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Timothy W. Powell

THE VALUE OF KNOWLEDGE

KNOWLEDGE SERVICES

Timothy Wood Powell

The Value of Knowledge

Knowledge Services

Edited by Guy St. Clair

Timothy Wood Powell

The Value of Knowledge

The Economics of Enterprise Knowledge and Intelligence

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For Ellen: my partner, my mate, my friend, and – quite literally for parts of this journey – my right hand.

For my beloved sons Mike and Dave: your intelligence, courage, wit, and resilience have always inspired me.

For my late parents Kay and Jim and my dear sister Susie: without your undying support, love, and inspiration my work would not exist.

And for my grandsons Ellis and Marlon: your eventual fields of endeavor have likely not even been invented yet. Tomorrow belongs to you!

You distant, dim unknown – or young or old – countless, unspecified, readers belov'd,
We never met, and ne'er shall meet – and yet our souls embrace, long, close and long

Walt Whitman, *Thanks in Old Age (Leaves of Grass)*

Series Editor's Foreword: About Knowledge Services

A Broader Perspective for Managing Intellectual Capital

When Peter Drucker first introduced the concept of the knowledge worker, he did those destined to work with information, knowledge, and strategic learning a big favor. He said that these knowledge workers would be required to have a good deal of formal education. He also pointed out that they would have to be able to acquire and apply theoretical knowledge. "It was," Drucker said, "a different approach to work and a different mindset."

It was not a prediction. It was a statement. And while Drucker is famous for having said, "I never predict. I just look out the window and see what's visible but not yet seen," it soon became clear that what he saw for knowledge workers was indeed a different approach to knowledge work. It was an approach that, in the years following Drucker's statement in *Forbes Magazine* (in March 10, 1997), allowed many information, knowledge, and learning professionals to understand Drucker's description as a rationale, a plan, for how they could deal with organizational knowledge. His reference to an approach and a mindset became what we now refer to as knowledge services, the subject of this series.

Regardless of the type of organization under discussion – whether it is a for-profit business, a non-profit furthering a particular social cause or a shared point of view, a not-for-profit organization, an academic institution, a government agency, or any other type of collective body that has come together to achieve an agreed-upon goal or mission – the organization's collective knowledge is its most fundamental asset. Often characterized as "what everyone in the organization knows," this collective knowledge and the organization's successful efforts in knowledge development, knowledge sharing, and knowledge utilization (often designated with the acronym "KD/KS/KU") are essential to the realization of that organizational goal.

Knowledge services is usually described as a methodology that streamlines the management of an organization's knowledge by converging information management, knowledge management (KM), and strategic learning into a single enterprise-wide discipline. Its purpose is to ensure the highest levels of knowledge sharing within the organizations in which it is practiced, and being industry and workplace agnostic, knowledge services brings important management and leadership value to knowledge strategists and knowledge leaders, as noted, in all organizations.

The titles published in ***Knowledge Services*** are written to provide knowledge strategists with theoretical and practical advice for ensuring the level of excellence in knowledge sharing they are expected to provide. New and innovative

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approaches to the management of intellectual capital and – in particular – to the development of knowledge strategy development are offered. And since the purpose of knowledge services is to enable all organizations to engage in and practice high-level knowledge services, the discipline relates closely to organizational behavior, the study of human behavior in an organizational setting. As such, recommended knowledge services applications connect closely with the human/organization relationship.

In addition to addressing a wide range of workplace environments, series titles also include works by authors writing about a background or historical topic relating to knowledge services. Others explore, as here, the growth and development of knowledge services in the general history of information management, knowledge management, and strategic learning, including the critical link between knowledge value and organizational management.

Timothy Wood Powell is widely recognized as the developer of the concept of the Knowledge Value Chain® and of other frameworks for measuring and improving Return on Investment (ROI), especially the return on knowledge investments. As president and founder of The Knowledge Agency®, a management research and consulting firm focused on strategic analytics and knowledge strategy, Tim's professional experience bridges corporate intelligence, knowledge management, competitive strategy, information technology, marketing, financial modeling and forecasting, psychology, and public service. He is quick to note that he is especially interested in the value of knowledge and the impact of knowledge on enterprise value and competitiveness, themes clearly developed in this book and, at the same time, themes that connect with Powell's solid understanding of all that has come before in the history of knowledge services and knowledge sharing. Furthermore, in addition to his wealth of understanding about knowledge-related thinking in the past (and the great knowledge leaders who have come before today's knowledge workers), Powell is expert at linking what is happening in knowledge management and knowledge services today with knowledge disciplines that will affect knowledge development, knowledge sharing, and knowledge utilization in the future.

