 2011) that affect our traditional information management and knowledge transfer roles.

Furthermore, an action orientation—to improve local situations and professional practices—requires cultural workplace values and organizational structures that promote the necessary relationships for connecting information, learning, and technology. Such enabling systems infrastructure encourages information exchange and knowledge creation. At the intersection of these elements, "informed learning" occurs.

Informed Systems. http://dx.doi.org/10.1016/B978-0-08-100175-2.00002-X

2.2 Organizational context

Organizational redesign initiatives are fueled by the recognition that "library services in higher education will continue to be crucial to the core processes of learning, teaching, and research as long as the key library structures, processes, services, and staff roles evolve to accommodate epochal changes occurring in publishing and communications" (Wawrzaszek & Wedaman, 2008). In response, library staff members must transition from "their inherited position as the mediators of a print-focused, highly controlled environment to become collaborators in a multimedia rich, user-empowered, disintermediated free-for-all where their value will be proven only by demonstrably improving outcomes in learning, teaching, and research" (Wawrzaszek & Wedaman, 2008). In so doing, we can survive—and even flourish—in the Digital Age by inventing new ways of expressing libraries' distinctive advantages, customized to local conditions and circumstances.

The traditional mission of academic libraries has been to select, collect, and preserve information and to facilitate access to and use of this information. Until fairly recently, this mission has largely been expressed in a print-centered world, where the book is a universally recognized container of data and information. In a print world, local collections are vitally important: books and journals on the shelf provide the most effective access to information; they are discovered and obtained much more easily than resources held by other institutions; and the number of items owned is an appropriate measure of library value and institutional status. It follows that in this local and print-based context, libraries were revered, specialized, stable organizations with unquestioned importance on campus—in many instances, at the heart of the campus both figuratively and literally. The librarian acted as mediator to the collections of information through classification, reference, instruction, and access services. In this traditional environment, library work was, by and large, consistent and unchanging, governed by well-organized professional principles and practices appropriately fulfilled through an entrenched organizational hierarchy.

Into this orderly and ordered world came digitized art, music, and film; online journals and e-books; Web sites and blogs; open access and social media—all of which have dramatically changed expectations and experiences. Formats, creators, and publishers continue to rapidly proliferate, irrevocably altering and, ultimately, fragmenting traditional knowledge creation practices for enabling quality, linkage, and access (Smart, 2014). Information is now ubiquitous and global, permitting information consumers to search and find independently, eroding the need for librarians' traditional mediation services. Instead, individuals now expect to seamlessly experience information discovery, evaluation, selection, and creation. The full continuum of researchers—from novice to expert—express impatience with disaggregated services reflected in libraries' traditionally separate functions of evaluating, selecting, classifying, consulting, instructing, housing, and circulating.

Meanwhile, knowledge continues to grow exponentially each year while long standing relationships among libraries, publishers, and service providers (vendors) have been disrupted by emergent technological advances and scholarship practices, disallowing continuance of "how we've always done things here" while simultaneously

creating unforeseen opportunities for "working together" across the ecosystem (Collins, Somerville, Pelsinsky, & Wood, 2013; Somerville & Conrad, 2013, 2014; Somerville, Schader, & Sack, 2012). Of this situation, one visionary has said: "The structures and practices of libraries will no more withstand the technological changes we are facing than the scribal culture withstood the changes brought on by the printing press. Change will not be instantaneous, but it will be relentless" (Lewis, 2007a). In other words, "real change requires real change. Incremental adjustments at the margins will not suffice; rather, alterations in fundamental practice will be needed" (Lewis, 2007b). This necessarily requires "an organizational culture that values learning and is willing to experiment even when success is not assured" (Lewis, 2007c).

2.3 Experiential antecedents

My response to contemporary challenges and unprecedented opportunities for academic libraries was indelibly influenced by experiences overseas during a Fulbright Scholar residency at the Swedish School of Library and Information Science in Borås in 1991. During that exchange, I was introduced to Scandinavian style participatory design and decision-making during a very formative period of my professional life. I had recently completed my doctoral dissertation, which suggested that culturally diverse learners could build upon what they knew about knowledge creation through their everyday information experiences as they explored the scholarly ecosystem for disciplinary knowledge (Huston, 1989). The Fulbright experience in Scandinavia permitted me to build on these democratic values through developing participative engagement and social learning strategies in workplace settings.

As my Swedish colleague Anita Mirijamdotter once told me about her social democratic cultural values, consultation and collaboration are transmitted "through the mother's milk." The country's distinctive egalitarian tradition permeated my Fulbright experiences, shaping my notions about both ideal and also appropriate workplace relationships. This new understanding in turn served to transform my conception of ideal workplace conditions—where "having a say" is highly valued. It inspired a 25-year quest in North American organizations to create inclusive workplace learning environments supported by enabling systems infrastructure and associated professional practices. Because my career aspirations were deeply influenced by the cultural values and intellectual heritage present in Sweden in the early 1990s, you could say that I was at the right place at the right time.

2.4 Contextual history

The political and social movements of the 1960s, 1970s, and 1980s in Scandinavia gained notable expression as "enabling workers to gain a voice in the technologies that affect their working lives" (Kensing & Greenbaum, 2013a). A strong trade union and collective bargaining legacy encouraged social activists to influence the

rapid adoption of automation on the shop floor. As technology was introduced into other workplaces, attention turned to also "giving voice" to office workers and technicians, reflective of growing awareness of "the politics behind all design" (Kensing & Greenbaum, 2013b). This growing critique challenged traditional systems analysis and organizational design assumptions that assumed computer human interaction could be easily expedited in then-emerging interfaces for presumed users. Engaging actual users also challenged "widespread use of management strategies to divide and conquer workers' power by automating tasks and de-skilling workers … to standardize and simply work tasks in order to create interchangeable workers as well as interchangeable manufactured parts" (Kensing & Greenbaum, 2013c).

Similar to the emancipatory aims of the "community action projects"[1] in which I participated in the 1960s and 1970s in the United States, Swedish initiatives aimed to do more than just "involve" users in design of computer systems. Organizers recognized that creating meaningful and sustainable change required creating more equitable power relations for genuine participation and mutual learning. This required establishment of learning cycles "where actions for change generated needs for new knowledge, which furthered new actions" (Kensing & Greenbaum, 2013d). These workplace processes fulfilled a number of desirable Swedish national cultural outcomes. First, it satisfied the political argument that people should have the right to influence working and learning conditions. Second, authentic participation fulfilled a pragmatic need, because by involving people who would be affected as active participants, better designs result. In other words, new ideas and knowledge were produced when workers have access to information and resources (time, money, and expert assistance) and authority to influence decisions (Kensing, 1983).

I was very receptive to Swedish colleagues' stories of co-determination over work conditions because I had been earlier introduced to cogenerative systems design and action research principles (Elden & Levin, 1991) by Scandinavian professors speaking at international systems sciences conferences. They recognized that participation and action made research contextual as the roles of the researchers and the researched interchanged through mutual development of knowledge and learning about people's real-world problems.

Also, in 1989, I read the English translation (from Swedish) of Gunilla Bradley's book, *Psychosocial Work Environments and Computers*, which presented her early theories on the complexity of interactions with technology and its effects on the individual, work life, and society. Subsequently, in 2001, she published a second volume in English, titled *Humans on the Net: Information and Communication Technology* (*ICT*) *Work Organization and Human Beings*, which again reflected "the strong attention to organizational and human issues" (Iivari & Lyytinen, 1998) characteristic of Scandinavian informatics. She also considerably broadened the scope of "system"

[1] Community action programs (CAP) began in the United States in 1965 as part of President Lyndon Johnson's "War on Poverty." CAP continues to help organize programs that foster self-sufficiency for low-income and socially marginalized populations.

to include consideration of international political, economic, and social systems that influence how people live, learn, and work.[2]

In addition, as an Associate Professor with responsibility for teaching systems analysis and design courses at the School of Information Studies at Texas Woman's University, I had read widely. I knew that Lucy Suchman's *Plans and Situated Actions: The Problem of Human-Machine Communication* (1987) challenged dominant cognitive science and Human-Computer Interaction assumptions about traditional computer development work and set the stage for understanding that human actions—in and outside the workplace—are appropriately situated within human experiences. In building on this idea, Terry Winograd and Fernando Flores's *Understanding Computers and Cognition: A New Foundation for Design* (1986) recognized that in designing tools we are designing ways of being (Winograd & Flores, 1986).

In further exploring this notion, Shoshana Zuboff conducted in-depth multi-year studies of office, factory, professional, executive, and craft workplaces characterized by a recent shift from traditional to computer-mediated task environments. Results reported in *In the Age of the Smart Machine: the Future of Work and Power* (1988) demonstrated the tripartite nature of the relationship between information technology and work. First, technology is not neutral, but rather embodies intrinsic characteristics that enable new human experiences and foreclose others. Second, within these new "horizons of the possible," individuals and groups construct meaning and make choices, further shaping the situation. Third, the interplay of intrinsic qualities and human choices is also shaped by social, political, and economic interests that imbue the situation with intended and unintended opportunities and limitations. She concluded: "The shifting grounds for knowledge invite managers to recognize the emergent demands for intellectual skills and develop a learning environment in which such skills can develop" (Zuboff, 1988).

In a complementary fashion, Donald Schön revealed in *The Reflective Practitioner: How Professionals Think in Action* (1983) that both workers and designers could actively reflect on their work in the midst of actual day-to-day situations. He recognized that a practitioner's situation is typically complex and unstable, and embedded in conflicting values. Therefore, the challenge is not to solve but rather to frame problematical situations and, through a cyclical process of action, reappreciation, and reframing, increasingly refine an approach for generating shared meaning and practical requirements. A dynamic "knowing-in-action" process engages the practitioner in research and practice at the same time through "reflection-in-action." "The unique and uncertain situation comes to be understood through the attempt to change it, and changes through the attempt to understand it" (Schön, 1983).

Such classic works and social movements suggested the redesign of the professional role and of the organizations that support it, with the aim to maximize the

[2] During a (more than) 40-year career, Bradley developed a holistic Convergence Model of "humans in the ICT society." Her lifetime contributions to organizational and psychosocial communication were celebrated in a Festschrift on the occasion of her 70th birthday. For more information, see: Haftor, R. M, & Mirijamdotter, A., Eds. (2011). *Information and communication technologies, society and human beings: Theory and framework. Honoring Professor Gunilla Bradley*. Hershey, Pennsylvania: Information Science Reference, IGI Global.

possibilities of reflection. These ideas very much framed my thinking about systems design, workplace learning, and organizational leadership, as the following highlights from the literature and from the field reveal.

2.5 Participatory design

Early Scandinavian writings and activist interventions produced guiding principles that continue to influence participatory design of both technology and organizational systems, despite changes in contemporary social, economic, technical, and design circumstances. Characteristic participatory design outcomes still equalize power relations, enact democratic practices, situate workplace decisions, enhance mutual learning, and catalyze alternative visions. Design thinking and design practices are typically "design-by-doing" projects with participatory and democratic intentions that include design participants who would ultimately be the users of the artifacts designed (Bannon & Ehn, 2013a).

Recent practice has sought more creative engagement with the design community (Bannon & Ehn, 2013a). Contemporary tools and techniques thereby amplify that participatory design "has always worked with users in imaginative ways. … [T]he interest in embodied interactions, tangible, personal and gestural interfaces, ambient media and the like, has spurred the use of creative and experimental approaches to design. Many of these methods have a playful component, engaging users and designers in joint exploration of the design space, and helping designers to better understand user needs" (Mörtberg et al., 2010).

Although many Scandinavian-originated and -influenced definitions exist for "design thinking" (Kimbell, 2011), the concept essentially references a process of framing a problematic situation, in contrast to solving a given problem.[3] "Problems are ill-defined, preferences are fluid and solutions emerge in action" (Garud, Jain, & Tuertscher, 2008a). Therefore, the activity of participatory designing is never complete. In environments characterized by continual change, design incompleteness can be pragmatically harnessed in a generative manner, as a "trigger for action" (Garud, Jain, & Tuertscher, 2008a). This suggests a change in the meaning of the word "design" itself—from one that separates the process of design from its outcome, to one that considers design as both the medium and outcome of action (Garud, Jain, & Tuertscher, 2008b).

User-centered design work, therefore, is characteristically "a situated, local accomplishment … practices are seen as dynamic configurations of minds, bodies, objects,

[3] The notion of "reflective practitioner" introduced in 1983 continues to be among the most influential contributions to the "design thinking" literature. In *The Reflective Practitioner—How Professionals Think in Action*, Schön acknowledges the complexity—and, therefore, "messiness"—of design situations. His concepts of "reflection-in-action" and "conversations-with-the-material-of-the-situation" offer ways to appreciate how professionals in design and other fields master this messiness and complexity "in the swamp." Schön's insights into "designerly" practice and reflective "doing," through using information to learn through collective "meaning making," anticipate Informed Systems.

discourses, knowledge, structures/processes, and agency" (Kimbell, 2012) in which stakeholders are at the center of design (Brown, 2009). Actual organizational change practices vary, however, dependent on a number of factors, including national histories and culture.[4] For instance, while a user-centered design—"user as subject"—is prevalent in the United States, the participatory approach—"user as partner"—has furthered collaborative design (co-design), co-creation, and collective creativity in Northern Europe since the 1970s (Sanders & Stappers, 2008). Creative Scandinavian design processes are therein distinguished among other national and international traditions by co-evolution of the problem space and the solution space through socio-cultural interaction (Bratteteig & Wagner, 2012).

Scandinavian participatory design practices also recognize that problem exploration and generative engagement require considerable attention to "how," not only content "what." The actual "doing" of design practice therefore includes focusing on "the nature of the design activities, the need for providing means for people to be able to be involved, the need for respect for different voices, the engagement of modes other than the technical or verbal, the concern with improvisation and ongoing evaluation through the design process, etc." (Bannon & Ehn, 2013b). This, of course, requires full worker participation in work changes (Ehn, 2013).

2.6 Organizations systems

A new conception of the workplace evolved from a process emphasis in socio-technical systems projects conducted after World War II at the Tavistock Institute of Human Relations in London, England. This approach developed in response to workplace planning wherein engineers set about fitting people to the requirements of the technology, not vice versa. The Tavistock researchers recognized that conceptual reframing must address growing alienation among workers in organizations where social and technical aspects of work were treated as separate domains (Mumford, 1993). In response, they re-conceptualized work organizations as "socio-technical systems, and not simply distinct social and technical systems" (Bannon & Ehn, 2013c). It followed that "the goal must therefore be joint optimization of the technical and social systems" (Mumford, 1987a), which required "reform of the social organization of the work system" (Mumford, 1987b) to "provide a high quality of working life for the members" (Mumford, 1987c).

New discoveries in quantum physics, chaos theory, and biology further challenged earlier mechanistic models. For instance, open systems theory, introduced by Austrian biologist Ludwig von Bertalanffy, focused on the organism as a whole. He recognized the complex organization and integration of physiological functions, and also metabolic and differentiation processes. Seeing that the whole determines the character

[4] For an insightful comparison of the national differences and cultural similarities between library traditions and organization values—and, hence, organizational change variations—in Sweden and the United States, read: Hansson, J. (2010). *Libraries and Identity: The Role of Institutional Self Image and Identity in the Emergence of New Types of Libraries*. Oxford, England: Chandos.

and functions of its parts subsequently led to von Bertalanffy's introduction of general systems theory in *General System Theory: Foundations, Development, Applications* (1968) and the emergence of cybernetics. This field studies the communication and control of regulatory feedback both in living and lifeless systems (organisms, organizations, or machines) and in combinations of those. Therefore, cybernetic researchers study how anything (digital, mechanical, or biological) controls its behavior, processes information, reacts to information, and changes, including how factors can be changed to better accomplish primary system purposes.

When transferred to the organizational realm, these holistic systems ideas called into question earlier ways of thinking about organizations, which stood in the way of innovative and effective leadership.[5] Rather, it follows that "a work system consisted of both a social system and a technical system interacting with an external environment (both the organization in which people are working, and the environment within which the firm operates) and that these sub-systems needed to be 'in balance' in order for an optimal output from the overall system" (Bannon & Ehn, 2013d). Organizational leadership attention must therefore focus on "how a workplace organizes its relationships … [and] the patterns of relationship and the capacities available to form them" (Wheatley, 1992a).

Organizational systems literature was also influenced and enriched by other intellectual developments. In the United States, Charles West Churchman openly advocated multiple "frames" for viewing "systems" in *The Design of Inquiring Systems* (1971). He thereby attributed value to acknowledging different perspectives while designing knowledge systems. Subsequently, in the United Kingdom, Peter Checkland similarly recognized the existence of a variety of stakeholders in any project who would have distinct interests—named "worldviews"—that could impact the design process. In *Systems Thinking, Systems Practice* (1981), he introduced Soft Systems Methodology. Systems thinking frameworks and participatory design tools support dialog and reach accommodation, in keeping with British socio-technical and Scandinavian participatory design and action research traditions. Other leading systems thinkers have also discussed the usefulness of combining systems thinking and action research (Checkland, 1985; Flood, 1998; Midgley, 2000; Stowell & West, 1994).

2.7 Participatory action research

European born social psychologist Kurt Lewin is credited with originating the concept of action research and then participatory action research in the 1940s. While leading a series of action research studies from 1939 to 1947, Lewin and two of his protégés conducted research on group behavioral problems related to industrial management and productivity within the Harwood Manufacturing Corporation of Virginia in the United States. The research team demonstrated the higher productivity of workers assigned to democratic decision-making groups *vis-à-vis* workers in managerial,

[5] Evaluation trends in Sweden since 1960 illustrate the variation over time of national notions about what and how to evaluate (Vedung, E. (2010) Four waves of evaluation diffusion. *Evaluation,* 16(3), 263–277).

autocratic groups, following the introduction of new technologies at the plant. Although the research was non-participatory, it demonstrated the efficacy of democratically functioning work modes.

Then, at Massachusetts Institute of Technology in 1945, Lewin created the Research Center for Group Dynamics, which conducted action research on community affairs with the Commission on Community Interrelations of the American Jewish Congress. Staff members coined the term *participant* action research to describe community members' involvement from the beginning in research processes investigating minority problems, ethnocultural conflict, and discriminatory behaviors (Harkavy & Puckett, 2014). "A spiral of steps, each of which is composed of a circle of planning, action, and fact-finding about the result of the action" (Lewin, 1946), aimed to address practical problems through self-reflection and critique. Dialog, collaboration, mutual learning, and action constituted the guiding principles.

In *Pedagogy of the Oppressed* (1970), Paulo Freire advanced similar ideas through highlighting the potential of education as a political tool for stimulating the consciousness of oppressed people. Freire's notion of "conscientization" evolved from his experiences with adult literacy programs in Brazil, which reinforced that socially marginalized people, through dialog, can critically analyze their own situation as well as organize action to improve it. His *thematic investigation*, employed in 1973, first in Brazil and later in Chile, inspired scholars and activists to collaborate with community residents to bring about community-controlled social change projects, learning through investigation (Pant, 2014).

In participatory action research, practitioners are involved as both subjects and co-researchers (Agryris & Schön, 1991). Despite considerable diversity in research methodologies (Baskerville & Wood-Harper, 1998), action research approaches continue to share a common cycle comprised of situation diagnosis, action planning, and action taking (intervening), followed by evaluation and reflection (Susman & Evered, 1978). "The world is seen not as a collection of independent objects, but as a collection of integrated, interactive, self-consistent and creative relationships of actors. The researcher involves the subjects of the research as co-inquirers" (Rasmussen, 2004). Change occurs within participatory action research initiatives as participants freely exchange information and make informed choices, which increases commitment to actualizing insights (Checkland & Holwell, 1998; Dick, 2004). This is in contrast to other types of applied research in which "research is conducted *on* people rather than *with* people" (Rasmussen, 2004).

Participatory action research initiatives within organizations aim to improve local situations and professional practice. Toward these ends, participants co-construct, test, and improve evolving theories about particular experiences and situated interpretations. On the journey of discovery (Mirijamdotter & Somerville, 2009), action-oriented systems thinking processes (Checkland, 1979; Lewis, 1992) fostered by reflective dialog (Banathy & Jenlink, 2005) and appreciative judgments (Checkland & Casar, 1986; Vickers, 1983a, 1983b) further collective communication and organizational learning. In this way, through interacting with each other, action research participants thereby learn that they can better control their social world (Elden & Levin, 1991), opening up new ways of thinking and doing. (For more information, see Attachment 2.1.)

2.8 Organizational purpose

You will recall that the educational philosophy at California Polytechnic State University embraced "learn by doing,"[6] which is how I approached my professional responsibilities in 2003, new to higher education administration and therefore "learning my way to leading." Reminiscent of my good fortune in arriving in Sweden for a Fulbright residency at a propitious time in that nation's intellectual history, fate once again intervened early in my new leadership assignment when I was invited to deliver a series of lectures and workshops in Sweden. The presentation titles suggest the range of my intellectual interests, initiated during doctoral studies and refined during professorial teaching (Huston, 1990). (For more information on the synergies between my doctoral studies and Informed Systems, see Attachment 2.2.) Now, however, I intended to implement high level theories and lofty aspirations in a real North American workplace.

At Luleå University of Technology in the north of Sweden, I conducted a seminar, "A 'systems thinking' organizational leadership model for digital age knowledge organizations," for graduate students in Social Informatics and Systems Science. I also delivered a lecture, "Interactive planning and idealized design: A California Polytechnic State University case study," in an undergraduate social informatics course. And I traveled to the south of Sweden to present a Research Colloquium Series lecture at the Swedish School of Library and Information Science at the University College of Borås. The presentation, "Knowledge integration work across boundaries: Inquiry into shared context for information exchange and knowledge creation," was especially rewarding because many of the professors present during my Fulbright residency a dozen years earlier were in the audience.[7]

In a culminating activity, I facilitated a full-day workshop, "If you build it with them, they will come: User-centered systems and services design strategies," to library practitioners from University College of Borås, University College of Trollhättan, and University College of Skövde. Throughout the day, participants shared their organizational experiences with collaborative design (co-design) of academic library service

[6] John Dewey is credited with originating American pragmatism, which promoted "learn by doing." His theory of knowledge recognized that learning is fostered through framing situations, searching, experimenting, and experiencing real life—i.e., "learn by doing." As Dewey explained, to understand something is to see it in relation to other things: to note how it operates or functions, what consequences follow from it, what causes it. We go beyond the information given to make inferences, connections, and associations to generate a "theory" that works. "Powerful and insightful models or illustrations are the results of this understanding … [which] can bind together seemingly disparate facts into a coherent, comprehensive, and illuminating account." (Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process*, p. 137. Boston, MA: Henry Holt.) His work coincided with the founding of California Polytechnic State University, which prompted adoption of the University philosophy of "learn by doing."

[7] Ten years later in 2012, I delivered a Research Colloquium Series presentation titled *Informed learning in the workplace: An emerging systems approach*. And, once again, several Swedish School of Library and Information Science professors employed during my Fulbright residency were present. Additionally, my Swedish collaborator Anita Mirijamdotter was a co-presenter, reflective of the marvelous academic tradition of transitioning former students to research collaborators.

and systems. This renewed my appreciation for the easy alignment of Swedish workplace values and participatory design. And it intensified my desire to better understand, as a newly appointed organizational leader in North America, essential elements for fostering more inclusive cultural values and creative workplace practices elsewhere.

As luck would have it, earlier in that visit to Sweden, I met a doctoral student at Luleå University of Technology who introduced me to the work of Professor Ikujiro Nonaka and his associates in Japan. Building upon Peter Drucker's observation that knowledge productivity is the only meaningful resource (Drucker, 1993) in the knowledge society, Nonaka advanced a new theory: "The raison d'etre of a firm is to continuously create knowledge" (Nonaka, Toyama, & Nagata, 2000a). Through knowledge and the capacity to create and utilize such knowledge, an organization is able to innovate new products, processes, and services, or improve existing ones more efficiently and effectively. This approach looks "inside" the organization to see how it produces knowledge through workplace strategy, structure, activities, and culture, the essential elements of organizational design for knowledge creation. (For more information, see Attachment 2.3.)

> *The knowledge-creating view of the organization is based on the view of a human as a dynamic being and a firm as a dynamic entity that actively interacts with others and the environment. Knowledge is essentially related to human activity. Without understanding the nature of human beings and the complex nature of human interactions, we cannot understand the theory of organizational knowledge creation.*
>
> *Nonaka et al. (2000a)*

In contrast to Western epistemology (the theory of knowledge) which views knowledge as absolute and objective, knowledge was viewed through an Eastern lens as "context-specific, relational, dynamic and humanistic" (Nonaka et al., 2000a). This theory of organizational knowledge assumed that individuals and organizations have the potential to grow together through the process of knowledge creation in organizations designed to recognize that "Knowledge is created through the dynamic interactions among individuals and/or between individuals and their environments, rather than an individual who operates alone in a vacuum" (Nonaka, Toyama, & Nagata, 2000b). (For more information, see Attachment 2.4.) Consequently, Nonaka's organizational design ideas acknowledged the relationships needed within a workplace environment to enable systemic exploration of issues, sharing of ideas, and expansion of knowledge. As existing knowledge is continuously shared, used, and stored, through learning, new knowledge is created "through action and interaction. An organization actively interacts with its environment, reshaping this environment and even itself through the process of knowledge creation" (Nonaka, Toyama, & Byosiere, 2001).

2.9 Organizational learning

In a complementary fashion in the United States, Margaret Wheatley advanced a new conception of the organization when she published *Leadership and the New Science: Learning about Organization from an Orderly Universe* in 1992. Her ideas emerged

from the "new science—those hypotheses and discoveries in biology, chemistry, and physics that challenge us to reshape our fundamental world view" (Wheatley, 1992a). Wheatley espoused learning to see the world anew, as "living systems" (Capra, 1983) that evolve through processes of change and patterns of connections amidst constant flux and unpredictability. Like Nonaka, she challenged the predominant Western management viewpoint at the time, which assumed that organizations functioned like machines for processing information bits and bytes.

Instead, Wheatley advanced the notion of "understanding the [organizational] system as a system and giving primary value to the relationships that exist among seemingly discrete parts" (Wheatley, 1992b). Construing the workplace in this way—as a "learning organization"[8]—acknowledges its self-renewing capacity. This is also a property of living systems that are constantly changing as waves of information spread out broadly in a "participative universe" (Wheatley, 1992a). Co-workers thereby create their workplace environment through action and implementation (enactment) as organizational realities (Weick, 1979) evolve within webs of relationships and levels of interconnectedness. Participatory processes generate the reality to which organizational members then commit: "people support what they create" (Wheatley, 1992c).

Well aligned with the participatory design and systems thinking highlights reviewed earlier in this chapter, this systems viewpoint recognizes that an organization is a whole entity that is an adaptive whole. It can adapt and survive in a changing environment. It will have emergent properties, and may contain sub-systems or be part of a wider system. It will have processes of communication and levels of organization that allow adaptation to occur (Checkland, 2011) through information exchanged during "the rich interplay between processes and level[s]" (Crossan, Lane, & White, 1999) as various layers function within the whole system to express properties that are characteristic and emergent (Beer, 1985; Leonard, 1999).

It follows that leadership must necessarily replace bureaucracy with designs that "invent organizations where process is allowed its varied-tempo dance, where structures come and go as they support the process that needs to occur, and where form arises to support the necessary relationships" (Wheatley, 1992a) through which energy and information flow. Such adaptive, self-organizing systems depend on new information, both about external factors and internal resources, to create new knowledge that ensures improved use of resources and response to changes. "As the ecosystem matures, it develops an internal stability, a resiliency to the environment that, in turn, creates conditions that support more efficient use of energy and protection from environmental demands" (Wheatley, 1992a). New forms evolve through a process of exchange between system and environment, using information to learn.

[8] Peter Senge is widely recognized as introducing the notion of a learning organization into the popular imagination when he published *The Fifth Dimension* in 1990. In this seminal work, he defines learning organization as a group of people who are continually enhancing their ability to create what they want to create.

2.10 Organizational design

As this review of antecedent literature and historical thought reveals, an organization can be conceptualized as a purposeful social interaction system in which collective capabilities develop through collaborative learning processes. Workplace commitment to social learning must therefore recognize the importance of sustainable organizational structures and communication systems that encourage and enable the relationships and interactions which promote investigation and negotiation of the interests, judgments, and decisions. Through an ongoing interplay of action, observation, and evaluation, nimble responsiveness is enabled and animated—initiating never ending individual, team, and organizational learning aimed at ever-deepening insight and performance which reflect-in- and on-action (Schön, 1983).

Robust organizational learning necessarily depends on suitable conditions for the human cognition and action that enable individual and collective growth and maturation. Reminiscent of Suchman's observation that information is situated within human experiences, Nonaka and his associates use the Japanese term *ba* to refer to a shared space (or platform for knowledge creation) for emerging relationships within the team, the organization, and the ecosystem, wherein creative processes are amplified to share, create, and use knowledge. This space can be physical such as business space and offices, virtual such as intranets and teleconferences, or mental such as ideas or ideals, or any combination of these experiences.

"Ba is a place where information is given meaning through interpretation to become knowledge, and new knowledge is created out of existing knowledge through the change of the meanings and the contexts. In other words, *ba* is a shared context in cognition and action" (Nonaka et al., 2000a). The word represents emerging relationships among individuals, and between an individual and the environment, expressed through interactions among individuals with different types and contents of knowledge. These "hard" and "soft" knowledge assets range from documents and technology to ideas and competencies as well as shared know-how and operational processes that can holistically generate learning. However, "without being put into a context, knowledge is just information, not knowledge" (Nonaka et al., 2000a).

This theory of organizational knowledge creation recognizes that organizational design must consider knowledge vision and values; organizational form, culture, and practices; and organizational leadership. The first of these elements, knowledge vision, determines the mission of the organization and purpose of its knowledge. Together with organizational values and norms, vision determines what kinds of knowledge are needed, created, and retained. Second, organizational configurations and structures promote or hinder functional and cross-functional interactions. Similarly, workplace culture and practices influence how co-workers view the approach to knowledge and knowledge creation and therefore how they interact with others. Therefore, moving beyond organizational inertia (the "status quo") to workplace readiness requires purposeful leadership (Nonaka, Toyama, & Nagata, 2000c).

Within a vibrant workplace environment, energized and enabled by knowledge sharing and creation processes, this necessarily requires implementation of "a model of situated leadership in organizational knowledge creation, explaining centralized

and distributed leadership at three layers of activity. These layers depict the composition of activities, conditions, and structures within different contexts and functions of organizations. The interaction of these layers allows for a holistic view of the organization, combining micro-level activities with macro-level structures, and distributed with centralized leadership" (Von Krogh, Nonaka, & Rechsteiner, 2012).

In enabling knowledge, rather than merely managing information, "enabling context" is vitally important. The "right" context fosters emerging relationships within microcommunities, across group boundaries, throughout an organization. This is in part facilitated

> *by providing appropriate physical spaces (meeting rooms) or cyber connections (computer networks), or by promoting interactions among organizational members through task forces, teams, and retreats. Yet enabling contexts are also spontaneously created, and care-based relationships provide the foundation for the trust, support, and commitment required to nurture such unplanned occurrences. … The enabling context must be energized so that individuals or the organization can create and amplify knowledge. For that purpose, managers need to provide the following conditions: the right amount of autonomy for participants; a certain level of creative chaos, a high-care organization—one that fosters mutual support and commitment, along with indwelling … in which participants "live" with a concept together, converting tacit knowledge into effective social knowledge.*
>
> *Von Krogh, Ichijo, and Nonaka (2000a)*

This approach to organizational learning departs from the conventional wisdom on "communities of practice" (Lave & Wenger, 1991; Wenger, 2000) where boundaries are firmly set by the task, culture, and history of that community. It can take new members some time to be sufficiently enculturated for full participation. On the other hand, an enabling context is determined by the participants and can be changed easily. "Instead of being constrained by history, an enabling context has a here-and-now quality—and it is this quality that can spark real innovations" (Von Krogh, Ichijo, & Nonaka, 2000b).

2.11 Organizational leadership

"Organizational knowledge creation is the process of making available and amplifying knowledge created by individuals, as well as crystallizing and connecting it with an organization's knowledge system. It is a continuous process through which individual boundaries are transcended and a new context, a new view of the world, and new knowledge are acquired" (Von Krogh et al., 2012). From a socio-technical perspective, advancement requires "infrastructure" (communication-enabling hardware and software), "infostructure" (formal rules that govern exchange and cognitive resources, such as workplace metaphors and common language) and "infoculture" (the stock of background knowledge embedded in social relations) (Pan & Scarbrough, 1999). When the organization is conceptualized as a "cognitive enterprise"

(Argyris & Schön, 1978), as in the lens of knowledge creation theory, leadership requires "a continuum that ranges from centralized to distributed (shared) leadership at three layers of activity: a core layer of local knowledge creation; a distributed conditional layer that provides the resources and context for knowledge creation; and a structural layer that forms the overall frame and direction for knowledge creation in the organization" (Von Krogh et al., 2012).

In addition, an enabling context—a shared knowledge space—encourages and nurtures participation on many different levels. This is the space that fosters "indwelling," in which participants "live" with a concept together, converting tacit knowledge into effective social knowledge. It is the shared space that knowledge activists shape in their roles as catalysts or energizers of knowledge creation (Von Krogh, Nonaka, & Ichiko, 1997). Four types of interactions contribute to overall enabling context: originating—sharing tacit knowledge between individuals, conversing—having group conversations to form concepts, documenting—converting knowledge into explicit forms, and internalizing—making explicit knowledge tacit once more.

> *Originating, for instance, is closely connected with the sharing of tacit knowledge within microcommunities; conversing is related to concept creation and justification; documenting is part of prototype building; and internalizing is connected to cross-leveling of knowledge. … the knowledge shared through each kind of interaction is eventually shared and forms the knowledge base of the organization. In other words, it all adds up to something larger than the sum of individual efforts.*
>
> *Von Krogh, Ichijo, and Nonaka (2000c)*

Depending on the organization and its knowledge vision, such enabling conditions for learning may emphasize originating over documenting—or rely on e-mail rather than face-to-face meetings. In other words, every organization has an interaction style of its own and will use different kinds of experiences to form its network of mutual obligation and trust underpinning knowledge-intensive activities within the "right" organizational structure for enabling knowledge in action.

> *Organizational forms are structural relations among organizational members that become formalized, designed, or adapted. Centralized leadership practices such forms; it reinforces structural relations by defining and partitioning tasks, designing communication channels, and controlling the flow of knowledge and information. … new tasks can trigger a search for new forms that imply new structural relations. In this way spontaneous collaboration and emerging working relations become a source of new formalized practices. Leadership grafts these new elements onto existing arrangements and … new practice.*
>
> *Von Krogh et al. (2012)*

Any theoretical framework for leadership, therefore, must acknowledge both formal and informal organizations, the former characterized by formal structures, management responsibilities, and labor divisions, and the latter represented by natural social groups that exercise authority and responsibility within informal workplace experiences. Thus, examining leadership in organizational knowledge creation requires

attention to the intersections between distributed leadership—which may be associated with more informal environments—and centralized leadership associated with more formal organization.

Within this framework, three layers of activity span formal and informal organizations. In the "core activity," or informal layer, knowledge is created through direct contact and collaboration between co-workers exercising distributed or shared leadership. Their activities take place in practice and often in small groups, such as project teams, in which collaboration and learning emerge in an unstructured environment. The "structural" layer hosts formal and structured processes. Leadership at this level concerns structuring activities to maintain the coherence of knowledge creation throughout the organization. This necessarily entails linking context, processes, and assets through overseeing, coordinating, and building vision, as well as formulating goals and procedures. In between the core activity and the structural layer, "conditional" leadership activities connect the knowledge creation processes with the overlying formal structures (Von Krogh et al., 2012). This dynamic interplay between centralized and distributed leadership activities connects enabling context, learning processes, and knowledge assets through amplifying and modulating organizational learning within workplace culture (Sarabia, 2007).

