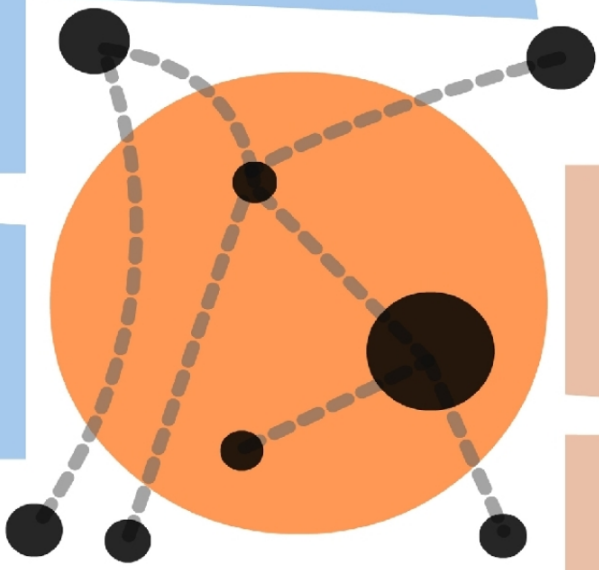
Knowing Knowledge



George Siemens

KNOWING KNOWLEDGE

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THANK YOU...

Many individuals contributed (or sacrificed) time to this project. In particular, I would like to say thanks to family (my wife Karen and children Alysha, Jared, and Kariel) for tolerating holidays whining about lack of internet access, evenings of distracted conversations, and the numerous obtuse ideas dropped upon unsuspecting recipients.

My thinking has been very public for over five years (www.elearnspace.org). Thank you to those who have read and provided feedback on countless articles and blog postings. Your time reading and commenting has been an encouragement and important learning process for me.

Stepping out into alternative means of expressing thoughts (through online publishing, instead of traditional journals), is an act of optimism that has been modeled and directed with other transparent thinkers. One needs to abandon notions of perfection to attempt online dialogue—warts, poor sentence structure, quickly jotted thoughts, embarrassingly simple viewpoints—are kept and preserved by search engines and archives. Those who hold to product views of learning and knowledge, instead of process views, find the unforgiving nature of archives intimidating. I thank my fellow sojourners for their effort in walking new paths: Stephen Downes, Jay Cross, Will Richardson, and Maish Nichani.

Special thanks as well to those who have taken the time to provide reviews of the thoughts contained in text. Those who previously held the power to filter content are finding a diminishing world as many are now able to create, validate, and share freely. The review efforts, thoughts, guidance, advice, and input of these people are invaluable: Zaid Ali Alsagoff, Wayne Batchelder, Doug Belshaw, Mark Berthelemy, Alison Bickford, Stephen Downes, Patricia Duebel, Denham Grey, Bill Hall, David Hawkes, Pam Hook, David Lee, Karla Lopez, Corrado Petrucco, John D. Smith, Susan Spero, Louise Starkey, Liz Stevenson, Peter Tittenberger, John Veitch, Jack Vinson, Peter West, Gerry White, Terry Yelmene, Steve Yurkiw, and Christopher Zielinski.

Thanks to Euan Semple, Dave Snowden, and Denham Grey for interview/online discussions relating to knowledge in our world today.

The images in this book are the work of Murray Toews. I spent much time with him in creating a non-structured, non-linear model for expressing key concepts. I have read too many books on knowledge and knowledge management that assume advanced theories must be expressed in complex, intimidating images. Structure does not equate with knowledge (structure is quite different from organization).

As an active participant in the transparent world of online writing, I know the value of building on the work of others. I have tried to cite original ideas (I went through the painful process of trying to locate origins of popular quotes—a task not readily achieved, beyond linking to a quote database). The rapidly evolving nature of knowledge sometimes results in areas being overlooked. If you find expressions in this text that have not been sourced, please let me know.

The onerous task of editing fell on Karen Graham…

Thank You

The First Step toward Knowledge is to Know that We are Ignorant.

Richard Cecil [1]

PREFACE

Knowledge has changed; from categorization and hierarchies, to networks and ecologies. This changes everything and emphasizes the need to change the spaces and structures of our organizations.

- How do we run a meeting?
  - How do we decide on action items?
    - How do we create our marketing plan?
    - How do we learn? How do we share knowledge?
    - How do we define organizational ethics?
  - How do we foster democracy?
- How do we achieve our strategic goals?

We supposedly exist in a knowledge era. Our work and our lives center on the creation, communication, and application of knowledge.

- But what IS knowledge?
  - How is it CREATED?
    - How is it SHARED?

How does knowledge flow through our organizations today? Is it different than it was

- 10 years ago?
- 50 years ago?
- A century ago?

What does our Future hold as a Knowledge-Based Society?

Why does so much of our society look as it did in the past? Our schools, our government, our religious organizations, our media—while more complex, have maintained their general structure and shape. Classroom structure today, with the exception of a computer or an LCD projector, looks remarkably unchanged—teacher at the front, students in rows. Our business processes are still built on theories and viewpoints that existed over a century ago (with periodic amendments from thinkers like Drucker[2]). In essence, we have transferred (not transformed) our physical identity to online spaces and structures.

This book seeks to tackle knowledge—not to provide a definition—but to provide a way of seeing trends developing in the world today. Due to the changed context and characteristics of knowledge, traditional definitions are no longer adequate. Language produces different meaning for different people. The meaning generated by a single definition is not sufficiently reflective of knowledge as a whole.

We are able to ***describe***, not ***define*** knowledge.[3]

Most leaders today would settle for a view of knowledge that enables them to take action consistent with core changes—so their organizations do not suffer from outdated actions.

Knowledge possesses two broad characteristics:

1. It describes or explains some part of the world (how atoms act, which companies to invest in for future growth, how diseases are spread),
2. We can use it in some type of action (building particle accelerators, investing, preventing disease).

All Knowledge is Information,

but NOT all Information is Knowledge.

It is my hope that this book will not be seen as a product, but rather an invitation to dialogue and debate. You can discuss the book at the **www.knowingknowledge.com** website. Articles, interviews, and news on the changing context and characteristics of knowledge will be available as well. Readers are invited to share their comments on the book or assist in re-writing it in the wiki.

I have intentionally left thoughts unstructured and unconnected, allowing readers to create their own connections.

It is not intended to be read as a comprehensive treatise on society's changes. It is designed to mimic the chaotic, complex, but holistic, nature of knowledge (and learning) in today's organizations—an attempt to duplicate knowledge in form, not only content.

I have mirrored the nature of knowledge today through text.

I have resisted the urge to extensively classify concepts.

Today, individuals stitch and weave their own networks.

The practice of **CLASSIFICATION,** as means to reduce cognitive load, ends up more taxing when it fails to accurately reflect the **UNDERLYING CORE.**

Writing in a linear format is challenging!

I am used to writing in hypertext.
Concepts relate to other concepts—but not in a linear manner.
For example, when addressing connectivism as a changed theory of learning, I want to relate it to implementation, or when addressing changes in the context in which knowledge occurs, I want to connect to changes in knowledge characteristics—but without continual repetition.
Books do not work that way. To achieve the same effect in a book, I would have to rewrite (and you would have to reread) my thoughts numerous times in numerous places. The repetition would be annoying.
I introduce similar concepts in various places to show connections.

Viewing learning and knowledge as network phenomena alters much of how we have experienced knowledge in the last century. Networks are adaptive, fluid, and readily scale in size and scope. A *hierarchy imposes* structure, while *networks reflect* structure.

Mass media and education, for example, have been largely designed on a one-way flow model (structure imposed by hierarchy). Hierarchies, unlike networks and ecologies, do not permit rapid adaptation to trends outside of established structure. Structure is created by a select few and imposed on the many.

The newspaper publishes, we consume.

The teacher instructs, we learn.

The news is broadcast, we listen.