As he demonstrates in ***The Value of Knowledge***, Tim Powell's understanding of knowledge as an enterprise function, when considered with knowledge as an economic resource, gives him the opportunity to provide a unique perspective for readers of this book, for his students who hear him lecture on the value of knowledge, and for his business clients. Additionally, the book offers direction for approaching an understanding of the theories that provide the foundation for knowledge value. At the same time, he provides certain and unhindered directions for ensuring that what is offered can be realized effectively and efficiently. These last – in particular as the development of knowledge strategy

is put forward – become almost in themselves highly attractive (and practical) reasons for reading the book. In this case, and especially as it follows the history of the intellectual growth of knowledge and knowledge value, the book's content describing the principles of knowledge strategy together with the valuable description of the knowledge strategy development process all come together to establish the book as critical for the study of knowledge services.

A Technical Note: At the bottom of the first page of each chapter readers will find a URL, for ease in viewing the book electronically. When entered online, an electronic version of the chapter is available for qualified viewers.

Guy St. Clair
Series Editor

Preface – Dr. Michael Koenig

A romp through the maze of Knowledge – what could be more delightful, or useful, or timely? We all use the words Information, Knowledge, and Intelligence blithely and sometimes almost interchangeably, and we recognize them as valuable, but how are they valuable, and to what degree? None of them lend themselves to crisp definitions or to easy analysis.

The focus of this book is how to understand their role, particularly that of knowledge, in the organization, and how to develop and manage a strategy for your organization to leverage that understanding.

The basis of the book is the author's extensive experience as a consultant, experience centered around precisely that issue – helping organizations to understand the role that knowledge played in their enterprise, and how to make better use of it. Sometimes that was knowledge that they had and didn't appreciate or deploy effectively, and sometimes it was knowledge that they didn't have and didn't appreciate its potential.

Central to the analyses in this book is the Knowledge Value Chain; it is the basis for an understanding of how to value knowledge.

Quantifying or metricizing knowledge is extremely difficult and context specific.

The obvious goal is to measure the ROI, return on investment, of knowledge, and to some degree that can be accomplished, and in some cases satisfactory surrogate measures can be used. Ultimately, however, the key is to link and measure the effects and the consequences of the utilization and the deployment of knowledge.

For some decades now it has been recognized that information and knowledge must be added to the classic trio of land, labor, and capital, but we are only now recognizing how potently in many instances information and knowledge can almost eclipse the rest in importance. The Value of Knowledge then is not just a timely topic, it is one that is crucial that we understand better.

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1 Introduction to the Value of Knowledge

Do you ever come upon those *existential stress tests* – those moments of self-questioning when you entertain the possibility, however remote, that what you have been working on or thinking about is not fully worthy of the enormous attention you have paid it? I occasionally have such "purpose alignment" moments – but, over the years, I have trained myself to convert them into renewed inspiration for my work.

Not long ago I had one of these moments while riding New York City's number 1 train uptown to Columbia University. *Here I am*, I thought, *going to lecture to a group of students about the* value of knowledge. *These are people who are sacrificing many of their evenings and weekends, plus significant tuition funds, to hear what I, aided by their peers, am going to say. Surely in some sense they already understand the value of knowledge – so is my lecture by definition an absurdist exercise in redundancy? Am I wasting my time, and their money?*

Certainly, university students understand the *costs* of knowledge. And it's likely they understand intuitively that there are *benefits* there. But in a rigorous, empirical sense, they may be unable to clearly articulate these benefits, should they be queried. And it's likely that they will at some point face such queries, as the benefits of knowledge are increasingly debated, both in households and in larger organizations, with questions like:

- For a **family**, what is the return on higher education? Is college "worth it"?
- For a **business**, what is the optimal amount to be spending on research and development?
- For the **scientific community**, who owns the rights to publish and profit from scientific research?
- For **society**, should consumers be compensated for the collection and use of their personal data?

On the whole, we as a society no longer take the benefits of knowledge for granted, nor assume that such benefits will somehow eventually materialize. But though we have become more *empirical* in what we expect from knowledge, we frequently lack the tools to rigorously test our experiences against such expectations.

My own consulting work and readings over four decades have convinced me irretrievably that understanding the *value of knowledge* is a non-trivial quest fully worthy of our highest thinking and greatest possible effort; that it is a question of great import that has no single, final, definitive answer, but that evolves and morphs even as we approach anything resembling such an answer. This is mostly because, in a world increasingly governed by data, evidence, and metrics,

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intuitions that something is true – though potentially useful as guideposts – no longer suffice as persuasive supports for action.