2.12 Learning organization

Successful exploration, understanding, and adaption to changing conditions requires purposeful organizational learning or, as Chris Argyris phrased it, "initiating change that perseveres" (Argyris, 1997a). In explicitly linking his theory of learning to action, Argyris noted that "organizations that can produce actionable knowledge create a supportive context for learning and improving performance" (Argyris, 1997b). In initiating change, "Two steps are critical to change. The first is to make previously undiscussable problems discussable. Learning behaviors, in contrast to controlling behaviors, are crafted in ways that encourage inquiry and testing" (Argyris, 1997a). Of special relevance here, Argyris observed that if you can engage people in the larger task of improving performance in their organization, most will respond favorably and, furthermore, the systems revolution has provided technology that allows "the design of information practices to support individual and organizational learning" (Argyris, 1997a).

Within a companion learning literature, action learning offers a rich philosophy of learning and practice that offers significant contributions to organizational development, organizational change, and action research. The latter is of special relevance to the Informed Learning concept of "learning in action." Action learning as a coherent and named body of practice was created and developed by an Englishman, Reg Revans, in the mid-twentieth century. "Core assumptions that underpin Action Learning are that learning derives from taking action and asking insightful questions about pressing problems or enticing opportunities" (Rigg, 2014). The approach recognizes that existing codified knowledge, while it may be drawn upon, may not suit the specific context of specific problematical situations, especially those which are

an ill structured "mess."[9] Therefore, "processes such as action and feedback, asking fresh questions, learning from and with peers and creating a multiplier effect between individual and organizational learning are central to Action Learning" (Rigg, 2014).

The phrase "action learning in action" (Marquardt, 1999) underscores that learning organizations have a bias toward reflection-in-action because the capacity to quickly take action and generate information is critical to organizations amidst unrelenting uncertainty and disruptive change. As Senge noted in *The Fifth Discipline*, learning cannot exist apart from action because action provides a basis for the critical dimension of reflection (Senge, 1990). Action then is "the basis for learning: no real learning takes place unless and until action is taken" (Rigg, 2014).

It naturally follows that learning is understood to result from the inquiry, investigation, experimentation, and reflection which emerges from the search for situated questions and questioning insight among group members who seek to clarify the nature of the problematical situation, reflect on their assumptions about framing the issue, and reveal what is known as well as unknown. In other words, this action-oriented learning approach recognizes a synergy between learning and action, exercised through learning cycles of action and reflection. Praxis is expressed through collegial engagement within organizational structures and with organizational processes that, over time and with practice, build capacity.

2.13 Informed learning evolution

Deep and highly complementary insight into the phenomenon of workplace learning, activated and sustained through using information to learn, emerged from the "relational information literacy" (Gunton, Bruce, & Davis, 2014) approach established by Christine Bruce in Australia in *The Seven Faces of Information Literacy* (1997). This line of inquiry involves investigation of phenomena, in which peoples' experiences assume a range of meanings depending on context. The research approach thereby aims to obtain a deeper and more complex understanding of subjective realities based on participants' representations of their experiences, which collectively reveal the varying aspects of information users' "life-world" and, thereby, insight into what a phenomenon means in practice (Entwistle, 1997). A relational approach to information usage therefore values effective engagement with information when learning in different contexts.

In addition to valuing principles of independent learning and critical thinking, the relational model promotes "the development of personal values that encourage the critical use of information, the acquisition of sound knowledge of the information environments and a personal information style that facilitates the learner's

[9] "A mess is a set of conditions that produces dissatisfaction. It can be conceptualized as a system of problems or opportunities; a problem or an opportunity is an ultimate element abstracted from a mess" (Ison, R. (2008). Systems thinking and practice for action research. In P. Reason & H. Bradbury (Eds.), *The SAGE Handbook of Action Research: Participatory Inquiry and Practice* (pp. 141–158) (2nd ed.) Los Angeles, CA: SAGE Publications. p. 139).

interaction with the world at large" (Andretta, 2005). The relational approach further recognizes that individuals experience information in relation to, not apart from, their environment and focuses on learners' experiences of engaging with information to attain more varied and complex understanding (Marton, 2014). Experience thereby serves as both an object of study and a theoretical construct. (For more information, see Attachments 2.5 and 2.6.)

Within the underlying research tradition, learning is viewed as becoming aware of a wider possible range of experienced meanings. When brought into informational worlds, the focus turns toward depictions of experiential variation that reveal the connection between information and learning. Each individual makes a unique connection in awareness that recognizes "aspects of the world around them when they are working with information" (Bruce, 1998) and anticipates the identification of necessary conditions for learning. (For more information, see Attachment 2.7.) Ten years later, Bruce extended these early insights about workplace learning experiences (Bruce, 1999) in a second book titled *Informed Learning* (2008).

Informed learning theory remains grounded in a relational view of learning. Drawing from extensive research across the globe, both in the classroom and in the workplace, Bruce recommends explicitly building information experiences into learning activities. This necessarily requires associated reflection activities that surface improved understanding, transferable to other settings and novel contexts. Accelerated learning requires simultaneous focus on information use and subject content (Bruce & Hughes, 2010). Relatedly, using information to learn is always about something, so informed learning activities are purposeful and contextual. Also, holistic appreciation of information experience necessarily acknowledges its various facets, as revealed in *Seven Faces*, including technology, sources, and processes elements, which benefit from reflection as a strategy for encouraging learning.

Of special importance in the workplace, informed learning promotes the simultaneous development of discipline (or professional) and process learning whereby both the domain knowledge and the learning practices advance through effective interaction and engagement with information. Ideally, through deepening learning experiences, outcomes are transferable to other unfamiliar situations. At the same time, learning activities must recognize that in particular encounters, information can be experienced as objective, subjective, or transformational—i.e., information as neutral, information as meaning making, or information as life changing (Bruce, 2013a). This suggests that varied preferences and unique ways of working with information should be respected and encouraged, including the requisite communication skills for exchanging information and sharing insights.

Within an Informed Systems (Somerville & Mirijamdotter, 2014) framework, as individuals and groups increase awareness of their ways of experiencing information use in various contexts, the ultimate aim is to enable the collaborative design of enabling conditions for learning, amidst considerable diversity, mindful that "powerful ways of experiencing make possible powerful outcomes" (Bruce, 2013b). Within an organization, this idea suggests leadership aspirations for advancing learning designs grounded in discipline and professional information practices, which requires

thoughtful consideration of the information practices and professional contexts through which workplace colleagues learn to exercise a full repertoire of information experiences.

Reflective of growing international interest in the phenomenon of information experience, Bruce and her Australian colleagues produced an edited volume, *Information Experience: Approaches to Theory and Practice,* in 2014. It explores the multiple dimensions of and relationships between information experience, learning experience, user experience, and similar constructs. Contributors reveal considerable variation in information experiences that activate and extend prior understanding through learning new ways of seeing, being, or knowing the world. Chapters explore the nature of information experiences, including what constitutes information and how information is experienced, and the significance of information experiences in "informational life worlds."

This international compendium, with origins in phenomenography, demonstrates the efficacy of information experience that turns attention toward "people's lived experiences in their life-world" (Bruce, Davis, Hughes, Partridge, & Stoodley, 2014). This focus explores "people's informed existences, considering people and what informs them, within their wider environments, in a manner which considers people and their world as inseparable" (Bruce et al., 2014). "Information experience may thus be conceptualized as the way in which people experience or derive meaning from the way in which they engage with information and their lived worlds as they go about their daily life and work. This goes beyond how they make meaning from an objective entity identifiable as information, to consider what informs them and how they are informed, encompassing the many nuances of that experience within different … contexts" (Bruce et al., 2014). This reorientation to the wide range of forms that information experiences and information practices might take expands and widens the boundaries of what may be experienced as information (Bruce, 2008).

In that spirit, as earlier sections of this chapter have illustrated and this chapter has corroborated, building knowledge creation capability through Informed Systems in learning organizations relies on design and activation of robust systems-enabled organizational learning environments that foster rich exchange relationships and innovative collaborations. In turn, this requires organizational design and knowledge vision that recognizes the importance of cultivating both formal and informal interactions among individuals and with information to ignite contextualized information experiences. From this follows transformative information experiences wherein learning enacted within co-designed systems fosters information-centered, action-oriented inquiry. Enabling professional practices then inform collective decision making and action taking.

2.14 Learning reflections

Selected literature and associated history reveal antecedent thought that connects people and ideas through using information to learn and using technology for learning. An international survey offers illustrative highlights from systems design and design

thinking, organizational leadership and shared leadership, organizational learning and knowledge creation, and action research and evidence-based decision-making. Within this rich intellectual milieu, essential learning organization design elements activate and sustain interactions between individuals and information to produce rich information experiences within intentional learning environments, which situate workplace enactment of Informed Systems.

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Informed Systems approach

3

3.1 Contemporary conditions

Informed Systems acknowledges that, first and foremost, an organization is a system in which generative theories and associated tools can guide development of transferable capacity for using information to learn. As organizational members explore information and its connection to learning, engaged deliberation, unified purpose, and informed learning can advance understanding of how information is used and how information could be used across organizational units. Progressive understanding—experienced as "sense-making" as a "reflective practitioner"—evolved through reading the literatures of systems design and design thinking, organizational leadership and shared leadership, organizational learning and knowledge creation, and action research and evidence-based decision-making. Significantly, none of these literatures in and of themselves (alone) explain how to catalyze workplace learning to promote increased understanding of contemporary circumstances and future possibilities. Also of significance, as the literatures matured, so has research and development on Informed Systems.

The search for a robust approach for transforming information and learning experiences, across virtual and physical spaces through innovative leadership practice, arose within North American academic libraries experiencing relentless turbulence and increasing uncertainty. Volatile forces within the scholarly ecosystem had irrevocably disrupted traditional relationships among researchers, librarians, publishers, and vendors. These systemic changes required systemic responses because a case-by-case or incident-by-incident response was inadequate, given the magnitude of transformation underway. In response, Informed Systems—which integrates complementary information- and learning-focused theories—addresses a research-in-practice problem that emerges from a problem of practice—i.e., the lack of an integrated model to inform workplace learning in contemporary information and knowledge organizations.

3.2 Theoretical antecedents

Over the past decade, three theories were identified as critically important to activate and enable robust information usage for workplace learning. In combination, these ideas promote collective learning from using information to learn through design and then, within collaboratively designed systems, to enable using information to learn through knowledge creation. The systemic approach to informed learning in the workplace expresses the learning theories of Peter Checkland which advance systems design and informed action, Christine Bruce which generate information experiences and situated learning professional practice, and Ikujiro Nonaka which further information exchange and knowledge creation within enabling organizational systems. These complementary

Informed Systems. http://dx.doi.org/10.1016/B978-0-08-100175-2.00003-1

contributions acknowledge that the full potential of using information is best achieved within a holistically designed organizational learning environment.

A systems-based approach to organizational efficacy depends on purposefully using information encounters for workplace learning and knowledge creation. Therefore, the Informed Systems approach incorporates principles of informed learning and systems thinking through an inclusive, participatory design process that fosters information exchange, reflective dialog, knowledge creation, and conceptual change. The approach aspires, over time and with practice, to evolve co-workers' capacity for creating systems and producing knowledge, activated by participatory design, amplified by systems thinking, and exercised by action research. Systems leadership models represent essential elements and guide professional practices to improve local situations through learning in action catalyzed by well-contextualized information experiences. Such experiences promote reflection and dialog for collective sense-making to inform organizational "action taking."

3.3 Approach basics

Disruptions within the scholarly communications community, which have irrevocably altered traditional roles, relationships, and technologies, necessitate the transformation of workplace assumptions and organizational outcomes. Intentional use of information to learn in the workplace and beyond can further "working better together" (Somerville & Conrad, 2014) with "value chain"[1] contributors who are essential to the health and dynamism of the entire ecosystem, including higher educators who both produce and disseminate the results of research and creative activities. As a consequence, the Informed Systems approach was developed to guide academic libraries facing this challenging opportunity: "library services in higher education will continue to be crucial to the core processes of learning, teaching, and research as long as the key library structures, processes, services, and staff roles evolve to accommodate epochal changes occurring in publishing and communications" (Wawrzaszek & Wedaman, 2008). In response, Informed Systems principles and practices exercise and enable information-focused workplace design and inquiry.

With the aim to initiate and sustain workplace learning, the Informed Systems approach has been under development since 2003 in North America. Absent a unified theory of organizational learning (Crossan, Maurer, & White, 2011), an international research team[2] identified and integrated complementary theories, frameworks, and models that emphasize information and its connection to learning. At the core is Informed Learning theory, which presents the requisite conditions for catalyzing experiences of "using information to learn." The "informed learning" (Bruce, 2008a) conception

[1] "Value chain" is a concept popularized by Michael E. Porter in *Competitive Advantage: Creating and Sustaining Superior Performance* (1985). Although the term initially referred to a series of activities that create and build value, culminating in the total value delivered, the definition has evolved in recent decades. In this context, value chain refers to scholarly corpus supply chains and distribution networks. Coordinated interactions between supply and distribution channels create an extended global value chain ecosystem, including suppliers, buyers, and consumers.

[2] For a list of major contributors, see Acknowledgments in the Preface.

purposefully advances participants' consideration and experience of the role of information in ever expanding professional contexts. It explicitly connects workplace learning and information experiences. With the recognition that people learn in differing ways, the Informed Systems approach places information in ever expanding professional contexts through purposefully varying individual and group information experiences.

The Informed Systems approach recognizes that all human practices and information experiences are social. It follows that workplace learning originates from interactions (and ultimately relationships) among organizational members, which enable investigation and negotiation of diverse interests, judgments, and decisions. The process can be explained thusly:

> *people can learn to create knowledge on the basis of their concrete experiences, through observing and reflecting on that experience, by forming abstract concepts and generalizations, and by testing the implications of these concepts in new situations, which lead to new concrete experience that initiates a new cycle. This assertion fortified our aspiration to develop reflective practitioners who learn through critical (and self-critical) collaborative inquiry processes that foster individual self-evaluation, collective problem-formulation, inclusive contextualized inquiry, and professional development.*
> *(Somerville & Mirijamdotter, 2014)*

The transformative power of applying informed learning theory is that, at its very essence, it is collectively experienced at individual, group, and organizational levels through context-specific learning processes—i.e., participatory design and information practices—that connect information sources in the workplace with workplace practices required to access and utilize them. "Soft" systems design[3] (Checkland & Scholes, 1999) must therefore necessarily consider aspects of information like: "What

[3] Soft systems design, as expressed in Soft Systems Methodology (SSM), is oftentimes misunderstood as a methodology for dealing solely with "soft problems" involving psychological, social, and cultural elements. However, SSM does not differentiate between "soft" and "hard" problems; rather, it provides a distinctive way of addressing situations perceived as problematical. SSM treats the notion of system as a mental (epistemological) construct used for advancing human understanding. It follows that "system" is understood as "an integrated whole whose essential properties arise from the relationships between its parts; from the Greek *synhistanai*, meaning 'to place together'" (Ison, R. (2008). Systems thinking and practice for action research. In *The SAGE Handbook of Action Research: Participatory Inquiry and Practice*, P. Reason & H. Bradbury (Eds.), p. 141–158. 2nd ed. Los Angeles, CA: SAGE Publications. p. 140). So, within an organizational setting, systems thinking tools purposefully invite participants' varied perspectives and values, which in turn determine what is considered to be part of the situation under investigation. This necessarily requires negotiating diverse worldviews, "that view of the world which enables each observer to attribute meaning to what is observed (sometimes the German word *Weltanschauung* is used synonymously" (Ison, R. (2008). Systems thinking and practice for action research. In *The SAGE Handbook of Action Research: Participatory Inquiry and Practice*, P. Reason & H. Bradbury (Eds.), p. 141–158. 2nd ed. Los Angeles, CA: SAGE Publications. p. 140). Consideration of the different ways of understanding, negotiated through SSM learning cycles, advances information-focused and action-oriented workplace learning simultaneous with organizational transformation, here defined as "changes, modeled as an interconnected set of activities which convert an input to an output which may leave the system (a 'product') or become an input to another transformation" (Ison, R. (2008). Systems thinking and practice for action research. In *The SAGE Handbook of Action Research: Participatory Inquiry and Practice*, P. Reason & H. Bradbury (Eds.), p. 141–158. 2nd ed. Los Angeles, CA: SAGE Publications. p. 140).

information would in principle have to be available to someone carrying out this activity? Also: what information would be generated by doing this activity? [Then follow many subsidiary questions of the kind: Who would supply or use this information? In what form? With what frequency?, etc.).]" (Checkland & Poulter, 2006),[4] which recalls the benefits implied in the word itself: in-*formation* (Wheatley, 1992). Within the informed learning framework, "information is a dynamic element, taking center stage. It is information that gives order, that prompts growth, that defines what is alive. It is both the underlying structure and the dynamic process that ensure life" (Wheatley, 1992). What constitutes information in a particular context is quite varied, ranging from visual observations to subliminal intuitions to emotional reactions, as well as the more tradition definitions of information as text documents, data spreadsheets, and visual images.

Organizations must, therefore, generate rich information experiences. "The origin of the English term *experience* appears to come from the Latin *experiential*, which means to try, to experiment, to trial. Even more insightful is the German word for experience—*Erlebnis*—the *experience of the life, to live through something*" (Todd, 2014). The focus on "information experience" in Informed Systems thereby makes visible richer and deeper contextualizations and examinations of "the lived-world experiences of people in everyday contexts as they be, do, and become. It is about people's information life-worlds and lived experiences" (Todd, 2014). "We need, therefore, to develop new approaches to information—not management but encouragement, not control but genesis. How do we create more of this wonderful life source?" (Wheatley, 1992).

3.4 Value proposition

Informed learning is both a theoretical construct, which encourages exploration of learning-related aspects of information experience, and a pedagogical framework, which enables expansion of learners' information using and learning experiences (Hughes, 2014). It follows that, with roots in informed learning, Informed Systems values co-creation of organizational learning through information experience, here defined as "a complex of information experiences, as contextualized instances of using information. It integrates all information-related actions, thoughts, feelings, and has social and cultural dimensions" (Hughes, 2014).

[4] To acknowledge that workplace information is critically important to systems design and organizational learning, Checkland created a new word, "capta"—from the Latin word *capere*, to take—just as data come from the Latin "dare," to give—which represents "an item of data which we have an interest in knowing" (Checkland, P., & Poulter, J. (2006). *Learning for action: A short definitive account of Soft Systems Methodology and its use for practitioners, teachers, and students*. Chichester, England: John Wiley & Sons. p. 112). He describes the process of using information to learn like this: "Having paid attention to some data, thus turning it into capta, we enrich it further as a result of our interest in it. That provides a context which makes the capta meaningful for us. We call such meaningful capta information. Finally, we can assemble items of information into larger, multi-layered, longer-living structures of knowledge" (Checkland, P., & Poulter, J. (2006). *Learning for action: A short definitive account of Soft Systems Methodology and its use for practitioners, teachers, and students*. Chichester, England: John Wiley & Sons. p. 112) which can inform action taking to improve problematical situations.

> *Informed learning enables people to make sense of their multiple information experiences, whilst enriching their information experience. Through multiple information experiences, we are using information to learn and so engaged in informed learning. As we are immersed in a dynamic information environment, we constantly engage with information in myriad forms. Spoken and written words, gestures, smells, pictures, memories, melodies, clothing and ambient sounds all constitute information.*
>
> *(Hughes, 2014)*

A twofold focus on informed learning and systems thinking promotes changes in organizational awareness and behavior, both building information that leads to changes and also building ways that people use information that leads to changes. This is accomplished by establishing a hospitable appreciative setting (Checkland, 2005) and requisite information culture (Oliver, 2011) for the co-design of workplace systems and practices and the co-creation of workplace inquiry and interpretation.

Such a holistic systems perspective acknowledges that any organization is part of a larger enterprise, which requires appreciation of the overall purpose of the system. At the same time, "systems thinking" observes that, while fulfilling a function in relation to the larger whole, the part in itself is an autonomous whole, which includes parts and properties that exhibit functional relationships to each other, producing interconnections and interdependencies between organizational parts and their purposes. Workplace learning outcomes therefore necessarily include collective alignment and shared understanding of the organization's purposes and priorities, which guide fiscal and human resource allocations, as well as day-to-day decision-making and long-range direction setting. Consequently, Informed Systems values collective information experiences that encourage understanding self and others as part of a larger whole. In addition, this approach values co-workers' knowledge and the knowledge built into its structures and systems.

3.5 Informed organizational learning

Within Informed Systems, the working definition for a learning organization is a purposeful social interaction system in which collective information experiences are fostered by professional information practices to bring about change in organizational awareness and behavior and thereby further knowledge creation processes. Within such a "whole systems" framework, organizational leadership must establish and embed the sustainable social interactions and enabling workplace systems that can successfully consider these questions: "'What information … experiences do we want to facilitate or make possible?' and 'What information and learning experiences are vital to further our own professional work?'" (Bruce, 2013).

At a more granular level, informed learning in the workplace must necessarily activate and extend core aspects (known as "faces") of co-workers' information experience:

Information awareness: Using face-to-face and technology enabled processes to establish workplace relationships and professional networks representing multiple relationships and global access trends.

Sources: Selecting credible sources (textural, oral, or pictorial) to engage in evidence-based practice, independently or with information professionals.

Process: Applying information processes appropriate for organizational and professional practices for independent and collaborative information exchange, decision making, and knowledge creation.

Control: Making and managing connections between information use and workplace needs, including capturing and organizing content for access and discovery.

Knowledge construction: Enabling and constructing corporate memory by developing personal and collective understanding through purposeful planning, reflection, implementation, and evaluation activities.

Knowledge extension: Applying new insights or solutions to advance individual understanding and team insight through evolving self-awareness and collective engagement as catalysts for innovation and development.

Wisdom: Evolving explicit social benefits for individual, team, and organizational work, including making wise use of information to further corporate social responsibility.

(Bruce, Hughes, & Somerville, 2012)

Within this framework, co-workers gain progressive insight into nuanced dimensions of using information to learn through exploring such questions as these: "What constitutes information? What informed learning experiences are being used? What information experiences appear? What is being learned? How is understanding/experience of the world changing? What can we do to enrich informed learning experiences? … to introduce new experiences? How would access to a range of experiences, and awareness of these experiences, be demonstrated?" (Bruce, 2012).

In addition to consideration of experiential dimensions of work information, the Informed Systems learning approach recognizes that assumptions and conclusions, including norms and values on which collective judgments are based, is the result of previous individual, group, and organization experiences and history. As Senge popularized in *The Fifth Discipline (1990)* and *The Fifth Discipline Fieldbook: Strategies and Tools for Building a Learning Organization (1994)*, explicit reflective practices can surface individual and group awareness of tacit thinking and reasoning. Questions for making assumptions visible include: "What is the observable data behind that statement? Does everyone agree on what the data is? … How did you get from that data to these abstract assumptions? When you said '[your inference]', did you mean '[my interpretation of it]'?" (Senge, 1994).

For individuals, reflection can be expressed as "being mindful of self, either within or after experience, as if a mirror in which the practitioner can view and focus self within the context of a particular experience, in order to confront, understand and move toward resolving contradiction between one's vision and actual practice. Through the conflict of contradiction, the commitment to realize one's vision, and understanding why things are as they are, the practitioner can gain new insight into self and be empowered to respond more congruently in future situations within a reflexive spiral

toward developing practical wisdom and realizing one's vision as praxis" (Johns, 2013), as a lived reality.[5]

In *The Reflective Practitioner—How Professionals Think in Action* (1983), Schön describes "reflection-in-action" (in contrast to "reflection-on-action") as a way of thinking, feeling, and responding while engaged within the experience of a situation, in order to reframe and adjust. This may require pausing to consider new ways of responding or proceeding during an unfolding information encounter. When reflective inquiry occurs within a "whole context" (West, 2005) framework that acknowledges the multiple relationships underpinning organizational learning and decision-making, then taking action becomes increasingly congruent with desirable practice outcomes.

For the collective, because shared ideas are shaped by workplace vision and expressed by professional practices, changes in collective thinking and acting can evolve as co-workers appreciatively learn to construct information experiences and conduct reflective dialog (Checkland, 2005; Checkland & Casar, 1986). Improved understanding becomes possible because "The knowledge that individuals and organizations have of themselves provides the framework in which they choose alternatives from among a huge, often unaccountable, range of possibilities. Typically, self-knowledge is mediated by the culture and language in which discussions take place and the extent to which it is possible to integrate various perspectives and models in order to act as a purposefully entity" (Leonard, 1999). To move beyond surface issues and explore deeper issues, practitioners must harness the potential of reflective inquiry amidst collaborative action (Ghaye, 2010; Loughran, 2010).

In response, Informed Systems offers a (re)learning model, conducted within an enabling systems infrastructure, for collaborative evidence-based information processes which promote sense-making and thereby enable workplace learning. Throughout, dialog, as a specific form of conversation among practitioners elaborated by David Bohm in *On Dialogue* (1996), is characteristically appreciative of differences and open to possibilities. Free exchange of ideas and information occurs without judgment, collectively enacted through commitment to work with others toward shared understanding through co-creation of increasing shared vision and inquiring collaborative practice. This requires suspension of personal assumptions and prejudices, cultivation of framing and inquiring communication experiences (Torbert & Taylor, 2008), as well as listening with appreciative engagement and respect throughout ongoing inquiry and action.

Figure 3.1 delineates processes of organizational meaning that advance using information to learn through interactive relationships between the organizational context (elements 1–5), in that individuals and groups create meanings and intentions, that leads to purposeful action (element 6) being taken, with the support of information

[5] In ancient Greece, praxis was associated with politics, which originally concerned actions, rights, and duties of active citizenship—in other words, to citizen (πολίτες or polites) membership in the immediate community or polis (πόλις or city state). Hence, in the thinking of Aristotle, praxis became a technical term designating a particular way of knowing (γνώσις or gnosis) based on a certain form of activity, wherein "the location of the principles of change in the known—the whats, hows and whys of our own acting—is in the knower, but it is also in the known." (Eikeland, O. (2014). Praxis. In D. Coghlan & M. Brydon-Miller (Eds.), *The SAGE encyclopedia of action research* (pp. 653–657). Vol. 2. Los Angeles, CA: SAGE Reference. p. 655).

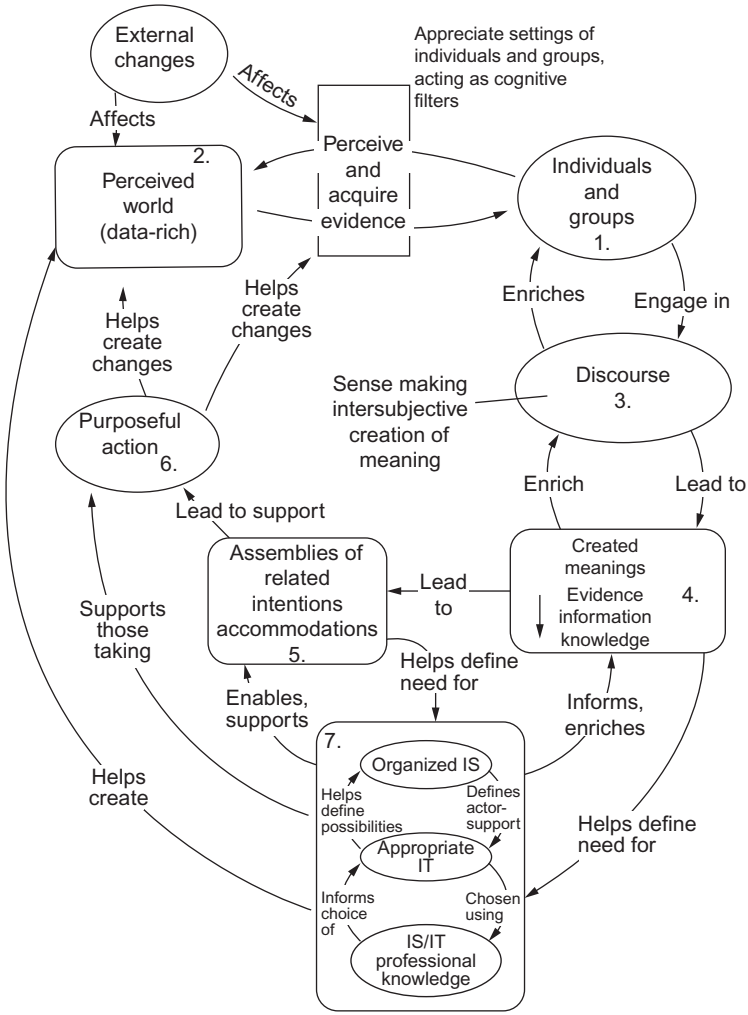

Figure 3.1 Collaborative evidence-based information process model. This figure was originally published in Somerville et al. (2014). Adapted from: Checkland, P., & Holwell, S. (1998). Information, systems, and information systems: Making sense of the field. Chichester, England: Wiley (p. 106). Reprinted with permission.

transfer and knowledge generation systems (element 7). The collaborative evidence-based information process model recognizes that individuals select information from the workplace (and extended) environment based upon a worldview consisting of existing interests, experience, and values. In other words, unless purposeful intervention occurs, individual perception is highly selective and tends to reinforce existing assumptions. So the first step in designing a sense-making process for organizational (re)learning is to initiate conscious reconsideration. Raising awareness to stimulate re-thinking requires catalyzing the innate mental processes that are performed tacitly,

without individuals making conscious decisions about what is being admitted for consideration, and can eventually widen consideration about what assumptions to make or which data to select (Mirijamdotter & Somerville, 2005).

Elements 1 and 2 and the interaction between them involves selectively perceiving reality and making judgments about it through filtering processes that influence what individuals choose to mind and, consequently, use as perception and interpretation filters. These dimensions of information experience are negotiated through sense-making processes, including dialog and reflections (element 3). Learning thereby emerges within the context of workplace vision and shared assumptions, including cultural beliefs and associated interpretations and workplace practices, as depicted in element 4.

Organized information systems (IS) and appropriate information technology (IT), together with information and information technology skills (element 7), further inform, enrich, and enable learning. In this way, tacit assumptions represented in a worldview are explicitly reconsidered in the light of emergent new norms and values. Judgments evolve and are explicated among employees through dialog, which then becomes the bases for forming intentions (element 5) toward particular actions to be carried out (element 6). As is characteristic in systems models, the seven elements are seen as interacting—i.e., element 7 informs and enriches element 4, and it enables and supports element 5, even as it helps to create the perceived world (element 2), including vision, values, and practices.

Within this systemic context, thought leaders and knowledge activists offer filters to select what is important from available information models to expand individuals' ability to understand and use information to learn (Nonaka, 1994). These interventions are challenging because tacit knowledge "consists of mental models, beliefs, and perspectives so ingrained that we take them for granted and therefore cannot easily articulate them" (Nonaka, 2007). However, as "new explicit knowledge is shared throughout an organization, other employees begin to internalize it—that is, they use it to broaden, extend, and reframe their own tacit knowledge" (Nonaka, 2007). Senge characterized these learning cycles as moving between action and reflection, between activity and repose—"to create not only time to think, but time for different types of thought and collective discussion" (Senge, 1994), which pose unprecedented opportunities and challenges for organizational leadership.

3.6 Organizational leadership essentials

It has become increasingly clear that the new century demands new leadership approaches. Styles and skills that may have worked in a more stable, predictable environment of the twentieth century are inadequate in this new era of uncertainty and rapid change, where we can hardly define the problem, much less identify possible solutions (Marquardt, 2000). In response, Informed Systems enables creation of new knowledge from using information in learning organizations. In fact, knowledge construction and knowledge extension represent ultimate outcomes of the informed learning phenomenon, culminating in wisdom which involves using knowledge in ways that benefit others (Bruce, 2008b).

Such aspirations are best pursued through exercising soft interpretive learning cycles through participatory design and action research to generate "evidence" that animates intentional dialog and reflection. Over time and with practice, participants improve topical understanding and refine systems functionalities. This workplace information experience can be characterized as an iterative spiral composed of planning, action, and evaluation about the result of the action. Participants therefore enter into "a problematical situation and becomes a participant as well as a researcher, using reflections on the experience gained as his or her source of learning" (Checkland, 2011).

Informed Systems, therefore, harnesses workplace learning within collaboratively designed systems that enable using information to learn through collegial exchange and reflective dialog. This systemic approach to workplace learning integrates theoretical antecedents and process models, including the learning theories of Christine Bruce (Informed Learning) and Peter Checkland (Soft Systems Methodology, SSM), which support informed action within designed systems that generate "information experiences" for knowledge creation, as advanced by Ikujiro Nonaka and his associates.

In order to engage organization members in using information to learn, "mindful" leadership must further reflective practice and evolve self-awareness through collective "conditions of learning" within the workplace. The creation of such a community of inquiry has historical roots in ancient Greece and philosophical origins with John Dewey. It requires collaborative and "purposeful discourse focused on exploring, constructing meaning and validating understanding" (Garrison, 2014). Vision setting thereby necessarily depends on forging shared agreement on organizational purpose(s) among co-learners. Doing so, in turn, assures the creation of collaborative relationships for working together toward shared success, fortified by a strong sense of commitment and motivation.

The Informed Systems Leadership Model presented in Figure 3.2 identifies essential elements for such organizational leadership, supported by collaborative learning relationships that catalyze systemic outcome and process evaluation cycles.

It illustrates a process-oriented human activity system for an Informed Systems leadership model, which elaborates information systems' roles. It visually represents knowledge developed over a decade about the purposeful activities necessary to construct and sustain an environment that enables informed learning experiences through informed leadership. The model builds on the SSM technique for drawing purposeful activity models, conceptualized as activities that together comprise processes for action and, ideally, transformation. In this case, the informed leadership model presents high-level activities for which (formal and informal) organizational leaders are responsible. Additionally, the model can be expanded in more detail so that an expressed activity is conveyed by a number of sub-activities. However, in this process-oriented system model, only meta-level leadership responsibilities are represented.

The activities in purposeful activity models are expressed as verbs in imperative form and are linked in sequence—illustrated by arrows—which denotes communication. Additionally, when there are arrows in two directions between activities, this illustrates two-way communication and interaction. For example, in Figure 3.2, Activity 1

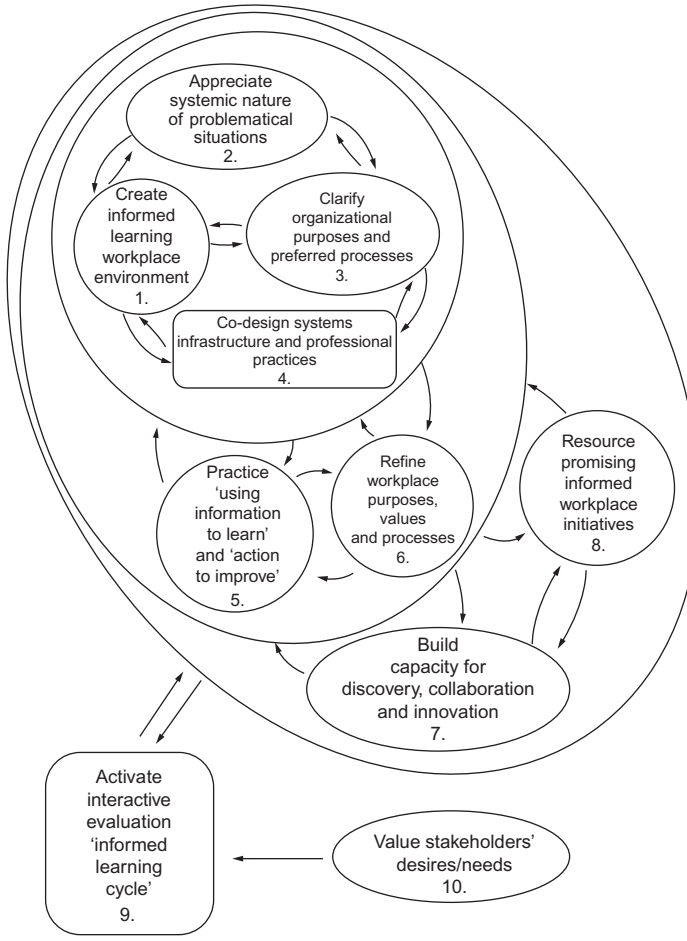

Figure 3.2 Informed Systems leadership model. The figure was originally published in Somerville (Mary, 2009).

represents the initiating activity. However, Activities 2, 3, and 4 also contribute to Activity 1 and thus must also be carried out to complete the full cycle. Additionally, activities can be ordered in layers to connote that they form a grouping. Activities outside the layered group—but with an arrow pointing to or from a boundary line—illustrate interaction and communication with all activities inside the layered boundary. For example, Activity 5 may lead to insights that promote modifications and improvements in any of the activities in the "core grouping" of Activities 1 through 4. Finally, feedback processes need to be illustrated, as do the activities related to these, such as monitoring the performance of all activities so that decisions can be made in a proactive fashion about needed changes to adapt to changing internal or external conditions, rather than passively reacting to the inevitable.