An alternative to this one-way model has been developing momentum over the last few years. Simple, social, end-user control tools (blogs,[4] wikis,[5] tagging and social bookmarking,[6] podcasting,[7] video logging[8]) are affording new methods of information connection and back-flow to the original source. Feedback is more common in media and advertising than in education...but academics are beginning to see increased desire from learners to engage, not only consume, learning materials and concepts.

AS GOES **KNOWLEDGE,** SO GO OUR **ORGANIZATIONS**

This book intends to serve **5** broad purposes:

ONE To conceptualize learning and knowing as connection-based processes;

TWO To explore the nature of change in the context in which knowledge exists;

THREE To explore the change in the characteristics of knowledge itself;

FOUR To present knowledge as a context-game—a dance that requires multiple realities, each selected to serve the intended needs of each task, challenge, or opportunity;

FIVE To present a model for the spaces and structures which will serve the needs of our organizations (schools, universities, and corporations) for tomorrow.

LIFE IS LEARNING

KNOWING KNOWLEDGE is divided into ***2*** distinct sections.

SECTION ONE provides a chaotic exploration of knowledge and associated concerns. The exploration of learning, connectivism, and connective knowledge forms a lens through which we can see and understand trends impacting learning and knowledge development. The *theoretical basis of learning* is presented in this section.

SECTION TWO provides a description of the changes relating to knowledge today. Implications of changes, suggested revisions to spaces and structures of our society and corporations, and models for implementing are suggested. The *practical basis of connectivism* is presented in this section.

Knowing Knowledge is directed at two broad audiences:

Educators (designers, instructors, and administration) & *Business Leaders*

While this may be an interesting pairing of target audience, it extends from my assertion that life is a learning/knowledge-based process. Literacy, marketing, leading, producing, instructing—in our developing knowledge society, these tasks require knowledge. Anyone who works with knowledge needs to be acquainted with learning processes.

A business executive needs to understand the characteristics of knowledge that impact creating effective teams to achieve corporate strategy. An educator needs to understand the new context of knowledge in order to prepare learners for a life of learning and working with knowledge. Simply put, life is learning. If we are interacting with people, ideas, or concepts (in a classroom or corporate boardroom), knowing and learning are our constant companions.

> *"Whoever undertakes*
> *to set himself up*
> *as a judge of*
> *Truth and Knowledge*
> *is shipwrecked by*
> *the laughter of the gods."*
>
> *Albert Einstein*[9]

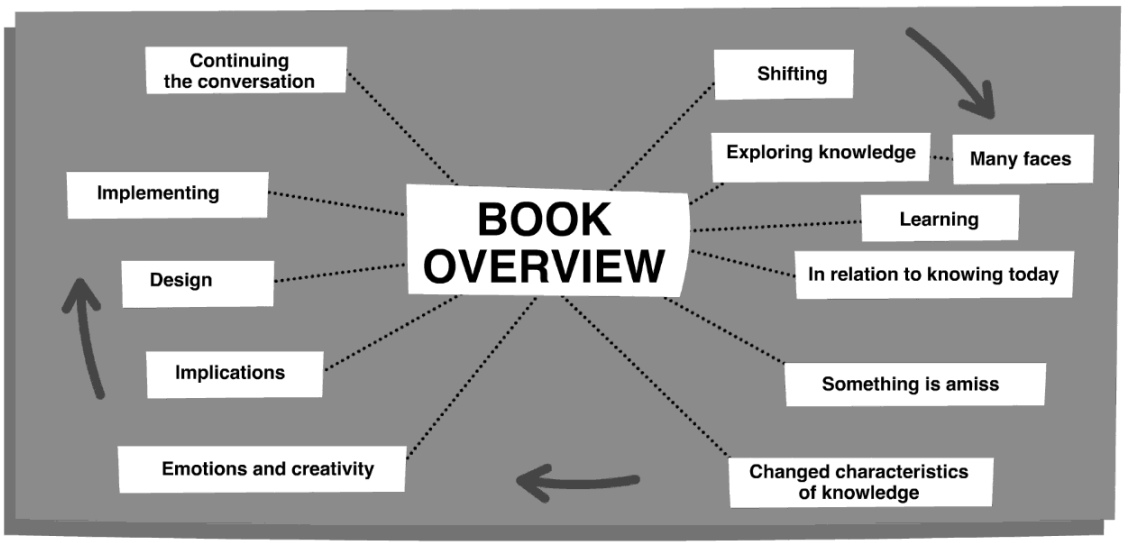


Figure 1: Book Overview[10]

An exploration

OF THEORETICAL views of KNOWING and LEARNING

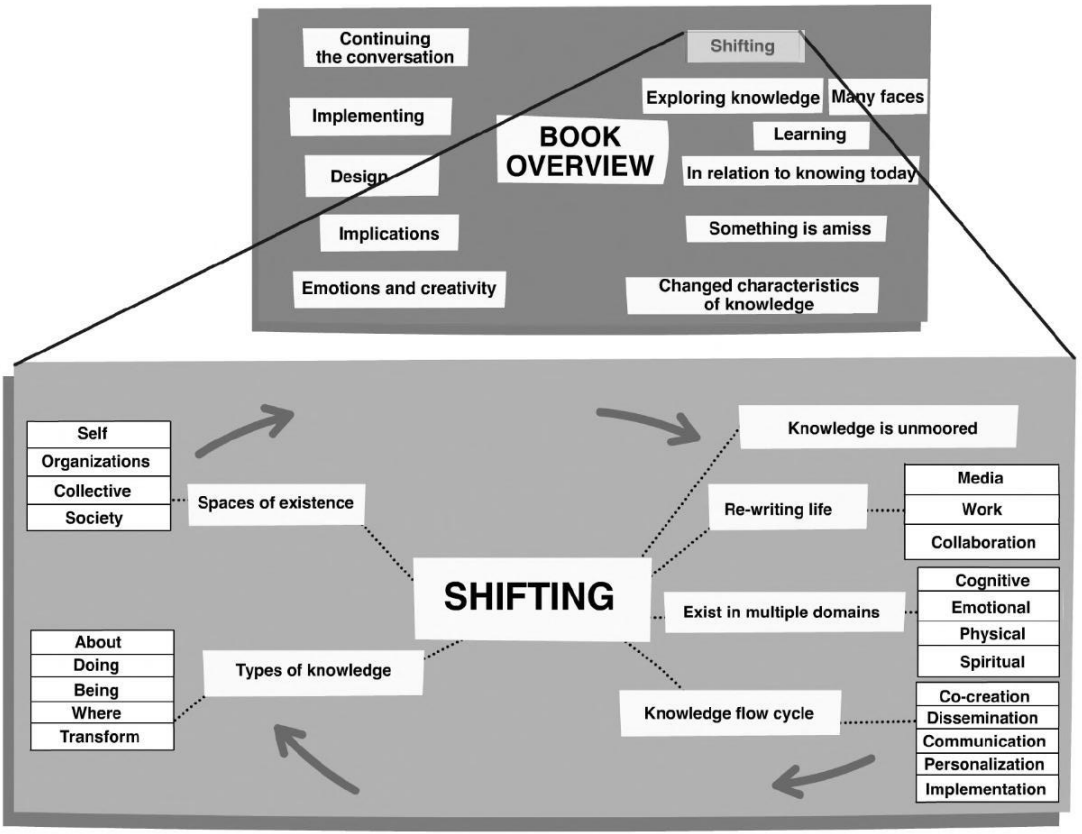


Figure 2. Introduction

SHIFTING . . .

Changes do not manifest themselves significantly in society until they are of sufficient weight and force. The building of many small, individual changes requires long periods of time before fundamental change occurs.[11] Our conceptual world view of knowledge—static, organized, and defined by experts—is in the process of being replaced by a more dynamic and multi-faceted view.

Knowledge has broken free from its moorings, its shackles. Those, like Francis Bacon, who equate knowledge with power, find that the masses are flooding the pools and reservoirs of the elite. The filters, gatekeepers, and organizers are awakening to a sea of change that leaves them adrift, clinging to their old methods of creating, controlling, and distributing knowledge.