I have always been struck by the volume of literature in both the academic and business press about knowledge and knowledge management – the *what to do* of knowledge – while finding discussions of the financial and other justifications – the *why to do* it – inadequate or lacking entirely. Even a sweeping and thorough survey such as Hislop's *Knowledge Management in Organizations* falls short on direct reference to the financial implications and organization impact of knowledge.[1] Knowing the tremendous power that financial ideas and financial executives have within most organizations, I have found this to be a critical omission – one that I vowed to correct in any ways available to me.

1.1 Purpose of this Book

The value of knowledge is highly contextual. The processes by which we explore it and come to understand it are as important as any measurements we may attempt to make of it. That said, our goal is not simply to *understand* the value of knowledge – it is to *change* it, for the better – to improve it qualitatively and maximize it quantitatively. This will remain our guiding principle herein.

Three anecdotes will serve to introduce this principle. Two of these come from my own experiences; the third comes from an early knowledge services leader best known for other endeavors.

1.1.1 My Summer of the Rabbits

During my youth, I was especially interested in biology. I worked hard at it and was able to win some student honors in the field. One such benefit was that in the summer preceding my final year in high school, I was selected to participate in a research internship at Jefferson Medical College, a major U.S. medical school in Philadelphia, Pennsylvania, USA.

There I worked under Dr. Eli Fromm, a biomedical engineer, on a project to understand the hormonal cycles of female rabbits. Dr. Fromm had developed a technique for surgically implanting small radio transmitters, each about two centimeters in diameter, into the rabbits. Attached to each radio was a transducer

1 Hislop does summarize the argument that knowledge management is a management fad, and documents the flow and ebb of interest among consulting firms and corporations in the topic.

designed to measure the contractions of each rabbit's uterus during its menstrual cycle. The radio would then transmit this data to a data collection device, where it could then be analyzed and correlated with data on the hormone levels in the test animals' blood.

Along with learning basic techniques of incision and suturing, I quickly learned that I did not much care for the slicing open of rabbits and the splashing around in their bloody guts. To this day, I remember the "distinktive" smells of the operating room. Any thoughts I might have harbored of a career as a surgeon were dashed at that tender age.

But there was another aspect of the project toward which I gravitated – which I now see was the beginning of an important career step for me. Someone needed to go to Jefferson's medical library – a first-rate facility – to determine what *other work* had already been done in this and related fields, what *trends* were developing in the field, and which *researchers* were especially active in this field worldwide. I volunteered.

I was conducting what two decades later we would come to call *competitive intelligence*. This was during the late 1960s, about three decades before the Internet was generally available, so my research was manual – slow, difficult, and narrow compared to what would be possible today. But for me, it was fascinating and even fun at times – and I was told that it added significant value to the overall research effort.

1.1.2 Thoreau and the Pencils

The early nineteenth century thinker and writer Henry David Thoreau is perhaps best-known for his nature writings, and in particular his six-month hiatus from civilization spent living alone and "off the grid" on Walden Pond in Concord, Massachusetts, USA outside Boston.

Thoreau came from a family that was financially comfortable due to their ownership of a pencil factory (when pencils were among the leading information technologies of the day). After Henry graduated from Harvard College, he co-founded a grammar school at which he taught – and later became known worldwide for his naturalistic, philosophical, and political writings.

For most of his life, he stayed involved in the family business. There came a time when the prosperity of the business was under threat from German and French pencil makers, who had come to dominate the global pencil market through innovative manufacturing processes not used in the USA at the time. While not formally trained in engineering, Henry conducted research at Harvard University's library to identify specifically what his rivals were doing – namely,

adding clay to bind the graphite and other ingredients, thereby making a higher-quality product.

Thoreau Pencils soon adapted this innovation to their own operations. With this infusion of *competitive intelligence*, the family business surpassed its domestic rivals and regained its financial footing. It was this success that enabled Henry to publish his first books and to take his famous "time off" at Walden (Petroski 1990). Ironically, it seems that the great writer did not leave behind any published writings on his work methods or business innovations – though they would likely be of only historical interest today.

1.1.3 A Tale of Two Recessions

Each of the preceding stories illustrates the *value of knowledge* to the enterprise – a scientific research laboratory in the first case, a manufacturing business in the second. In each case, knowledge was an enabler – an "empowerer," even – of the *results*, *outcomes*, *and impact* sought by the organization (i.e., better research in the first case, better products in the second).