To explicate a process for proactive, nimble, and responsive informed leadership, Figure 3.2 illustrates essential aspects of workplace informed learning, enabled by supporting systems design. Activity 1 represents activities that are aimed at encouraging collective exploration and, thereby, fostering a robust learning environment. Its centrality in the model reflects the conviction that contemporary organizations cannot be managed in the traditional sense. Rather, co-workers should be encouraged to actively engage in information exchange and knowledge creation, purposefully using information to learn within enabling co-designed systems.

Activity 2 signifies the belief that effective workplace learning environments employ appreciative inquiry and systems thinking to advance understanding of organizational parts, their interrelations, and their synergies. Emphasis on life giving and big picture understanding bridges individual silos and crosses organizational functions. In the informed leadership model, this concept is reflected in organizational vision, mission, values, and goals, which constitute Activity 3.

Activity 4 recognizes the critical importance of enabling the expression and extension of systems thinking frameworks through purposeful systems that connect people with ideas, oftentimes (but not exclusively) through technologies. This workplace infrastructure for using information to learn enables generous information sharing opportunities and invites robust sense-making experiences, guided by knowledge vision.

Activity 5 acknowledges the significance of engaging in collegial activities to improve professional practices and local situations. Therefore, Activity 6 represents the importance of ongoing reflection and dialog to create continuous improvements in using information to learn how to take action to improve situations. Activity 7 indicates that sustained movement forward depends upon establishing strong learning relationships inside and outside the organization. The list of potential actions resultant from exploring Activities 1 through 7 should be prioritized and promising informed learning workplace initiatives should be adequately resourced as indicated in Activity 8.

In order to nourish informed learning experiences and support worldview evolution, Activity 9 recognizes the necessity of using interactive evaluation to ensure nimble responses to changing conditions. In this way, Activity 9 initiates a feedback cycle, where performance can be monitored to inform decisions about possible adaptations. Activity 10 acknowledges the importance of ensuring responsive alignment of mission and vision with human and fiscal resources, which values changing stakeholder circumstances. Therefore, this appreciative setting, from which to assess the success of activities, requires constant review.

This Informed Systems leadership model recognizes that for learning to occur, information encounters must be experienced as sufficiently contextualized to activate and extend prior understanding (Bruce, 1997). This achievement depends on "relationship maintenance" (West, 2005) within the "appreciative system" that is at the heart of soft systems design and learning. This orientation challenges conventional workplace goal setting to refocus attention on context-dependent organizational activities. When the workplace is conceptualized in this way, organizational culture is experienced as a shared basis of appreciation and action (Schön, 1983)

developed through persistent communication and maintained by learning relationships exercised in action-oriented inquiry and inclusive decision-making.

3.7 Informed System Approach

"The systemic view focuses on organized wholes, taking into account the multidimensional and multi-level nature of complex systems" (Schwaninger, 2009). Therefore, Informed Systems models delineate processes that advance "using information to learn" through interactive relationships and organizational context in which individuals and groups create meanings and intentions. This leads to purposeful action being taken, with the support of information transfer and knowledge generation systems.

The Informed Systems approach recognizes that individuals select information from the workplace (and extended) environment based on a worldview consisting of existing interests, experiences, and values. In other words, unless purposeful intervention occurs, individual perception is highly selective and tends to reinforce existing assumptions. So the first step in designing a sense-making progress for organizational (re)learning is to initiate explicit reconsideration. Raising awareness to stimulate re-thinking requires catalyzing the innate mental processes that are performed tacitly, without individuals making conscious decisions about what is being admitted for consideration, and can eventually widen consideration about what assumptions to make or which data to select.

These (re)contextualizing learning processes recognize that the norms and values on which collective judgments are based is the result of previous individual, group, and organization experiences and history. Ideas are shaped by shared workplace vision and expressed through professional practices. However, both thinking and behaving can evolve as co-workers learn from workplace information experiences enabled by purposeful designed systems. This occurs as organizational leadership provides evolving context to reconstruct existing perspectives, frameworks and premises and thereby expand collective capacity to convert information to knowledge (Nonaka, 1994). As new knowledge is shared throughout an organization, co-workers begin to internalize it—that is, they use it to learn and thereby broaden, extend, and reframe their working knowledge (Nonaka, 2007).

3.8 Organizational knowledge creation

Creating new knowledge represents a critical dimension of using information to learn. In fact, knowledge construction and knowledge extension represent the ultimate outcomes of Bruce's informed learning phenomenon (Bruce, 1997). Nonaka's complementary ideas reveal the nuanced dimension of using information to learn through a spiraling process of systemic interactions between explicit and tacit knowledge to create new knowledge (Nonaka, 1994). This systems model, Socialization, Externalization, Combination, and Internalization (SECI), recognizes that knowledge exists in a continuum of two forms: tacit (unarticulated knowledge gained through experience) and explicit (articulated knowledge that can be easily created and transmitted to others, stored, managed, and reused).

Nonaka's SECI system ideas permit the conceptualization of conversion patterns. Socialization and externalization activities are the starting points for the organizational learning spiral in which the tacit knowledge of individuals is articulated and thereby made explicitly available for others. When knowledge is then contextualized so that employees understand its applicability to their situations, the collective knowledge of the organization is enriched. The fourth conversion pattern, internalization, reflects the importance of accumulating understanding so that new learning will induce fresh understanding. In accumulating, explicit knowledge is added to tacit knowledge and the enhanced understanding becomes internalized at both individual and collective levels. Stated differently, "Knowledge creation is based on individuals performing activities in which their existing tacit and explicit knowledge is combined and used for refinement of activities and for exploring new possibilities" (Kodama, 2006). After internalization, the process "spirals up" and continues at a new level as a result of dialog and reflection among organizational members engaged in collaborative knowledge creation activities.

To achieve this ideal requires rich dialog and interaction opportunities within an organizational workplace designed for using information to learn at multiple levels. Acknowledgement of multi-level organizational functions and interrelationships—and consequential multi-level learning—recognizes that learning organizations are necessarily systems. An organizational system is itself a part of a larger whole within which it fulfills specific functions. It is, as well, comprised of sub-systems. Each layer includes structure animated by communication and coordination patterns between the sub-systems and its external organizational environment. Systemic ideas recognize the rich interplay between processes and levels.

The idea of a layered structure recognizes various layers' functions within the whole system. This in turn encourages acknowledgment of properties, both characteristic and emergent, produced through interactions at and between specific levels. Interactions are expressed through exploring various perspectives, appreciating layers' elements, and defining learning indicators. When paired with informed learning theory, such systems ideas can guide coordinated action through informed learning experiences that, for instance, further: (a) environmental scanning and communication strategies which ensure staff are up-to-date on important matters; (b) resources and services that ensure staff can access required information; (c) preferred approaches to problem solving, decision-making, project management, and reporting; and (d) strategic processes for ensuring information management and capturing organizational memory (Bruce et al., 2012).

3.9 Workplace synergies

Multi-level systems models offer valuable insights into creating knowledge enabling workplace processes and systemic structures for advancing new ways of knowing an information landscape. Resultant multi-level learning is essential to create a workplace environment capable of activating and sustaining knowledge creation through continuous social interaction of tacit and explicit knowledge. In an iterative fashion, this dynamic interplay of ideas among individuals and groups produces knowledge

through social learning when robust exchange relationships further the sharing of information, skills, expertise, and experience for the purpose of establishing a common ground and common practices to influence purposeful actions.

More specifically, within enabling workplace systems, informed learning occurs through assimilating new learning and using what has been learned, thereby advancing organizational renewal. More than the sum of individual learning processes and team learning processes, the three levels of organizational learning (individual, group, and organization) are linked by social and psychological processes—intuiting, interpreting, integrating, and institutionalizing—i.e., the 4i framework. These four processes connect the three levels of analysis and define the structures through which workplace learning takes place. Intuiting and interpreting occurs at the individual level, interpreting and integrating occur at the group level, and integrating and institutionalizing occur at the organizational level (Crossan, Lane, & White, 1999).

It follows that, when organizational learning incorporates the dynamic multilevel nature of a phenomenon and captures the rich interplay between processes and level, cognition affects action, and action affects cognition, in a reciprocal fashion. As well, cognition influences collective learning captured and institutionalized in the form of processes, routines, systems, structures, strategies, and practices that in turn affect the "what" of cognition and the "how" of behavior across levels (Crossan et al., 2011). Adoption of an informed learning approach in a workplace, therefore explicitly acknowledges using information to learn, furthering the what of topical knowledge and the how of professional practices (Somerville, Mirijamdotter, Bruce, & Farner, 2014).

In this way, an organization can be conceptualized as a purposeful social interaction system in which collective capabilities develop through workplace learning processes. An organization's commitment to establishing workplace learning must therefore recognize the importance of establishing sustainable organizational structures and communication systems that encourage and enable the social interactions which promote investigation and negotiation of the interests, judgments, and decisions through which people learn interdependently.

Through an ongoing interplay of action, observation, and evaluation, nimble responsiveness is enabled and animated, thereby initiating perpetual individual, team, and organizational learning aimed at ever-deepening insight and performance which reflect-in- and on-action. Such reflection includes the ability to carry on "learningful" conversations that balance inquiry and advocacy, where people expose their own thinking effectively and make that thinking open to the influence of others (Senge, 1990), thereby increasing awareness of a wide range of forms of information experience and expressions of information practice (Bruce, 2008a).

Building knowledge production capability within an organization therefore relies on development and implementation of organizational environments that foster robust exchange relationships and effective collaborations. This in turn requires an organizational design that recognizes the importance of cultivating both formal and informal interactions among individuals and with information to ignite contextualized information experiences that enable knowledge creation and advance workplace learning.

3.10 Systems design gestalt

Informed Systems advances organizational learning that purposefully employs collaborative systems design (from Checkland) to enable situated learning experiences (from Bruce) for organizational knowledge creation (from Nonaka). Because these theorists understand that information is central to learning, they use information to further learning. These theorists also recognize technology as potentially enabling, especially if inclusive systems design processes initiate, further, and sustain learning. In addition, their antecedent theories recognize that organizational learning is social so each individual's learning depends upon the knowledge that other members of the organization possess. Therefore, "social interaction facilitates not only communication and coordination, but also learning. The meaning, the understanding and the learning are defined according to a context" (Curado, 2006a). This latter point acknowledges why it is so difficult to unlearn, whether within individual, team, or organizational information transfer contexts, because by implication, learning implies having some kind of sense, or knowledge from experience accumulated to allow change (Fear, 2003).

Organizations are not able to create knowledge, only individuals can. While only individuals have the capability to create knowledge, organizations are the context where learning occurs or, more precisely, organizational learning happens in an organizational context, when the factors and conditions that enable learning are present. In this sense, learning involves organizational and individual capabilities, and knowledge creation is activated and shaped by the social constitution of the organizations where it occurs (Curado, 2006b).

Forward thinking movement, therefore, requires activating designed phases of organizational learning. The first corresponds to the cognitive level wherein organizational members are exposed to new ideas, from either external sources or internal sources. As a consequence, they expand their knowledge and begin thinking in different ways. The second phase is behavioral. Employees start to internalize new perspectives and, as a consequence, alter their behaviors. The third and last phase occurs when performance improvement occurs. This happens when changes in behavior lead to measurable improvements in results (Garvin, 1998).

Despite a multitude of learning cycles concurrently enacted within the workplace, organizational leadership must successfully balance resources and activities between exploration—the pursuit of new knowledge, of things that might come to known, and exploitation—the use and development of things already known (March, 1991). In addition, to enable "strategic integration" and "organizational fit," organizational learning must be integrated into overall organizational strategy, structure, culture, and capabilities, including policies and practices (Bierly & Daly, 2002). In response, Informed Systems recognizes that multi-level use of information to learn in contemporary organizations requires shared professional practices supported by enabling learning systems infrastructure. Further, the approach acknowledges the interplay of enabling systems and socializing practices, which determine how organizations function, change, and adapt.

Figure 3.3 illustrates this holistic approach, which recognizes the processes for spiraling knowledge conversion that produce ever increasing variation and complexity in information experiences. This depends, of course, on the efficacy of co-designed professional processes and enabling systems for cultivating formal and informal interactions among individuals and ideas.

Figure 3.3 illustrates the conversion of knowledge in an organizational learning spiral catalyzed by using information to learn within the iterative learning construct of the Soft Systems Methodology Processes of Meaning model. At the bottom of the figure,

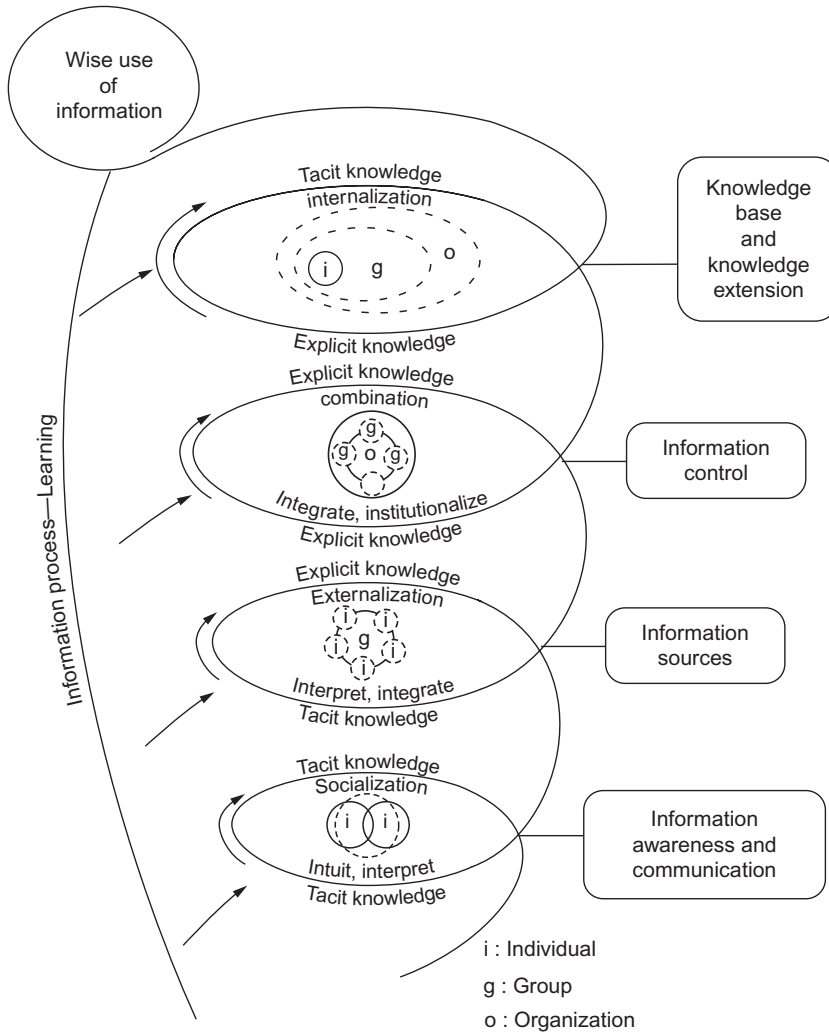

Figure 3.3 Synergistic aspects of informed learning theory, SECI models, and 4i framework contributions to Informed Systems. This figure was originally published in Somerville et al. (2014).

tacit knowledge is illustrated as becoming explicit through socialization processes employed by individuals exercising shared professional practices. From an informed learning perspective, this first spiral corresponds to information users first becoming aware and then finding ways to communicate with each other to learn as they gain proficiency in making tacit knowledge explicit. The second phase illustrates the externalization process, including individuals turning their attention to new information sources, including but not limited to colleagues' knowledge. Here information use is experienced as extending individual awareness and use of collective information sources.

In the third step, combination, knowledge is contextualized and systematized, and made available through organizational documents or other mediums. Bruce refers to this kind of information use as information control, in which new explicit knowledge is shared within the organization for agreed upon purposes and through shared practices in order to foster collaborative learning. In the fourth phases of the spiral, learning requires internalization in which individual and group knowledge is made tacit and integrated into the organization's knowledge base. In Bruce's framework, this phase denotes that acquired knowledge influences personal perspectives in such a way that novel insights are gained and personal knowledge bases are extended. Additionally, the combination and internalization steps recognize that, throughout, information users are engaged in evaluation processes and critical analysis, mindful of actions to be taken, represented here as an organizational sense-making model.

Nonaka's knowledge conversion model further acknowledges that the knowledge creation process is iterative, just as learning is continuous. So, appropriately, the Informed System Approach is cyclical: upon completion of Nonaka's four phases, amplified by Crossan's 4i's, Checkland's sense-making processes commence. On a meta-level which characterizes all phases of the knowledge conversion model, the ability to successfully navigate unfamiliar situations requires an agile capacity for finding, valuing, and using information to learn. This requires being aware of personal values, attitudes, and beliefs in order to make wise decisions that place information in a larger context that ensures ethical and optimal decisions for the benefit of self and others, as envisioned within informed learning theory.

3.11 Informed organizational outcomes

The holistic Informed Systems approach to generating informed action within the workplace offers a robust information-centered and systems-enabled organizational learning approach for contemporary organizations. The approach combines proven theories, models, and frameworks offering information, learning, and systems ideas. Sense making processes and associated sub-processes recognize that every level of an organization (individual, group, and organization) must work together to generate purposeful action. This action must be coordinated in order to ensure fulfillment of strategic purposes and core activities identified through continuous multi-level exchanges that focus on using information to learn—i.e., informed learning.

As using information to learn becomes a shared basis of appreciation and action, the workplace culture reflects heightened regard for initiating, maintaining, and

sustaining communication and relationships that promote collective alignment and shared understanding of the organization's purposes and priorities. Such collective understanding guides fiscal and human resource allocations, as well as day-to-day decision-making. In addition, pervasive systems thinking encourages understanding self and others as part of a larger whole—e.g., the librarian within the academic library within the university and beyond to higher education.

In combination, informed learning and systems ideas can construct supportive multi-level learning infrastructure, fortified by enabling professional learning practices. Over time and with experience, as environmental conditions change, design tools and techniques can manage complexity and ensure adaptability of workplace learning systems and associated professional practices. In an ongoing fashion, this is accomplished through clarifying and adjusting the cultural worldviews and workplace norms, at individual, group, and organizational levels, which are used to filter information and evaluate relevance and thereby inform decision-making and action taking.

Several organizational design elements can significantly impact organizational learning. The organizational culture defines the values reflected in shared behavior and shared attitudes. Organizational leadership guides the actions, the words, the ethics, and the examples set, as well as the priority given to and efforts made in support of the management of organizational learning. Organizational knowledge vision and associated knowledge processes determine information and knowledge sharing practices, including tacit and explicit knowledge exchange, and workplace communications within the organizational structure, comprised of hierarchy and groups as well as work space distribution. A final design element, the organizational technological infrastructure, consists of hardware and software components used in the communication and in the collaboration among organizational members, as well as used in storage, in transfer, and in location, in the creation and integration of knowledge (Curado, 2006b).

In the case of academic libraries in the digital age, continued viability requires that organizations must harness the potential of these organizational design elements to transform outdated filters so that appropriate worldviews can guide reimagined value propositions, service models, and curation strategies. In the past decade, applied research results in three North American academic libraries illustrate that enhanced information availability and coordinated learning veracity can successfully guide the application of systems ideas grounded in informed learning. In these cases, a focus on information constitutes both the subject of workplace inquiries, which use information to learn in individual, group, and organizational settings, and also inform the substance of professional practices, which use information to advance multi-level learning that engages, enables, and enriches informed employees' experiences in an expansive information universe.

3.12 Concluding reflections

Information work today requires that organizational members draw from a wide range of information sources and engage with information related activities that enable them to know the information landscape of the workplace; to understand how information is

situated within it; and to connect with the performance of work as it happens (Lloyd, 2013). Recognizing that there are many ways of knowing how work happens acknowledges the many ways of understanding, experiencing and conceptualizing it (Lloyd, 2005), as well as enacting it in practice. When these dimensions of workplace information experiences become purposefully enabled and intentionally informing, this can produce a vibrant social learning environment in which information use and information experience become transformative.

Using information to learn thereby requires and extends shared leadership principles and practice, activated by appreciative inquiry aspirations and action research intentions. Collaborative design of enabling learning systems that harness technologies and promote discourse ensures collective capacity for knowledge advancement and, ultimately, workplace reinvention. This necessarily requires that shared intentions, collective behaviors, cultural groundings, and professional processes evolve so employees gain more complex understanding of their work and their worldviews, and those of others.

The next chapter illustrates the efficacy of systemic leadership that advances essential elements of informed learning and information experience through collaboratively designed communication systems for enabling information sharing and knowledge creation processes fortified by professional exchange and reflective dialog practices. Locally contextualizing values, experiences, and purposes serve to further the emergence of organizational change and innovation amidst uncertainty, complexity, and ambiguity.

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Informed Systems implementation 4

4.1 Organization description

Built in 1976, the Auraria Library is a centralized resource of information and expertise serving three institutions of higher education on the Auraria Campus in the heart of downtown Denver, Colorado, USA. The only such multi-institutional academic library in the nation, it currently houses approximately 650,000 print books; provides access to 140,000 e-books, 60,000 e-journals, and 280 million electronic resource records; and maintains 580 journal and newspaper subscriptions, 350 database subscriptions, and a film and videotape collection of more than 22,000 titles.

These resources serve the students and faculty of the University of Colorado Denver (CU Denver), the Metropolitan State University of Denver, and the Community College of Denver, with a combined enrollment of 54,000 students representing 17% of all college students in the State of Colorado. At each of the schools, populations of "non-traditional" students range from 25% to more than 50%. Whether minority, low-income, first-generation, married with family, splitting time between work and school, resuming an interrupted education, separating from the military, or possibly all of the above, students find that the Auraria Campus institutions are experienced at enabling them to succeed. The Library also actively collaborates with other major research libraries in Colorado to advance discovery and access to unique local holdings, digitized and hosted in institutional repository environments that, collectively, enhance the scope of Colorado collections.

4.2 Organizational reinvention

Across the globe, changes are disrupting traditional practices of information and knowledge professionals throughout the scholarly ecosystem (Somerville, Schader, & Sack, 2012; Somerville & Conrad, 2014). Accelerated diffusion of Internet usage is continuing to challenge traditional library usage patterns and associated workplace priorities, outcomes, and processes. In addition to these global pressures, the Auraria Library was experiencing the national recession further aggravated by regional economic depression and a "print to digital" migration mandate when I assumed the role of Library Director in 2008. These combined global and local changes provided the impetus for comprehensive organizational renewal to satisfy the pervasive need in contemporary organizations for decentralized application of expert skills and understanding.

To create an enabling infrastructure, a collaborative design initiative advanced reinvention of structures, processes, services, and roles throughout the organization, with emphasis on distinctive social, relational, and interactive aspects of workplace

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learning. Fostered by appreciative inquiry, enabled by social learning, fortified by systems thinking, and animated by shared leadership, the redesign initiative aimed to advance informed learning, thereby applying theoretical conceptions to transformation of a real-world workplace environment.

Earlier applied research initiatives had demonstrated that advancement of the use of information to learn required furthering information exchange, decision-making, and knowledge creation systems through purposeful organizational redesign. Therefore, the reinvention of organizational culture, collaborative processes, and workplace outcomes intentionally furthered these organizational elements. Changes were firmly grounded in a working understanding of Informed Learning theory and associated professional practices, reflective of prioritization of "using information to learn" (Bruce, 2008) in the workplace, fortified by continuing voracious reading of literatures relevant to the comprehensive organizational redesign initiatives discussed below.

4.3 Organizational learning

To create learning aspirations and learning systems, organizational learning was initiated through "appreciative inquiry" (Pan & Howard, 2010; Somerville & Farner, 2012) and furthered by human-centered systems design processes (Mirijamdotter, 2010; Somerville & Howard, 2010). Intentional, incremental building of conditions necessary for transformative "information experiences" (Somerville & Mirijamdotter, 2014a) in an emergent organizational learning environment supported progressive understanding of "problematical situations" through "opportunity for all participants to be part of the enquiry rather than the objects of the enquiry" (Stowell, 2013) when "finding out" about shared concerns. The phrase "problematical situation" intentionally contrasts informed learning, which describes a continual process, with problem solving, which assumes that there are discrete problems that can be solved once and forever. Therefore, in the spirit of informed learning, "research for change" (Reed, 2007a) within enabling learning systems aimed to advance collective thinking about situations so that concerted action could be taken to bring about local improvements. Mindful of learning, enhancements in professional practices and advancements in topical understanding typically occurred as well.

According to Checkland and Poulter (2006), "The complexity of problematical situations in real life stems from the fact that not only are they never static, they also contain multiple interacting perceptions of reality. This comes about because different people have different taken-as-given (and often unexamined) assumptions about the world. This causes them to see it in a particular way." Within libraries, this can be expressed as employees seeing the library as a repository of established knowledge or, in contrast, as an environment for knowledge creation. Differing viewpoints produce different assumptions about the nature of the library institution and about the mission of library professionals. In other words, people have different worldviews, "mental and social constructions derived via social interaction" (Guba & Lincoln, 1989). Therefore, informed learning experiences have to include analysis at a level that allows worldviews to be surfaced and examined.

As examples below illustrate, even fixed worldviews can change over time because "All problematical situations, as well as containing different worldviews, have a second important characteristic. They always contain people who are working purposefully, with intention, not simply acting by instinct or randomly thrashing about—though there is always plenty of that too in human affairs" (Checkland & Poulter, 2006). Recognition of the existence of conflicting worldviews and the ubiquity of purposeful actions can inform the exploration of problematical situations through a process of inquiry which, through social learning (Lave & Wenger, 1991), leads to discovery and insight for taking "action to improve" professional practices and real situations. When locally contextualized by values, experiences, and purposes, iterative learning cycles identify changes that are both arguably desirable and also culturally feasible for the people in a particular situation with its particular history, culture and politics. That is to say, this approach to action reflects "a process of finding versions of the to-be-changed situation which different people with conflicting worldviews could nevertheless *live with*" (Checkland & Poulter, 2006).

4.4 Systems thinking

Rethinking together can produce accommodated agreements if four conditions, fundamental to "systems thinking," are met. These conditions recognize that "the underpinning abstract concept is that of a system as an adaptive whole, which can survive as its environment may change and deliver shocks to it. In such a whole, each functional part will be properly linked to others, and appropriate information will be continuously available to enable adaption to take place in response to the monitoring of performance" (Checkland, 2012).

First, any entity called a "system" may also contain within itself functional subsystems, and may itself, as a whole, be a functional part of a wider system. For example, an academic library is comprised of units—such as technical, public, technology, and administrative services—and is also an integral part of a higher education institution.

Second, to achieve adaption to change, processes of communication involving both the system and its environment will enable performance to be monitored so that a decision to adapt or not can be taken. In the Auraria Library, purposeful communication systems were co-designed to ensure ready access to data and information, with accompanying processes for dialog and reflection. Elsewhere, such processes are referred to as information practices but here these processes are referred to as professional practices because the intentional conversion of data and information to knowledge and wisdom oftentimes requires other professional knowledge bases, including Soft Systems Methodology (SSM) design tools from systems sciences and charette (workshop) design practices from architecture and landscape architecture.

Third, "if action to adapt is to be taken, the system will have to have available a number of possible control processes (responses to the shocks from the environment and internal failure), which can be appropriately activated to bring about change" (Checkland, 2012). In this instance, a thoughtfully articulated structure for shared leadership, including interactive evaluation, decision-making, and strategic

planning, ensures nimble responsiveness to changing conditions. A workplace culture of evidence-based decision-making, animated and informed by participatory action research studies, serves to further appreciative inquiry possibilities.

Fourth, definable "emergent properties" that characterize the particular system, and which are a result of the interactions between functional sub-systems, must be active. In the case of Auraria Library, adoption of Informed Learning theory ensures attention to learning. The workplace was further enabled for learning by theories for co-designed knowledge systems and professional practices described by both Bruce and Checkland. Within these intersecting theoretical frameworks, these questions provided points of departure: "What information literacy experiences do we want to facilitate or make possible?" and "What information and learning experiences are vital to furthering our own professional work?" (Bruce, 2013).

In the Auraria Library environment, appreciative inquiry, shared leadership, co-design, and systems thinking provided the means to promote discovery. The new library recognizes that academic libraries are a part of a rapidly changing higher education landscape that necessitates active exploration—and responsive transformation—of traditional resource, service, and facility assumptions, with and for campus stakeholders. These theories and elements are described in the following sections, with the aim of ensuring "recoverability" (Checkland, 2012) of the whole course of thinking about this organizational transformation by any interested outsiders.

4.5 Organizational readiness

Assuming the role of University Librarian and Library Director at the University of Colorado Denver provided me with an opportunity to serve as thought leader and knowledge enabler by expressing the lessons learned from previous organizational settings. Earlier research projects had underscored the importance of such seemingly disparate factors as worldview paradigms, shared vision, cultural norms, professional practices, metanarrative stories, and performance behaviors used in determining critical information sources and workplace capabilities required, both for the collective learning process and for the organizational learning system. In choosing to adopt an informed learning orientation, I drew from my prior experience, which illustrated that successful adoption requires leadership to consistently focus on the relationship between the organization's communication systems and information experiences. Ultimately, this focus provides understanding of what is being learned about the organization and how this learning occurs as a result of those experiences. Therefore, I chose to complement Bruce's Informed Learning theory with Checkland's SSM tools to co-design organizational systems to enable knowledge creation, as explicated by Nonaka.

The fundamental aim of the redesign process was to cultivate "information resilient workers" (Lloyd, 2013), which enables nimble workplace responsiveness, even amidst considerable disequilibration and disruption of "the way we do things here." I anticipated that, in a synergistic fashion, employees' enhanced information competences would both build upon and also further reinvent relationships among information, technology, and people. Project highlights below illustrate various strategies

intentionally applied to introduce ideas that extended established but outdated worldviews and their associated assumptions. In addition, the redesign initiative sought to overcome pervasive deficit thinking and silo-ed decision-making. Along the way, entrenched paradigms of librarian as gatekeeper and library as warehouse were challenged and transformed, as they disabled movement forward amidst disintermediated searching and disruptive technologies.

4.6 Reinvention genesis

Since intentions, fortified by enabling structures and processes, are quite influential in determining workplace character, the initial priorities of the capacity building initiative focused on collaborative design and inclusive construction of knowledge that enabled systems to ensure progressive accomplishment of newly envisioned initiatives. From my earlier experiences, I understood the importance of involving all interested employees in the creation of aspirational systems for communication, planning, and governance. While these directions were initiated from "the top" based on action research results in previous institutions, the Informed Systems Approach organically gained "bottom up" adoption and adaption within this holistically co-designed and systems-enabled learning organization.

To begin, I conducted one-on-one interviews with 85 employees, using questions based in Appreciative Inquiry (Whitney & Trosten-Bloom, 2003; Sullivan, 2004). This approach to inquiry recognizes and affirms past and present strengths, successes, and potentials. It invites discussants to perceive that which gives life—such as health, vitality, and excellence—to living systems. By encouraging exploration and discovery, I signaled my openness to seeing new potentials and possibilities and invited others to do so also. I also initiated a coevolutionary search for the best in people and in our organization, as well as the world around us, in the belief that, over time and with practice, this would strengthen workplace capacity to apprehend, anticipate, and heighten positive potential and co-create a shared vision of valued and possible futures.

Thought questions presented in one-on-one meetings and group discussion included these "work life" inquiries, which increasingly explored employee "experience":

> *Think of a time when you felt especially creative. Describe what you were doing, what you were thinking, and what you were feeling.*
> *Describe a peak experience in your professional work. What was it about your situation, organization, colleagues, or yourself that enabled this to occur?*
> *Recall a situation in this library when you worked well as a member of a team. Describe this experience. How did you feel? What made this possible?*
> *Recall a successful partnership-like experience outside the library with university faculty or staff. Describe this experience. How did you feel? What made this possible?*
> *Describe a leader who has influenced you. What did that person do? How did that person interact with you? Describe some specific instances in which you experienced this influence.*
> *What are the three or four most important aspirations for the future of the library? What are the key components for its vision?*

In addition to discovering individual dreams, strengths, and aspirations, I was able to utilize the knowledge gained through these experiences to identify the individuals best suited to become Associate Directors. These individuals then conducted similar interviews with employees in their newly constituted units, asking "What is your greatest contribution to this organization?" and, relatedly, "What would you like to contribute to the Library in the future?" Results from these appreciative inquiry sessions clarified the variations in employee expertise and aspiration. In addition, "conversations about the 'best of what is' currently and 'what could be' in the future provided a foundation for organizational revitalization" (Pan & Howard, 2009a). As a consequence, a significant number of voluntary staffing reassignments were made, and the Associate Directors and I learned to work together to both build their own new units and also develop a big picture appreciation of the whole enterprise. In learning to see the potential of enterprise-level for "working together" (Somerville, 2009), formal organizational leaders learned both to discern the parts in the whole and also the relationship of parts to the whole. They also learned to see those parts and the whole in new ways.

As the following sections will illustrate, an early Appreciative Inquiry intervention served to reinterpret predominant deficit thinking and activate possibility thinking, which assisted employees in learning through a new lens. Progressively, they began to see that the whole and its constituent parts are adaptive. In addition, new professional practices based in evidence-based decision-making produced recognition that academic libraries need to provide the facilities, resources, and services most valued by stakeholders, rather than what employees desire to offer, or believe without analysis that present or potential constituencies require. Therefore, workplace structures and decision-making processes must ensure action-oriented and forward thinking movement toward organizational outcomes expressive of shared vision and enabled by learning systems.

4.7 Participatory systems design

A series of workshops conducted at the Auraria Library in March 2009 by Visiting Research Scholar Anita Mirijamdotter aimed to further creation of an evidence-based organizational culture grounded in shared leadership principles and fortified by reflective decision-making and strategic planning practices. This focus emerged from a previous workshop, facilitated by organizational development consultant Maureen Sullivan in November 2008. In this working session, participants identified desirable features for organizational communication, decision-making, and strategic planning systems within the larger context of shared leadership. Core issues included the need to organize systems for receiving and sending communications, identify what is important to know within an organizational context, and select appropriate tools to achieve desired communication outcomes. (For more information, see Attachment 4.1.)

Over the course of 3 days, Mirijamdotter delivered workshops that built on employees' prior understanding, following the SSM learning process (Checkland & Poulter, 2006).