We are in the early stages of dramatic change—change that will shake the spaces and structures of our society. Knowledge, the building block of tomorrow, is riding a tumultuous sea of change. Previously, knowledge served the aims of the economy—creation, production, and marketing. Today, knowledge is the economy. What used to be the means has today become the end.

Left in the wake of cataclysmic change are the knowledge creation and holding structures of the past. The ideologies and philosophies of reality and knowing—battle spaces of thought and theory for the last several millennia—have fallen as guides. Libraries, schools, businesses—engines of productivity and society—are stretching under the heavy burden of change. New epistemological and ontological theories are being formed, as we will discuss shortly with *connective knowledge*. These changes do not wash away previous definitions of knowledge, but instead serve as the fertile top of multiple soil layers.

The task of this book is to provide an overview of what is happening to knowledge and to the spaces in which knowledge is created, disseminated, shared, and utilized.

The pursuit of knowledge is ongoing. Unlike most desires, this desire is insatiable.[12] We tinker with the constructs of reality: What causes weather patterns? Why did it (pick any event) happen? What is that (pick any phenomenon)? If we change this, how does it impact that?

Human existence is a quest to understand. Our spaces and structures need to be aligned with our new understanding of knowledge…and the manner in which it moves, flows, and behaves.

We live as an integrated experience—we see, know, and function in connections. Life, like knowing, is not an isolated activity—it is a rich, interconnected part of who we are. We cannot stop the desire to know. The desire to know is balanced with our desire to communicate, to share, to connect, and our desire to make sense, to understand—to know the meaning. In an effort to make ourselves understood, we create structures to hold our knowledge: hierarchies, books, libraries, encyclopedias, the internet, search engines. We create spaces where we can dialogue about and enact knowledge: corporations, organizations, schools, universities, societies. And we create tools to disseminate knowledge: peer-review journals, discussion panels, conferences.

The last decade has fundamentally re-written how we:

- Consume media
- Authenticate and validate knowledge
- Express ourselves and our ideas
- Relate to information/knowledge (the relationship time is much shorter–compare 1/2 hour reading the morning newspaper vs. reading 50 news sources online in 10 minutes)
- Relate to the deluge of information, requiring that we become much more selective and that we start using external resources (social bookmarking, user-generated and filtered content, personal tagging) to cope
- Function in knowledge-intense environments (mass movement to knowledge-based work, diminishing physical or industrial work activities).

What has caused knowledge to leave the safe, trusted spaces of generations past?

Changes are occurring on several levels:

The context (or environment) in which knowledge exists; and

The flow and characteristics of knowledge itself.

What is the impact of KNOWLEDGE SET FREE?

The most substantial changes will be felt in how we organize ourselves. The spaces and structures of society—corporations, churches and religious bodies, schools, and government—will experience a different relationship with knowledge. Instead of relationships of control/monitor and cause/effect, these organizations require a shift in view to foster, nurture, and connect. Customers, students, and clients no longer tolerate pre-packaging (music, news, media). Knowledge set free enables dynamic, adaptive, and personalized experiences.

Yochai Benkler, in his exploration of the growing prominence of networks in society, offers a glimpse into what is at stake in our world of morphing knowledge:

> *Information, knowledge, and culture are central to human freedom and human development. How they are produced and exchanged in our society critically affects the ways we see the state of the world as it is and might be...for more than 150 years, modern complex democracies have depended in large measure on an industrial information economy for these basic functions. In the past decade and a half, we have begun to see a radical change in the organization of information production.*[13]

These changes are still being interpreted through existing beliefs of how we should structure our organizations and what it means to know and learn. How deep must change penetrate our organizations before we see systemic change? The first attempt at implementation usually involves forcing decentralized processes into centralized models.

We stand with our feet in two worlds: one in the models and structures that originated in (and served well) the industrial era, and the second within the emerging processes and functions of knowledge flow in our era today. Our dual existence is noticed in business, education, and media—we have new tools being used to serve old needs. This phenomenon was found in the early days of video. Initially, video was thought to be best suited for taping and recording live stage shows. Video was seen as a second-rate experience to live shows. Over time, once producers and editors understood the uniqueness of the medium, video developed into its own art form.

Or consider email in its earlier days—many printed out a paper copy of emails, at least the important ones, and filed them in a file cabinet. Today we are beginning to see a shift with email products that archive and make email searchable and allow individuals to apply metadata at point of use (tagging).

Similarly, we are in the in-between stage of organizational models—we are trying to force the changed context and expressions of knowledge into structures and processes that served a previous age.

KNOWLEDGE IS NOT STATIC.

The knowledge flow cycle (see Figure 3) begins with some type of knowledge creation (individual, group, organization) and then moves through the following stages:

Co-creation . . .	(like end-user generated content) is a recent addition to the knowledge cycle. The ability to build on/with the work of others opens doors for innovation and rapid development of ideas and concepts.
Dissemination . . .	(analysis, evaluation, and filtering elements through the network) is the next stage in the knowledge-flow cycle
Communication . . . of key ideas	(those that have survived the dissemination process) enter conduits for dispersion throughout the network
Personalization . . .	at this stage, we bring new knowledge to ourselves through the experience of internalization, dialogue, or reflection.
Implementation . . .	is the final stage, where action occurs and feeds back into the personalization stage. Our understanding of a concept changes when we are acting on it, versus only theorizing or learning about it.

(It is worth noting, even the diagram provided to support this line of reasoning falls into static, almost hierarchical representations—our text/visual tools perpetuate and feed our linearity—a concept we will explore in greater detail when discussing the changed attributes of knowledge).

A simple example is the process of communicating via text. Traditionally, a book was the created knowledge object. Once written, it was released for others to read and disseminate. As an object, the flow of discussion was essentially one way—from the author to the reader (though readers may form book clubs to discuss the work of an author). The original source was not updated regularly, perhaps only in subsequent editions occurring every several years.

In today's online world, an author can post a series of ideas/writings, and receive critique from colleagues, members of other disciplines, or peers from around the world. The ideas can be used by others to build more elaborate (or personalized) representations. The dialogue continues, and ideas gain momentum as they are analyzed and co-created in different variations. After only a brief time (sometimes a matter of days), the ideas can be sharpened, enlarged, challenged, or propagated. The cycle is dizzying in pace, process, and final product, which is then fed back into the flow cycle for continual iteration.

We do not consume knowledge as a passive entity that remains unchanged as it moves through our world and our work. We dance and court the knowledge of others—in ways the original creators did not intend. We make it ours, and in so doing, diminish the prominence of the originator.

Many processes tug at and work the fabric of knowledge.

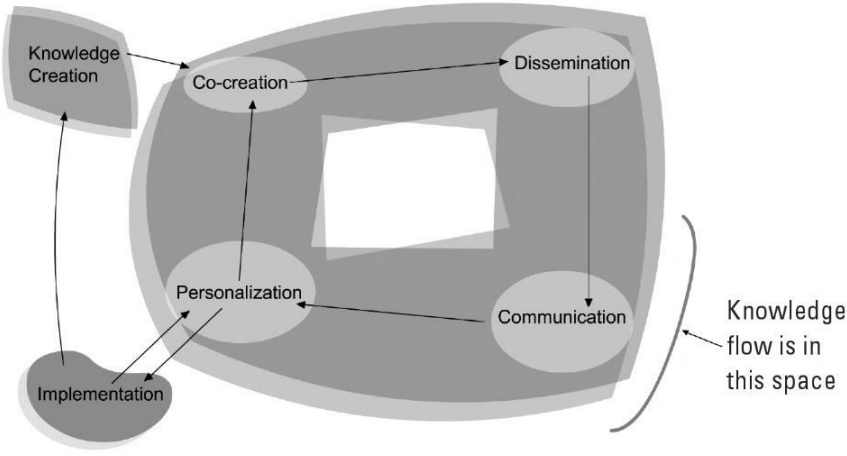


Figure 3. Knowledge Flow Cycle

Rather, knowledge comes to us through

a network of

prejudices,

opinions,

innervations,

self-corrections,

presuppositions

and exaggerations,

in short

through the dense, firmly-founded but by no means

uniformly transparent medium of experience. (Theodor Adorno)[14]

We exist in multiple domains[15]

PHYSICAL COGNITIVE
EMOTIONAL SPIRITUAL

It is to our own ill that we consider any one domain above the others. We are most alive, most human, and most complete when we see the full color of our multi-domain continuums.