During my studies with Dr. Sidney Winter and others at the Yale School of Management, my own readings of Peter Drucker, Herbert Simon, James March, and others, and my subsequent consulting career working for firms in a range of industries, I became convinced that *knowledge is the hidden economic resource that underpins all other resources*. On the strength of that insight, in 1996 I founded the firm that eventually became known as The Knowledge Agency®. My original vision was that we would help organizations define and actualize this heretofore latent asset. We had several significant successes early on – and were able to compete with much larger firms for the business of large clients, based on this niche we had helped to define.

That remains my vision to this day – though now tested and tempered by the many client experiences and vicissitudes that have since intervened. My faith in this model was challenged by the "tech bubble" recession that hit the U.S. in 2000–2001. I remember the day a large pending proposal I had submitted with a colleague to one of the Big Four consulting firms was cancelled – and the roughly 400 knowledge professionals employed by that firm were let go or reassigned. During that time a private investor with whom I had been meeting, with the idea that he might help to fund my development efforts, began what turned out to be our last conversation by asking, "So, Tim, *now* how are you planning to *sell this knowledge stuff*?"

I improvised an answer to his question, though I was not as prepared for it as I should have been. Which brings me to my primary motivation for writing this

book – namely, that I want you, dear reader, to be prepared for these kinds of questions when you face them in your own work (as it is almost assured that you will).

But don't all knowledge workers know already that their work is valuable? Isn't that why they choose that career path in the first place? And don't they all know that "knowledge is power"? In short, do I pursue the fool's errand of preaching to the converted?

Perhaps I do – but too often, our clients do not "get" this connection between knowledge and value – and specifically, the value they themselves create in doing their own work. Or, worse, they claim to understand the connection, but "when push comes to shove" see knowledge as discretionary – and available to be sacrificed in order to protect more revenue-relevant functions during an economic emergency.

As if my first recession wasn't lesson enough, another recession hit the U.S. economy in 2008–2009. This was sharp and deep, the full recovery from which lasted the better part of the following decade. Knowledge-related contracts were postponed, then cancelled, then client personnel were let go, sometime *en masse*. Enterprises large and small, in all economic sectors, went into survival mode. Once again, it became virtually impossible to sell anything new, most of all something as forward-looking and intangible as "better knowledge practices."

1.1.4 "Selling this Knowledge Stuff"

When you practice independent consultancy, as I have for over two decades, you are essentially in the business of selling your knowledge. In addition to maintaining mastery of your subject matter, you must learn – as quickly as possible, though often by trial and error – how to convert your knowledge into revenues efficiently and effectively. If you do not succeed in learning this, it's likely you will not survive for any extended length of time in independent practice. Knowledge value is the lifeblood of a sustainable knowledge-based practice, of which consulting is a prime example.

In the mid-2000s, I made a significant change in my firm's standard proposal template. Where we had always discussed Background, Project Scope, Approach, Cost, Team, Deliverables, and Timing for each proposed engagement – we now added a Benefits section immediately after the Cost section. My goal was to *reposition* our services in the minds of our clients and prospects – away from being an *expense* item, forever gone once spent, toward being an *investment* item for which a financial return (preferably, an ongoing one) was to be expected.

I will explain this important distinction later (in Section 3.6.1), and it is a key message that I will deliver in various complementary ways throughout this book. I realized that *all knowledge services* (like all organizational activities) *exist within an economic context* – whether or not that context is directly acknowledged or gauged.[2] Simply put, knowledge brings real costs and real benefits. Understanding that economic context for knowledge – mapping it, modeling it, measuring it in order to optimize it – is at the core of my professional practice. I hope to teach you to understand, or at least appreciate, how I approach this.

I have consistently found both in my client work and in my teaching that the knowledge-value connection is something to which many *knowledge professionals* – even the most professionally competent ones – are typically not fully attuned. They are not formally trained that way, and consequently they don't think that way – unless they are sensitized and coached to do so. Providing such guidance and coaching became a primary mission of my consulting and training practice.

It has been my experience that some knowledge professionals, having (as they rightly do) great professional pride and integrity, are not always entirely comfortable with the idea of having to "sell" their services – which they themselves believe to have great value. While I sincerely empathize with that point of view, having held it myself at times, I now see it as impeding the professional advancement of those who hold it, even tacitly. I will try to persuade you to look at the world through your clients' eyes, and to avoid anything resembling disdain for them, for their work, and for their (perhaps skeptical) view of your work.