Workshop participants first analyzed existing communication channels, including the benefits for each, as well as current structures, processes, and purposes of organizational systems. During dialog and reflection, employees indicated a general preference for face-to-face forms of interaction that permit more personal, direct, and nuanced communication while conversing, deciding, and planning. Real-time interactions were also recognized as most supportive of informed learning, which depends on social exchange for "sense making." However, workshop participants noted that it is difficult—and sometimes impossible—to schedule large group face-to-face meetings, which necessitates co-creation of vibrant virtual learning environments.

During the workshops, Mirijamdotter guided participants from surfacing general observations about characteristics of various communications channels in the current environment to identifying design characteristics for ideal communications, decision-making, and planning systems. Since ideal systems must satisfy shared needs, she also elicited shared concerns about problematical situations. For workshop participants, these included: to inform oneself and inform others; practice collaborative evidence-based decision-making; avoid duplication of effort; ensure team accountability; solve technological problems; share "big picture" professional frameworks; and disseminate organizational policies and procedures.

In moving from needs finding to system designing, Mirijamdotter employed the SSM "rich picture" tool to elicit mental models from small groups. She thereby created an intentional collective information experience that used information to learn (Somerville & Mirijamdotter, 2014b). The information-focused and learning intensive nature of various SSM tools and techniques guide action research cycles, in which participants address perceived problematical situations. As they explore situations through the lenses of diverse worldviews in a workplace culture rich in dialog and reflection opportunities, participants can find negotiated accommodations that enable collective action to improve. As isolated "learning in action" activities evolve into more widespread "collaborative evidence-based information practice," persistent learning can catalyze discoveries that support adaption and, ultimately, transformation, as employees learn to "act wisely" (Rowley & Gibbs, 2008).

4.8 Shared leadership

In order to achieve this potential, the long-standing practice of working in isolation had to be transformed into working together collaboratively through "shared leadership" (Cawthorne, 2010; Pearce & Conger, 2003). (For more information, see Attachment 4.2.) Thus, collaborative evidence-based decision-making fortified by appreciative inquiry-based research (Reed, 2007b) and reflective dialog practices was introduced into the workplace. Organization-wide understanding was promoted through active involvement of a newly constituted Shared Leadership Team (SLT), composed of representatives from all levels across the organization, which assumed an oversight role. Monthly library-wide open forums ensured easy access to decision-making processes and resultant outcomes, as well as organization-wide discussion of and reflection on

implications. In these ways, intentional information-focused learning experiences simultaneously offered real-world practice exercising the new cultural values of shared leadership, appreciative inquiry, and organizational learning.

These early experiences also exercised the co-designed communication and planning system built to further organizational learning. When considered holistically, the system consists of both human and technology parts. Reflective of the former, newly constituted committees, task forces, and work groups began to routinely publish meeting outcomes on the new organizational intranet. Since dialog and reflection were deemed essential to evolving collaborative evidence-based information practices, a system of regular face-to-face meetings further enabled making decisions at the lowest appropriate level and leading "from wherever you are in the organization." "This shared leadership approach moved decision-making beyond organizational hierarchies to distribute influence and authority throughout the workplace, in recognition that organizational success relies upon individuals, teams, departments, and divisions working collaboratively, cross-functionally and across hierarchies" (Pan & Howard, 2009b).

These foundational experiences promoted shared learning through intentional use of information to learn within a co-designed infrastructure for taking action to improve. (For more information about "actions to improve" orchestrated by the SLT, see Attachment 4.3.) Six years later, shared professional practices include collective reflection on, and refinement of information resources, collaboration essentials, and systems functionalities. Interactive evaluation and collaborative redesign activities purposefully develop staff capabilities to further decision-making and advance continuous improvements. Throughout, purposeful connections and sustainable relationships are cultivated among individuals and information within a multi-level systems-based environment for workplace exploration and social learning. The characteristics of the learning environment, reinforced by the social process of defining those elements, underscored "the social nature of using information to learn" (Bruce, 2008) and encouraged "social collaboration or interdependence between colleagues rather than emphasis on individual capability" (Bruce, 2008).

4.9 Shared Leadership Team

The accomplishments of the SLT illustrate the efficacy of distributed leadership and governance. Significantly, despite its short 9-month history in March 2009, during a workshop facilitated by Mirijamdotter, members expressed shared appreciation for the potential of shared leadership and common agreement on the role of this organizational oversight group. They understood that, given the breadth and depth of the SLT charge, members are recruited from across the organization to ensure rich representation from functional unit perspectives, both among formally designated leaders (on the organizational chart) as well as informal thought leaders, knowledge enablers, boundary spanners, and culture shapers throughout the organization. During the workshop, the SLT produced visual renderings (or "rich pictures") illustrating various aspects of ideal organizational systems (technology and human), including direct and indirect relationships among cross-functional units.

SLT members' "rich pictures" represented a workplace environment of dialog and reflection that provided sufficient time for fruitful discussion enabled by constructive "meaning making" behaviors. The renderings acknowledged the efficacy of inclusive action research processes for addressing perceived problematical situations. Initially, concerns focused on identifying ideal modes of communication for shared leadership through informed learning grounded in effective information experiences which demonstrate that "It's possible to establish shared priorities" (Mirijamdotter, 2009). Over time and with practice, shared experiences further corroborated that no matter what the previous history, every system can be altered and invented, which suggests that "if organizations are constructed, they can be reconstructed" (Norum, 2001). It follows that leadership is responsible for design of organizations, processes, and learning environments to further individual and organizational learning (Mirijamdotter, 2010). (For more information, see the final report, Attachment 4.4.)

After Mirijamdotter's workshops, the process, outcomes, and aspirations of SLT meetings continued to evolve with the intention of more deliberately creating shared information experiences in which disciplinary (and transdisciplinary) questions inform, and are informed by, evolving professional practices. For example, agendas are collectively constructed and centrally posted in advance of meetings. Agenda items are identified as information, with the aim of encouraging dialog and reflection, or action, with the intention to follow dialog and reflection with decision-making to inform action taking. Library meeting rooms have been equipped with laptops and monitors, permitting simultaneous note taking that support collective sense making because minutes are read and reviewed, before publication on the intranet, at the conclusion of each meeting. To ensure organization-wide benefit, SLT minutes are also regularly discussed in various face-to-face meetings to ensure ample dialog and reflection on organizational governance outcomes.

In combination, agenda building, meeting minutes, and dissemination strategies constitute a designed organizational learning system, comprised of humans, technology, and learning (Bruce, 2012, 2013), which fulfills "the way we do things together" (Gherardi, 2009a). One SLT member described her experience of this organizational design as "flourish[ing] like an ecosystem, with the SLT as a primary source of energy radiating" (Mirijamdotter, 2009).

4.10 Professional information practices

Building on Mirijamdotter's earlier capacity building work, 18 months later, an Australian Fulbright Scholar-in-Residence, Hilary Hughes, coached Shared Leadership Team members on workplace applications for informed learning. To enhance the potential of the "practice lens" (Gherardi, 2009b) to animate connections-in-action that transform "organizational learning to knowing in practice" (Gherardi, 2006), she facilitated learning experiences on user needs analysis, learning space design, and service model evaluation. Hughes' approach demonstrated the twofold value to professional practices of informed learning: to expand one's workplace learning framework and to

apply this theory to enhancing others' learning experiences. In a subsequent evaluation of SLT members' experiences and outcomes, she found that the three key principles of informed learning (Bruce & Hughes, 2010) were present.

Principle #1: Informed learning builds on learners' own experiences of using information to learn.

Principles were applied to practice through SLT members' expansion of their professional knowledge through enhanced conversance with Informed Learning theory that explicitly connects information with learning. This encouraged further attention in SLT oversight discussions and decisions to ensuring the redesigned programs and services enable others, such as co-workers, students, and professors, to expand their experiences of using information to learn in more varied academic contexts and in more critical, ethical, and creative ways.

Principle #2: Informed learning promotes the simultaneous learning of discipline- or profession-related content or practices, and learning about the experience of using information.

Through participating in informed learning workshops, discussion, and projects, SLT members enhanced their own disciplinary knowledge and practice of informed learning as an emergent theory and practice within the field of library and information science. Through encouraging collaborations in informed learning-based curriculum development and teaching, they aimed to enable others, such as co-workers, students, and professors, to extend their experiences of using information to learn about their discipline in academic programs, course assignments, or research topics.

Principle #3: Informed learning is about the changing learners' experiences to become in order to be reflective learners, helping them to develop new and more complex ways of working with information.

Through developing and implementing innovative new policies and practices, and evaluating, discussing, and reflecting on these experiences, SLT members gained new understandings about their own use of information. Through sharing insights gained, they enabled others, including co-workers, students, and professors, to experience and to understand different ways of using information to learn in academic study, library research, and professional practice.

In the years following these facilitated evaluation workshops, SLT members continue to evaluate and redesign systems and practices. Members' varying perspectives on a problem situation and its improvement explore such questions as how to build heightened awareness of information experiences through using information to learn, rather than merely acquiring generic information literacy skills. In addition, to further cross-functional teamwork, SLT agendas consider how to advance social collaboration and interprofessional interdependence, rather than emphasizing individual capability.

In complementary activities, formal and informal library leaders explicitly cultivate dialog and reflection expertise and opportunities for sense making and knowledge creation. They encourage and support, with fiscal and human resources, robust partnerships among organizational employees, campus leaders, and project beneficiaries, which further and extend collaborative Informed Systems practices and ensure their sustainability through ongoing learning relationships. In addition, professional development and organizational effectiveness opportunities are created, which focus on

intellectual use of transdisciplinary collaborative information practices, exercised within a workplace culture that further enables cross-disciplinary knowledge sharing, fortified by human resources and resource allocation incentives (Bruce, Hughes, & Somerville, 2012). The following examples detail the processes and outcomes of initiatives fostered by applications of Informed Learning theory and enabled by co-designed communications systems and co-created professional practices.

4.11 Web-scale discovery service

Given the importance of electronic resources management, discovery, and access to the entire organization, Technical Services staff members were first to initiate a collective reorganization process to "reinvent themselves" and their workplace. As a consequence, the acquisitions, e-resources and serials, and cataloging and metadata services were combined. Under this unified management, the processes associated with ordering, receiving, processing, cataloging, and other access and discovery management functions could be coordinated into a single workflow, visually represented as an e-resources lifecycle model. To accomplish this, group experiences of constructing solutions together were initially provided through reorganization activities that simultaneously cultivated shared leadership. "These cooperative efforts presented new opportunities to break down traditional silos; work collaboratively and cross-functionally; create more efficient workflows; establish backup training for continuous service; and promote increased communication within the department and library" (Pan & Howard, 2010). (For more information, see Attachment 4.5.)

Recent experience of designing "work around" workflows for non-unified workplace systems heightened Technical Services employees' awareness of the need for a unified discovery system for library researchers (Somerville, 2013a). So they naturally assumed leadership responsibilities for selecting, customizing, and enhancing a Web-scale discovery service offering a Google-like single search box. Having learned the importance of supporting the full e-resources lifecycle through well-aligned workflows, these thought leaders also achieved consensus on the committed engagement needed across the organization to realize the promise of the discovery service as the place to go for full text, video, and images. Throughout the 2-year process from product evaluation to Web site launch, the collaboratively designed organizational learning system for sharing information, taking action, and generating insight, ensured progressive change in understanding the work-to-be-done together. For example, Web design professionals now regularly contribute Google analytics evidence that improves user experiences, as Technical Services employees continue to curate pre-indexed content and ensure its access.

"The active collection curation and interface customization roles assumed by public and technical services libraries illustrate their new professional responsibilities as collaborative content developers and system designers" (Somerville, 2013b). While engaging with new information types, workflow processes, and professional practices, Technical Services members necessarily established productive information-sharing relationships beyond the boundaries of their usual work teams. They learned

to appreciate the interrelated elements of robust workplace information experience: its context-situated nature; its connection with informed learning, which uses information to learn; its potential for transformative outcomes; and its social dimensions. Such critical and creative information use, when applied to the generation and sharing of new knowledge, can also inform programming decisions, of benefit to others, as illustrated in an inclusive planning process for facility renovation.

4.12 Facility space redesign

The need to anticipate and support rapidly changing higher education learning and teaching patterns necessitated redesign of library facilities. In keeping with the Library's inclusive collaborative design philosophy, action-oriented investigations engaged organizational beneficiaries and campus stakeholders in visioning activities using information to learn (informed learning). For this purpose, participatory action research was selected to guide information gathering, interpretation, and dissemination, in a continuous learning cycle (Agryris & Schön, 1991; Heron & Reason, 2001). As this initiative demonstrates, reflective practitioners can learn through collaborative inquiry processes that engage co-workers in conducting research with, and for, concerned others.

Over an 18-month period, to exercise systems thinking and advance holistic understanding, librarians solicited various constituencies' points of view. Data collection methods included online and "paper and pencil" surveys, semi-structured interviews, "library as lab" course assignments, formal meetings, and participant observation logs, culminating in an architectural charette (design workshop). Participants included senior academic leadership at the provost and vice chancellor level, senior and middle management in student support services, elected officers of student governance assemblies and committees, campus master planners, and academic deans and directors. All were engaged around such questions as: How should the library, and its services and collections, serve the institutions? What programs not in the library at present, should be in the facility in the future? How does the library add value to the academic experiences of the students and faculty? How is the library building presently perceived, and how can it function in the future as an interdependent facility with other learning and teaching opportunities on campus? How much of the traditional library program must remain in the centralized facility? How does the library reflect the vision of the institution of which it is a part? (Somerville & Brown-Sica, 2011; Howard & Somerville, 2014).

In a "signature" Auraria Library approach to evidence-based decision-making, which engages students enrolled in academic courses, the evolving purpose of the library facility in the academic enterprise was collaboratively reconsidered, guided by such questions as: How might this space enrich educational experiences? What are the learning essentials that can happen in this space that compels building or remodeling a brick and mortar learning space, rather than relying on a virtual one? How might this physical space be designed to encourage students to spend more time studying and

working more productively? For what position on the continuum from isolated study to collaborative study should this learning space be designed? Should this space be designed to encourage student/faculty exchanges outside the classroom? (Somerville & Brown-Sica, 2011).

In addition, students in two graduate-level architecture studios focused on the following provocative questions: "What type of physical environment, technology, and services are needed to support and enhance the learning and research experience of the Auraria Library community?" and "How could the Library involve campus students, faculty, staff, and administrators in cocreating the re-design concept?" (Brown-Sica, Sobel, & Rogers, 2010). Such engaging questions also catalyzed lively conversations on the larger question: "What is a library?"

Collective learning, guided by discovery questions and enabled by professional practices, underscored that library facilities must be conceived as an integral part of the institution as a whole. Therefore, the conceptual program phase of a facility—whether a new building or a facility renovation—must consider not only anticipated learning patterns but also institutional goals and aspirations, including the type of learning environment that faculty and students desire. It follows that, once the potential role and value for the library in the educational experience are clarified, alternatives for spatial organization can be explored through an architectural design workshop known as a charette, as a means to fulfilling educational vision, mission, and goals. (For more information, see Attachment 4.6.)

A number of facility improvements were incorporated into newly envisioned space utilization plans, informed and inspired by the preceding data collection and interpretation activities. For instance, building more collaborative study spaces, through de-selecting seldom or never used physical collections and then constructing technology-enabled study rooms, advanced the shared goal of improving learning spaces. Informal social learning opportunities were further encouraged through the addition of comfortable seating and initiation of café services. New outward focused public services were initiated through integration of research and technology assistance desks. Capacity building across functional units was advanced through relocating most staff to a shared work environment equipped with collaboration tools and meeting spaces. Viewed through the magnifying lens of the information experience, library employees collectively expanded their information horizons through engaging colleagues and stakeholders in library repurposing conversations and redesigning activities.

4.13 Organizational capacity building

The significant outcomes of the discovery services and facility design initiatives challenged and changed employees' collective lenses for viewing the world and, ultimately, experiencing and knowing it. Workplace transformation evolved through more complex experiences of using information to learn. Over time and with practice, emergent curiosities and remarkable insights stimulated novel inquires and furthered collaborative explorations. Therefore, changing individuals' lenses and, ultimately, the

collective worldview, progressively transformed employees' attention—and cultivated their enthusiasm—as informed learning became integrated into the workplace culture, thereby sustaining capacity for innovative discoveries and organizational redirections.

The possibility of organizational transformation through informed learning was initially catalyzed through appreciative inquiry. Upon this foundation of possibility thinking (i.e., of "the glass as [more than] half full"), a "soft" (human-centered) systems design process was introduced to create a unified workplace learning system. Within that enabling infrastructure, situated experiences of contextualized information now promote collegial exchange for taking action and building knowledge. In other words, "collaborative systems design and collaboratively designed systems … enable and sustain informed learning—'using information to learn'—in the workplace" (Somerville, Mirijamdotter, Bruce, & Farner, 2014).

Informed learning focuses on people's experience of using information to learn in different contexts, including what is necessary to make sustainable learning possible. Therefore, the values of collaboration and action were integrated into systems co-design and informed learning. As a consequence, the use of information for learning in ever expanding professional contexts has consistently grown collective capacity for knowledge advancement and, ultimately, workplace reinvention, despite volatility, uncertainty, complexity, and ambiguity in the scholarly landscape and in higher education.

Early on, the Associate Directors and I, with advice and counsel from SLT members, recognized the importance of purposefully enriching informed learning experiences, with the aim of furthering information exchange for knowledge creation. In addition to ensuring the co-design of an enabling systems infrastructure (human and technology), we encouraged co-workers to release outdated worldviews and embrace new ways of seeing, thinking, and knowing. This was encouraged through evidence-based decision-making processes supplemented by generous professional development and workplace training programs. Exposure to and engagement with new ideas informed the evolution of new professional worldviews and associated professional practices that privileged revitalizing—and "life giving"—informed learning experiences within an enabling reinvented culture. Over time, leadership was understood to be an organizational quality rather than an individual attribute.

4.14 Informed leadership reflections

The Auraria Library's forward thinking approach to shared leadership is imminently transferable to information- and knowledge-based professional work in other industries, which also require the decentralized application of expert skills and understanding. In response, the Informed Systems Leadership model recognizes that information work today requires that employees draw from a wide range of information sources and engage with information related activities that enable them to know the information landscape of the workplace; to understand how information is situated within it; and to connect with the performance of work as it happens (Lloyd, 2013). The model therefore recognizes that there are many ways of knowing how work happens. It acknowledges the many ways of understanding, experiencing and conceptualizing it

(Lloyd, 2005), as well as enacting it in practice, and therein anticipates the changing nature of leadership requirements in contemporary organizations.

The conception of "information" in Informed Systems is seen as embedded and embodied in different social practices with associated artifacts and activities that assume meaning within the context of specific workplace practices (Lloyd, 2010). When everyday information experiences become intentionally informing and action-oriented outcomes are purposefully enabled, this can produce a vibrant social learning system (Wenger, 2000). As preceding examples illustrate, organizational members can learn for a world of constant change as they co-create dynamic and robust workplace systems and practices dedicated to "using information to learn." Within this enabling infrastructure, they can experience information use as transformative if they necessarily exercise and elaborate their informed learning through cocreation of synergistic information experiences.

This application of informed learning in the workplace acknowledges that employees' capacities build on intentions and behaviors directed by internalized worldviews. It follows that as shared intentions, collective behaviors, cultural groundings, and professional processes evolve, employees gain more complex understanding of their work and worldviews, and those of others. Using information thereby requires and extends shared leadership principles and practice, activated by appreciative inquiry aspirations and action research intentions. Collaborative design of enabling learning systems that harness technologies and promote discourse ensures collective capacity for knowledge advancement and, ultimately, workplace reinvention.

According to one employee's assessment, "With the force of our collective dreams, explorations, research, vision, outreach, and collaborations, the Library is evolving into both an intellectual and physical 'destination'. … We are at the confluence of many forms of information and its usage, … the future of workplace learning and organizational transformation, amidst rich diversity of local and global thoughts and ideas." This unsolicited testimonial reveals, as this chapter describes, a vibrant workplace animated by informed leadership activities, purposeful information experiences, enabling learning systems, and associated professional practices. These accomplishments underscore that learning is a socio-cultural process which facilitates "the construction and reconstruction of the learner" (Lloyd, 2006) through interactive relationships among information, technology, and people. Therefore, forward thinking organizational leaders are ultimately responsible for construction of learning, of learners, and of the environments in which they operate (Hager, 2004).

The information interaction or use and what is being learned, as well as the professional practice that guides learning outcomes, are vital elements in informed learning. This is all the more so because in drawing deliberate attention to the relationship between information and learning, intentional information experiences can simultaneously advance both situated domain knowledge and transferable learning capacity. In addition, the characteristics of the learning environment, reinforced by the social process of defining those essential elements, serve to underscore "the social nature of using information to learn" (Bruce, 2008) and encourage "social collaboration or interdependence between colleagues rather than emphasis on individual capacity" (Bruce, 2008).

4.15 Concluding observations

The Informed Systems Leadership model identifies organizational processes that create and sustain co-designed learning systems and collaborative information experiences to evolve employees' ability to adopt and adapt, create and recreate, contextualize and recontextualize (Lloyd, 2003). As learning occurs, employees can see the world in new and more complex ways, transforming worldviews, and therein advancing new ways of seeing, knowing, and being in the world.

More specifically, Informed Systems recognizes the value of a collaborative design approach for socially enacted learning and action to enable workplace inquiry to explore, engage, and extend relationships among people and ideas. This oftentimes requires employing technologies and always requires exercising practices. Ideally, the latter occurs "with and for" organizational beneficiaries, in the spirit of collaborative discovery, through a participatory action research orientation. When embedded in organizational culture, this approach to "working smarter" (Somerville, Howard, & Mirijamdotter, 2009) enables robust information exchange and knowledge creation practices that persistently improve and enhance enabling systems, activities, and processes, so learning—and learning how to learn—advances.

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Informed organization design

5

5.1 Organizational effectiveness roots

With roots in European participatory design and Australian learning principles, organizational development initiatives in North America have incorporated theory and practice from systems thinking and informed learning for workplace reinvention. Outcomes foster information exchange, reflective dialog, knowledge creation, and, ultimately, organizational transformation. This inclusive and democratic approach aims to further expression of collaborative professional practices that enrich workplace information experiences through simultaneously advancing both situated domain knowledge and transferable learning capacity.

An Informed Systems leadership model guides participants' developing awareness of and engagement with informed learning and information experience. "Design for the cycle" (Brown, 2008) activities move learners from inspiration to ideation to implementation, when the cycle commences again, within enabling systems infrastructure fortified by professional information practices. As workplace interactions and experiences are collaboratively created and recreated, an action-oriented intention and inclusive participatory disposition improve real-world situations and, simultaneously, local professional practices.

In this chapter, I reflect on professional underpinnings and practical applications of these design ideas for organizational learning, inspired by European and Asian organizational development theorists and complemented by "value added" Australian learning principles and American "Yankee ingenuity" projects. Throughout, my observations acknowledge that stakeholder participation in collaborative design processes can produce shared understanding of ideal outcomes for behavioral activities and enabling systems, whether within a library, elsewhere on campus, or in "real-world" organizations. Such intrinsically satisfying relationships nourish "life-giving" learning and, therein, progress individual and group understanding to promote knowledge creation efficacy, effectiveness, and efficiency. Potentialities are best realized when design and evaluation activities are integrated into organizational workflows to support perpetual inquiry practices supportive of varying information experiences in expanding professional contexts.

5.2 Information conception evolution

To begin at the beginning in framing this discussion, it is important to note changing professional perspectives on "information" over the years. "In library and information science, information is a core concept, yet it is neither simple nor unambiguous" (Limberg, Sundin, & Talja, 2012). In its most conventional meaning, the term

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traditionally refers to primarily textual information sources published in print or digital form. However, nowadays, information can be almost anything that carries information potential. Witness Brenda Dervin's statement in 1977: "Information can be whatever an individual finds 'informing'" (Dervin, 1977a).

Dervin's sense-making ideas challenged the dominant paradigm of information, which at that time emphasized an innate structure or pattern of reality, experienced as data or objective information. In contrast, she recognizes that individuals' perceptions of "reality" are highly subjective and, therefore, library "busyness" statistics are not good indicators. This includes regularly collected and reported data on how many books were circulated and who checked out what kind of materials. Research generated by her alternative perspective would ask instead: "Did the user learn, come to understand, or find out about something as a result of intersecting with a library activity? What library resource served as impetus? What kind of sense did the user make? How did he make that sense?" (Dervin, 1977b). Anticipating recent interest in variation in information experience, she further proposed:

> *The question, then, becomes 'How did the individual find the information useful?' A given piece of information … may help one individual calm down and get self-control. For another, it may provide motivation to continue on an arduous road. For another it may provide a sense of not being alone in a difficult situation. For another it may provide a respite or retreat from reality. The same information obtained or created by the same means can serve different functions.*
>
> *Dervin (1977c)*

Dervin acknowledged the "situationality" of "using information to learn," noting that "meanings are in people," and thereby anticipating contemporary sense-making theory and practice during knowledge seeking and using. Her approach encourages inquiry into questions about how people "make sense" as they create and use information (Dervin, 1977b). This viewpoint quite naturally predicts Bruce's conception of relational information literacy, subsequently developed into Informed Learning and information experience. For instance, Dervin considered how information encounters allow individuals to move, to cope, to control. Relatedly, she wondered how such encounters allow individuals to make sense and, ultimately, how individuals use information to learn. Of "informing" information experiences, Dervin asked: In what kinds of situations do people seek information? What kinds of situations lead to use of different kinds of information? What do people do to make sense of different kinds of situations (Dervin, 1977d)? To extend this line of thinking to its logical conclusions, she expanded: "In this view, the sense making and sense unmaking that is knowledge is a verb, always an activity, embedded in time and space, moving from a history toward a horizon, made at the juncture between self and culture, society, organization" (Dervin, 1998).

Michael Buckland's conceptual analysis of "information," presented in 1991, also recognizes "using information to learn" as the process of "becoming informed." His use of the term "informed" denotes "the process whereby people's personal knowledge changes in response to information. … becoming informed is

the information-as-process by which information-as-thing results in the addition of information-as-knowledge" (Buckland, 1991a). Buckland thereby makes the distinction between information as process (the activity of informing or being informed), information as knowledge (that which is imparted through the process), and information as thing (physical entity) (Buckland, 1991b). Information, therefore, has several dimensions: "it is related to and embedded in specific activities, it is something that refers to content, and it has a material form and existence" (Limberg et al., 2012). Furthermore, Buckland recognizes that the catalyst for change in knowing, which can lead to new situated beliefs, is a combination of credible evidence and reflective thought (Buckland, 1991c).

In subsequent years, Carol Kulthau also predicted the more recent literature on "information experience" in advancing an "information search process" (Kulthau, 1999). Her work considered experience as a personal attribute, like the length of time (throughout a process) that a person has been engaged in an activity (like searching or organizing or writing) within a longitudinal continuum of emotional states, characteristically ranging from certainty to uncertainty and somewhere in between. She identified changes in perception of information tasks. In addition, she recognized uncertainty, complexity, and construction—as well as source and process differences (Lloyd, 2005).

A decade later in Australia, Annemaree Lloyd released doctoral dissertation findings, which explicated the information experiences of firefighters and, later, ambulance officers during training, in the transition to on-road practice, and on-road (Lloyd, 2005). Her approach explored preprofessional and professional use and experience of information, in learning to become practitioners and enact "informing practice" (Lloyd, 2009), Lloyd revealed qualitative and holistic experience with information, as well as specific information experiences. Her work significantly advanced understanding of the information environment. In addition, she furthered recognition of the types of information that are important, which includes advice from colleagues and sensations in the body. In identifying the variation in how "working information" (Lloyd & Somerville, 2006) is experienced, she too anticipated the growing literature on the information experience phenomena.

Since Bruce released her doctoral dissertation results in 1997, a Queensland University of Technology Information Studies Group in Australia has advanced recognition of the efficacy of exploring people's lived experience of informational "lifeworlds" (Yates, Partridge, & Bruce, 2012) with information and learning aspects. The conception of information experience allows a broad understanding and interpretation of people's engagement and interaction with the information environment. This holistic approach takes into account the interrelations between people and their broader environments in a manner that considers people and their world as inseparable. It also provides deep insights into the ways in which people relate to their informational lifeworlds (Bruce & Partridge, 2011). In 2014, these Australian investigators stimulated international recognition of the variation in information experience research across the globe through an edited work, *Information experience: Approaches to theory and practice*, in which Informed Systems was first presented.

5.3 Informed Systems opportunities

This rich antecedent thought from the library and information science literature indelibly shaped my professional context, which was further refined into the Informed Systems approach after a decade of library services, systems, and facility design reinvention. Systems model development was further informed and inspired by learning and organization literatures which acknowledge that people can learn to create knowledge on the basis of their concrete experiences. This is accomplished through observing and reflecting on that experience, by forming abstract concepts and generalizations, and by testing the implications of these concepts in new situations, which lead to new concrete experience that initiates a new cycle. This iterative learning process, which constitutes the genesis of "using information to learn," develops reflective practitioners who learn through critical (and self-critical) collaborative inquiry processes that foster individual self-evaluation, collective problem-formulation, inclusive contextualized inquiry, and robust professional development.

Informed Systems therefore aims to further informed learning in the workplace—the kind of learning made possible through evolving and transferable capacity to use information to learn. Therefore, a workplace organization is defined as a purposeful social interaction system in which collective information experiences and new knowledge develop through social learning processes. From this viewpoint, informed learning projects aim to establish sustainable social interactions that create remarkable information experiences, furthered by dialog and reflection to investigate and negotiate the interests, judgments, and decisions by which people learn interdependently, through "using information to learn."

Within this framework for "learning in action," participatory design and participatory action research processes, guided by inclusive social Scandinavian values, foster participants' interpretation of their information experiences and its furtherance. Iterative (re)design activities build on this foundational self-knowledge, with the aim to advance understanding of the topic under discussion and simultaneously further improvements of organizational systems and information practices. This, in turn, enables information experiences for constituencies served, as well as co-workers, wherein culture operates as a shared basis of appreciation and action, developed through communication and maintained through relationships.

Informed Systems' inclusive design and evaluation practices, with the twofold purpose of furthering professional learning practices and strengthening rich information experiences, is well aligned with the ubiquitous value accorded inquiry within higher education. Toward that end, informed organizational learning offers impactful learning outcomes, including collective alignment and shared understanding of the organization's purposes and priorities, which guide fiscal and human resource allocations as well as day-to-day decision-making. In addition, pervasive systems thinking that incorporates and values people's information experiences encourages understanding self and others as part of a larger whole—i.e., the academic library within the university and beyond to higher education. In combination, these elements inform concerted action to ensure that the academic library continues to foster informed learning as an essential part of teaching, learning, and research through evolving organizational structures, services, processes, and roles.

5.4 Guiding principles

The international research team's joint research agenda expresses democratic Scandinavian values through a systemic design methodology originating in England and fortified by high-level theory founded in Australia. Over the last decade, through organizational development initiatives in North American library organizations, we have discovered that workplace information experiences and practices can be advanced through collaborative design of organizational systems for communication, decision-making, and planning when these systems purposefully and simultaneously enable both information use and learning. It follows that learning is a part of information use, learning affects information use, information use affects learning, information use and learning interact, and information use is part of learning (Lupton, 2004).

Informed Systems, therefore, offers a framework for co-creating organizational learning and agile responsiveness. It applies principles of systems thinking and informed learning to establish an appreciative setting for the co-design of workplace systems and research initiatives. Thus, it incorporates notions of parts existing within a whole and varying information experiences as a vital part of using information to learn. On an academic campus, the resulting high impact organizational outcomes are expressed through sustained learning relationships that inform and influence evidence generating, interpreting, and sharing through collaborative sense- and meaning-making processes. Framing the "jobs-to-be-done" in this way underscores the importance of an organizational knowledge vision that seeks opportunities to engage "with and for" beneficiaries and colleagues. This is most often accomplished through socially enacted evidence-based information practices, fostered by an appreciative inquiry orientation and an action research disposition.

Situated real-world outcomes of the Informed Systems approach are therefore conducted according to participatory design processes, which necessarily include multiple stakeholders and beneficiaries who share information and professional and positional perspectives during structured discussion and debate. Processes, which involve using information to learn, engage participants in a variety of information experiences typically consists of these elements: enter a situation deemed problematical and take part in improving it; find out how the situation is understood and identify multiple world views; make purposeful activity models based on declared pure world views; use models to question the real world, structuring discussion and debate; use the discussion/debate to find accommodations among conflicting world views, to allow action-to-improve which is both systemically desirable and culturally feasible; take the action; and at a meta-level, continually iterate among the above to ensure sustained learning (Checkland, 2011a). In a persistent fashion, these elements generate evidence from multiple perspectives, which inform intentional dialog and reflection on both the research investigation content and process and also the enabling workplace systems and structures.

More specifically, Informed Systems aims to further informed learning—the kind of learning made possible through evolving and transferable capacity to use information to learn from information exchange, sense making, and knowledge creation activities that advance information use and learning relationships in the workplace.

These information experiences occur within collaboratively designed communication systems that recognize the social nature of using information to learn and encourage collegial interdependence. "Working together" (Somerville, 2009) is initiated and promoted through collaborative design of enabling learning systems to activate and change prior understanding through contextualized information encounters and associated professional practices. When learning occurs within such an extended information universe, co-workers' capacity for discussion and analysis of complexities and interdependencies advances.

Three essential elements of the informed learning pedagogy, which attends simultaneously to information use and learning (Bruce & Hughes, 2010), in both the classroom and the workplace, catalyze and enable "learning in action." First, informed learning builds on learners' own experiences of using information to learn. Constructivist in nature, it aims to recall and extend prior understanding. Secondly, informed learning promotes the simultaneous learning of discipline- or profession-related content or practices, as well as learning about the experience of using information. As a consequence, guiding theory both advances workplace knowledge creation through enhanced contextualization of information experiences and also furthers participants' reflective appreciation for how they—and others—learn. And, lastly, informed learning concerns changing learners' experiences so they become reflective learners capable of new and more complex ways of working with information, oftentimes within a social setting.

5.5 Informed organizational implications

The holistic Informed Systems approach to generating informed action within the workplace offers a robust information-centered and systems-enabled organizational learning approach for contemporary organizations. The approach combines proven theories, models, and frameworks offering information, learning, and systems ideas. Sense-making processes and associated sub-processes recognize that every level of an organization (individual, group, and organization) must work together to generate purposeful action. This action must be coordinated in order to ensure fulfillment of strategic purposes and core activities identified through continuous multi-level exchanges that focus on using information to learn, which produces informed learning. Within Informed Systems, enhanced capacity for informed learning is exercised through participatory design and participatory action research initiatives enacted within a purposeful social interaction environment in which information experiences produce new knowledge through information practices supported by enabling infrastructure.

As "using information to learn" becomes a shared basis of appreciation and action, the workplace culture reflects heightened regard for initiating, maintaining, and sustaining communication and relationships that promote collective alignment and shared understanding of the organization's purposes and priorities. Such collective understanding guides fiscal and human resource allocations, as well as day-to-day decision-making. In addition, pervasive systems thinking encourages understanding self and others as part of a larger whole—e.g., the librarian within the academic library

within the university and beyond to higher education. In combination, informed learning and systems ideas can construct supportive multi-level learning infrastructure, fortified by enabling professional learning practices. Over time, as environmental conditions change, design tools and techniques can manage complexity and ensure adaptability of workplace systems supporting learning processes expressed through shared practices (Mirijamdotter & Somerville, 2009).

In an ongoing fashion, this is accomplished through clarifying and adjusting the cultural worldviews and workplace norms at individual, group, and organizational levels, which are used to filter information and evaluate relevance. In the case of academic libraries in the digital age, continued viability requires that organizations transform outdated filters so that updated worldviews can provide new insights for effective strategies and collective action, such as reimagined value propositions, service models, and curation strategies (Bruce, 2013; Somerville, 2013; Somerville & Farner, 2012). Enhanced information availability and coordinated learning veracity, guided by systems ideas grounded in informed learning, constitute both the subject of workplace inquiries, which use information to learn in individual, group, and organizational settings, and also inform the substance of professional practices that engage, enable, and enrich informed co-workers' experiences in an expansive information universe.