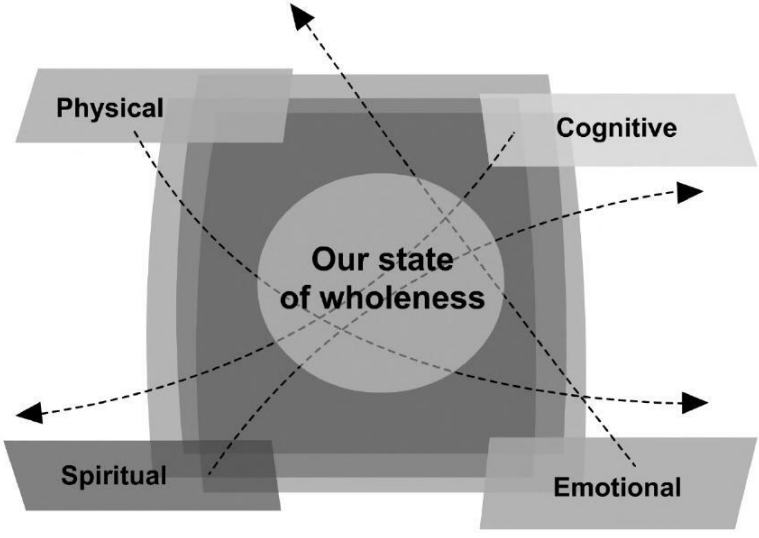


Figure 4. Domains of Knowing

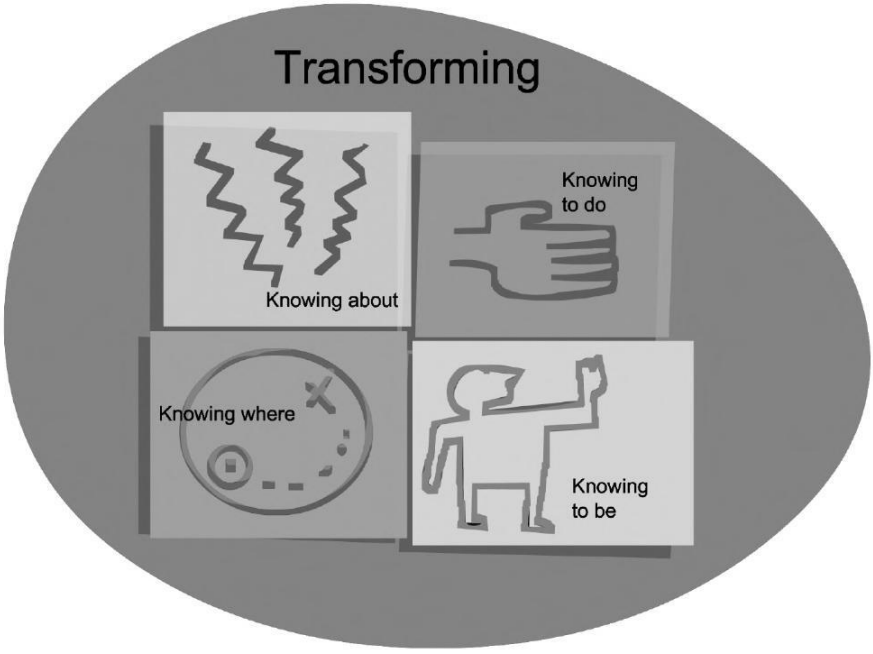


Figure 5.
Knowledge Types

Our quadratic existence runs
through spheres of interconnection.
Cognitive, emotional, physical, and
spiritual domains of knowledge
interact in a myriad of ways.
Life is not lived in a silo.
Artificial constructs may
be useful for categorization,
but fail to capture the true richness
and interconnectivity of knowledge.
The aggregate of domains,
each with various levels
of prominence in different
situations, provides the conduit
through which we experience
knowledge.

KNOWLEDGE consists of different types:

Knowing ABOUT	news events, basics of a field, introductory concepts in a discipline
Knowing TO DO	drive a car, solve a math problem, code a program, conduct research, manage a project
Knowing TO BE	to embody knowledge with humanity (doing blended with consistency and daily existence), to be a doctor or psychologist (mannerism, professionalism), to be an ethical person, to be compassionate, to relate, to feel
Knowing WHERE	to find knowledge when needed, web search, library, database, an organization, and increasingly, knowing who to approach for assistance
Knowing TO TRANSFORM	to tweak, to adjust, to recombine, to align with reality, to innovate, to exist at levels deeper than readily noticeable, to think. The "why of knowing" resides in this domain

We have created journals, books, libraries, and museums to house knowledge. Most knowledge in these storage structures is in the about and doing levels. Knowing to be, where to find knowledge (in today's environment, knowing how to navigate knowledge as a process or flow), and knowing to transform are all outside of these container-views.

Schools, universities, and corporations attempt to serve dissemination processes of knowledge-in-containers. Under the pressure of constant, ongoing change (and being designed to manage products not processes), these organizations are unable to attend to the full array of knowing. For most of us, we find our higher-level understanding through reflection and informal learning, where we engage with knowledge to gain new understandings. The skills and processes that will make us people of tomorrow are not yet embedded in our educational structures. While there are many who are attempting new approaches, the vast majority are ensconced in structures, preparing students and employees for a future that will not exist.

The quad-space of self occurs in the larger space of organizations and society; just as we exist in different domains: physical, cognitive, social, and spiritual (see Figure 4), we exist in different spaces: self, collective, organizational, and societal (see Figure 6).

Each space of existence holds its own culture. Knowledge experienced in the space of self holds a different context (and thereby, meaning) than knowledge experienced in our collective spaces (hobbies, volunteer groups, social spaces). Each sphere of existence has an accompanying culture and feel (an evolving zeitgeist)…which, themselves, become perspective-points for perceiving (and filtering) knowledge.

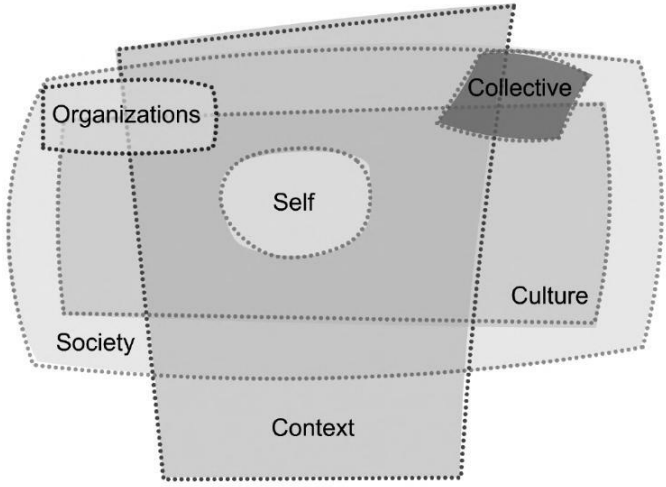


Figure 6. Our Structures of Existence

The complexities of functioning in numerous (and ambiguous) spaces requires increased lines of communication. Duncan Watts addresses the challenge of rapidly changing environments through "intense communication," ensuring that each agent in the space is aware and informed.

> When solving complex problems in ambiguous environments, individuals compensate for their limited knowledge of the interdependencies between their various tasks and for their uncertainty about the future by exchanging information—knowledge, advice, expertise, and resources—with other problem-solvers within the same organization.
>
> Duncan Watts[16]

An important scientific innovation rarely makes its way by by gradually winning over and converting its opponents. It rarely happens that Saul becomes Paul. What does happen is its opponents gradually die out and the growing generation is familiarized with the idea from the beginning.