Our clients have a lot on their minds, and they need to be coached and guided in the *value conversation* just like the rest of us. Value exists only in the mind of your client, whether or not that client has to actually write you a check for your services. If the client sees the benefit in what you are doing, relative to its cost, he or she will be highly like to "buy" what you are selling.

By understanding the value context in some detail, you are in a position to (1) *increase* the value for your client and to (2) *communicate* the value to your client. Both the doing and the communicating are equally important. As the great knowledge thought leader and raconteur Larry Prusak recently remarked to Columbia University's *Information and Knowledge Strategy* students, "You have

2 As Drucker (1964, 5) puts it, "There are no profit centers within the business; there are only cost centers. The only thing one can say with certainty about any business activity, whether engineering or selling, manufacturing or accounting, is that it consumes efforts and thereby incurs costs. *Whether or not it contributes to results remains to be seen.*" (Emphasis added) Indeed, we will address this latter question throughout this book.

to learn how to sell this [knowledge] stuff." We will devote a section herein (Section 6.4) to exactly that challenge.

1.1.5 My Goals Herein

What would compel me to take time from working with clients, speaking and lecturing, mentoring students, and generally enjoying life to sit in front of my screen and pour out my ideas for a group of people whom I may not know – and whom I may not ever have the good fortune to meet or even correspond with? Partly because, having been generously offered this opportunity by my editor and publisher to compile these thoughts and techniques – each of which I have tested and used in my own practice – I feel a professional obligation to my colleagues, peers, and clients to do so.

But beyond that, I find myself experiencing great satisfaction, even joy, in so doing. The chances to explore and recount the work of those who have inspired me, and to mine my own case files and lectures for insights to share, have been challenges that have proved intensely rewarding. The possibility that my efforts may bring value to others down the road is like icing on the cake.

Knowledge as an economic resource is a construct not universally embraced by those in positions of organizational power, for reasons we will explore herein. And, frankly, knowledge professionals occasionally exhibit behaviors that those in power may find inconsequential, mysterious, or even threatening. If I, as an MBA/economist and organizational advisor, could help those in knowledge services fields to be more acceptable to, and accepted by, their organizations, I will proudly count the investments of my time and energy as worthwhile.

My overarching goal herein will be to present a survey and roadmap of the *body of knowledge* that underlies "value of knowledge" thinking, and specifically:

- **General "value of knowledge" principles**. I will survey the applied economics of knowledge from its roots in the 1960s to the present day, with a few side trips into related fields.
- **Specific tools and techniques.** During my more than two decades in private practice my firm has developed, tested, and employed diagnostic and analytic tools and frameworks, including the Knowledge Value Chain® and many others. I will discuss how these are used and how you can apply them in your work.
- **Case examples.** Where I am able to disclose results without compromising my clients' confidentiality, I will demonstrate how the tools were specifically applied, and what results were produced.

- **Research ideas.** Occasionally I will point out topics that deserve rigorous investigation beyond what is currently available.
- **Purpose, motivation, and inspiration.** Perhaps most important, I hope to provide you with insights into your mission-critical work that will transcend clichés, stimulate new ideas and approaches to your work, and give you increased access to the resources you need to optimize the benefits you provide to the enterprise. By being able to provide greater value to your clients, you will provide greater value to yourself and your career.

My intended end point is not only that you will *understand* the factors that transform knowledge into enterprise value – it's also that you will be better prepared to *manage* these factors effectively in order to *change* your performance and results for the better. My sincere hope is that the book will be put to the following uses:

- As a **textbook** and discussion guide to accompany a one-semester course on the economics of knowledge and intelligence (for which I have designed an accompanying curriculum)
- As a practical **guidebook** for organizational knowledge practitioners and managers seeking to improve the value and ROI of their work
- As a **reference** work containing research challenges and pointers to source materials for further study.

1.2 Who Will Gain Value from this Book?

Anyone who is a "knowledge worker" can use the insights discussed herein to do his or her job better and achieve higher performance – and that includes the great majority of us working in large, modern organizations. The audiences for this book largely fall within the following groups:

- **Knowledge Producers.** Knowledge services practitioners can use the lessons herein to improve the quality of their work, better organize scarce time and resources, and improve communications with clients.
- **Knowledge Managers.** Knowledge services managers can use these tools and insights to guide the acquisition and allocation of resources, to implement project planning, and to identify areas for skills development and/or outsourcing.
- **Knowledge Users.** Decision-makers and other knowledge clients learn how to see inside the "black box" of the knowledge process, how to focus knowledge on areas of maximum strategic impact, and how to improve the ROI of knowledge.