5.6 Information experience impact

Inspired by Swedish cultural practices and guided by Checkland's facilitation tools, Informed Systems integrates Bruce's informed learning conception to purposefully advance participants' consideration and experience of the role of information in ever expanding professional contexts. Building on international research acknowledging the need for workplace learning to recognize that people experience information and use information to learn in differing ways, Informed Systems places information in ever expanding professional contexts through purposefully varying individual and group information experiences. In this way, collective capacity for knowledge advancement and, ultimately, workplace reinvention, evolves.

Viewed through an information experience lens, participants collectively expand the information horizons of their work environments. While engaging with new information types and communication processes, they establish productive information-sharing relationships which extend beyond team boundaries through the interrelated elements of workplace information experience: its situatedness; its connection with informed learning and transformative outcomes; and its cognitive and social dimensions, through critical and creative information use and the generation and sharing of new knowledge (Somerville & Mirijamdotter, 2014).

In addition, Informed Systems processes generate evidence from multiple perspectives and inform intentional dialog and reflection on both inquiry content and process and also enabling workplace systems and structures. This workplace information experience has been characterized as a spiral of steps, each of which is composed of a circle of planning, action and fact finding about the result of the action (Lewin, 1946). Participants therefore enter into "a problematical situation and becomes a participant

as well as a researcher, using reflections on the experience gained as his or her source of learning" (Checkland, 2011b).

Workplace learning and organizational efficacy therefore requires understanding how participants (inside and outside the organization) are experiencing both information content and use. This permits design of optimal learning experiences by formal and informal organizational leaders and others designated as thought leaders, culture shapers, or knowledge enablers who serve as knowledge activists (von Krogh, Nonaka, & Ichiko, 1997). Cultivation of simultaneous discipline and process learning also requires consideration of what constitutes knowledge from different points of view in various problem situations.

Within this holistic context, Informed Systems encourages evolution of collaborative, sociocultural practices—a constellation of skills, practices, and processes—within context specific environments. When supported by enabling organizational systems (face-to-face and technology enabled) that advance communication and sustain relationships, employees can learn to see the world in new or more complex ways because "ideas in the head lead to our experience of the world having a particular form and content" (Checkland, 2011c). In turn, such heightened interaction with information in context transforms both workplace learning and organizational culture. In this way, Informed Systems cultivates informed learning through creating new and more complex experience of using information for learning.

5.7 Designing information experience systems

Workplace learning processes enacted within inclusively designed information experience systems can both enable reconsideration of current (perhaps outdated assumptions and worldviews) and also cultivate transferable capacity to learn successfully in other situations. Designing information experiences, whereby information advances learning, depends on cultivating experiential relationships between information and people, as well as experiential relationships with technology. Workplace capacity increases as individuals and groups advance conceptualization and implementation practices within multiple-context spaces. Increasingly complex environments demand transliteracies—competencies to read, write, and interact across a range of platforms, tools, and media (Andretta, 2012).

"Collaborative evidence-based decision-making" (Somerville, Rogers, Mirijamdotter, & Partridge, 2007) is a signature element of Informed Systems, which requires deep understanding of the wants and needs of beneficiaries—whether staff or stakeholders—who inform organizational outcomes. Enabling workplace information practices evolve shared visions and common meanings that guide collective actions by co-workers as they learn together to build collaborative action capacity. Participatory design of dialog, meaning, intention, and action through continuous learning builds collaborative learning capacity. As employees learn to initiate and sustain inquiries and actions which are information-centered, action-oriented, and learning-enabled, they reinvent roles, responsibilities, processes, and relationships to co-create organizational futures.

Intentionally varying workplace information experiences disrupts structures, processes, and relationships, making possible comprehensive reconsideration and reinvention. This requires developing a shared commitment to become a learning organization "where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured and where people are continually learning how to learn together" (Senge, 1990) with and for organization and community stakeholders. As collective context and nimble responsiveness grows, continuous learning processes challenge existing ways of seeing and doing, and inform co-creation of ideal organization futures that improve information experiences of those who interact within and with the organization.

Highly participatory by nature, Informed Systems combines systems and experiential thinking in inviting relevant stakeholders to contribute their varied knowledge and, additionally, offers a framework for informed decision-making and action taking. By inclusively engaging individuals and groups in decisions likely to affect their work, the approach intentionally encourages creativity and collectivity, people and perspectives, cooperation and negotiation, thereby changing the nature of both work and the workplace.

Therefore, organizational reinvention and "information resiliency" (Lloyd, 2013) depends upon purposefully designed and exercised workplace "informed learning" experiences which involve coming to see aspects of the world differently through the experience of effective information use in an increasing variety of settings and frameworks. In the belief that knowledge may be used as the basis for developing new knowledge as well as the basis for actions or decisions (Rowley, 2001a), Informed Systems aims to initiate sustainable and transferable learning capacity, expressed as nimble "learning in action," which exercises those expanded ways of knowing, seeing, and being in new (previously unknown) situations. Such an organizational knowledge vision appreciates that the ultimate aim of workplace learning is collective knowledge building, so purposeful information exchange must both inform learning and be informed by it.

Workplace learning is enabled and enacted when information use interacts with purposeful learning. In other words, information use both accelerates organizational learning and forms a basis for measuring the effectiveness of the organizational learning process (Rowley, 2001b). The two directions then constitute interaction (Kari & Savolainen, 2010a) wherein information, learning, and technology intersect, as illustrated below.

As Figure 5.1 illustrates, within workplace environments designed (and redesigned) to create inclusive systems and learning processes, Informed Systems leadership activities foster requisite relationships among information, technology, and learning through building capacity to create collective knowledge together (Somerville & Howard, 2010; Somerville, Mirijamdotter, Bruce, & Farner, 2014) and thereby navigate uncertainty, complexity, ambiguity, and volatility through moving "from here to there." Movement occurs through systemic leadership exercised with a shared leadership philosophy (Cawthorne, 2010) expressed within co-designed systems amplified through professional practices that acknowledge content, the information itself, and context, the interrelationships between people and their environment. These connections have been expressed thusly: "learning is part of information use; information use is part of learning; learning affects information use; information use affects learning; and information use and learning interact" (Kari & Savolainen, 2010b).

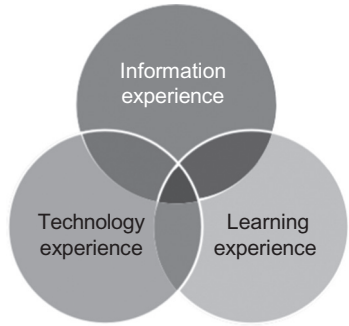

Figure 5.1 Intersection of information, learning, and technology experience in informed learning experience.
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5.8 Learning synergies

The Informed Systems leadership approach offers valuable insights into creating knowledge enabling systemic structures and workplace processes for advancing informed learning, a way of knowing an information landscape (Lloyd, 2010). Purposeful multi-level learning ensures workplace synergies capable of activating and sustaining knowledge creation through continuous social interaction that—in an iterative fashion—actualizes knowledge vision through social learning. Within the Informed Systems approach, therefore, robust exchange relationships further the sharing of information, skills, expertise, and experience with the aim of establishing a common ground and common practices to repurpose, redirect, reorganize, and relearn. Participatory design and participatory action research offer enabling tools and techniques for forward movement and nimble responsiveness.

Informed Systems has deep and abiding roots in the theoretical ideas of Bruce, Checkland, and Nonaka, who understand that information is central to learning and technology is potentially enabling when inclusive design processes initiate, further, and sustain conditions for learning within the contemporary workplace. These organizational design elements necessarily engage multi-level information use, shared professional practices, and situated learning experiences to cultivate formal and informal interactions with ideas among individuals and groups. The Informed Systems approach also explicitly acknowledges the interplay of enabling systems and socializing practices, which determine how organizations function, change, and adapt through processes for knowledge conversion that produce ever increasing variation and complexity in information experiences. The essential learning elements for the Informed Systems approach are illustrated in Figure 5.2.

As Figure 5.2 depicts, co-creation of an informed learning workplace environment necessarily requires the presence of an appreciative systemic lens, supported by shared organizational vision and process philosophy. Co-designed systems infrastructure and professional (information) practices facilitate a continuous learning cycle that advances capacity to successfully navigate unfamiliar situations and establish

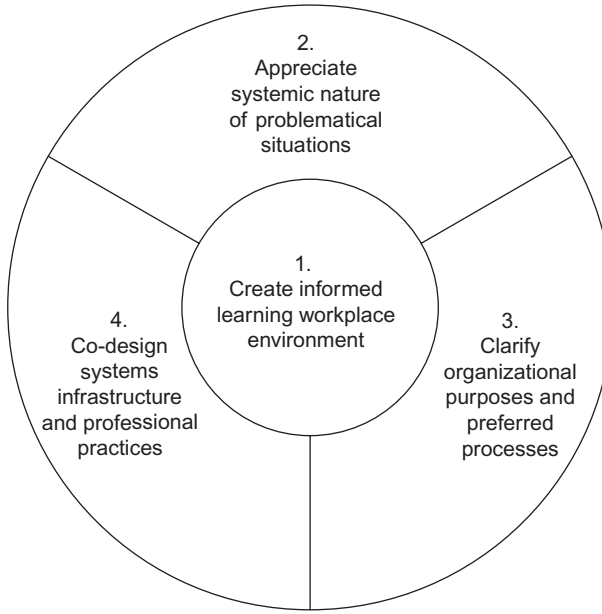

Figure 5.2 Informed Systems essential learning elements.

appropriate learning processes for finding, valuing, and using information to learn. This pre-supposes being aware of personal values, attitudes, and beliefs. Additionally, inherent in Informed Learning theory and supported by systems ideas, "wise" decisions involve placing the information in a larger context and seeing it in the light of broader perspectives and experiences to ensure ethical and optimal decisions for the benefit of self and others (Bruce, 2008). Such explicit awareness must be intentionally developed and is, therefore, included in the collaborative learning processes orchestrated through the Informed Systems leadership model.

5.9 Informed Systems as information experience

With a foundation in informed learning, Informed Systems recognizes that intentional and unintentional information experiences should lead to understanding the world in new or more complex ways—that is, learning. It naturally follows that "working smarter" (Somerville, Howard, & Mirijamdotter, 2009) in the workplace requires making sense of increasingly more complex information experiences. At one end of the continuum, a new manager might simply implement a policy, word for word. However, a more mature manager or leader, who embraces opportunities to serve as a learning coach, knowledge facilitator, and role model fosters and sustains workplace socialization and organizational learning process to support informed learning through naturally occurring encounters within the social, procedural, and physical information

environment. This transforms organizational culture from reactive to proactive and generative, enabled by rich relational information experiences and social interaction opportunities among workplace participants and, increasingly, organizational beneficiaries.

Therefore, a more seasoned manager might initiate a broader discussion of the situation prompting a policy through intentionally inviting investigation and negotiation of interests, judgments, and perspectives. In so doing, the manager should exhibit leadership characteristics conducive to informed workplace learning. Such workplace dialog might consider what constitutes authoritative information. Shared understanding of appropriate criteria for judging authority would serve to evolve collaborative, sociocultural, and evidence-based practices within a particular context. Such shared understanding would further the construction of shared professional meanings through situated engagement with contextualized information (Somerville & Mirijamdotter, 2014).

In such a learning environment, knowledge emerges through meaningful encounters that activate and change prior understanding within individuals and among groups. To animate learning, information encounters must be adequately situated and purposefully guided. As illustrated in previous chapters, this cyclical process for cultivating informed learning in the workplace has the potential to enhance the exchange of information and the production of knowledge—and thereby the variety of information experiences—when it is embedded into organizational work practices and enabling systems.

5.10 Informed leadership insights

Ten years of "research-in-practice" reveals the robust potential of leadership principles informed by participatory design philosophy from Scandinavia, systems design processes from the United Kingdom, informed learning theory from Australia, and "learning in action" organizational practices from North America. When fortified by knowledge creation models from Asia, this eclectic framework appropriately assumes stature as a "cosmopolitan" approach for cultivating nimble organizational responsiveness in contemporary organizations. Enduring insights on the application and evolution of Informed Systems include these observations:

> *Integral to creation of a robust learning organization, leadership must design workplace environments supportive of information-rich conversations.*
> *Systems thinking can be used to contextualize workplace issues in terms that revisit both the nature of organizational information and the purpose of organizational work.*
> *As leadership applies systems thinking methodologies and tools to understand the complexity of the organization and its situation, coworkers learn to problematize situations, further inquiry, and make informed responses with an holistic context.*
> *(Somerville, Schader, & Huston, 2005a)*

This changes how people think and what they think about:

> *Individuals see the underlying context and assumptions for their decision. This new relational understanding predisposes them to adjust their assumptions and strategies as they learn—i.e., as they change appreciative settings.*

> *Over time and with practice, individuals' adoption of systems thinking tools provides a strategy for successfully responding to new information and unique situations. Situated conversations rich in relational context provide the substance of a robust organizational learning environment in which dialogue has transformational potential when it activates and extends informed learning.*
>
> *(Somerville, Schader, & Huston, 2005b)*

As these leadership insights reveal, evolving capacity to initiate and animate an information-intensive, dialog-driven, systems thinking approach for "boundary crossing" collaborations across the organization emphasize processes over structures. "More fluid boundaries serve to improve the communication necessary to clarify what we change and how we change it … as we continue to evolve better ways of leading, organizing, working, and thinking through formal and informal teaching, coaching, and mentoring" (Somerville, Schader, & Huston, 2005b). Change must therefore be thoughtfully designed—in the belief that you must either "plan or be planned for" (Ackoff, 2001)—using "soft" systems design tools that inform workplace learning on planning change, enabling people, and building alliances across disciplinary and functional boundaries, both within and outside.

5.11 Informed Systems actions

Earlier chapters illustrated the efficacy of this approach, through which academic library organizations were repositioned on campus as centers of collaborative instruction, exploration, and learning. Signature action research projects ensured user-centered perspectives, considered with organizational learning systems designed through participatory processes. This necessarily requires that systemic organizational leadership must:

> *Reflect in all said and done that systems thinking is both a preferred and successful way to structure individual and group thinking processes. Therefore, in a discussion among team members, reinforce individual and collection knowledge and encourage coworkers, together, to apply their expertise to a problem situation.*
> *Make tacit systems thinking explicit to set the stage for organizational transformation. So even when speaking about the personal, explore the situational context. Place formal and informal conversation in the context of the learning cycle of finding out, modeling, evaluating, and taking action. In this way, incrementally build workplace capacity for cocreating rich relational information experiences that produce new insights.*
> *Instill and advance the vision held among information organization members by leveraging group communication opportunities to advance systems thinking processes. To ensure "any time, any place" access to shared knowledge, use participatory design processes to build suitable infrastructure for organizing organizational knowledge and making it available through different media, including intranets, databases, and listservs. Throughout, encourage exploration of better ways to create contextual meaning. Infuse shared knowledge into both formal and informal socialization efforts intended to ensure and extend the holding of collective context among individuals, for the purpose of institutionalizing shared (and appreciative) organizational memory. Therefore, seize opportunities to create and capture new stories and new meanings. And explore*

> *throughout the possibilities for leveraging computer supported collaborative work technologies to advance knowledge creation, discovery, access, and preservation.*
> *(Mirijamdotter & Somerville, 2004)*

When these principles and practices guide organizational design, inquiry tools and reflective practices facilitate development of organizational capacity to "learn the way" through exercising knowledge vision and values aligned with organizational form, culture, and practices.

Organizational knowledge creation leadership necessarily also requires a continuum that ranges from centralized to distributed (shared) leadership at three layers of activity: a core layer of local knowledge creation; a distributed conditional layer that provides the resources and context for knowledge creation; and a structural layer that forms the overall frame and direction for knowledge creation in the organization. In combination, these design layers further collective appreciation for task particulars, social relations, and "big picture" (Nonaka, Toyama, & Hirata, 2008), which can be contextualized by local values, experiences, and purposes.

Within this three-part organizational structure, knowledge creation is set in motion by participants who spontaneously collaborate, shifting between leading and following, to evolve the workplaces practices required to accomplish their collective interests. In this way, interdependence naturally results from complementarity in participants' knowledge, or from overlaps, so that the capacity of the group is enhanced. At this stage, shared knowledge is largely explicit and knowledge creation occurs through combination (von Krogh, Nonaka, & Rechsteiner, 2012a), activated and animated by shared leadership which creates a sense of synergy (Gronn, 2002) as participants shift between instructing and listening. As practitioners gradually shape the microdynamics of group process and information practices, they refine their skill at leading—by presenting, discussing, and demonstrating knowledge assets—and following—by listening, reviewing, using, or adjusting, as the situation demands, to create knowledge (von Krogh, Nonaka, & Rechsteiner, 2012b).

Knowledge generation therefore requires designed workplace learning environments, amplified by knowledge management systems and associated communication practices, and contextualized by clear organizational purposes and shared priorities. Within this setting, centralized leadership fulfills Informed Systems responsibilities for establishing viable conditions for learning, including directing relationships, conducting meetings, shaping beliefs, generating expectations, offering incentives, and providing resources. Of special relevance to information, formal leadership must also determine reporting lines, information flows, and decision-making authority (von Krogh, Nonaka, & Rechsteiner, 2012c). In turn, practitioners with shared (or distributed) leadership responsibilities interact within these conditions and, as needed, negotiate changes (or accommodations) required for core knowledge creation activities. This requires responsible, constructive group leadership and teamwork skills as well as organizational context and process influence capabilities. Finally, oversight for these activities is provided at the structural layer, where leadership is centralized, providing overall coherence and orientation to knowledge creation activities throughout the organization (von Krogh, Nonaka, & Rechsteiner, 2012d).

5.12 Learning in action

Within Informed Systems, informed learning simultaneously attends to information use and learning (Bruce & Hughes, 2010). In a complementary fashion, action research and systems thinking simultaneously bring about a change in the problematic situation (the action) while learning from the process of deriving the change (the research) (Wilson, 1984). In practice, this necessitates inviting participants to share professional and positional perspectives during a variety of information experiences culminating with purposeful human activities (Rose, 1997). Typically, the learning cycle consists of problematizing a situation, exploring the terrain, developing a response, evaluating the results, and resuming this process once again. As described above, collected, analyzed, and interpreted findings can create improved practices and situations through socially enacted validation and evaluation processes.

This represents a departure from traditional research assumptions, in which the expectation is that users of research (practitioners) will improve their practice through applying other researchers' propositional theory. In action research, the expectation is that practitioner–researchers will improve their practice through studying and thereby learning from existing practices within local circumstances, and will explain how and why (or why not) improvement(s) happen, using locally relevant validation processes. Research outcomes necessarily offer both explanations for ongoing improvements of practice and demonstrate the validity of the explanations, as "living theories" (McNiff & Whitehead, 2010) subject to change as new insights occur. The definition of "evidence," therefore, is reminiscent of Nonaka's description of "knowledge" as context dependent "justified true belief" (von Krogh, Nonaka, & Rechsteiner, 2012e), which informs the meaning of "evidence" represented in the collaborative evidence-based information process model.

It follows that, within Informed Systems, participatory action research represents "an *orientation to inquiry* … on significant practical issues. … it is a practice of participation, engaging those who might otherwise be subjects of research or recipients of interventions … as inquiring co-researchers [into] change *with* others" (Reason & Bradbury, 2008a). These communities of inquiry and action evolve to address questions and issues that are significant for those who participate as co-researchers. Iterative inquiry-in-action cycles advance exploration, action, and reflection phases as co-researchers explore problematical situations and gather (that which is deemed) "evidence," followed by collective "sense making."

Oftentimes, collaborative relationships generate new "communication spaces" (Reason & Bradbury, 2008b), reminiscent of Nonaka's *ba* (Nonaka, Konno, & Toyama, 2000), in which dialog and development flourish. As awareness of many ways of knowing emerges, participants naturally expand definitions of acceptable "authoritative evidence" generated through inquiry and interpreted through reflection. As a living emergent process, action research projects thereby develop and change as those engaged deepen their understanding of the issues to be addressed and develop their capacity as individual and collective co-inquirers (McNiff & Whitehead, 2010). In these ways, "Action research aims to contribute both to the practical concerns of

people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework" (Rapport, 1970). In other words, action research aims to solve a practical problem and at the same time increase research knowledge (Mirijamdotter & Somerville, 2009). So, in building on this foundation, Informed Systems employs action research projects guided by systems thinking processes to produce simultaneous learning about local situations and improvements in enabling systems.

5.13 Informed Systems initiation

"Soft" systems thinking tools and Scandinavian participatory design philosophies can produce information- and learning-focused professional practices that enable information exchange and knowledge creation. In fact, informed learning is exercised first within design experiences and then through workplace inquiries enabled within these co-designed environments. Interrelationships are thereby furthered between people and their environment, including content, the information itself, and context (Bruce, Hughes, & Somerville, 2012). The basic Informed Systems process involves:

> *An activating event sets the stage for cognitive dissonance wherein learners identify discrepancies between what they know and what they are learning.*
> *Dialogue processes enable coworkers to identify and articulate their current assumptions as well as changes in their own assumptions and understanding.*
> *Active discourse promotes considering new evidence and alternative perspectives to promote assumptions revision and knowledge construction.*
> *Continued learning opportunities test assumptions and encourage reflection to progress understanding within enlarging disciplinary contexts.*

When paired with informed learning theory, which emphasizes the experience of and conditions for learning through information encounters, systems ideas can then guide workplace responses to specific organizational-level priorities. This might include, for instance, environmental scanning and communication strategies that ensure staff are up-to-date on important matters; resources and services that ensure staff can access required information; preferred approaches to problem solving, decision-making, project management, and reporting; and strategic processes for ensuring information management and capturing corporate memory. In these varied ways, Informed Systems promotes collaborative inquiry processes that further learning relationships and information experiences within enabling systems that further evidence-based decision-making enlivened by shared leadership values and action-oriented results.

5.14 Informed organization outcomes

Realization of the full potential of this "learning in action" approach necessarily requires that information experiences are sufficiently robust to bring about change in seeing or understanding what is important in the environment. Therefore, both

formal and informal workplace leaders advance workplace learning through serving as thought leaders, culture shapers, knowledge enablers, and boundary spanners to catalyze "big picture" understanding of how the workplace information landscape is constructed. This includes awareness of where (including within whom) information and knowledge resides within an organization.

Transformation builds on this appreciative foundation to further collective capacity through evolution of desirable shared values and performance behaviors that ensure coherence among (newly constructed) contextual, structural, and performance dimensions in employees' day-to-day work lives. In these ways, Informed Systems catalyzes transforming information and learning experiences, across virtual and physical spaces, through innovative leadership activities and collaborative inquiry practices which enable co-learners to co-design the future.

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From here to there

6

6.1 Framing the conversation

My informed learning journey was initially provoked by intellectual curiosity as, again and again, I entered staid organizations in bucolic settings. I wondered: "How can we design robust organizations that anticipate unprecedented user expectations and enable nimble employee responsiveness within a complex and disrupted ecosystem?" As I "moved up the career ladder" to assume increasingly influential leadership roles and organizational responsibilities, the topic assumed a real urgency for me as, "in the eye of the storm," I increasingly experienced, full force, the turbulence that necessitates revision and reinvention of library services, collections, and facilities and repurposing and retooling human resources. Over time, a more specific question emerged: "How might organizational leadership enable systems design processes and enact workplace learning practices?" In the preceding chapters of *Informed Systems*, I present the content, process, and result of my learning journey.

As I compose this concluding chapter, I sit in my home office, surrounded by journal articles, book chapters, conference papers, doctoral dissertations, and research monographs from the library and information science field. Over the years, I have gained considerable solace and significant inspiration from these particular authors, who offer especially enriching ideas to professional practice. I recount highlights in this chapter to illustrate the presence of sympathetic professional viewpoints and frameworks, upon which readers can draw to customize an Informed Systems approach to local circumstances.

6.2 Learning organizations

Early in the new century, Maureen Sullivan published principles for organizational effectiveness (Hayes & Sullivan, 2003) and work redesign (Hayes & Sullivan, 2003) in the professional journal literature. She introduced these ideas within the larger framework of learning organizations, which she characterized as follows:

"Among the characteristics of a learning organization are:

- The organizational system learns as a whole, almost as if the organization were a single brain.
- People in the organization recognize that ongoing, organization-wide learning is critical for current and future success.
- Learning is a continuous, strategic process that is integrated with and parallel to work.
- The organization believes that systems thinking is fundamental.
- People in the organization have access to information resources that are important to the organization's success.

Informed Systems. http://dx.doi.org/10.1016/B978-0-08-100175-2.00006-7

- The organizational climate encourages, rewards, and accelerates individual and group learning.
- Staff members are innovative and collaborative in their networking, both inside and outside the organization.
- The organization embraces change and views surprises and failures as opportunities to learn.
- The organization is flexible, agile, and responsive.
- People in the organization are driven by a desire for quality and continuous improvement.
- Aspiration, reflection, and conceptualization characterize most organizational activities.
- The organization continually adapts, renews, and revitalizes itself in response to changing environments (Sullivan, 2004a)."

In further reflections, Sullivan described the organization as a "mystery" and a "marvel" to be embraced, not a problem (Cooperrider & Svirastava, 1987). In that spirit, she envisioned planned change as a "collaborative and highly participatory, system-wide approach to seeking, identifying, and enhancing the 'life giving forces' that are present when a system is performing optimally in human, economic, and organizational terms. It is a journey during which profound knowledge of a human system at its moments of wonder is uncovered and used to co-construct the best and highest future of that system" (Watkins & Mohr, 2001). Within this appreciative framework, reconsideration of assumptions, values, beliefs, and images can clarify purposeful actions within "whole" systems that will co-construct desired futures (Sullivan, 2004b).

Mirroring Senge's ideas in *Fifth Discipline* (1990), Sullivan noted these enlivening workplace properties: "a belief in the capacity of people to create change; the importance of generative thinking and generative learning; collaboration as a means for learning, growth, and development; understanding the organization as an organic and dynamic human system" (Sullivan, 2004c). It naturally followed that leadership must "bring positive focus to the inquiry and learning process" (Sullivan, 2004d) to realize the possibilities of "learning as we go" (Sullivan, 2004d). She concluded: "any large scale change effort requires a commitment to continual learning, growth, and development—of the organization, of groups and teams, and of all individuals" (Sullivan, 2004d). In other words, "leadership influences a library's effectiveness, institutional role, and adaptability" (Weiner, 2003).

6.3 Organizational leadership

Over the years, Sullivan has also harvested insights from leadership literature and infused these highlights into library literature. Her aim throughout is to improve organizational effectiveness in academic libraries through continuous learning within dynamic systems. This necessarily requires open communication to develop relationships and create resonance among co-workers (Sullivan, 2010a). In recalling the ideas that Bennis and Nanus introduced in their book, *Leaders* (1985), subsequently extended

by Bennis in a second book, *On becoming a leader* (1989),[1] Sullivan suggests these essential elements: "attention through vision" for catalyzing employee commitment; "meaning through communication" for shaping social architecture; "trust through positioning" by taking explicit transparent action; and "deployment of self" through continuous learning experiences. In other words,

> *leadership that inform and guide practice call for the encouragement of followers; building relationships based on trust and authentic behavior; diagnosing the situation and choosing a response that will result in the best approach for the organization, its staff, and its future; and paying continuous attention to the development of self and others. The work of leadership is to listen, learn, empower, respect, inspire, motivate, and engage followers in the accomplishment of meaningful results for the organization. The work is necessarily done in a context of uncertainty, ambiguity, and challenge.*
>
> *Sullivan (2010b)*

In exploring these themes further, Dr. Jon Cawthorne also acknowledged the systemic nature of organizational life in his doctoral dissertation, *Viewing the Future of University Research Libraries through the Perspectives of Scenarios*. Completed in 2013 in the PhD program in Managerial Leadership in the Information Professions at Simmons Graduate School of Library and Information Science in Boston, Massachusetts, USA, the multidisciplinary research study built upon and contributed to administrative sciences, organizational studies, human resources, and library science literatures.

In recognizing the place of academic libraries within higher education systems, Cawthorne explicitly framed academic library leadership decisions within the core university mission as he investigated these research questions: "What new organizational structures are necessary to support emerging client demands given new fiscal constraints?" "How can libraries creatively redesign facilities and services to realize cost savings and support student success and faculty productivity?" "How will the work of librarians change?" His research findings recognized that addressing these concerns necessarily requires "developing an organizational culture that values learning" (Lewis, 2007) and sustaining "a commitment to organizational development" (Lewis, 2007).

To move organizations toward desired scenarios of the future, Cawthorne proposed flexible tools that incorporate complexity and uncertainty into planning processes. This necessarily requires organizational structures that define "how job tasks are divided, grouped, and coordinated. The structure facilitates communication, coordination, and motivation of employees" (Cawthorne, 2013a). His results further recognize that

[1] In his book, *On becoming a leader* (1989), Warren Bennis writes: "Learning=Leading. An organization should, by definition, function organically, which means that its purposes should determine its structure, rather than the other way around, and that it should function as a community rather than a hierarchy … because ultimately an organization is merely the means, not the end. Since the release and full use of the individual's potential is the organization's true task, all organizations must provide for the growth and development of their members and find ways of offering them opportunities for such growth and development. This is the one true mission of all organizations and the principal challenge to today's organizations" (p. 187).

organizational changes require re-envisioning roles and redesigning workplaces. This necessarily challenges existing cultural norms and values, defined by Schein as "a pattern of shared basic assumptions learned by a group as it solves its problems of external adaption and internal integration that works well enough to be considered valid and therefore may be taught to new members as the correct way to perceive and think and feel in relation to those problems" (Schein, 2004).

As Cawthorne notes, this "explanation of shared basic assumptions and modifying work to externally adapt and internally integrate fits the research library culture" (Cawthorne, 2013b). In further elaborating, he emphasizes that culture is holistic, as well as historic. It is socially constructed and expressed through ways of thinking, values and ideas. Therefore, it is inert and difficult to change, "as Schein's definition suggests, once the culture is established, new people who come into the organization are taught how to think and feel about problems facing the organization" (Cawthorne, 2013c). New employees are thereby enculturated into the socially constructed belief system, including unspoken values, that govern how people within the organization interact with one another. However, with intentional and deliberate intervention, cultural values and practices can evolve as the group evolves (Cawthorne, 2013d).

Fortunately, insights from diverse literatures now offers professional guidance for (re)creating organizational structures and (re)inventing workplace culture in order to anticipate changes needed to successfully anticipate the uncertain pathways to the future (Bradigan & Hartel, 2013). As Cawthorne's results reveal for academic libraries, these transformational changes must be negotiated with executive university leaders, such as academic provosts and human resources officers. In establishing wide boundaries of influence and concern, library leadership practice within higher education must therefore necessarily extend well beyond "bricks and mortar" walls. Through evoking "big picture" understanding of the systemic nature of organizational life, such thinking is well aligned with Informed Systems philosophy and practice.

As a Professor at Simmons School of Library and Information Science, Peter Herndon conducted literature reviews and empirical studies to further contextualize contemporary leadership opportunities and dilemmas. Investigations into library leadership offer rich insights into relationships among individuals and with information, as represented in a model of distributed leadership comprised of four interrelated domains or capacities of foremost importance. These include "sense-making, defined as 'understanding the context in which a company and its people operate,' relating, defined as 'building relationships within and across organizations'; visioning, defined as 'creating a compelling picture of the future'; and inventing, defined as 'developing new ways to achieve the vision'" (Hernon, 2008).

Earlier chapters demonstrate that the organizational design concepts in Informed Systems draw from systems sciences, information research, and knowledge creation literatures to propose systemic process and activity models that accelerate and amplify organization effectiveness. As this chapter illustrates, rich insights in library and information science literature further enrich implementations of Informed Systems, which underscores the value of applying multiple perspectives to generate novel insights. Within the professional library literature, participatory design, action research, and evidence-based information practice are especially compatible with Informed Systems models for systemic organizational leadership and collaborative information practice.

6.4 Participatory design

For a decade, commencing in 2004, Nancy Fried Foster and Susan Gibbons advanced participatory design of library systems and services through ethnographic studies at the University of Rochester in New York State in North America. Initial results were reported in *Studying Students*: *The Undergraduate Research Project at the University of Rochester* (2007). A second report, titled *Studying Students*: *A Second Look* (2013), further explicates "what we learned and how we acted on it" (Foster, 2013). Essential elements of this ethnographic approach to user-centered design mirror the tenets of Informed Systems, which include engaging staff and stakeholders in learning together through participatory design methods because:

> *User-centered design means designing things—technology, spaces, services—to meet the needs of the people who will use them and to perform well in real-life situations…. user-centered design in higher education must take a broad view of the 'user' and pay attention to a wide range of needs, preferences, and constraints on the part of the numerous people who are served by the technology, space, and services the library provides.*
>
> *Gibbons and Foster (2007)*

As Foster has also stated, there is intrinsic value to participatory design "where the people who will use those things participate centrally in coming up with concepts and then designing the actual products" (Foster, 2012a). As she explains:

> *While it is easy to engage traditional specialists—such as architects and software engineers—in the design and development of spaces and technologies, it is not so easy nor so obvious how to engage lay people who will use what is built. In the case of academic libraries, the challenge is to create a way for faculty members, university staff, undergraduates, and graduate students to contribute their specialized knowledge in the process. Specialized knowledge in this case refers mainly to information about the work they do—how they do it when it goes well, what they do when they hit a snag, what they would do if only they had precisely the spaces and tools that would best support them. …*
>
> *Participatory design activities make it possible for faculty and staff, undergraduates and graduate students to communicate with such specialists as graphic artists and software developers, architects, and builders. Since all of these people can be said to speak different languages and to conceive of what they are building in different ways, someone needs to facilitate communication among them so that the people with the professional knowledge to build spaces, design services, or make a piece of software are able to understand the work practices and requirements of the people who will use those things in order to give them products that will support their work.*
>
> *Foster (2012b)*

In a subsequent publication, Foster counsels librarians to integrate inquiry methods and design approaches into professional practice, for the twofold purpose of generating fresh insights and revising legacy assumptions (Foster, 2014a). She explains that to discover information about work practices and purposes—i.e., "the reason people

undertake work in academic libraries or use scholarly resources in the first place" (Foster, 2014b)—necessarily requires continuous organizational learning among professionals, elsewhere characterized as "practitioner–researchers" (Watson-Boone, 2000). As these various approaches to participatory design illustrate, whether employing systems, design, or ethnographic practices, the desired outcome remains to foster "learning in action" to improve local situations.

North Americans Steven Bell and John Shank have also acknowledged the value of employing user-centered design to engage "academic libraries with the people who work in them" (Foster, 2012c). In *Academic Librarianship by Design*: *A Blended Librarianship Guide to the Tools and Techniques* (2007), the authors draw from architectural design, interior design, graphic design, digital design, industrial design, and instructional design practices to illustrate design applications (Bell & Shank, 2007a). The preface makes the case for change: "We are deluged with information and options. We are overwhelmed with an accelerated flood of information itself, of new forms of information, of new tools for manipulating information, of new capacities for storing and retrieving information, of new capacities for storing and retrieving information, of new options for teaching and learning, of new ways of collaborating, and of new forms of seclusion" (Bell & Shank, 2007b).