Max Planck[17]

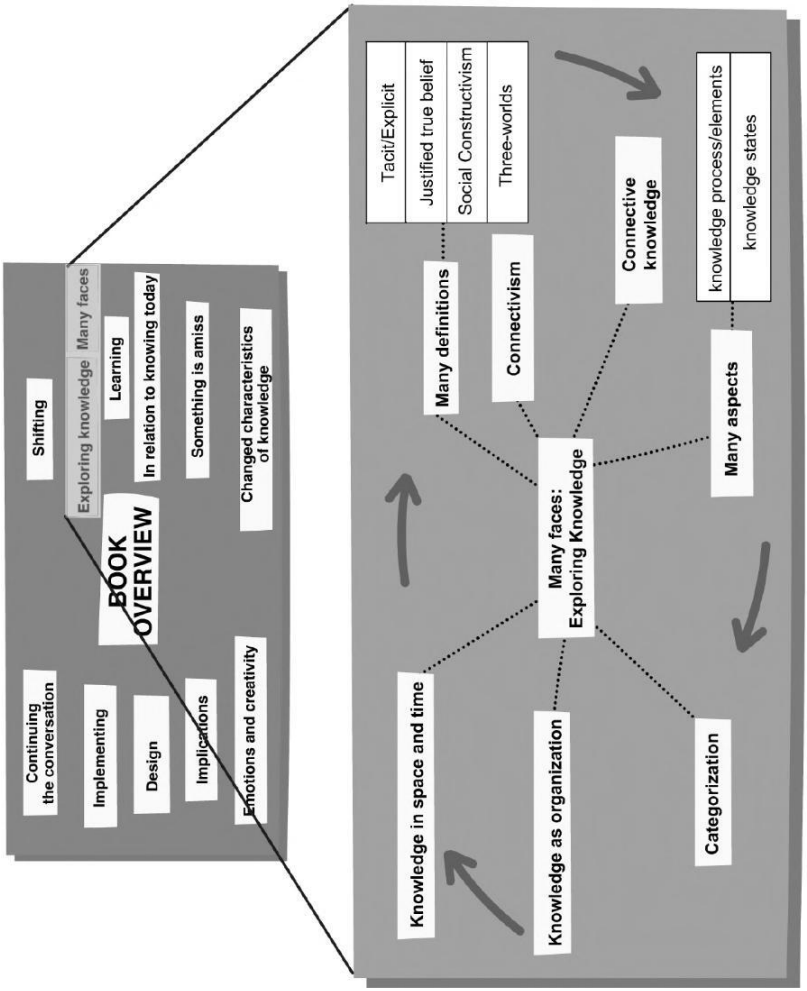


Figure 7. What is Knowledge?

In order to understand beauty, we kill it.

And in the process,

we understand more about our nature

and less about beauty.

MANY FACES
Exploring Knowledge

The categories of human thought are never fixed in any one definite form; they are made, unmade and remade incessantly; they change with places and times.

Emile Durkheim[18]

Understanding knowledge in a particular era is important in ensuring that we have aligned our spaces and structures with the nature of knowledge. Until recently, we have been able to make knowledge fit our models. Now that we are entering a two-way flow model, (where original sources receive feedback from end-users) we need to adjust our models to fit the changed nature of *"what it means to know."*

As promised in the preface, this book is not intended to provide a definition of knowledge. Rather, the intent is to present characteristics we may consider in exploring the richness of the landscape. A hiker entering a new territory would think it foolish to settle on a simple, myopic, diluted definition of the ecology. Instead, the rich space is explored for plant and animal life, streams and lakes; sounds and smells. Any singular definition of the landscape would fail to define the whole. Each definition of the landscape becomes valuable when it abandons pretences of being the only one and acknowledges other perceptions. This does not embrace relativity (in each context, one view may be the most appropriate. Paul Boghossian, in his exploration of truth, belief, and facts, rejects the notion that "all views are equally valid"[19]). It does, however, embrace diversity, acknowledging that many different views exist, and different ones will be more applicable in different situations (each context may better align with one particular view, eliminating the notion of equal validity of all views in a particular context).

Many have provided knowledge definitions and models:

- Justified true belief (Socrates and Plato);
- A gradient of data, information, knowledge, understanding, and wisdom; [20]
- Defined by tacit and explicit spirals: socialization (tacit to tacit), externalization (tacit to explicit), combination (explicit to explicit), and internalization (explicit to tacit);[21]
- Three worlds of knowledge: one–physical/material, two–physiological/ subjective, and three–culture/artifacts;[22]
- Sense-making and organization.[23]

Can multiple definitions of knowledge be true?

Can knowledge exist independent of ***human*** knowing?
Is knowledge ACQUIRED or is it CREATED through active participation?
Is knowledge a personal activity? Do we socially construct knowledge?

The aim of argument, or of discussion, should not be victory, but progress.

Joseph Joupert[24]

Knowledge can be described in many ways; an entity and a process, a sequence of continuums: type, level, and application, implicit, explicit, tacit, procedural, declarative, inductive, deductive, qualitative, and quantitative. Knowledge **rests** in an individual; it **resides** in the collective.

While not ascribing to pure subjectivity views of knowledge (some things are, and we must align ourselves with them—pure subjectivity is the playground of theorists and philosophers. Reality often presents both objective and subjective elements[25]), we can see that certain things may be appropriate in one context, while not in another.

Knowledge in the pharmaceutical field will possess different traits than knowledge in agriculture. Different definitions will apply based on different understandings. A knowledge product (a mathematical formula) is different from a knowledge process (ongoing attempt to stay current in a world of accelerating knowledge). To see in monochromatic views is to fail to see the full breadth of knowledge.

We must become skilled at seeing continuums and context.

We may periodically ascribe object-like elements to knowledge, but only for the ability to discuss, debate, and dialogue. For example, research in neuroscience reveals patterns that can be presented and shared with other researchers. The moment, however, that knowledge is created, it becomes subject to the knowledge flow cycle discussed previously…where knowledge leads to co-creation, dissemination, communication, personalization, implementation, and ongoing cycles of building and sharing.

Today we may be able to say that "the brain works this way," but only if we acknowledge that the discoveries themselves are emerging. We are constantly expanding our understanding (revisiting our preconceived notions) and forcing the brain to reveal its functioning. Our understanding is a transitory state, influenced by our domains of knowing (see Figure 4): cognitive, emotional, physical, and spiritual, and types of knowledge (see Figure 5): about, to do, to be, know where, and transforming, as well as our structures of existence (see Figure 6): self, collective, organizational, and societal.

Social tools are emerging which permit rapid exchange of knowledge, and high levels of dialogue. Communication can now occur collaboratively (wiki, online meetings), through individual broadcast (blogs, podcasts, video logs), and in shared spaces (social bookmarking). Knowledge, when buffeted by numerous forces and factors, is under constant scrutiny by the masses.

Perhaps we should pursue a therapy view of knowledge. Therapies create understanding only after all elements (which are constantly changing) have been considered. We must resist the urge to give shape too early. Ambiguity is an unfailing companion. Constructs, and classifications represent only part of the knowledge space—primarily those knowledge elements that have hardened (see Figure 8).

In a broad sense, knowledge has historically been defined or categorized along two lines: quantitative or qualitative. We require an epistemology that subsumes or, at minimum, extends these viewpoints into our world today.

Knowing and learning are today defined by connections. CONNECTIVISM[26] is the assertion that learning is primarily a network-forming process.

Downes provides connective knowledge[27] as the epistemological foundation of connectivism:

A property of one entity must lead to or become a property of another entity in order for them to be considered connected; the knowledge that results from such connections is ***connective knowledge.***

Connective knowledge networks possess four traits:

DIVERSITY.... Is the widest possible spectrum of points of view revealed?

AUTONOMY.... Were the individual knowers contributing to the interaction of their own accord, according to their own knowledge, values and decisions, or were they acting at the behest of some external agency seeking to magnify a certain point of view through quantity rather than reason and reflection?

INTERACTIVITY.... Is the knowledge being produced the product of an interaction between the members, or is it a (mere) aggregation of the members' perspectives?

OPENNESS.... Is there a mechanism that allows a given perspective to be entered into the system, to be heard and interacted with by others?

We must negotiate knowledge definitions, as a doctor provides therapy for a patient. Our knowledge definitions and activities are dances of context (or, to abuse Wittgenstein[28], much of the process of knowledge is a context game). We may encounter situations where tacit and explicit views serve our purposes...or where justified true belief is an appropriate definition. Context and purpose often reveal the ***needed*** definition (not the definition formulated in advance and applied to different situations).

The context game should reveal the nature of knowledge in each space. Some things ***are,*** and we are most effective when we align to ***what is***[29]. In other instances, the nature of knowledge is vague, ambiguous, or chaotic. Our treatment and approach must be defined by the nature of knowledge we are considering.

To arrive at a true definition of knowledge is to render it useless for diverse implementation.

A broad definition is possible (much like we can ascribe broad characteristics to mammals), and while the specific functions in the larger whole, we must see each knowledge element/experience/interaction for what it uniquely is (like we ascribe certain characteristics to dogs, or cats…and further provide detailed breakdown of species and types). The more precise the definition, the less applicable in multiple situations.

If a financial services organization is seeking to improve the ability of employees to provide rapid loan approvals, the needed knowledge cannot be defined in advance. Decisions are made based on multiple factors—each carrying a different weight in the final outcome. The supporting processes, which allow employees quick access to needed knowledge—credit rating, debt ratios in different sectors, enable and foster decision making. Access to knowledge is not enough—the mark of complex functioning is the following of a few simple rules.[30] Instead of defining the construct of knowledge and decision-making, simple rules, guided by access to needed knowledge, permit individuals to make complex decisions.

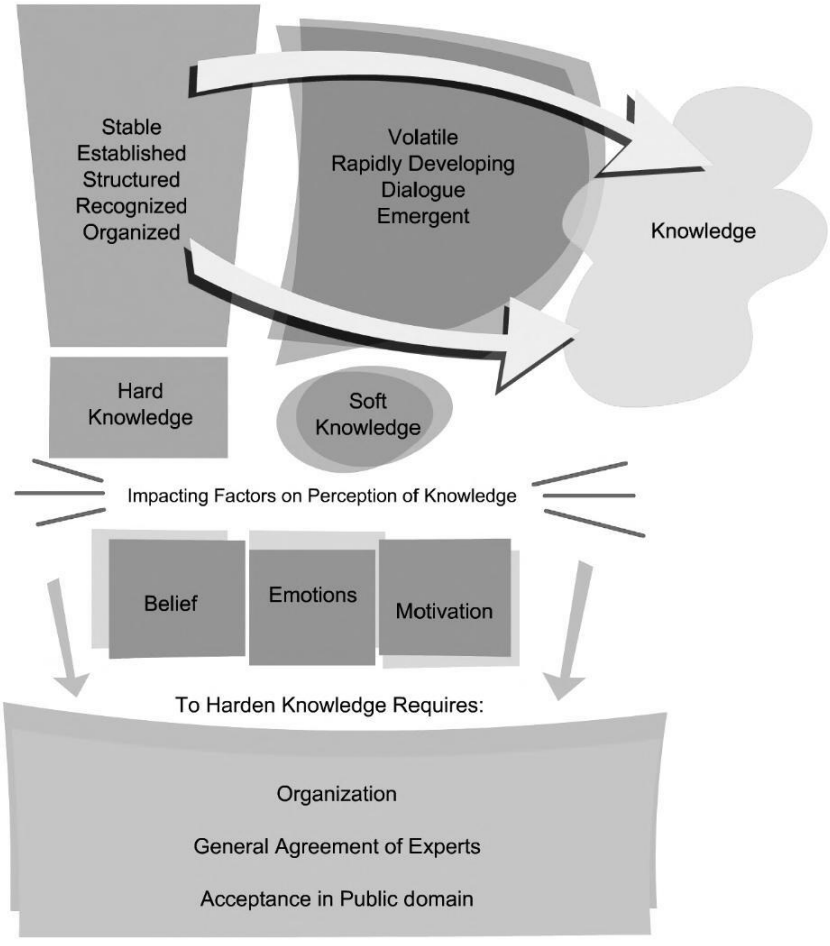


Figure 8. Knowledge States

Knowledge possesses different states…along a continuum. Hard knowledge occurs in fields and eras where change is slow. Through a process of expert validation and acceptance of the public, knowledge acquires solid states. Over the last several decades, more of our knowledge has shifted to soft knowledge. When things change rapidly, many knowledge elements do not have time to harden before they are replaced or amended. Managing hard and soft knowledge (as a continuum, not distinct points) requires different processes.

We have a different relationship with knowledge that has been *crystallized* in the form of a book or a journal. Why do we respect it more?

Do increased input costs of time or finances equate with increased value? Do copyright and ownership claims raise value?

Knowledge is subject to numerous processes (see Figure 9)—how it is created; by experts or the masses, structured; in preset containers or clouds and networks of nebulous shape, disseminated; one-way models like books or journals or soft two-way flow of the internet, validated; by experts or peers, and acquired and implemented; through content consumption, dialogue, or reflection.

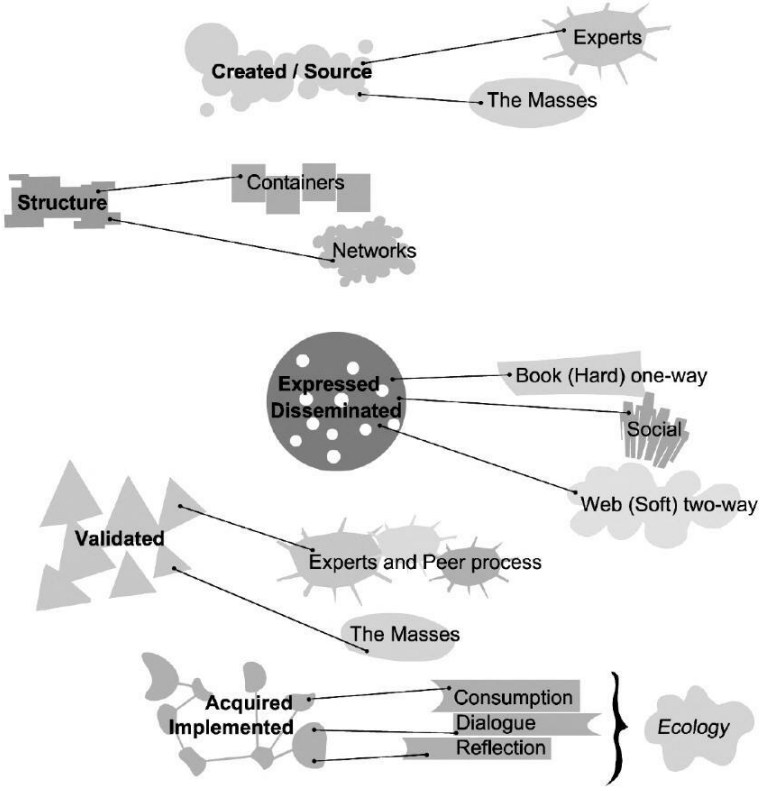


Figure 9. Knowledge Process/Elements

Each of these processes is currently being reshaped and changed as knowledge changes. Technology is providing new affordances for individuals to become involved in publishing, knowledge exchange, and to access experts.

Definitions are subject to numerous elements that reduce their effectiveness: language and meaning, context, culture, and perspective. We cannot define a field by one definition. Instead, definitions need to be created on a one-to-one basis. Explore the entity. Then decide. Do not force the entity into preformed containers.