Given a turbulent information landscape, Bell and Shank recommend enhanced library integration into teaching and learning through exercising design thinking in the development of library services and systems. "This involves utilizing both existing and emerging instructional technologies … in the process. Additionally, we need to partner and form learning communities with our faculty, instructional designers and technologists, and other staff as well as with these professionals at other institutions to successfully design and use instructional technologies and ultimately enhance the library services and products offered" (Bell & Shank, 2007c). This "blended librarian" design approach for developing instructional products and enhancing learning processes thereby has the further benefit of activating connections and fostering collaborations with other stakeholders in the higher education enterprise while "designing the future academic library experience" (Bell, 2014).

Such aspirations easily evoke images of workplace ecosystems wherein standard information forms, as well as tacit, embedded, procedural, and anecdotal knowledge, are recognized as the "life-blood" of the organization that needs to adapt quickly to its external environment. From the perspective of such an ideal organization, information is "readily available and renewable and … individual capacities and knowledge sharing processes support the required levels of organizational learning" (Ferguson, 2009). In anticipation of these contemporary requirements, Informed Systems promotes participatory design of enabling systems and practices that intentionally further both workplace learning and workplace outcomes.

Meanwhile, in Australia, Zaana Howard advances an interactive and human-centered approach to open and collaborative design thinking in contemporary organizations. She emphasizes the value of user engagement in human-centered design processes and expands the role of the organizational leadership to include design facilitator, teacher and performer (Howard & Melles, 2011). To create sustainable and scalable solutions adaptable to rapid and unrelenting changes, Howard and her associates recommend participatory action research (Howard & Somerville, 2014) and collaborative evidence-based

information practices (Howard & Davis, 2011) to address "wicked problems" in the contemporary workplace. Such "messy" situations are ill formulated, information is complex, ramifications are confusing, and participants hold conflicting values (Churchman, 1967), which constitute the very conditions for which Informed Systems was designed.

Dr. Howard significantly advances inquiry on design thinking as a way of work and a way of life in her doctoral dissertation, *Understanding Design Thinking in Practice*: *A Qualitative Study of Design Led Professionals Working with Large Organisations*, completed in 2014 at the Swinburne University of Technology School of Design in Melbourne, Australia. She explores understanding and enactment of design thinking to intangible products, such as systems, services and experiences, to further "understanding design thinking in practice." Mindful that it is individuals, not organizations, who apply design thinking, she recognizes the importance of necessary conditions of learning, including a culture of thinking that is directed toward desired situations and systems and toward synthesis in decision-making and action taking. Noting the fundamentally pragmatic nature of design, she emphasizes its action-oriented focus on resolving organizational issues through envisioning change and working toward it, thereby acknowledging and extending Bell's introduction of design thinking to the library profession (Bell, 2008).

Building upon her earlier soft systems design insights (Somerville & Howard, 2008a, 2010; Somerville, Howard, & Mirijamdotter, 2009), Howard also predicts the considerable variation anticipated in local expression of Informed Systems, adapted to particular circumstances. In framing movement of participants from concept to capability, she describes interdependent relationships among the design approach, organizational environment, and design leadership that influence local design-as-practice and design-in-practice. Her dissertation concludes with an original framework that offers a conversation starter for understanding maturity in design thinking for individuals and teams and can also be used in practice to develop maturity and movement from "novice—way of work" to "expert—way of life" (Howard, 2014).

With the practical aim of improving quality outcomes through shared understanding of team knowledge and capability, Howard envisions a continuum of collective understanding and development beginning with teachable process and tool skills. She recognizes that demonstrable mastery in design skill evolves from acquiring diverse knowledge sets and mindsets that enable continuous situation assessment and approach adjustment as needed. Mature design leadership therefore encompasses adapting tools, adjusting sequencing, and moving in and between roles through determining the most appropriate courses of action depending on the context. Mastery and mindset develop over time and through experience with human centered design (Howard, 2014), as enabled in Informed Systems process models.

6.5 Action research

Action research interventions reported in the library science literature similarly emphasize "learning in action" through activating the dynamic relationships among research and action and learning. Action research is typically conceptualized as consisting of two interlinked cycles—that is, action and research—which together further

researcher learning and advance local outcomes. “Thinking of action research in this way would have implications for the process used in an action research project, and the learning and research outcomes that may emerge from an action research intervention” (McKay & Marshall, 2001).

With antecedent roots in Lewin’s seminal 1946 article, action research is characteristically viewed as representing a spiral process of reflection and inquiry with an emphasis on improving work conditions and local situations (Lewin, 1946). English influence harkens back to the London Tavistock Institute pioneers who believed research projects should both increase workers’ knowledge and improve workplace environments. This philosophy resulted in development of socio-technical action research that, within systemic frameworks, considered technology (machine) implementations within human contexts. The approach also assumed that practice should lead to better theory and theory should improve practice (Mumford, 2001).

These various historical influences continue to inform action research initiatives within library science. “First, each involves the practitioner in the research process. Second, some type of action of intervention takes place with practical or theoretical applications. Third, completion of the plan involves assessment, evaluation, and/or reflection. Fourth, the process benefits the action researcher as well as the organization” (Jefferson, 2014). Finally, action research “(1) leads to new knowledge, (2) provides evidence to support the new knowledge, (3) makes explicit the process of inquiry through which knowledge emerges, and (4) links new knowledge with existing knowledge” (McNiff, Lomax, & Whitehead, 1996).

In a doctoral dissertation completed in the PhD program in Leadership and Change at Antioch University in Yellow Springs, Ohio, USA, Dr. Kara Malenfant presents outcomes from her study of an action research initiative to aid librarians in examining their perceptions on the future of higher education. As reported in *Understanding faculty perceptions of the future*: *Action research for academic librarians* (2011), the research “*with* and *by* the library faculty and staff as participants” (Malenfant, 2011a) also engaged disciplinary faculty members to understand their views, and determined actions to take to shape the future. Through this action research process, employing mixed methods, library staff, faculty, and administrators developed new ways to craft strategies and make decisions. They evolved their cultural practices from strategic planning to “strategic thinking as a process, a way of organizational learning” (Malenfant, 2011b).

This North American example mirrors Informed Systems leadership processes that employ action-oriented and learning focused inquiry within a participatory culture.[2] Workplace dialog and reflection practice can then be recast around the fundamental concept that “knowledge is created through conversation. Libraries are in the knowledge business. Therefore libraries are in the conversation business” (Lankes,

[2] In highlighting participatory action research initiatives in her review article, Jefferson acknowledges the University of Colorado Denver initiative, which assured organizational readiness (Brown-Sica, M., Sobel, K., & Rogers, E. (2010). User-centered planning in learning commons design. *New Library World*, *111*(7/8), 302–319) to ensure sustainable information practices and local improvements (Somerville, M. M., & Brown-Sica, M. (2011). Library space planning: A participatory action research approach. *The Electronic Library*, *29*(*5*), 669–681).

Silverstein, & Nicholson, 2007a). It follows that librarians approach their work as facilitators of conversation, whether through practice, policies, programs, or tools, with the aim to enrich, capture, store, and disseminate conversations (Lankes, Silverstein, & Nicholson, 2007b). Within an Informed Systems context, assessment involves how well activities contribute to nourishing an active social learning environment catalyzed by information rich decision-making practices.

6.6 Evidence-based information practice

The literature of evidence-based information practice provides another example of a robust approach that can be integrated into Informed Systems professional practice. Adapted from Evidence-Based Health Care in the United Kingdom and United States (Booth, 2002; Eldredge, 2000), evidence-based practice within library and information professions promotes the collection, interpretation and integration of valid, important and applicable user-reported, librarian-observed, and research-derived evidence. Then, the best available evidence, moderated by user needs and preferences, is applied to improve the quality of professional judgments (Booth & Brice, 2004). Like action research, evidence-based library and information practice (EBLIP) involves a cyclical inquiry learning process, which has evolved over the years (Booth, 2003, 2009; Koufogiannakis, 2011).

Over time, the empirical scientific practices characteristic of the medical field have largely been replaced by social sciences research methods (Eldridge, 2004) that better reflect the kind of research likely to be undertaken by librarians (Crumley & Koufogiannakis, 2002). Agreement of what constitutes "authoritative" varies. Evidence may now include a wide range of information sources and professional knowledge, oftentimes beginning with a review of peer-reviewed publications, and also including quantitative and qualitative research results, locally collected statistics, open access data, and even "soft" sources such as accumulated knowledge, opinion, relationships, and instinct.

A dissertation completed by Dr. Denise Koufogiannakis in 2013 at the Department of Information Studies at Aberystwyth University in Wales, United Kingdom offers deep insight into the contributions of evidence-based practice to learning organizations and organizational learning. In *How academic librarians use evidence in their decision making*: *Reconsidering the evidence based practice model*, Koufogiannakis corroborates the advantages of a pervasive culture of evidence-based workplace practice to develop contemporary skills, knowledge, and attributes (Partridge, Menzies, Lee, & Munro, 2010; Williams & Winston, 2003) within the library and information profession. The importance of engaging colleagues in decision-making is of special relevance, as it anticipates the efficacy of collaborative evidence-based information practice (Somerville, Rogers, Mirijamdotter, & Partridge, 2007) in Informed Systems evidence-based practice (Booth, 2009). Relatedly, Koufogiannakis' confirmation of the significance of a positive work environment, enabled by appropriate processes for open discussions for decision-making and action taking, predicts the value proposition for the Informed Systems leadership model.

In shedding new light on the complex nature of using evidence to learn within situated practice among the Canadian librarians who participated in the study, Koufogiannakis further explains:

> *Understanding that librarians use evidence to convince, allows an entire organization to look more completely at what the pertinent forms of evidence contribute to the decision, to weigh those pieces of evidence, and to make a decision that is more transparent. The use of evidence for convincing illustrates the complexity of decision making, particularly within academic libraries, and points to the fact that evidence sources do not stand alone, and are not enough in and of themselves. The EBLIP process must account for the human interactions, and organisational complexity within which decisions are made.*
>
> *Koufogiannakis (2013a)*

In supplementing the evidence-based practice literature on organizational barriers and facilitators (Booth, 2011), Koufogiannakis identifies obstacles and enablers to evidence use. Organizational dynamics emerges at the top of both lists, here defined as "structure and function of an organization, including the behavior of individuals and groups" (Koufogiannakis, 2013b). The latter behavioral professional practices flourish "when the culture of the organization is generally felt to be positive and one that is open-minded with respect to decision-making" (Koufogiannakis, 2013b). Positive determinants of effective decision-making and evidence use in turn depend on leadership to ensure "the culture of the organization is one which allows open discussion, input, and values the use of evidence in decision-making" (Koufogiannakis, 2013c) because "whether or how new information get assimilated is contingent on local priorities, cultures and systems of meaning. What makes sense in one setting can make a different sense in another" (Davies, Nutley, & Walter, 2008). Therefore, sense making for decision-making and action taking in a specific organization requires leadership oversight of interactions between new knowledge and shifting contexts, supported by workplace practices that guide and move collective thinking forward.

In anticipation of these conditions for learning, workplace environment, knowledge creation, and information transfer processes are essential elements of Informed Systems. For instance, the Informed Systems collaborative evidence-based information process model anticipates Koufogiannakis' finding "which stresses the importance of 'soft' sources of evidence" (Koufogiannakis, 2013d). This research outcome harkens back to Schön's observation about the value of both "hard" and "soft" evidence for "thinking in action," which acknowledges that even when practitioners make conscious use of research-based theories and techniques, they are dependent on tacit recognitions, judgments, and skillful performances (Schön, 1983). "Knowledge and understanding are thereby learned through the active function of practice by an individual, within the larger body of practice" (Koufogiannakis, 2013e) which can exist within the workplace, where local context is very important, or at a broader level among colleagues at other institutions. Through such community experiences, intersubjectively created meaning is reinforced and changes over time through constant negotiation (Gherardi, 2009).

In proposing a new EBLIP model, Koufogiannakis therefore considers holistic evidence-based practice to constitute these phases: Articulate—come to an understanding of the problem and articulate it; Assemble—assemble evidence from multiple sources that are most appropriate to the problem at hand; Assess—place the evidence against all components of the wider overarching problem and assess the evidence for its quantity and quality; Agree—determine the best way forward and if working within a group, try to achieve consensus based on the evidence and the organizational goals; and Adapt—revisit goals and needs and reflect on the success of the implementation (Koufogiannakis, 2013f). This enhanced model recognizes that an evidence-based practitioner incorporates research evidence, data sources, and professional knowledge into decision-making, thereby encouraging variation in sources of evidence incorporated into decision-making. In addition, the model offers a group process to prompt questions and critical thinking, as well as ensure that decision-making is transparent. In anticipation of this requirement, the collaborative evidence-based decision-making and leadership models, which together comprise Informed Systems, guides inclusive and transparent decision-making and action taking. Then, in a recursive fashion, interactive evaluation promotes perpetual inquiry and, thereby, workplace learning.

Koufogiannakis' systemic approach furthermore clarifies elements of organizational design and professional practice essential to collaborative evidence-based decision-making. This includes fostering a culture in which processes are transparent and evidence sources are relevant. Organizational knowledge practices must necessarily include routine collection of local data, organized for discovery, access, and use in future decision-making. Within such enabling learning conditions, modeling desirable learning behaviors—to promote "leading from wherever you are" through asking questions and requiring evidence from both internal and external sources—can build awareness and cultivate capacity to proactively enable changes, opportunities, and advancements. Finally, clear communication within the organization is paramount, as are clear goals and work expectations. As earlier chapters have illustrated, systemic participatory design can create these enablers of organizational learning.

6.7 Organizational learning

Considerable differences exist across the globe in national, occupational, and corporate cultures which influence organizational culture and, thereby, organizational learning. In information and library realms, cultural differences influence such fundamentals as respect for information as evidence, respect for information as knowledge, willingness to share information, trust in information, and trust in organizational systems, as well as how information related competences such as information and computer fluencies are expressed (Oliver, 2011). Furthermore, not-for-profit organizational goals vary appreciably from for-profit corporate priorities and thereby influence enactment of both leadership and learning.

Illustrative of international variation, organizational learning initiatives within nonprofit organizations such as libraries in the United States are often expressed as

pragmatism. As a philosophy, pragmatism focuses on how things work best in practice and seeks to discover ways to reliably achieve goals and improve performance. Therefore, "pragmatism serves as a … means to taking more effective actions by improving the accuracy of one's beliefs about how things actually work in the world. It is a system that draws on lessons learned from experience—in both deliberate and systematic ways—to create knowledge for action. High quality knowledge leads to effective action that works reliably well in reaching performance goals" (Cavaleri, 2008a) such as inquiry and analysis of learning outcomes applicable in both the classroom and the workplace.

Illustrative of this approach, the University of California Berkeley Library aligned their organizational learning initiative within the University's mission and, more specifically, academic departments. They used academic program reviews, which academic institutions in the United States began using in the 1970s as quality assurance exercises and, ultimately, institutional effectiveness indicators, as data sources. Analysis of these self-studies provided insights for Library organizational development, which library liaison participants defined as a systemic approach to reshaping processes, structures, and attitudes to address challenges (Stephens & Russell, 2015). This novel collaborative and research-driven approach utilizes the unique relationships among subject specialist liaisons and academic department faculty, which uniquely qualifies them to identify and interpret information needs within a library services context. It also establishes a researcher–practitioner model that enables research findings to inform practice because "those with the greatest ability to affect change in departmental relationships will have the knowledge to act" (Loo & Dupuis, 2015).

A pragmatic approach thereby improves practice by eliminating "defects in beliefs" that cause errors and creating tools to solve problems (Cavaleri, 2008b) through "reiterative learning-based processes" for taking productive reflective action. Topic selection identifies a creative, focused, and manageable topic that addresses potentially significant yet previously less explored aspects of the topic. Existing knowledge, research, and/or views synthesizes in depth information from relevant sources representing various points of view and approaches. Finally, analysis organizes and synthesizes evidence to reveal insightful patterns, differences, or similarities related to the topic focus (Oakleaf, 2011a). Necessarily, professionals must thoughtfully interpret the environment, reflect on past experiences, and learn from new experiences. Because this capability is not inherent, but rather learned, Informed Systems offers process models for design of enabling environments and inquiry practices.

Exercising systems thinking during inquiry and reasoning furthers appreciation of how patterns of cause and effect might impact future experiences. As knowledge builds, performance is improved, uncertainty is reduced, and confidence—to take action to achieve desired results—is increased through "incorporating discoveries from action" (Cavaleri, 2008c). This organizational response recalls Senge's popularization of the notion in *The Fifth Dimension* (1990), which produced the emergence of learning organizations in academic libraries in the United States in the latter twentieth century and early twenty-first century, most notably at the University of Arizona (Phipps, 1993, 2004) and University of Nebraska Lincoln (Giesecke & McNeil, 2004). More

recently, in the recognition that "libraries need to enable the learning of their members and stakeholders, and continuously transform themselves: that is, they need to be learning organisations" (Harvey, 2014), several promising initiatives in Australian libraries exercise systems thinking and process design models to produce robust learning outcomes.

6.8 Learning organizations

Over the last decade in Australian libraries, notable examples of Senge's five essential elements of systems thinking, personal mastery, mental models, shared vision, and team learning have promoted "systems and processes to streamline the sharing of knowledge and information, enabling the organization to adapt to rapidly changing environments and unpredictable pressures" (Renner et al., 2014). Reflective of the Informed Systems' knowledge creation theories advanced by Nonaka and his associates, guiding conceptions recognized that "a learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights" (Garvin, 1993). It naturally follows that within a supportive learning environment, concrete learning processes and practices and leadership aspirations and behavior that reinforce learning (Garvin, Edmondson, & Gino, 2008) can develop the notion of a "practically wise organization," which "captures knowledge and learning created by a deliberate engagement with its environment and becomes skillful at the engagement through experience, practice, and judgment" (Rowley & Gibbs, 2008) of creating organization innovation (Rowley, 2011).

Illustrative of these aims, since 2008, a systemic evidence-base approach within the Royal Melbourne Institute of Technology (RMIT) University Library has produced strategic and evidence-based cultural change that enables positive organizational responses to the demands of a changing environment (Leong & Anderson, 2012). Instantiated through fortifying cross unit collaboration and interdisciplinary work experiences, fostering leadership skills and group work, and enabling technology innovation and knowledge sharing (Leong, 2014), this holistic approach to professional development provides training throughout the employment job cycle to produce a unified learning culture at all library sites.

Learning aspirations in the RMIT Library occur within the larger University "behavioral capacity framework" which, since 2011, values resilience, connectedness, commitment to excellence (continuous improvement), innovation, outcomes focus, and open thinking. The alignment of training and education opportunities with the University's aspirations and the Library's goals is ensured through routinely collected evidence, including participants' reaction, learning, and behavior feedback. The fourth outcome, results, is assessed through client surveys that recognize: "Probably the most important strategy for inspiring and motivating an entire organization to move quickly and empathetically toward becoming a learning organization is to link increased learning with increased organizational success" (Marquardt, 2011).

More granular assessment of workplace learning capacity answers: "Are they learning? Are we?" (Oakleaf, 2011b). These questions prompted development and implementation of a Processes and Phases of Organizational Learning (PPPOL) study within 67 Taiwanese libraries. In anticipation of Informed Systems premises, the questionnaire recognized that organizations necessarily have frameworks through which individuals can express opinions and by which organizations can learn (Chen, 2006a). Unfortunately, few organizations make intentional use of this potential, so the evaluation study aimed to promote organizational learning and thereby improve local situations.

PPPOL results help respondents understand elements of their workplace culture, appreciate the value of organizational learning, and "develop improved structures and mechanisms whereby knowledge and information can be transferred upwards, downwards and sideways" (Chen, 2006b). A comparison of results from organizations exhibiting higher organizational learning with those demonstrating only limited and low-order learning reveals a critical difference: "where the results from action taken in response to environmental stimuli are unsuccessful, the situation is fed back into the learning process, beginning again with intuiting, interpreting, integrating and institutionalizing so that the library as an organization can change its existing norms. That is, the library has now learned to respond differently and to grow thereby" (Chen, 2006c).

In a highly complementary fashion, the Library at the University of Melbourne applied a 2005 Standards Australia knowledge management standard for "improving organizational outcomes and learning through maximizing the use of knowledge. It involves the design, implementation and review of social and technological activities and processes to improve the creating, sharing and applying or using of knowledge. Knowledge management is concerned with innovation and sharing behaviors, managing complexity and ambiguity through knowledge networks and connections, exploring smart processes, and deploying people-centric technologies" (Hayes & Kent, 2010). Enabling capacity to achieve organizational goals within the library emerged through changing structures and collaborative approaches to enhance communication networks that favored transaction and exchange of knowledge. Knowledge transfer and, thereby, knowledge creation became recognized as core workplace system strategies.

6.9 Learning organization maturation

With highly transferable implications, the National and State Libraries Australasia (NSLA) produced a Learning Organisations Maturity (LOM) Matrix that recognizes the systemic nature of learning needs. It now catalyzes purposeful conversations and best practices across the continent. In a holistic fashion, the Matrix recognizes that supportive leadership must ensure shared purpose and clear direction, because learning in one part of the system produces impacts throughout the system (Somerville & Howard, 2008b). The Matrix also recognizes that positive change and ongoing learning necessarily engages staff at all levels in formal and informal learning activities seamlessly integrated into an organizational learning culture (Tait & Blinco, 2014).

In conceptualizing the notion of a learning organization, the NSLA concept of "learning institution" encompasses two discrete lenses: the internal lens of the library's own organizational understanding and practice, and the external lens of the clients who engage in the learning programs delivered by the library. The Matrix thereby can enable libraries to assess their perceived levels of maturity as learning institutions along a continuum of "emerging" to "active" capabilities. The evolving process of developing a learning institution maturity framework considers individual, team and organizational learning, as well as clients' interactions with the organization, with the goal of developing a framework that has the potential to measure the value of learning and growth in both the library's staff and the library's communities (Hallam, Hiskens, & Ong, 2013).

The significance of this Australian organizational learning assessment approach is underscored by supportive documents issued in both the United Kingdom and the United States. In 2008, the Museums, Libraries and Archives Council (MLA) released *Inspiring learning—An improvement framework for museums*, *libraries and archives*, followed, in 2009, with release of *Museums*, *libraries*, *and 21st century skills* by the Institute of Museum and Library Services (IMLS). Both documents focus on supporting cultural institutions in envisioning and defining their roles as institutions of learning in the twenty-first century. These new directions in international thinking coincided with funded national Australian initiatives, so the NSLA[3] committed to conceptualize the library as a learning organization and to create a maturity framework to develop a shared understanding of libraries' potential new roles, offering learning opportunities through resources and programs, with the staff expertise to support knowledge creation.

With the aim to scale from emerging to developing to "active" learning organizations, matrix designers examined the general concept of learning organization to more specifically clarify guiding principles and success attributes for organizational learning. Then, to contribute to a deeper understanding of maturity models, they explored frameworks for organizational learning, with the aim to improve "bifocal" view through both an internal and public lens. These results informed the identification of assessment tools and measurement instruments for the learning organization maturity

[3] National and State Libraries Australasia (NSLA) represents the national libraries of Australia and New Zealand, and the State and Territorial libraries of Australia. These libraries work collaboratively to strengthen the information infrastructure in Australia and New Zealand, to share expertise and work together on joint projects to achieve more than each library could on its own. In June 2007, NSLA published a paper titled *The big bang*: *Creating the new library un*iverse, which outlines the case for change for the library sector, given the impact of new technologies. It also set an agenda for NSLA libraries to pursue in order to encourage flexibility, rapid response, and innovation with the library sector (National and State Libraries Australasia (2007). *The Big Bang theory*: *Creating the new library univer*se. Available: http://www.nsla.org.au/sites/www.nsla.org.au/files/publications/NSLA.Discussion-Paper-The.Big_.Bang_200707.pdf). In 2012, NSLA's updated strategy, *Re-imagining libraries 2012–2016*, acknowledged the "joined up" digital world, the drive for greater efficiency and effectiveness, building partnerships and changing expectations in a world where "service development is adventurous and agile." The strategy also highlighted the sharpening focus on the central role or libraries in enabling people to learn and to develop the skills to engage with knowledge and ideas and to participate actively in the digital society. Available: http://www.nsla.org.au/sites/www.nsla.org.au/files/publications/NSLA.Reimagining_Libraries_2012-2016_strategic_plan.pdf.

matrix (Hallam, Hiskens, & Ong, 2014a), with the aim of providing a tool to shape organizational culture, to promote critical reflection, and to examine workplace practice, thereby "constantly evolving organizational understanding and practice" (Hallam, Hiskens, & Ong, 2014b).

6.10 Toward beyond

Well within this library and information science literature—and also extending considerably beyond it, the Informed Systems offers an information focused and systems enabled approach for "working together" (Somerville, 2009) in contemporary organizations. Essential elements emphasize collaborative inquiry processes that further learning relationships and information experiences within enabling workplace systems. Inclusive, action-oriented investigations generate continuous improvement in local situations through evidence-based decision-making practice exercised within collaboratively designed communication systems.

Informed Systems enables and enlivens workplace possibilities. Inclusive participatory design principles create organizational communication, decision-making, and planning systems with associated professional practices that further information exchange to inform "action to improve." High-level theory guides processes for intuiting, interpreting, integrating, and institutionalizing knowledge within individuals and among groups. Within an intentional culture of collaborative evidence-based information practice, experiences of "using information to learn" simultaneously advance learning to use information and learning to co-create future possibilities. Workplace processes include collaborative design of organizational elements that ensure sustainable communication and, hence, collective learning.

The genesis of this approach is informed learning. This school of thought recognizes the value of information experiences that build upon prior understanding to further situated topical learning and transferable learning capacity (Bruce & Hughes, 2010). Although most applications occur in educational settings (Maybee, Bruce, Lupton, & Rebmann, 2013), informed learning also offers rich and transferable insights for organizational design (Somerville & Howard, 2010; Somerville & Mirijamdotter, 2014) and workplace learning (Bruce, Hughes, & Somerville, 2012; Somerville & Mirijamdotter, 2014), as former chapters illustrate. To realize this potential, the Informed Systems approach cultivates information experiences to catalyze and enrich information exchange, reflective dialog, and knowledge creation for "learning in action." Action learning essentials harness collaborative evidence-based information practices to simultaneously advance both domain knowledge and learning capacity through "working together."

Establishment of shared meaning and common vision necessarily requires learning to talk about how information and knowledge come to be created, discovered, analyzed, and evaluated within the workplace, including what constitutes evidence. It naturally follows that information about information and necessary conditions of learning become everyday topics of collegial discourse and action taking. As generative

evidence-based professional practices are exercised within an ever-expanding information universe, using information to learn and employing technology to learn foster nimble responsiveness and creative innovation.

An action orientation—to improve local situations and professional practices—requires leadership vision that values and promotes workplace learning. Enabling systems infrastructure must necessarily promote communication relationships that connect information, learning, and technology. At the intersections of information exchange and knowledge creation, "informed learning" occurs. This necessarily requires consistency of purpose instantiated within organizational systems aimed at re-inventing traditional outcomes and "reworking" traditional processes. Toward these ends, Informed Systems leadership generates contextualized information experiences for resilient knowledge creation that enables "forward thinking" decision-making and action taking. Persistent evaluation activities ensure continuous learning and local improvement.

6.11 Concluding reflections

At its core, Informed Systems facilitates inclusive governance, innovative infrastructures, information practices, and leadership processes that enable robust information transfer and knowledge creation. Collective learning advances within supportive systems and through information experiences. Design activities clarify shared purposes for human communication systems and technology enabled solutions. Over time and with practice, inclusive learning processes coalesce shared vision and values into a knowledge vision enacting through cyclical collaborative evidence-based information practices.

Essential Informed Systems design elements enable organizational members to reinvent professional purposes, redesign organizational systems, and revitalize workplace outcomes. Shared leadership challenges traditional hierarchical structures and authoritative relationships, releasing generative energies. Appreciative inquiry reveals collective aspirations and catalyzes workplace capabilities, activating "life-giving" energy. Throughout, process models guide creation and coordination of workplace systems for harnessing generative insights and emergent expertise. As this chapter reveals, rich examples in academic libraries and library literature around the world support the customization of Informed Learning principles and practices to local circumstances and aspirations.

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Attachments

Attachment 1.1: Interactive Media and Information Design Course

An interactive media and information design course was a particularly suitable occupant for the innovation zone of the library's learning commons because the highly interdisciplinary field lacked an established curriculum. Therefore, faculty members were free to invent curricular and co-curricular means of advancing student learning. Within that intellectual "zone of innovation" (Somerville, 2009), they decided to explore the application of narrative, including its theatrical forms, in the design of content for complex, interactive digital environments. The course scope explicitly acknowledged the modern electronic culture that occupied much of students' out-of-class use of "real-world" technology tools. In addition, faculty expected students to integrate these technologies in a casual but innovative fashion into their coursework.

In advancing the learning commons' goal of encouraging pedagogical experimentation, the faculty teaching team envisioned a course design that embodied a wide range of theoretical approaches, cultural histories, and technology tools. They also intended for the course content to draw students directly into the central concerns of new media theory and development as well as learning theory and knowledge creation processes. Within this framework, professors in technical writing, media theory, architectural design, and software engineering coached students over two semesters to create a new form of interactive theater.

To prepare students, faculty members build a course syllabus that introduced students to media history with a focus on the development of cinema, including a survey of theoretical structures for narrative and esthetic analysis. At the same time, students were prepared to design and build a physical space—a "black box" media theater—in which to demonstrate media transmission and media interpretation processes for a new form of fully immersive interactive cinema, which could be repurposed for open collaboration, artistic expression, interactive storytelling, and gaming computers.

The curriculum was based on the pedagogical assumption that practice informs and builds upon a firm understanding of media theory and communication practice. In cultivating students' abilities as developers—in the role of script writer, production director, camera operator, video editor, and so on—faculty members intentionally moved them beyond uncritical consumption of the artifacts of this important form of cultural expression. The course developers placed the tools of production directly into students' hands. Furthermore, they strengthened students' knowledge of how digital systems can be used (and misused) for effective persuasion and for various forms of artistic, cultural, commercial, and political expression.

Toward that end, students learned about the process of new media design from the point of view of the artist, the storyteller, and the narrator, as well as from the perspectives of the audience member and the nontechnologist. By combining technological invention with reflective analysis of theory and history, students became effective participants in the process of modern electronically mediated discourse. Along the way, they developed capabilities transferable to other learning contexts, including evaluation of how the moving image presents itself in the real world across a wide range of mediums for a wide range of communicative and persuasive purposes.

The course location in the library learning commons placed librarians in convenient proximity to intensive learning and teaching experiences. On a daily basis, they observed cross-disciplinary collaboration among students and faculty from widely divergent backgrounds who shared common aspirations to progress these capabilities:

> Research competence to formulate effective research questions and search strategies for finding, evaluating, organizing, and communicating information.
> Resource competence to select appropriate formats and sources during information retrieval and, following information evaluation and knowledge integration, to choose appropriate channels for dissemination.
> Social-structure competence to understand how information is produced, including but not limited to the professional publication process, emphasizing how information exchange fuels knowledge creation.
> Technology competence to use information and communication technology tools for effectively finding, organizing, and presenting data, information, and knowledge.
> Publishing competence to infuse original ideas into a community of inquiry, including Web-based environments (Gillette & Somerville, 2006).

These ambitious learning outcomes reflected the distinctive Cal Poly "learn by doing" educational philosophy, which integrates concrete experience, reflective observation, abstract conceptualization, and active experimentation. Therefore, learning commons' activities encouraged pedagogically sound and innovative connection of information and technology for transformative teaching and learning experiences in the digital age. Informal learning was also precipitated by casual conversations about the role of information and technology in contemporary knowledge production, dissemination, and management.

Attachment 1.2: Exercising Disciplinary Knowledge

Reflective of the Australian antecedents of the Informed Systems approach, my colleagues and I adopted the "relational" information literacy framework advanced by the Australian and New Zealand Institute for Information Literacy and the Council of Australian University Librarians (2004). These bodies suggest that well-prepared graduates are capable of abstract thinking about information and its manipulation. This requires that graduates are able to frame researchable questions as well as to locate, evaluate, manage, and use information in a range of contexts using a diversity of resources and a variety of media. Finally, they can interpret and present information in various

forms—written, statistical, graphs, charts, diagrams, and tables. It naturally follows that, to enable this in others, academic librarians must first become proficient themselves.

Therefore, when librarians worked with faculty on discipline-specific projects, such as a marketing information portal (Somerville & Vuotto, 2005), planning meetings included explicit discussion about how information comes to be created, discovered, analyzed, and evaluated in the field of business. This "meta" gaze served to explore "information about information." A series of information-centered questions informed dialog about the knowledge, research, questions, studies, and activities most appropriate to advancing essential disciplinary learning outcomes. This line of inquiry also served to define portal content scope and structure by considering such discipline-specific questions as these (adapted from Lant, 2001):

- From what other fields did this field of study derive its origins? At what point was this field recognized?
- Has the collection, analysis, evaluation, or presentation of information changed over the years since the inception of this field of study?

This context setting dialog naturally led to exploring the field's information structure in more detail. In doing so, faculty members were guided by librarians' curiosity about "information about information," including:

- What constitutes information in this field? Since the field's inception, how has the definition of appropriate information changed? Have certain sources of information fallen out of favor or become more reputable with the passage of time?
- Does this field of study involve different levels of information—for instance, primary, secondary, data, and/or metadata?
- Where does information in this field come from? How is it collected? Who collects it? Who comments upon it?
- How is information stored? Where is information archived?
- In what format is information in this field presented? In what form is commentary upon information presented?
- Is information in the field presented numerically, textually, visually? Which media are most important in the storage and presentation of information in this field?

The intense scrutiny devoted to explicating aspects of the discipline's information environment reflected shared conviction that disciplinary mastery evolves as students develop increasingly more sophisticated understanding of information sources, information use, and information management. This line of inquiry led quite easily to considering how well-contextualized information encounters could cultivate these higher level-thinking capabilities—within the broader context of the marketing department curriculum. For this purpose, other guiding questions proved useful:

- What constitutes relevant research in the field? How does one frame a relevant question?
- How do researchers access information needed to answer questions effectively and efficiently?
- How and where is disciplinary information stored? Who determines which information will be stored?
- Are special skills needed to discover information in the field? If yes, what are those skills?
- Are there restrictions on who can collect information? Are legal or ethical issues involved in its collection?

Following this discussion of research, discovery, and search practices—and their implications for curriculum, conversation focused on related aspects of the field's communication practices, such as:

- Who owns information in the field? Who communicates it?
- How is information communicated in the field? How is it presented?
- Are special skills needed to present information? If yes, what are those skills? How is authority established?
- Do specialists in this field meet? Where? When? What do they do when they meet?
- How and by whom are valued information sources and collections in the field physically and digitally organized, stored, and accessed? (Lant, 2001)

Attachment 1.3: Appreciative Inquiry Basics

Appreciative Inquiry (AI) has the potential to take an organization beyond disenchantment with the past, confusion about the present, and concern about the future through offering alternative conceptions of knowledge, fresh discourse on human potential, and exciting directions for approaching change. Such transformation occurs through "changes in the identity of the system and qualitative changes in the state of being of that system" (Bushe & Kassam, 2005a). This is accomplished by "a positive approach to change" (Kelly, 2010) that initiates a

> *co-evolutionary search for the best in people, their organizations, and the relevant world around them. In its broadest focus, it involves systematic discovery of what gives 'life' to a living system when it is most alive, most effective, and most constructively capable in economic, ecological, and human terms. AI involves, in a central way, the art and practice of asking questions that strengthen a system's capacity to apprehend, anticipate, and heighten positive potential. … In AI, the arduous task of intervention gives way to the speed of imagination and innovation; … there is discovery, dream, and design.*
>
> *Cooperrider and Whitney (n.d.-a)*

The transformative 4-Cycle intervention model associated with AI begins with discovery (appreciating what is), then moves onto dream (imagining what could be), which is followed by design (determining what should be), and then destiny (creating what will be). During the discovery process of inquiry, "stories" about their best experiences are collected from system members and other stakeholders. Participants are asked about their personal experience of the "affirmative topic" (the focus of the inquiry)—e.g., best work experience, best team experience, best user experience. This phase recognizes the role of narrative (stories) in organizational life—i.e., organizational reality is created and perpetuated through the stories told (Ludema, 2002).