Organizationally, our challenge is to *work with knowledge based on its characteristics, not on our pre-created viewpoints.* We need to resist the urge "to make something "familiar" even at the cost of destroying what [we have] found."[31] We can no longer create our filters in advance. We must learn to dance (engage and interact) with knowledge in order to understand what it is.

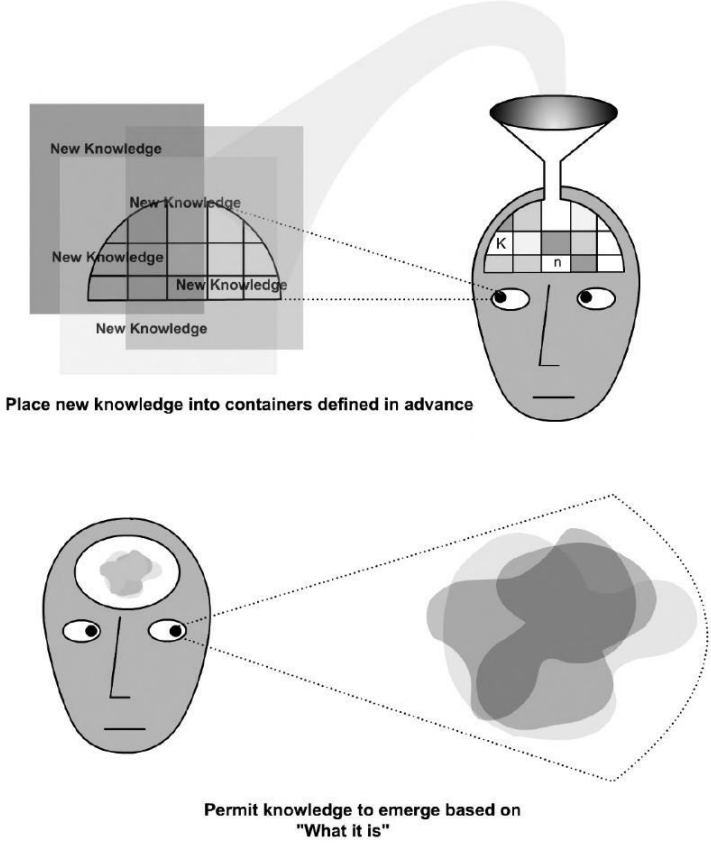


Figure 10. Categorization

Knowledge is organization. **NOT STRUCTURE.**

KNOWLEDGE IS NOT INTENDED TO FILL MINDS. IT IS INTENDED TO OPEN THEM.

Traditional knowledge organization consisted of fairly static hierarchies and containers. Organization today consists of dynamic networks and ecologies—models capable of adaptation (adjusting and reacting to changes). Structure is the outgrowth of organization, not the pre-requisite to organization.

What we define as knowledge is the codification of information or data in a particular way. The principles of gravity existed long before they were articulated in a manner that could be communicated, analyzed, and explored. Seeing the pattern (how things were organized and what that organization meant), is the resulting knowledge.

Similarly, the ability to perform a heart transplant existed as a theory before actual doing in reality. The knowledge to build the machines, procedures, and accompanying elements resulted from a particular recombination of information.

Our cognitive efforts are not exclusively structured and hierarchical. We explore information with a desire to personalize and *patternize*—to translate into knowledge.

Figure 11 presents elements involved in the knowledge process:

- Knowledge seeker
- Content
- Context
- Conduits (the medium through which knower and seeker communicate…and through which the known entity finds expression)
- Knower/Expert

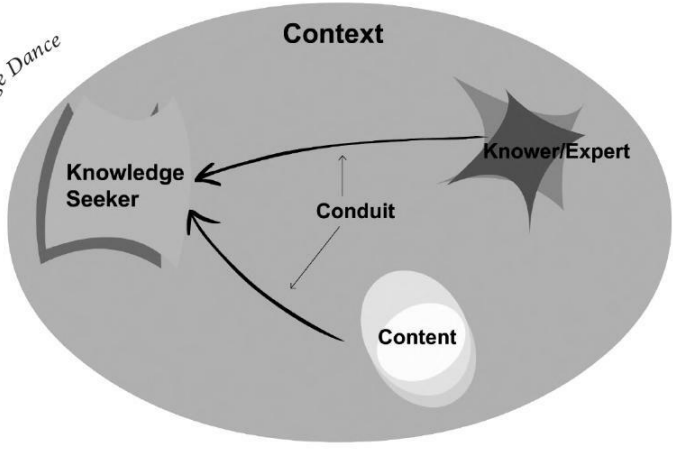


Figure 11. *Components of Knowledge Dance*

Knowledge comes from systems and integrated structures. Better quality networks and connections result in better quality knowledge sharing. Forming effective networks is as important a challenge as utilizing the networks for our knowledge needs.

While building our networks, we cannot unearth knowledge by only focusing on one domain. To exclude social, emotional, or spiritual dimensions is to grey the picture. The wider the lens of our perception, the brighter (and more complete) the image.

What are trusted sources of knowledge?

What skills and processes do we need to work with soft knowledge (see Figure 8)? We have spent our history with hard/codified knowledge as a product. We now need to learn to work with soft knowledge as a process.

How does it happen today? How is knowledge vetted for validity and authenticity? The opinions and views of experts are augmented by trusted networks (like recommender systems in many communities—to validate individuals based on their history and previous activities within a space). Checks and balances, not hierarchical structures, create vetting models.

Can a group be as effective as an expert?

We experience knowledge in time and space allowing us to see from only one point at a time (we cannot hold opposing perspectives, even though we are aware of others).

A network reflects on itself. I am a node on my own network. I can only see and think from where I exist. If I move, I lose the initial perspective. We cannot maintain two points in our network simultaneously. Understanding that a different view exists is very different from seeing the different view.

Learning is the equivalent of opening a door to a new way of perceiving and knowing. An open door leads to corridors of new thought and ways of knowing (or forgetting).