A change in stories told can alter a negative inner organizational dialog over time as the dominant story line (macronarrative), which is used to understand the past, present, and future, erodes (Bushe, 2001). As dozens of new positive micronarratives are expressed, a new dominant story line of appreciative language and ideas can emerge

(Ludema, 2002). These elements "from the ground" of peak experiences and "from the ground up" in the organization shift the core assumptions which employees use to make decisions and take actions (Bushe & Kassam, 2005b).

Transformational outcomes are accomplished through two sets of principles, which provide structure for renegotiating "sensemaking" (Weick, 1995) and (re)creating meaning (Schein, 1991) through iterative processes of reflection, reframing, and reinterpretation (Keefe & Pesut, 2004). The first four AI principles require that the inquiry begins with appreciation and is applicable, provocative, and collaborative (Cooperrider & Srivasta, 1987). The first AI principle states that—rather than focusing on problems that need to be solved—organizational members might focus on examples of the organization at its best. The second principle assumes that the outcomes of AI have to be applicable to the circumstances in which the inquiry takes place and should result in action. The third principle acknowledges that the inquiry should create knowledge, models, and images that are compelling to participants and provoke them to action. The final principle reinforces that staff members must be part of the design and execution of the inquiry (Bushe & Kassam, 2005b).

A set of four AI principles further clarifies intended outcomes and organizational significance, including the constructivist principle, principles of simultaneity, the poetic principle, the anticipatory principle, and the positive principle (Bushe & Kassam, 2005b).

The first principle recognizes that organizations are socially constructed realities. Therefore, AI should engage as many members as possible to inquire into desirable futures. The principle of simultaneity is based on the belief that inquiry is intervention, that as we inquire into human systems, we change them. "The seeds of change—that is, the things people think and talk about, the things people discover and learn, and the things that inform dialog and inspire images of the future—are implicit in the very first questions we ask" (Cooperrider & Whitney, n.d.-b).

AI also recognizes that organizational life is expressed in the stories that people tell one another. As expressed through the poetic principle, the story of the organization is constantly being coauthored to "refashion anticipatory reality" (Cooperrider & Whitney, n.d.-c). In practice, this means that the language of inquiry has important outcomes in and of itself. Therefore, in all phases, words are used to enliven and inspire the best in people. Therefore, the positive principle recognizes that sustainable change is fueled by positive emotional energy. "What we have found is that the more positive the question we ask in our work the more long lasting and successful the change effort. … The major thing we do that makes the difference is to craft and seed, in better and more catalytic ways, the unconditional positive question" (Cooperrider & Whitney, n.d.-c).

Within this positive thinking and action-oriented framework, "high impact" outcomes determine AI intervention success. For instance, transformative change that produces a qualitative shift in the state of being or nature of identity of the system is preferred to new processes, procedures, plans, or methods applied without changing the basic nature of the system. Similarly, new knowledge is valued (versus new processes) that lead to collective creation of a new referential base (as opposed to creating consensus around a specific end). Ultimately, within the larger framework of

adherence to 4-D cycle (discovery, dream, design, and destiny) and its four principles, transformative outcomes depend on "ground breaking and shifting" inquiry, which surfaces elements of the organization for increased inspection and then penetrates deeply enough to create new assumptions for organizational actions (Somerville & Farner, 2012).

Additionally, while improvisation is valued as reflective of many continuous, sometimes disparate changes that are linked to a deeper fundamental change in how the organization is perceived, specific tangible agreed upon change is highly desirable. Among the ways that transformative change may be catalyzed is through collected and shared stories, whereby a change in generative metaphor (a persistent symbol—e.g., memory of key event) that holds meaning for group members contains within it new lenses and new possibilities for action (Bushe & Kassam, 2005b). In his holistic fashion, AI evokes new worlds of meaning through transformative redesign of social relationships, knowledge systems, and workplace aspirations.

Learning through conversation is at its core. Reflective of a social constructivist perspective, AI recognizes that "people invent and create their organizations and communities through conversation about who they are (identity) and what they want (ideals). From this perspective, organizations can be understood as networks of conversation—multiple layers of conversations that are embedded in other conversations. This means that change agents work with, through, and on conversations to generate, sustain, and complete new conversations to bring about new patterns of action" (Ludema & Fry, 2008a).

> *To do this well, it is essential to have as many relevant parties as possible engaged in the inquiry. When people inquire, converse, learn, and take action across previously polarizing boundaries, it has many benefits. First, it eliminates false assumptions and evokes trust. Second, it allows people to gain a sense of interdependence with others. Third, it lets people see, experience, and connect with a purpose greater than their own or that of their group or department. Fourth, it satisfies the fundamental human need to be part of a larger community. Fifth, it fosters a 'whole organization' perspective, which creates new possibilities for action, possibilities that previously lay dormant or undiscovered. Finally, it establishes credibility in the outcomes.*
>
> *Ludema and Fry (2008b)*

Inclusive processes of decision- and commitment-making and action taking engender heightened engagement among organizational participants. When integrated into the workplace culture, AI practices catalyze and sustain organizational learning.

Attachment 1.4: Learning Commons Conception

A signature "learn by doing" initiative, characterized as "library as lab," emerged as a culturally viable and politically feasible metaphor as well as a strategic initiative for organizational change at the California Polytechnic State University Library in San Luis Obispo. In this collaborative approach, faculty and student "stakeholders"

assumed responsibilities for problem definition, research design, project implementation, and data analysis, in consultation with librarian specialists and support staff (Somerville, Rogers, Mirijamdotter, & Partridge, 2007). Student-generated and faculty-supervised results progressively informed library decision-making, action taking, and interactive evaluation.

Over time, as guiding principles for the learning commons evolved, information-focused and action-oriented studies were increasingly embedded within academic courses regularly scheduled to meet in this library "zone of innovation." The learning commons—both a place and a metaphor—intentionally supported advancement of these educational outcomes among both library practitioners and constituencies served:

Intellectual—to advance inquiry processes for developing conceptions, questioning assumptions, and deepening cognitive understanding.
Social—to encourage cooperation and awareness of others, developing a sense of social identity, and facilitating a sense of belonging and community.
Personal—to develop self-awareness and self-efficacy, furthering commitment to growth, and providing opportunities to practice self-expression.
Practical—to further teamwork skills, expanding written and spoken proficiencies, and advancing group-work proficiencies.

These guiding principles generated and informed collaboratively conducted participatory action research and participatory design projects. Multi-perspectival and multidisciplinary "evidence" shifted the locus of decision-making from "library centric" to "user-centric." Intention to bring about a change in the project situation (the action), while learning from the process of deriving the change (the research), challenged fundamental notions about organizational purposes and related workplace roles and constituency relationships as "big-picture" appreciation of the larger academic enterprise evolved (Somerville et al., 2007).

At a more granular level, essential elements for resilient workplace learning, information-centered and systems enabled, emerged, including:

Information literacy from individuals' overview of the organizational and/or disciplinary knowledge base.
Problem solving skills from enhanced organizational and/or disciplinary problem knowledge.
Systemic thinking from individuals' development of an overview of the organizational operations and their role in it, and/or academic knowledge production and their role in it.
Critical thinking ability from practice applying the preceding resource-based knowledge age proficiencies.
Social competence from enhanced abilities in selecting appropriate information and formats for communicating messages that educate and inform.
Group cohesion which comes from collective learning experiences that improve appreciation of individual and team contributions to purposeful inquiry and discovery (Mirijamdotter & Somerville, 2004).

These organizational outcomes, including the consultative processes for their generation, served to coalesce collegial commitment to adopt learning processes within the workplace that anticipated information needs within the classroom.

Attachment 1.5: Soft Systems Methodology: Basic Learning Process

The catalyst for using information to learn through application of Soft Systems Methodology (SSM) tools is based on individuals' vantage points and other factors which guarantee that there will always be a number of worldviews—perspectives on the situation—which could be taken into account, leading to a number of possible human activity systems. In recognition of this, the basic SSM learning cycle guides information-centered dialog and reflection for orchestrating new understanding and, hence, local improvements. Systems thinking tools for intervening in a problematical real-world situation calling for "action to improve" include models of purposeful activity *relevant* to this situation (not describing it), a process of using the models as devices to explore the situation, and a guided dialog and reflection process for surfacing desirable and feasible change through organizational learning (Checkland & Poulter, 2010a).

Purposeful activity models can never be descriptions of (part of) the real world. Rather, each expresses one way of looking at and thinking about the real situation, and there will be multiple possibilities. Such models serve as intellectual devices to generate good questions to ask about the real situation, enabling rich exploration (Checkland & Poulter, 2010a) through systems approaches (Reynolds & Holwell, 2010). For example, in comparing the differences between a model and the situation, participants could explore whether they would like activity in the situation to be more or less like that in the model. Such questioning organizes and structures a discussion about the real-world situation.

Reflective discussion uses the different worldviews to explore possible ways of changing the problematical situation for the better through finding an accommodation that different people with different worldviews would accept. "Given the different worldviews which will always be present in any human situation, this means finding possible changes which meet two criteria simultaneously. They must be arguably *desirable*, given the outcomes of using the models to question the real situation, but must also be culturally *feasible* for these particular people in this particular situation with unique history and the unique narrative which its participants will have constructed over time in order to make sense of their experience" (Checkland & Poulter, 2010b).

Attachment 2.1: Knowledge Creation Essentials

When Nonaka introduced a new notion of the firm in the early 1990s, he contradicted the predominant wisdom in the West about the nature of organizations. As he explained, "Deeply ingrained in the traditions of Western management, from Frederick Taylor to Herbert Simon, is a view of the organization as a machine for 'information processing.' According to this view, the only useful knowledge is formal and systematic—hard (read: quantifiable) data, codified procedures, universal principles. And the key metrics for measuring the value of new knowledge are similarly hard and

quantifiable—increased efficiency, lower costs, improved return on investment. But there is another way to think about knowledge and its role" (Nonaka, 1991a).

"The raison d'etre of a firm is to continuously create knowledge" (Nonaka, Toyama, & Nagata, 2000a). This novel approach to managing the creation of knowledge relies upon developing organizational capacity for three aspects of knowledge creation: knowledge base, knowledge frames, and knowledge dynamics.

> *The knowledge base includes distinctive individual units of knowledge, such as functional knowledge embodied in specific groups of engineers, elemental technologies, various information-processing devices, databases.... Knowledge frames capture linkages of individual units of knowledge and their priorities. For instance, one could understand that the way of task partitioning between functional groups, the configuration of authority and the distribution of resources, shape a certain pattern in individual units of knowledge within the knowledge base. Knowledge dynamics is the dynamic interactions of knowledge between knowledge base and knowledge frames, such as communication and coordination across different functional groups. Knowledge dynamics sheds light on processes of dynamic interactions in which individual units of knowledge are combined and transformed, whereas knowledge frame captures stable patterns of linkages of knowledge. The capabilities provided by knowledge dynamics emerge from within the process of knowledge interaction.*
>
> *Nonaka, Toyama, and Nagata (2000b)*

This holistic approach to knowledge emerged out of recognition that "a company is not a machine but a living organism. Much like an individual, it can have a collective sense of identity and fundamental purpose. This is the organizational equivalent of self-knowledge—a shared understanding of what the company stands for, where it is going, what kind of world it wants to live in, and, most importantly, how to make that world a reality" (Nonaka, 1991b). At the individual level, Nonaka's knowledge creation approach relies on activation of a Socialization–Externalization–Combination–Internalization (SECI) process, which is further explained in "Attachment 2.4" section. Full realization of this catalytic process, whereby individuals' tacit information is made explicit and then internalized following enrichment through workplace learning, requires robust organizational design that anticipates how employees experience information use and information content as they transfer information for knowledge creation (Somerville, Mirijamdotter, Bruce, & Farner, 2014).

Attachment 2.2: Unanticipated Coincidences

Predictive of our intellectual collaboration on Informed Systems more than a decade later, Christine Bruce discussed results presented in my dissertation, a research monograph titled *A theoretical framework and an instructional model for educating end users of online bibliographic information retrieval systems* and published in 1988, in her dissertation, published as *The Seven Faces of Information Literacy* in 1997. As I was preparing this *Informed Systems* book manuscript, I rediscovered this early

indicator of our shared interests and approaches. Through the process of discovering and reading Bruce's discussion of my dissertation in her dissertation, I newly recognized very early signs of the "Informed Systems," approach, which I highlight below with references to published papers that offer additional detail.

Bruce noted that my conception of information literacy "revolves around seeing the world as a configuration of information systems" (Bruce, 1997a). She acknowledged my research results about the existence of three intersecting "information universes," derived from exploring the life-world of information users: the universe of everyday information, comprising natural communication networks; the universe of scholarly knowledge, including "natural and designed" communication networks; and information storage and retrieval systems, comprising designed and rational communication networks (Huston, 1990a). These findings predict my deep and abiding interest in systems design and systems thinking.

Bruce recognized that my perspective revolved around seeing the world as a configuration of information systems, like an "information Web" comprises "communication systems" which "individuals must navigate in order to obtain data that they can forge into information" (Huston, 1990b). Successful navigation depends on "knowing how to navigate systems that affect our everyday existence—like complex social, political, economic and work environments" (Huston, 1990c). This in turn requires conceptual contexts necessary for situating the context of a question, selecting one or more paths, and shifting the search to different pathways (Huston, 1990d). In this way, I recognized both situatedness and variance in experiences of using information to learn.

I employed a constructivist approach to understand the requisite thinking and learning process:

> *In other words, external information … is received in terms of individuals' existing constructions of the topic – as it were, within his or her head. In turn, this new information causes individual's representations of a topic to change. From this perspective, users' cognitive structures can be portrayed as systems that create, motivate and direct searchers for relevant information, even as they are influenced by external information.*
>
> *Fielder and Huston (1991a)*

It followed that information seekers must develop appropriate mental models of those systems, fortified by systems thinking (Huston, 1990e), through active discovery learning (Fielder & Huston, 1991b). These passages serve to predict the emphasis in Informed Systems on workplace communication systems, information practices, and learning processes.

Bruce also noted that I failed to take "designing teaching-learning strategies to its logical conclusion of specifying learning outcomes in terms of changed ways of experiencing the world" (Bruce, 1997b). Admittedly, at that point in my intellectual life, my aspirations did not include the creation of transformative learning environments in the workplace or in the classroom. However, after completion of my dissertation and a Fulbright residency in Sweden, I progressively cultivated a more action-oriented approach to designing information experiences in workplace settings, as I gained expertise and efficacy.

Attachment 2.3: Participatory Action Research Elements

Participatory action research employs social sciences research methods to develop actionable local knowledge. In seeking meaningful and inclusive ways of generating knowledge together in the workplace, practitioner–researchers combine action and reflection with theory and practice to improve local situations and enhance professional practices. Working *with and for* others, co-researchers evolve learning cycles that are practical and emergent, participatory and collaborative, emancipatory and democratic, and interpretive and local (Zuber-Skerritt, 1992).

Participatory action research typically begins with the question: How can we improve the situation? Relatedly, in a workplace setting, participants often ask: What would effective professional practice look like? In other words, the focus is not to make a high level theoretical contribution to the field of knowledge, as is typical of traditional academic research. Rather, participants initiate a cycle of inquiry and action that ensures learning and, thereby, informs being and acting in the workplace through integrating local (low level) theory and practice.

The participatory action research elements in Informed Learning illustrate action research elements transferable to other organizational settings. To begin, identify a research issue. Collaboratively identify research aims and formulate research questions. This will inform decisions about research study design, which can include qualitative, quantitative, and mixed methods. Also clarify criteria and standards by which to judge the relative quality and importance of data from various sources. This evaluative framework will inform analysis and interpretation of findings—i.e., generate "evidence" for decision-making and action taking. In presenting outcomes, explain the larger context and suggest the potential significance of the research process. Generate action-oriented theory from the research findings to further a sense of engagement by pairing images of future possibilities with collaboration principles that further inquiry, discovery, and creativity. Also further organizational readiness to take action in light of the new insights (McNiff & Whitehead, 2010a).

In an iterative fashion, this process is oftentimes begun again, as practitioner–researchers aspire to continue to improve professional practice and local situations. In subsequent iterations, the research question, the research methodology, and the evaluative criteria may change to reflect advancement in collective understanding among co-workers. Additionally, aspects of the local situation may have changed based on improvements resulting from the first iteration or phase.

The distinctive participatory action research cycles of action and reflection is attributed to Kurt Lewin who described the process in these terms: "It proceeds in a spiral of steps, each of which is composed of a circle of planning, action and fact finding about the results of the action" (Lewin, 1997). After more than 60 years, Peter Reason and Hilary Bradbury expanded on the definition, stating:

> *Action research is a participatory process concerned with developing practical knowing in the pursuit of worthwhile human purposes. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities.*
>
> *Reason and Bradbury (2008a)*

Realization of the full potential of participatory action research requires expression of these essential elements:

Is practice based, and practice is understood as action and research;
Is about improving practice (both action and research), creating knowledge, and generating living theories of practice;
Focuses on improving learning, not on improving behaviors (although behavioral changes may be an outcome);
Emphasizes the values base of practice (both personal professional values and professional values of the field);
Is about research and knowledge creation, and is more than just exercising professional practice or improving professional practices;
Is collaborative, and focuses on the cocreation of knowledge of practices;
Involves investigation and deconstruction (in essence, "taking apart" and then "reconstructing" understanding of the current and potential situation);
Demands higher order questioning;
Is intentionally political (while mindfully proceeding in ways that ensure the likelihood of adoption of findings on real-world improvements); and
Requires people to hold themselves accountable for what they are doing and accept responsibility for their own actions and enables them to do so (adapted from McNiff & Whitehead, 2010b).

Therefore, action research as a practice for the systemic development of knowing and knowledge operates from different assumptions than conventional academic research. Because "it has different purposes, is based in different relationships, has different ways of conceiving knowledge and its relation to practice" (Reason & Bradbury, 2008a), it reflects a novel approach to understanding the nature of inquiry and its outcomes. Its primary purpose is to produce practical knowledge that is useful to take actions to improve. This is accomplished by creating new understanding expressed as living knowledge through increasing capacity for inquiry within communities of learners. In other words, "it is a verb rather than a noun" (Reason & Bradbury, 2008b), deeply rooted in organizational development in which participants individually and collectively discover the capacity to construct and use knowledge through sharing information and working together.

Attachment 2.4: Organizational Learning Models

Two organizational learning models offer complementary insights into contributing processes for catalyzing inquiry, producing dialog, and coordinating action within the workplace. Crossan's 4i model (intuiting, interpreting, integrating, institutionalizing) identifies social and psychological elements present during multi-level (individual, group, and organizational) learning experiences. Then, through a more granular lens, Nonaka's SECI model (socialization, externalization, combination, and internalization) describes a spiraling process of cyclical interactions between explicit and tacit knowledge to create new knowledge.

Crossan's 4i framework recognizes that, more than the sum of individual learning processes and team learning processes, three levels of organizational learning (individual, group, and organization) are linked by social and psychological processes—intuiting, interpreting, integrating, and institutionalizing. These four processes connect the three levels of analysis and define the structures through which workplace learning takes place. Intuiting and interpreting occur at the individual level, interpreting and integrating occur at the group level, and integrating and institutionalizing occur at the organizational level (Crossan, Lane, & White, 1999a).

It follows that organizational learning "incorporates the dynamic multi-level nature of the phenomenon and captures the rich interplay between processes and level" (Crossan, Lane, & White, 1999b). In a reciprocal fashion, cognition affects action, and action affects cognition within individual levels of analysis. As well, cognition influences collective learning captured and institutionalized in the form of processes, routines, systems, structures, strategies, and practices that in turn affect the "what" of cognition and the "how" of behavior across levels. This in turn furthers the "what" of topical knowledge and the "how" of professional practices within local workplace environments (Crossan, Maurer, & White, 2011).

Nonaka's complementary ideas reveal the nuanced dimension of how information can be used to learn through a spiraling process of systemic interactions between explicit and tacit knowledge to create new knowledge (Nonaka, 1994). This systems model, Socialization, Externalization, Combination, and Internalization (SECI), recognizes that knowledge exists in a continuum of two forms: tacit (unarticulated knowledge gained through experience) and explicit (articulated knowledge that can be easily created and transmitted to others, stored, managed, and reused).

Socialization and externalization activities are the starting points for the organizational learning spiral in which the tacit knowledge of individuals is articulated and thereby made explicitly available for others. When the knowledge is then contextualized and combined to advance prior understanding, so that individuals understand its applicability to their situations, the collective knowledge of the organization is enriched. The fourth conversion pattern, internalization, reflects the importance of accumulating understanding so that new learning will induce fresh understanding. In accumulating, explicit knowledge is added to tacit knowledge and the enhanced understanding becomes internalized at both individual and collective levels. Stated differently, "Knowledge creation is based on individuals performing activities in which their existing tacit and explicit knowledge is combined and used for refinement of activities and for exploring new possibilities" (Kodama, 2006).

After internalization, the process "spirals up" and continues at a new level as a result of dialog and reflection among organizational members engaged in collaborative knowledge creation activities. To achieve this ideal requires rich dialog and interaction opportunities within an organizational workplace designed for using information to learn at multiple levels. Therefore, in combination, 4i and SECI models characterize the dynamics of using information to learn within a richly nuanced workplace learning environment.

Attachment 2.5: Phenomenography Basics

Phenomenography emerged from studies on learning conducted at the University of Gothenburg in Sweden in the 1970s. The word derives etymologically from the Greek noun *fainemonon*, which translates as apparent, or that which manifests itself, and *grafia* which means to describe in words or pictures that which designates an aspect or an experience of reality (Marton & Booth, 1997a). This qualitative research approach studies people's perspectives of the world and devises collective categories that describe the variation of this experience (Marton & Booth, 1997b). It is grounded in a constructivist view of learning which emphasizes the importance of understanding learners' ways of understanding the object of learning, including how they make use of knowledge they already possess. In other words, learning is conceptualized as an activity of constructing meaning. As Bruce reveals in *The Seven Faces of Information Literacy* (1997) and illustrates in *Informed Learning* (2008), learning is a change in understanding of the phenomenon that is the object of learning.

At its essence, "a phenomenographic lens seeks to access, understand, and analyze information experience in relation to people's whole life-worlds. It avoids dividing people's experience into particular aspects (such as actions or thoughts) and separating them from the experienced world that they inhabit. … It is understood as offering a holistic perspective that integrates: (1) people's engagement with information in their experience, (2) what people experience as information, and (3) how information is experienced. Adopting this kind of information experience lens … requires simultaneous attention to both experience and information" (Bruce, Davis, Hughes, Partridge, & Stoodley, 2014). Individuals' situated experiences of information serve both as the object of study and also as a theoretical construct.

By exploring learning from the learner's point of view and by focusing on the relationship between learner and information, a holistic evaluation of learning is necessarily exemplified by the qualitative changes in the way a person conceives and interacts with the world. "This perspective necessarily calls for a shift in emphasis … away from a 'learning what' approach and toward a 'learning how' attitude" (Andretta, 2007a) conducive to, for instance, exploration of the significance of subject content, disciplinary area, and professional practice within the categories of description of experience that together shape a phenomenon like using information to learn (Limberg, Sundin, & Talja, 2012). Although its practical value is as yet largely unrealized within library and information science, understanding the different experiences of various components of information systems could potentially influence systems design, user education, and evaluation strategies (Bruce, 1999).

In recent decades, the term phenomenography has come to refer to a methodological approach for studies on variation theory. The body of literature exploring conditions of learning, including what is necessary to make learning possible (Marton, 2014), is of special relevance to Informed Systems. This is because "variation between people's experiences of information seeking and use, linked to the same task or situation, captures different ways of engaging with information, which may in turn be linked to different ways of experiencing meaning in information, and thus has implications for learning from information" (Limberg et al., 2012). Bruce conveys this

notion in the phrase "informed learning," which represents "engaging in information practices in order to learn, engaging with different ways of using information to learn" (Bruce, 2008a). A similar conclusion was reached by Limberg (1998, 1999) who discovered that it is the differences between students' ways of using information that interact closely with the quality of their learning outcomes.

Attachment 2.6: Identifying and Delineating Information Experience as a Research Domain: A Discussion Paper*

C. Bruce, H. Partridge

On behalf of the QUT Information Studies Group, especially Kate Davis, Sylvia Edwards, Hilary Hughes, Mandy Lupton, and Mary Somerville.

A line of information and information literacy research has emerged that has a strong focus on information experience. Strengthened understanding, profiling, and theorizing of information experience as a specific domain of interest to information researchers is required. A focus on information experience is likely to have a major influence on the field, drawing attention to interpretive and experiential forms of research.

Researching information experience allows a broad understanding and interpretation of people's engagement and interaction with the information environment. A focus on experience offers a more holistic approach to understanding peoples' engagement with information than the behavioral approaches. Such a focus takes into account the interrelations between people and their broader environments in a manner which considers people and their world as inseparable. It also provides deep insights into the ways in which people relate to their informational life-worlds.[1] While a body of work has been established in this area, especially among researchers of information literacy in Australia and Europe (Andretta, 2007b; Bruce, 2008b; Hughes, 2009; Lloyd, 2009, 2010; Lupton, 2008; Tilley, 2009),[2] information experience as a theoretical construct needs development. Such development is required to progress information experience as a research domain.

How might we develop the notion of information experience as a research domain? Information experience is as yet not well articulated, delineated, or explored. While it shares with information behavior a strong interest in information users and their contexts, the objects of research such as information literacy, information skills, information practice, information seeking and use, and information sharing, would be interpreted and researched differently in these two domains.

* Prepared for Social Media and Information Practices Workshop, University of Borås, 10–11 November 2011, Borås, Sweden.

[1] Within this broad interpretation of what it means to attend to experience, the position of phenomenographers and socio-cultural researchers may be distinguished as follows: phenomenographic researchers are interested in variation in experience and sociocultural researchers are interested in the co-construction of experience.

[2] These are just a few examples representative of a much wider pool of material.

Presently "information behavior" (Chelton & Cool, 2007; Fisher, Erdelez, & McKechnie, 2006; Nahl & Bilal, 2007; Spink & Foster, 2007; Wilson, 2000) forms the dominant paradigm in information user research. The interaction between information behavior and information experience research has led to concerns such as the following:

- Information research focused on experience may appear under the information behavior research umbrella (e.g., Julien, 2007; Limberg, 2005; Parker & Berryman, 2007). Thus, information research focused on investigating experience is sometimes assumed to make a contribution to understanding information behavior, rather than to understanding information experience in the context under investigation.
- Information literacy research alternates between largely behavioral, experiential, or discursive perspectives (Limberg, Sundin, & Talja, 2012) but is not widely recognized as doing so. Consequently, information literacy research is sometimes contrasted with information behavior research, even though information literacy is often researched behaviorally. It needs to be recognized that information literacy research could belong to either space depending on how it is researched.

In order to establish a better elaborated and more coherent domain we need to:

- deepen our understanding of experience and information experience as theoretical constructs and how they are interpreted differently in information (user) research;
- build our understandings of information experience as an alternative frame for information research;
- understand more fully what it means to adopt an information experience perspective, in contrast with an information behavior perspective, on information research;
- consider ways of understanding the relationship between information experience research and information literacy research;
- understand what different research methods and world views reveal about people's experience of information use and the idea of information experience as a theoretical construct;
- understand what different contexts reveal about people's experience of information use and the idea of information experience;
- identify models and studies that are focused on information experience and draw them together as representing a coherent domain;
- examine and synthesize the currently disparate/fragmented thinking and theorizing on information experience;
- explore possible theories of information experience.

Researching information experience is of interest in at least two research groups in Australia. At QUT, researching information experience commenced in the early 1990s with research into doctoral students' experiences of literature reviews (Bruce, 1994). The work has expanded nationally and internationally and has grown to incorporate different research approaches, methods, and techniques. Directions in this area for the QUT Information Studies Group include:

- profiling information experience consistently as a research area in journal writing;
- producing a proposal for an edited book, *Information Experience* (please let us know if anyone would like to join the team of authors);
- generating grant applications focused on theorizing information experiences;
- supervising research students working with the idea of information experience.

A strand of the QUT team's focus is the phenomenographic approach to researching experience. Other approaches used at QUT which focus on researching experience include grounded theory, ethnography, evidence-based practice, and the expanded critical incident approach. Understanding the nature of the contributions of these approaches to exploring information experience offers an important future direction for researchers worldwide.

Attachment 2.7: Relational Information Conception

In *The Seven Faces of Information Literacy*, Bruce presents foundational outcomes from exploration of information experiences using a relational approach. These early results include four principles about the relational view and seven faces (facets or categories) for qualitatively different ways of experiencing information through using information to learn. In depicting the phenomenon as a whole, these principles and aspects represent an integration of experiential, contextual, and transformational perspectives, which departed from the predominant behavioral research and skills-based education in vogue when she released her findings in 1997.

The relational approach recognizes these guiding principles for using information to learn:

> *Learning is about changes in conception—that is, learning to develop new, more complex, ways of conceiving of, or experiencing information.*
> *Learning always has content as well as process—that is, individuals should be learning about something (disciplinary content) as they engage in learning to be effective information users.*
> *Learning is about relations between the learner and the subject matter—that is, learning to be an effective information user involves the relations between the learner and the information.*
> *Improving learning is about understanding the learner's perspective—that is, helping individuals to become better information users requires understanding their ways of conceiving of effective information use.*
>
> *(Bruce, 1997c)*

Within this guiding framework, which simultaneously focuses on information use and learning, the qualitatively different ways of experiencing information listed below should be understood as suggesting relationships and variations.

1. Information and communication technologies: harnessing technology for information and knowledge retrieval, communication, and management,
2. Information sources: using information sources (including people) for workplace learning and action taking,
3. Information and knowledge generation processes: developing personal practices or heuristics for finding and using information for novel situations,
4. Information curation and knowledge management: organizing and managing data, information, and knowledge for future professional needs,
5. Knowledge construction and worldview transformation: building knowledge through discovery, evaluation, discernment, and application,
6. Collegial sharing and knowledge extension: exercising and extending professional practices and knowledge bases to workplace insights, and
7. Professional wisdom and workplace learning: contributing to collegial learning through using information to learn to take better action to improve (adapted from Bruce, Hughes, & Somerville, 2012).

The "outcome space represents the relationships between those categories … it depicts the phenomenon as a whole" (Bruce, 1997d) within which learning creates changes in conceptions, as phenomenographic study results illustrate. At California Polytechnic State University in the United States, Clarence Maybee identified three primary ways that undergraduate students conceptualized information and its usage: sources, in which information use is seen as finding information located in information sources; processes, in which information use is seen as initiating a process; and knowledge base, in which information use is seen as building a personal knowledge base for various purposes (Maybee, 2006). In Australia, Mandy Lupton revealed the relationship between information use and learning as experienced in three ways by students: sequentially, where people identify useful information and then learn from it; cyclically, where the process of identifying information and learning from it recurs; and simultaneously, where information use in all its aspects and learning are experienced as occurring together (Lupton, 2008).

Such insights can inform creation of more variation in educational experience approaches, which may focus on content, competence, learning to learn, social impact, or personal relevance to reflect a complex of different ways of interacting with information (Bruce, Edwards, & Lupton, 2006). These findings underscore the importance of developing new, more complex ways of conceiving and experiencing the multifaceted phenomenon of learning. Relatedly, such discoveries suggest that people must become aware of how they experience and use information to learn within a context, so they can become more effective as they learn what it takes to make that possible. Within Informed Systems, therefore, individual and collective awareness and efficacy is furthered through participatory design of systems and cocreation of practices that mindfully foster transformative information experiences and transferable learning outcomes.

Attachment 4.1: Auraria Library Organizational Design Fundamentals

To enable redesign of organizational communication, decision-making, and planning systems for shared leadership and organizational learning, North American organizational development consultant Maureen Sullivan conducted workshops at the University of Colorado Denver in November 2008. She built upon insights derived from two organizational working groups, constituted in advance of her visit, to frame her consultancy activities.

The Communications Working Groups focused on organizational communication and reported several issues. They identified the problem of too many forms of communication and no centralized way of receiving communication besides e-mail. They recommended a means of identifying what's really important—i.e., "what need to know?"—and guidance on using the right tool(s) for communication, mindful of the audience—i.e., "who needs to know?" In a second report, the Learning and Development Working Group recommended well coordinated and well funded training programs, which would ideally include collegial mentoring as well as participation incentives.

In extending these ideas, Sullivan conducted a full-day workshop to further clarify co-workers' thinking about decision-making, organizational leadership, and working relationships. Results revealed these ideas and ideals:

Decision-Making
Know who makes (appropriate level) decisions
Understand who are affected/impacted parties in decisions made
Clarify decision-making processes
Clarify "shared leadership" concept—i.e., to empower employees to make decisions within guiding service philosophy and strategic plan
Willingness to and acceptance of failure
Safe environment to make mistakes

Organizational Leadership
Risk taking is understood to be a way to learn and move organization forward
Autonomy granted to determine "how" to do something (i.e., empowerment)
Resources aligned with mission
Encourage enlarged portfolios/skills and enhance competence

Working Relationships
Clear expectations
Teamwork
Professional courtesy
Interpersonal communication/listening
Free to bring up concerns
Open mindedness

These workshop results served to inform participatory systems design workshops conducted in March 2009 by Swedish research scholar Anita Mirijamdotter. For more information, see the final report (Attachment 4.4).

Attachment 4.2: Shared Leadership Reflections

Around the globe, academic library leaders are asking: How do we design our organizations to create "forward thinking" outcomes in the Digital Age? In response, our profession is increasingly recognizing that we must start by transitioning current employees into new roles and responsibilities within redesigned workplace environments. Given the magnitude of external economic, technological, and social changes, merely tinkering with traditional organizational models is inadequate. Rather, the forces at play require proactively moving from the old, comfortable model—designed for a world that no longer exists—to fundamentally reinvent professional assumptions, organizational structures, and workplace processes.

Leadership has historically been conceived around an individual and his or her relationship to subordinates or followers. As a result, the leadership field has largely focused its attention on the behaviors, mindsets, and actions of the leader in a team or organization. In recent years, however, some professional leaders and academic researchers have challenged this paradigm, arguing that leadership is an activity that is

shared or distributed among members of a group or organization. They propose that, depending on the demands of the moment, individuals can rise to the occasion to exhibit leadership and then step back at other times to allow others to lead.

This phenomenon is increasingly illustrated in the organizational unit of the team, specifically cross-functional teams. What distinguishes these groups from traditional organizational units is often the absence of hierarchical authority. Although a cross-functional team may have a formally appointed convener, this individual is more often considered a peer. Leadership is not determined by positions of authority but rather by an individual's capacity to influence peers and by the needs of the team in any given moment. In addition, each member of the team brings unique perspectives, knowledge, and capabilities to the team. At different junctures in the team's life, there are moments when these differing backgrounds provide an opportunity for leadership to be distributed among the team—opening the door to shared leadership.

Shared leadership has been defined as "a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of groups or organizational goals or both" (Pearce & Conger, 2003a). The drivers for this change have largely to do with shifts in how work is performed. For instance, to return to the example of the cross-functional team: what distinguishes this group from traditional organizational units is the absence of hierarchical authority. Although a cross-functional team may have a formally appointed convener or "leader," this individual is more often than not treated as a peer—i.e., outside of the team, they may not possess line authority over team members. Moreover, the cross-functional team leader is oftentimes at a knowledge disadvantage, given that the purpose of a cross-functional team is to harvest a diverse set of functional expertise. The formal leader's expertise represents only one of the numerous functional specialties needed to address the problem or the issue. Therefore, leadership opportunities can arise based on team members' expertise, given the needs of the group at that moment.