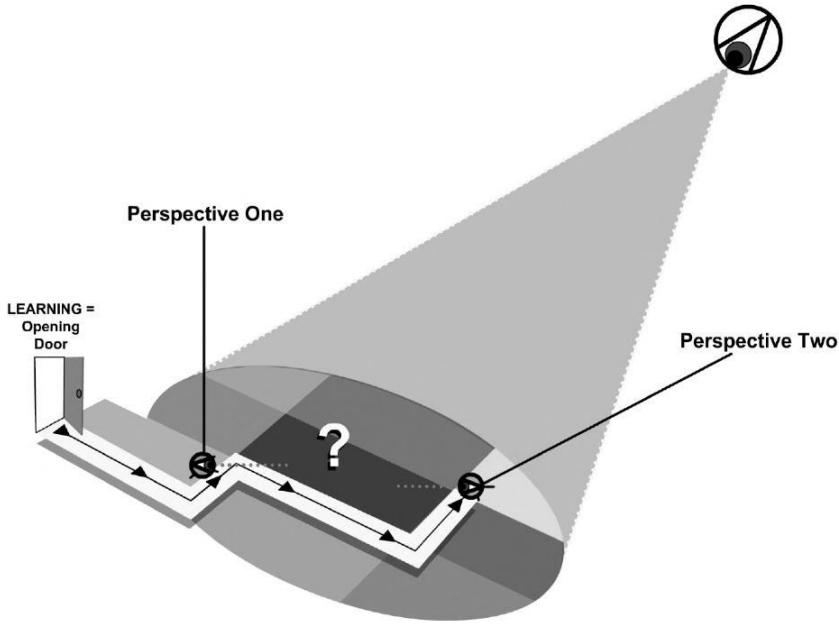


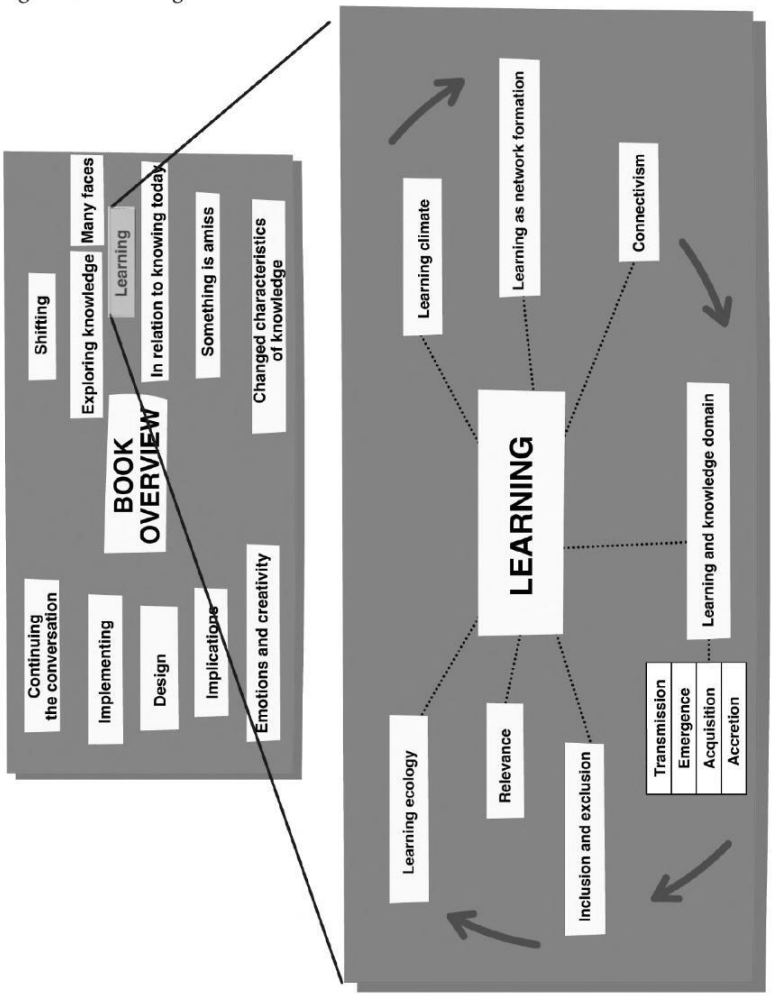
Figure 12. Time and Space

The newspaper editor, the news station, the radio host, who is able to promote and filter based on certain viewpoints (political, philosophical), is losing ground to the individual. Individuals can form and create their own spaces and networks of news, information, and knowledge filtering and dissemination.

We do not live our lives in active cognition. We spend much of our time in containers that we have created. Instead of thinking, we are merely sorting and filtering. (Or has sorting become the thinking of our era?). Even user-created networks resist active cognition in order to filter out contrasting viewpoints. The new spaces of knowledge, while conceptually democratic, are subject to the same quest for certainty and consistency that we desire in other knowledge sources. Wikipedia, an online encyclopedia written by numerous contributors, (not necessarily experts as traditional encyclopedias require), still requires certainty and validity. Wikipedia requires structure and control—though of a different nature. Instead of command and control models, guidelines are created through dialogue and transparency.

Our containers of organization are cracking. We are entering a new stage of active, ongoing cognition. We can no longer rely on categorization to meet our needs in a rapidly evolving, global knowledge climate. We must rely on network-formation and development of knowledge ecologies. We must become different people with different habits.

Figure 13. Learning



> “At the end of the last century, knowledge began to become the most valuable currency, like land in a feudal economy or capital in an industrial economy. The new science of learning should tell us that knowledge is not just a prize to be won in some desperate test-taking struggle for places in the contemporary mandarinate. Instead it is, literally and not just rhetorically, our universal human birthright.”
>
> J. Brockman[32]

LEARNING

The future of learning is written in the future of knowledge.

Stephen Downes[33]

Mass education designed for the industrial age meets the needs of neither the pre-industrial village nor the post-industrial future... indeed, all education—has to be totally reconceptualised.

Alvin Toffler[34]

In *Educating the Net Generation*[35] Diana and James Oblinger present an example of today's youth—influenced and changed by technology. Eric (the individual in their introduction), lives a different reality—not because ***of*** technology, but because of affordances provided ***by*** technology. For Eric, connecting with people and content is a constant, ongoing, daily activity. His learning is a continual, network-forming process. This model is gaining prominence in both academic and corporate environments. As we encounter new resources (knowledge, people, and technology nodes), we may choose to actively connect and create our personal learning network.

Learning is more than knowledge acquisition. Often it is a process of several stages with several distinct components. Exploration, inquiry, decision making, selecting, and deselecting are all preparatory activities before we even enter the learning experience (the learning experience being defined as the moment when we actively acquire the knowledge that is missing in order for us to complete the needed tasks or solve a problem).

During (and following) the learning experience, evaluations and assessments are occurring that measure if the learning needed has occurred. Each stage has different requirements. Preparatory learning relies more on informal tools; the learning experience most likely utilizes structured content and dialogue with gurus; the evaluation stage requires informal discussion, reflection, and self-expression. One tool or approach does not adequately address the entire process.

We need to ensure that we do not talk about learning in its entirety when we are really only referring to a certain stage or a certain type of learning. For example, if I was to say "learning communities are great for learning," but fail to specify that I am referring to the preparatory stage of learning in order to foster innovation, my ambiguity makes it difficult to dialogue with others on the concept (we will address this phenomena as context games in the next chapter). The listener may have a different focus of a particular learning stage or learning type and will attempt to engage/refute my comments from her/his own perspective.

We end up talking past each other. When we talk learning, we need to state the stage, the type, and the process to which we are referring. This discussion is similar to the knowledge discussion presented in the first two sections of this book. Defining the entity itself, not implementing our predefined processes, is critical.

Learning is a peer to knowledge. To learn is to come to know. To know is to have learned. We seek knowledge so that we can make sense. Knowledge today requires a shift from cognitive processing to pattern recognition.

Our metaphors of thought over the last century include:

Our mind is a **BLACK BOX** . . .	We can not fully know what goes on. Instead, we focus on the behavior—the observable manifestation of thought and cognition.
Our mind is like a **COMPUTER** . . .	We accept inputs, manage them in short-term memory, archive them in long-term memory (and retrieve into short-term memory when needed), generating some type of output.
Our mind constructs our **REALITY** . . .	We engage in active construction of our reality through the ideas and resources we encounter.

These established metaphors fall short in an era defined by rapid knowledge development. Our mind is not like a computer. Neuroscience has revealed that the computer model is wholly inaccurate. Our mind may have been a black box to researchers a century ago, but we now understand many of the functions of different areas of our brain...

we are slowly illuminating the box. Construction, while a useful metaphor, fails to align with our growing understanding that our mind is a connection-creating structure. We do not always construct (which is high cognitive load), but we do constantly connect.

We need to break false modes of thinking in relation to knowledge.

> Our mind is a network…an ecology.
> It adapts to the environment.

We cannot think of new directions while we are in battle with the boundaries of existing thought and context. Our thoughts exist in time and space (as neural points in an integrated network).

How we create corporate policies (how we design our knowledge flows) should be in line with how we learn and think. Cold logic does not serve an organization well. Neither does untamed emotion.

Holistic, multi-faceted views of learning, knowledge, corporate activities are required. Gain diverse perspectives…test/pilot/experiment… nurture…select…and amplify. Meyer and Davis reduce the concept even further:

> ***Seed, Select, and Amplify. Test many diverse options, and reinforce the winners. Experiment, don't plan.***
>
> *Chris Meyer and Stan Davis*[36]

LEARNING (see Figure 14) is defined by:

CHAOTIC
Diverse and messy, not necessarily neatly packaged and arranged.

CONTINUAL
Ongoing in development and communication. The model of "go to a course" is being replaced with learning and knowledge at the point of need.

CO-CREATION
Instead of content consumption (or passive learners involved in knowledge acquisition), experts and amateurs are now co-creators in knowledge.

COMPLEXITY
Learning is a multi-faceted, integrated process where changes with any one element alters the larger network. Knowledge is subject to the nuances of complex, adaptive systems.