Because each member of the team brings unique perspectives, knowledge, and capabilities to the team, the influence process whereby individuals' knowledge, skills, and abilities are infused into group decision-making processes involves both lateral peer influence and upward or downward hierarchical influence (Pearce & Conger, 2003b). The key distinction between shared leadership and traditional leadership models is that the influence process involves more than just downward influence on subordinates by an appointed or elected leader. Rather, leadership is broadly distributed among a set of individuals instead of centralized in the hands of a single individual who acts in the role of superior. In other words, leadership is a shared activity among members of the group or organization.

To initiate shared leadership values and practices through Informed Systems, participatory design of workplace systems for communication, decision-making, and planning engage organizational members in clarification of collective learning needs and process preferences. Resultant systems and associated practices enable distributed leadership opportunities throughout the workplace, at all levels and across boundaries, as individuals and groups rethink and repurpose the work-to-be-done. Within the guiding framework of the Informed Systems leadership model, pervasive efficacy and effectiveness naturally evolves over time and with practice.

Attachment 4.3: Shared Leadership Team Work Outcomes

The highly interdependent nature of organizational learning through "shared leadership" requires transformation of the organizational practices, structures, and relationships typically found in traditional workplaces. Therefore, in the Auraria Library, "shared leadership refers to a team property whereby leadership is distributed among team members rather than focused on a single designated leader" (Carson, Tesluk, & Marrone, 2007) This approach recognizes that "as higher education and academic libraries continue to function in an environment of fast paced change, … organizations cannot wait for leadership decisions to be pushed up to the top for action" (Cawthorne, 2010).

The work of the Shared Leadership Team (SLT) illustrates one way that the shared leadership conception is expressed at Auraria Library. It is comprises both supervisors and non-supervisors who, together, coordinate Appreciative Inquiry-generated initiatives such as these:

- redesign of functional units through iterative Appreciative Inquiry processes to identify "the best person for the job," which included transfers for persons indicating interest and ability for other types of work (Pan, 2012; Pan & Howard, 2009, 2010)
- redesign of the organizational structure to create a new Shared Leadership Team and Library committee structure that ensures information exchange and knowledge creation through dialogue and reflection (Somerville & Howard, 2010),
- new design of communications, decision-making, and planning systems with virtual and face-to-face (f2f) components that ensures easy information access and contextualizing dialogue experiences (Mirijamdotter, 2010; Somerville & Mirijamdotter, 2014),
- new professional and staff performance plans illustrating new roles and responsibilities which value holistic and interconnected work relationships and integrated work flows and collaborative processes (Somerville, 2013), and
- new "design concept" for renovated library facility, which embodies new means of expressing traditional professional values and expertise through technology-enabled collaborative learning spaces for both students and staff (Howard & Somerville, 2014; Somerville & Brown-Sica, 2011).

Positive Appreciative Inquiry philosophy and practices (Somerville & Farner, 2012) permeate the collaborative evidence-based decision-making exercised by the SLT as well as the standing committees and task forces that conduct information-focused and action-oriented "research for change" (Reed, 2007) upon which SLT decisions depend. In these various ways, individuals and groups improve their professional practice (McNiff & Whitehead, 2010c) as they appreciatively interpret findings and share insights, thereby modeling the inquiry and exploration that they seek to inspire and enable in others.

Attachment 4.4: Auraria Library Report on Communication Systems

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Executive Summary

To further creation of an evidence-based organizational culture grounded in shared leadership principles and fortified by reflective decision-making and strategic planning practices, library staff members were coached in a series of workshops over a 4-day period from March 15 to 19, 2009. This report presents results of the culminating workshop in which participants explored the shared leadership concept and, through participatory action research, initiated plans for organizational communication and decision-making improvements. In concluding remarks, I offer recommendations for sustainable organizational systems, which enable management and coordination of internal operations and external relationships. These build upon systems thinking theories and models furthered by theories on organizational knowledge creation and informed workplace learning. Recommendations include: how to prepare for and conduct SLT meetings, and document and disseminate minutes. In addition, I discuss issues concerning decision-making, group learning, knowledge sharing, and performance evaluation within the SLT, including strategies for making these explicit. Finally, I suggest how to continue designing an improved organizational communication system that benefits from participatory approaches for better aligning library activities with stakeholder needs.

Introduction

To further creation of an evidence-based organizational culture grounded in shared leadership principles and fortified by reflective decision-making and strategic planning practices, I coached library staff members during a 4-day residency from March 15 to 19, 2009. I delivered three participatory design workshops to Auraria Library staff and faculty on:

- Communication, decision-making, and planning system elements which support the Library's shared leadership philosophy and
- Evidence-based measures for annual library organization outcomes and faculty performance plans in preparation for the 2010 Library program review.

In addition, I presented a library wide Open Forum on:

- Student-centered needs assessment methods for developing Library learning spaces, especially Learning Commons, and
- Inclusive Scandinavian workplace practices for workplace communication, decision-making, and planning processes and systems.

For the purpose of capturing learning from these organizational activities, this report details recommendations for sustainable organizational systems, which enable management and coordination of internal operations and external relationships. These best practices reflect results of the culminating workshop in which participants explored the shared leadership concept and, through participatory action research, initiated plans for organizational communication and decision-making improvements. These insights emerged out of dialog and reflection on guiding strategic planning documents generated by Auraria Library faculty and staff from April 2008 to date:

- Auraria Library Strategic Plan 2008–2011 (mission and vision statements, guiding values)
- Auraria Library Communication Task Group Final Report (4/08)
- Committee Evaluation Task Force report, Auraria Library committee reporting structure (2/09)
- Committee Evaluation Task Force report (2/09)
- Shared Leadership Team minutes (2/5/09)
- Notes on ideal aspects for communication, decision-making, and planning systems for shared leadership and organizational learning (Sullivan workshop, 11/08)

Systems thinking theories and models (especially Checkland and Beer), as summarized below, shape this appreciative report on staff-generated aspirations and insights. This contextualizing framework also guided workshop design considerations, as well as workshop activities' outcomes. In addition, guidance for workshop design and outcomes interpretation benefited from Nonaka's theories on organizational knowledge creation and Bruce's theories on informed workplace learning. In the following pages, these theoretical frameworks are introduced, followed by a review of workshop processes and outcomes. Finally, I give recommendations for continued work.

Theoretical Framework for Method and Analysis

"Systems thinking" frameworks provide the overarching theoretical perspective for design of the Auraria Library workshops and interpretation of workshop outcomes. Such an approach aims to surface interrelationships through proven methods and analysis. In this instance, systems thinking is used to stimulate organizational learning through revisiting workplace assumptions to support the construction of larger frames of reference which enable development of "bigger view" understanding. When members of a library workplace share "big-picture" appreciation for their roles within the organization, as well as their potential roles within the higher education enterprise of which they constitute a part, their interactions and interrelationships begin to achieve more synergistic consequences.

Within the systems thinking field, I depend particularly on the work of Professor Peter Checkland, who founded SSM over 30 years ago. This action learning methodology informed the workshop process designs, including the "rich-picture" technique, which illustrates different aspects and perspectives of real-world situations. SSM also ensured a participatory action research orientation, which aims to improve the situation under investigation. In such an approach, practitioners are involved as both subjects and co-researchers who intend to solve a practical problem and, at the same time, increase collective knowledge. In other words, participatory action research aims to construct an environment where participants freely exchange information and make informed choices—in the spirit of what Australian researcher Christine Bruce has named "informed learning." In this way, commitment to the investigation results—as discovered by the group—is advanced, in the words of Ikujiro Nonaka, within a "knowledge enabling" environment.

In this case, I also draw insights from the work of the late systems thinker Professor Stafford Beer, who proposed a Viable System Model (VSM). The model provides a generic systems framework that can be used as a diagnostic device to explain, analyze,

and plan for organizational sustainability. It includes five functions or sub-systems, which can be useful in understanding organizational structures, roles, and functions.

System One (S1) of Beer's Viable System Model represents the sub-system in which operational work is carried out—for instance, in the Auraria Library, learning materials are acquired and organized, discovery and access systems are implemented and refined, research services are delivered and evaluated, and facilities spaces are reimagined and reconfigured.

The model assumes that there are several operational systems, several System One's, and therefore there is a need for oversight and coordination. This is the function of System Two (S2). By providing infrastructure and processes aimed at coordinating operational work, operational systems (One's) are enabled to perform more smoothly. In the case of the Auraria Library, this role—traditionally assigned to senior administration—is expressed in a decentralized fashion through a shared leadership philosophy. The SLT and the Strategic Planning Core Team and Steering Committee currently carry out such work.

System Three's (S3) function is to govern the internal stability of the organization by, for instance, planning operational strategies, strategically allocating resources, and monitoring and controlling operations. This function is also referred to as "here-and-now." Closely related to System Three is the auditing function of System Three. This function includes task force reviews and assessments of operational programs, services, and systems. Examples of this would be the work of the Auraria Library Education, Research, and Information task forces on a combined service desk or a self check out circulation function, as well as the work of the library evaluation task force.

The concerns of System Four (S4) are related to organizational development issues aimed at "there-and-then," including planning and defining strategies for long-term survival. Such activities can involve environmental scans and futurist scenarios, including aspirational briefs such as fund-raising case statements which invite external gifts for new initiatives.

Finally, System Five (S5) focuses on policy making and organizational direction. It furthers coherence among the interacting sub-systems represented by Systems One through Four. At the Auraria Library, the strategic plan's vision, mission, values, and initiatives inform the organization's purposes, policies, and decisions. The Strategic Planning Core Team and Steering Committee have special responsibility for coordinating the organization's movement forward.

In the Viable Systems Model (VSM), for an organization to be sustainable, the environment is also represented. Each VSM System has its own environment; though they may be overlapping, they are not identical. Further, the model includes information flows between the sub-systems or functions themselves and to respective environments. These symbolize two-way communication for receiving (e.g., listening, reflecting) and sending (e.g., talking, e-mailing).

Recursion, variety, and autonomy are key elements of a sustainable VSM-enabled organization. Recursion means that identical structures for the five functions, including interrelated information flows, are embedded in the functional units of each S1, like the Russian doll that includes triplets, perhaps even sextuplets. For instance, System One (S1) operational work is carried out in Technical Services in which cataloging,

electronic resources, etc.—each with its own operational processes and activities—maintain stability, develop outcomes, and provide policy. Each of these units ideally contributes to a coherent set of operations, which we recognize as "technical services."

Technical Services can also be understood as the composite of all of the S1–S5 elements contained in each of the embedded technical services' units. Each of the five functions in each of the technical services' units ideally interacts with each other in a recursive fashion. In addition, at a "meta" level, Technical Services ideally also interacts with its functional counterparts in Education, Research, and Information Services at these recursive levels. In the Auraria Library context, cataloging or electronic resources S1–S5 functions are negotiated and expressed at team meetings and/or informal discussions, while Technical Services S1–S5 functions are expressed and refined by Technical Services representatives through interactions with others at SLT meetings.

Variety represents a second element of a viable (sustainable) organization. This term recognizes complexity. It can be thought of as incoming requests or "disturbances" from the environment. To manage such variety, the organization can: decline incoming requests, change the operations, or change the objective (i.e., the expectations or operational outcomes)—or the organization can respond with a combination of the three. By way of example: if the objective against which the library is evaluated requires providing "all" traditional library services and a new service is requested, then the Auraria Library can either say, sorry, we do not provide this service and refer the requestor to someone else who does, initiate the service and related activities to enable satisfying the new request, or change the objective to, say, meeting 75% of the request (a compromise position). In the first response, information from the environment is filtered; in the second respond, operational activities are amended to cope with incoming variety; and in the third respond, expected level of performance is changed to be able to meet stated objectives (evaluation measures) in full.

The third VSM element—autonomy—emphasizes freedom and authority to manage one's "own affairs." This indicates that people have work tasks related to functions at embedded levels for which they have, or should have, autonomy. In exchange, individuals are expected to be responsible and accountable for their autonomous work tasks. Within the Auraria Library environment, this means that individuals have responsibility for their assigned work tasks and must be prepared (through training, coaching, etc.) to perform them autonomously. In the case of managers and directors, they also have responsibility for ensuring that their subordinates' operational level decision-making and action taking are aligned with organizational priorities and agreed-upon practices and procedures. The latter emerges from inclusive dialog and reflection at all levels of the organization, during team, unit, and SLT meetings, as expressions of policy and coordinating functions (S5 and S2). Robust information flows ensure that issues and resolutions are widely transmitted horizontally and vertically throughout the workplace.

Auraria Library Systems Thinking Enhancements

To fully express the learning potential of the collective commitment to shared leadership, as communicated by Auraria Library faculty and staff during my on site

interactions, these established European theories about organizational systems can be fruitfully enriched by additional perspectives from around the world. Given the unique conceptualization of "shared leadership" expressed by SLT members, their ambitious aspirations are best fortified by theory from Professor Ikujiro Nonaka (Japan) and from Professor Christine Bruce (Australia).

Japanese knowledge management researchers recognize that a corporation's most important sources of competitive advantage are the knowledge of its employees (as expressed by individuals in teams and other collaborative situations) and the knowledge built into the organization's operational and coordinating systems (expressed as S1–S5 in the Viable Systems Model). When these concepts are transferred to a not-for-profit environment such as an academic library, it follows that the catalyst for knowledge creation are formal and informal social interactions among employees, teams, units, etc.

According to Professor Ikujiro Nonaka, knowledge creation is a spiraling process of interactions between explicit and tacit knowledge. The interactions lead to the creation of new knowledge. The combination of the two categories, tacit and explicit, makes it possible to conceptualize four conversion patterns. Sharing and inspiration are the starting points for the organizational learning spiral in which the tacit knowledge of organizational members is articulated and thereby become explicit. When this information is sufficiently contextualized—so that participants understand its applicability to their situations—these information encounters enrich the collective knowledge of organizational members. As new knowledge emerges, creativity surfaces. The fourth element reflects the importance of accumulation, in which (at the individual level) new learning prompts fresh understanding which becomes internalized, as explicit knowledge is added to tacit knowledge, and the enhanced understanding becomes internalized at both individual and collective levels. At the organizational level, this speaks to the importance of supplementing individual and group memory with technology-enabled means of recording and preserving "evidence" and insights generated from social interactions.

As another Japanese theorist stated, "Knowledge creation is based on individuals performing activities in which their existing tacit and explicit knowledge is combined and used for refinement of activities and for exploring new possibilities" (Kodama, 2006). Kodama recognizes that organizational members' innovation process, referred to by him as "sharing—inspiration—creation—accumulation," "spirals up" as a result of dialog and reflection among organizational members engaged in collaborative activities. The spiraling process, in which organizational knowledge develops, explains how the Auraria Library faculty and staff are able to continually improve the quality of programs, services, and systems for faculty and students, within the guiding framework of the organization's strategic planning process.

Fully understanding the spiraling process of creating and integrating collective organizational knowledge (i.e., prior learning as expressed through tacit knowledge made explicit) permits "rethinking" together. As has been shown to be successful in another library organization (Mirijamdotter & Somerville, 2009), collective enhancement of knowledge within the workplace (working smarter) occurs through dialog-based activities, both formal and informal, which purposefully cultivate transferable learning "habits of mind."

Achieving this ideal within the Auraria Library context requires rich dialog and interaction opportunities fortified by shared leadership principles and practices guided by strategic planning priorities and processes. These workplace elements will serve to initiate and further a culture of inquiry which, over time and with practice, will also further and strengthen campus community partnerships. Such a learning organization will prove to be responsive, nimble, and adaptable among dynamically changing circumstances in both internal and external environments.

Shared Leadership Communication System Infrastructure Elements

During the culminating workshop with SLT members on 19th March, Auraria Library faculty and staff explored the concept of shared leadership as it relates to collaborative design of an organizational communication, decision-making, and planning system. A participatory action research method informed by SSM was used to structure activities and interpret outcomes through the guiding framework of Beer's Viable Systems Model for sustainable and responsive organizations. All workshops outcomes have been made available to library staff through files uploaded to the Intranet.

The notion of shared leadership was initially explored by asking participants to consider how it was expressed within their workplace contexts. Discussion revealed that shared leadership responsibilities required individuals to "act as a medium," a "voice" that reflected insights and issues derived from various embedded levels of the organization. In "rising above" their personal interests and functional responsibilities—such as unit head or team lead—SLT members aspired to apply their collective perspectives and expertise—their knowledge—to move the organization forward. Simultaneously, the participatory work culture and policies that the group has created (and will continue to evolve) within the SLT meeting environment are both informed by and inform expressions of "shared leadership" within Technical Services; Learning Spaces; Scholarly Communications; Education, Research, and Information; and Administrative Services units.

SLT decisions were described as occurring, in general, through "consensus"—meaning that everyone was invited to comment and then supported the agreed-upon outcomes, including communicating decisions to coworkers and constituencies. Because SLT's role is still relatively new to the organization, the process of coming to a decision—and even recognizing which kinds of decisions should be taken—was not entirely clear. To this point, the agendas have included policies, strategies, budgets, and reports, which suggest a wide range of responsibilities for the group, as recognized in the committee evaluation task force report.

Session outcomes also reveal that SLT members seek opportunities to learn from others' perspectives, including those of campus stakeholders (e.g., attendance at CU Online activities that reveal faculty teaching practices which utilize library resources). SLT participants recognize their responsibilities for advancing organizational outcomes through sharing insights and observations, framing questions and furthering inquiry, identifying and generating data and information (evidence), and

disseminating meeting outcomes and project updates to constituency groups and/or co-workers. In this sense, SLT members further two-way information flows supportive of the S2, S4, and S5 functions of the VSM model. Some members also work in a formal leadership position and therefore have additional responsibilities for S1 (operational work), S2 (oversight/coordination), S3 (day-to-day planning), and S4 (there-and-then strategic planning), as well as significant influence in S5 (policy making).

Many session participants pointed out the value of learning from each other. This raises questions such as: How do team members learn from each other? How does that learning affect workplace behavior and library operations? Can there be more explicit methods for learning and sharing knowledge, which intentionally promote the spiraling process of making tacit knowledge explicit for internalization and accumulation within the organization's "knowledge base"? How can workplace "informed learning" advance through situated information encounters that stimulate reflection and dialog and advance collective decision-making and action taking? How can library system, service, and program beneficiaries become further involved in library faculty and staff learning activities, toward the end of forging continuous relationships and sustainable communication? What measures can provide evidence of the value and impact of these learning encounters, in terms valued by the faculty, student, and staff constituencies at the three schools served? I will further address these issues below in my recommendations on follow up activities which involve theoretical frameworks from systems thinking and applied methodologies from participatory action research.

In addition to individual SLT members' reports to their peers and subordinates in regular meetings or through informal chats, SLT meeting outcomes are reported to the whole organization in the Open Forum meetings once a month, posted on the Intranet in the form of meeting minutes, and included in the biweekly *News@1100*. However, the "praxis" (practical application/custom) of disseminating information is not fully established yet, so there is some confusion on where and how to find meetings updates. Therefore, not all organizational members are conversant with SLT decisions and deliberations. In response, session participants suggested that every group should define both their information dissemination strategies and their processes for gathering feedback from embedded levels; multiple redundant opportunities should be available. Additional discussion concerned "storage strategy"—building an effective knowledge base that everyone can easily access. This involves decisions on, e.g., how minutes should be formatted, how to name meeting files, and where to file agendas, minutes, attachments, and reports.

A final issue that surfaced concerned the mechanisms for determining whether the system is effective, that is, the effectiveness of SLT. From a systems perspective, the effectiveness value would be determined in relation to SLT's contribution to overall organizational objectives, mission, and vision, including meeting stakeholders' aspirations for organizational development. In addition, SLT members expressed appreciation for opportunities to dialog, listen, and observe, besides the more tangible evidence-based measures.

Shared Leadership Communication System Channels and Processes

In a previous workshop facilitated by Maureen Sullivan (November 21, 2008), groups critiqued the current state of communication, decision-making, and planning in support of shared leadership and organizational learning. Emergent issues included the need to:

- organize systems for receiving and sending communications,
- identify what's important to know within an organizational context, and
- select appropriate tools to achieve desired communication outcomes.

In this workshop (March 19, 2009), participants further analyzed communication channels, including benefits for each, as well as current structures, processes, and purposes of communicating. These analyses were elaborated in rich pictures.

The modes of communicating through technology were classified and include: "push," such as e-mail and RSS feeds, and "pull," such as intranet and blogs. Discussion points included these observations: while traditional e-mail is easy to use, too many emails is burdensome, especially since it is difficult to distinguish relevance. The pull technologies usually enable shared contributions and collaboration; however, there is a learning curve and multiple passwords discourage use.

Verbal and face-to-face meetings were generally perceived more positively because they permit more personal and direct communication, including rich nuances such as body language. Such interactions were recognized as most supportive of informed learning, which depends on social exchange for "sense making." However, it can be difficult to schedule large group face-to-face meetings and oftentimes conversation outcomes are not consistently recorded.

In the "rich pictures" created in the workshop, both opportunities and problems were made explicit. A recurrent theme recognized the need to select channels appropriate to the meeting purpose, which might include to:

- inform oneself,
- inform others,
- apply meeting outcomes in decision-making,
- avoid duplication of effort, i.e., "work smarter, not harder,"
- enable accountability in project work (Basecamp for project management),
- report and solve technological problems (Bugzilla for tracking technology repairs),
- share framework for exploring organizational issues, and
- communicate organizational policies and procedures.

In one of the rich pictures, an ideal mode of communicating within the SLT was visualized as an environment providing sufficient time for fruitful discussion enabled by constructive "meaning-making" behaviors. For instance, time limits could be allocated for agenda items with the aim of encouraging dialog and reflection followed by decision-making to inform action taking. In this view, the organizational communication system could flourish like an ecosystem, with the SLT as a primary source of energy radiating through appropriate communication channels.

These lines of thought were continued in the next phase of the workshop in which SLT members were asked to design an ideal organizational communication system, including identifying appropriate technologies and corresponding ideal social behaviors. The groups summarized communication needs and requirements based on the "rich pictures" rendered in the previous task.

One group asked: what are our needs and reasons for communicating and how can these be satisfied by technology decisions? This group also discussed behavioral ideals for organizational communication. A second group focused on communication needs, appropriate technology, and social behaviors. A third group looked into appropriate modes of communication, including technology, in relation to organizational level, such as individual, departmental, interdepartmental, and SLT, with the aim of informing the entire Auraria Library staff.

The next step for the SLT would be to continue the iterative analysis and design process through the theoretical lens of the Viable System Model. This framework could clarify the complementary roles and responsibilities of SLT within the larger organizational context, including unit and team level considerations. VSM is additionally useful to further exploring communication issues such as

- how to package information,
- what to filter out,
- what to emphasize,
- to which function,
- to which functional level, and
- with which frequency.

Additionally, the principles of knowledge management and informed workplace learning, as put forward by Nonaka et al. and Bruce, respectively, should inform the principles and processes selected to ensure concurrent organizational learning and workplace development.

Participatory Action Research to Further the Organizational Learning

The workshop process employed participatory action research methodology to enable Auraria Library faculty and staff members to explore the concept of shared leadership and its relationship to organizational teamwork and collective advancement. This activity also stimulated planning for an organizational communication, decision-making, and planning system, through surfacing different perspectives on the problem situation and its improvement. In addition, this approach offers a promising set of philosophical and methodological strategies for outreach activities on the Auraria campus, as summarized in workshop participants' concluding observations about the workshop process. Comments included appreciation for:

- collaboratively working together,
- different points of view,

- different user needs,
- structured learning exercises,
- interdepartmental communication (reveals different needs),
- rich communication opportunities,
- enables action taking/decision-making,
- takes time (like a retreat project),
- common threads/commonalities, and
- establishes priorities in single venue.

Based on such enthusiastic comments, I strongly recommend this approach in both continuing organizational development work and also "needs finding" investigations among campus constituencies.

Conclusion and Recommendations

To further creation of an evidence-based organizational culture grounded in shared leadership principles and fortified by reflective decision-making and strategic planning practices, library staff members participated in a series of workshops during a 4-day residency from March 15 to 19, 2009. In the culminating workshop, which informs this report, participants explored the concept of shared leadership and, through participatory action research, planned for organizational communication and decision-making improvements.

The SLT members have a stabilizing and (re)directing function within the organization. Members' "back and forth" information flows align cross-functional organizational operations, strategies, assessments, policies, and directions. They also bring forth issues that have occurred within the organization as a consequence of interactions with external environments. As the SLT moves to "the next level" of maturity within the organization, strategies, and procedures for generating and organizing meeting agendas and for disseminating information and soliciting feedback need to become more explicit. My recommendations for SLT meetings include:

- A subset of SLT could take responsibility for scanning the environment, both within and outside the organization, for building meeting agendas.
- The agendas should be announced in advance, including expected outcomes, i.e., informational item, discussion item, and decision-making item.
- The meetings should be held regularly, perhaps for 2-h blocks of time, to allow for dialog and reflection, with a frequency of at least two meetings per month.
- Meetings could be organized according to systems functions—i.e., one meeting could take a broader perspective and focus on strategic issues while the next meeting could focus on operational alignment across departments.
- Templates should be used for creating agendas and preparing minutes and standard conventions should be developed for naming documents.

Additionally, decisions need to be made on how to better disseminate information generated in SLT meetings and, in a reciprocal fashion, how to gather

feedback from employees throughout the organization. Therefore, these issues should be discussed and decided:

- Define redundant dissemination and feedback strategies so individuals have a variety of ways of receiving and responding, such as:
  - Open Forum meetings for verbal and face-to-face (f2f) interaction,
  - minutes, where and how to be found, with file names that are both consistent and allow for efficient searches, including timeline for posting minutes,
  - virtual note boards (or blogs) for commenting on stored minutes,
  - departmental (unit, team) meetings with opportunities for discussing agendas and minutes from SLT, and
  - *News @ 1100* summaries of major SLT outcomes, accompanied by link to meeting minutes.

For developing collective SLT capabilities, including strengthening the group's identity, I recommend explicitly incorporating the theories presented in this report into the design of meeting activities. In particular, the organizational learning theories of Beer, Bruce, Checkland, and Nonaka would "add value" to the group's deliberations about three sets of issues:

Issues #1:
- the autonomy and scope of SLT for decision-making,
- the process of gathering evidence for decision-making,
- the strategy for arriving at a decision (e.g., consensus, accommodation, majority), and
- the expected behavior for observing agreed-upon decisions.

Issues #2:
- strategies for learning from each other within the team,
- methods for sharing knowledge within the team,
- methods for implementing the collective learning, and
- implications for Auraria Library faculty and staff behavior.

Issues #3:
- criteria for evaluating SLT performance,
- methods for defining evaluative criteria,
- methods for performing the evaluation,
- decisions and strategies for implementing evaluation results, and
- implications for Auraria library's operations and strategies.

In addition, the SLT should continue to refine the design considerations to improve organizational communication and decision-making. The "rich-picture" renderings and accompanying notes from the workshop should be further analyzed and merged into systems models which enhance SLT interaction and communication and thereby ensure the sustainability of the Auraria Library and its emerging shared leadership culture. Based on continued analysis of communication patterns and needs, including technology qualities and availability, I make the following recommendations:

- create communication strategies between organizational functions and levels to enrich and ensure information preservation, access, and interaction,

- develop a technology strategy that furthers core strategic library learning outcomes, including what the Auraria Library staff should assume responsibility for and what should be outsourced, and
- explore learning Web 2.0 applications and other new initiatives that may further internal operations and foster relationships, both internal and external.

The ideal approach for completing the technology strategy planning process would involve stakeholders from throughout the organization (and perhaps from key campus constituencies as well). Collaborative design (co-design) should actively involve participants in a manner similar to that experienced through the workshop's participatory action research approach, including:

- work together to surface different points of views and different user needs,
- provide rich communication opportunities through structured learning exercises, and
- establish priorities and "next steps" to enable action taking/decision-making that improves the situation.

Additionally, such an approach should ideally be used to encourage stakeholder (student and faculty) input with the intention of forming ongoing interactions and sustained relationships. Rather than "one time" events, students and faculty should be invited to continuously provide input on the redesign of systems, services, and products enabled by participatory action research methodologies. When these investigations are integrated into curricula, this "opens the door" for better integrating information resources and information literacy into campus teaching and learning processes.

Attachment 4.5: New Way of Working

At the Auraria Library, the process of Web-scale discovery service adoption—from inception through customization—was a response to the question: "What do we want to create together?" This query emerged following significant repurposing, reorganizing, and retooling within the organization, in response to tumultuous and unrelenting changes within the scholarly community ecosystem. At the same time, numerous research studies were documenting that the library Web site was no longer an integral part of many researchers' workflow. So we agreed to answer the question: "If Google can do it, why can't libraries?"

Additionally, perhaps unique to our history, a previous Web-scale discovery service implementation had failed. The initiative had been silo-ed, and therefore lacked support from public and technical services staff members. So we chose to carefully design inclusive selection, implementation, and customization processes that encouraged and sustained broad participation across the organization throughout the "discovery services lifecyle." This philosophy was also well aligned with our new workplace values to "lead from wherever you are in the organization" and "make decisions at the lowest appropriate level."

From the outset, Web-scale discovery service adoption reflected a new way of working that no longer depends on top down decision-making. So success has depended on evolving new ways of thinking that reflect changes in who we are and what we do. In addition, the nature of the work to be done required analysis of "jobs-to-be-done"

through the lens of present and potential users who must accomplish a task, achieve a goal, or solve a problem.

We learned that our users do not want a "discovery service." Rather, they need visibility, discoverability, and fulfillment pathways for academic content. In our case, because the majority of our 54,000 students are undergraduates, we choose to make our discovery service "the place to go for text, images, and video," based on analysis of outcomes desired in research consultation and reference desk transactions. Therefore, the default collection for our single (ProQuest Summon) search box does not include specialized abstracting and indexing (A&I) services that provide abstracts without full text. However, it does include streaming video—a discovery service customization produced by the vendor at our request, following our purchase of more than 30,000 educational films (Somerville, 2013).

The active collection curation and interface customization roles assumed by public and technical services libraries illustrate their new professional responsibilities as collaborative content developers and system designers. This has required and enabled revisiting relationships with primary and secondary publishers, intermediaries, and technology vendors. Necessarily, it has also required renegotiation of relationships among library colleagues formerly separated by departmental boundaries.

Organizational readiness was initiated in 2008 by an enterprise level initiative to reinvent organizational structures, processes, services, and roles. Redesign purposefully acknowledged global migration from print to electronic scholarship and intentionally fostered workplace creativity, discovery, and exploration. As a consequence, in technical services, multiple functions combined and integrated within an "e-resources life cycle" model that ensures a single streamlined workflow among acquisitions, e-resources, serials, and metadata management services.

To stimulate heightened collaboration across the organization, we also intentionally enabled participatory design and shared leadership through a co-designed organizational communication, decision-making, and strategic planning system. It was within this elaborated system of face-to-face reflection and dialog, fortified by technology-enabled information sharing and knowledge management, that we reached agreement "from the ground up" to thoughtfully support the discovery service lifecycle. Reflective of our emergent "learning organization" culture, co-workers "continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspirations are set free, and where people are continually learning to see the whole together" (Senge, 1990) through:

> Shared vision*: We have developed common understandings and commitments to create a shared vision and mutual agreements on learning targets, improvement strategies, and aspirational outcomes. We recognized that traditional library Web site discovery strategies—an online public catalog and A–Z database list—required reinvention. This has informed our shared decisions to invest fiscal and human resources in successful adoption of a robust discovery layer service.*
> Mental models*: Our beliefs, values, mindsets, and assumptions determine the way we think and act. So we have had to reframe our collective thinking—which has influenced our service model—because the new discovery "paradigm" requires a reorientation: content in all formats is now available through a single search box. A*

holistic discovery and fulfillment environment now offers new database recommender, "best bets," embedded chat, topical resource guides, and Ask a Librarian features which were once the purview of reference librarians.

Personal mastery and team learning*: New roles as content developers and systems designers have required extensive individual and group relearning and retooling. For instance, we have learned to inquiry together with and for our constituencies served. New workplace practices include evidence-based decision-making, informed by participatory action research projects that intentionally bridge cross-functional boundaries. Purposeful sharing of experiences, insights, knowledge, reflections, and skills refine our common vision and energize our collective commitments to ensure improved organizational outcomes.*

Systems thinking*: This framework for seeing inter-relationships that animate complex situations and interactions enabled our discovery of the interconnections essential to successful adoption of a Web-scale discovery service and, consequentially, repositioned the library in researchers' workflows. This shared lens has also renewed appreciation of our contributions to the scholarly ecosystem that produces peer-reviewed content to nourish academic inquiry and knowledge creation. Such heightened awareness in turn furthered the interconnectedness of library resources and professional expertise with campus curricula and academic constituencies.*

The rich interplay between discovery service adoption requirements and organizational transformation process enhancements continues to inspire (and require) new ways of working and thinking together. This synergy predicts the workplace resilience and nimble responsiveness needed to successfully navigate other uncertainties and opportunities ahead.

Attachment 4.6: "Getting to Know" in Library Space Planning

Radical shifts in the higher education environment and scholarly communications ecosystem necessitated redesign of the Auraria Library facility. Since "getting to know" users can inspire library vision processes and inform redesign activities, we choose to use participatory design when planning commenced in 2009. Six years later, we continue to collaboratively "design an academic library based not on precedent but on everything we can learn right now about the work practices of people who already use academic libraries, while also taking into account education's highest ideals and purposes" (Foster, 2014a).

"Participatory design provides a way to understand and incorporate information related to both sides of what the community needs—the practical and the transcendent—into the design process" (Foster, 2014b). By inviting campus constituencies to clarify "what we need," we have learned that "user experience is everywhere. It's reference, it's your website, it's every phone call, it's the kind of experiences patrons have with your hourly student staff, it's your collections and it is definitely how many comfortable chairs you have and making the most of that prime window seating" (McDonald, 2014). We have also learned that people undertake library research or use scholarly

resources to think, dream, imagine, and connect within an increasingly global network. Exploration and discovery increasingly require using robust communication and productivity tools in physical collaboration places and virtual learning spaces. When well designed, these "information experiences" (Bruce, Partridge, Hughes, Davis, & Stoodley, 2014) can produce learning.

We learned all this through analyzing participatory action research results to inform participatory "basis of design" for our spaces and services. Early data collection methods included online and "paper and pencil" surveys, semi-structured interviews, formal meeting discussions, Web site usability tests, and participant observation logs. Researcher–librarians complemented their action research findings with results from faculty-supervised student projects that used "the library as laboratory." Then, participatory design was used to share information and authority in the design of technology, spaces, services, and resources, as well as initiate the sustainable campus and community relationships essential for continuous reinvention of our academic library.

Over a 6-year period, lively conversations with campus and community participants explored the question: "What is a library?" Participatory design activities engaged participants in more focused information exchanges around the question: "What is our Library and how do we add value to our stakeholders?"

Guiding "basis of design" principles arose from our answers to the following questions:

> *"Can [and should] the Library be the new knowledge laboratory for the entire Auraria Campus?"*
> *"How can the Library become one of the top five reasons to attend one of the institutions on the Auraria campus?"*
> *"How can we design our physical space in ways that support or even create meaningful experiences for our stakeholders?"*
> *"What physical environment, technology, expertise, and services are needed to support and enhance learning and research experiences?"*

Outcomes demonstrate the importance of engaging nontraditional "experts"—academic library and student services staff as well as students and faculty—in rethinking and revitalizing "the new library." And, as an unanticipated consequence, the robust relationships fostered through these collaborative "making" activities continue to create campus conversations, initiate learning partnerships, and advance library effectiveness, which has transformed the library into a site of innovation and invention.

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