The potential audiences for the *Value of Knowledge* are large and worldwide. They include anyone who is aware that there is untapped opportunity in enterprise knowledge but is not sure how to tap into it. These could include:

- **Business executives.** Top and mid-level executives in general management, IT, finance, research, and security will readily grasp – and be able to apply – the insights presented here. Financial executives in particular will benefit from Section 3.6.
- **Business researchers and analysts.** IT professionals, librarians, business strategists, knowledge managers, competitive intelligence units, forensics firms, market researchers, securities analysts, and R&D departments will all benefit from the ideas herein.
- **Government agencies.** Members of government intelligence communities, as well as regional and local security and law enforcement officials, have used these concepts in training and in developing analytic methodologies.
- **Business and information studies students.** The author has presented these and similar materials at several leading universities, as well as at conferences hosted by professional organizations worldwide.
- **Libraries**. Business, academic, and research libraries worldwide could acquire reference copies – as well as applying the principles to their own work.
- **Job seekers**. The skills and insights taught in this book have helped job seekers to "compete in the knowledge economy" more effectively.

1.3 Structure of This Book

As I write, so I believe – and so I practice. In Section 1.5.2, we discuss at length the important distinctions between information and knowledge. Seen through the lens of that distinction, this book represents a complex set of *information* elements that you will (perhaps) read and study, thereby turning it into your *knowledge*, and then (perhaps) socialize as *intelligence* among your colleagues and put into *action* to drive *outcomes* in your organization. Then – and only then – will you achieve the benefit from the time, talent, and treasure that you have invested in acquiring this knowledge.

In conducting focus groups with my publishing clients, I once observed that users of a "useful" book place the greatest value on two structural elements of that book: its very beginning (the Table of Contents) and its very end (the Index). The reason is that these are the tools that enable you to reach into a book and quickly find the information you need to solve a problem. I used that lesson in developing a work process to "capture and tame" my own body of knowledge. I developed the contents outline and bibliography first – and got some audience feedback on that

"skeleton" – then worked inward. The book's modular structure reflects its intended use as a text and reference, rather than as a continuous narrative to be savored over a glass of wine. Most of the discrete sub-sections are designed to be the focal subject for a lecture and/or group discussion.

The structure consists of the following major sections, each of which is designed to answer key questions you may have:

- **Section 1 – Introduction.** What is the book's purpose (i.e., its overall *value proposition*)? Who are the intended audiences, and how can each put its contents to use? I'll draw some key taxonomic distinctions and definitions and offer some notes to clarify the scope of what I will cover.
- **Section 2 – Knowledge as an Enterprise Function.** Most of you reading this are working in *knowledge services* or related fields – or studying and planning to do so. Why do organizations create budgets and jobs for such activities? What purposes does knowledge serve in the modern enterprise?
- **Section 3 – Knowledge as an Economic Resource.** The idea that knowledge is an essential economic resource is a relatively new one. Where did it arise, and why? Is knowledge fully recognized as a resource, or is there still work to be done?
- **Section 4 – The Knowledge Value Chain®.** The KVC framework has evolved into a sort of "skeleton key" that opens the rest of my work. I have lectured on it around the world for over two decades and published one major monograph and many articles and blog posts about it. How does it work? How can it be applied? What value does it add?
- **Section 5 – Increasing Knowledge ROI.** My goal in teaching you about how the value of knowledge works is to enable you to recognize and capitalize on new opportunities to do so. How is knowledge ROI measured? What levers can we push to increase its value? How can we balance economic and societal value?
- **Section 6 – Knowledge to Value.** Some organizations generate so much knowledge that they can productize or even monetize that knowledge. How do you sell knowledge? What are the steps and resources needed to do this? How do you build a business case for knowledge?
- **Section 7 – Knowledge Strategy.** If, by this point in your journey, you have come to believe that knowledge is a key economic resource and is in fact *the* key resource to compete effectively in the Knowledge Era – as I have – then you will see the connection between knowledge and enterprise strategy. They achieve their maximum impact when they are closely integrated. How is this best accomplished? What are the advantages of doing this?
- **Appendix.** Presented here are two model question sets, one for Producers of knowledge, the other for Users. Also included is an index of more than two

dozen strategies for adding value and a list of major findings presented in the text.
- **Bibliography**. Decades ago, I began reading and collecting books and articles on topics related to the value of knowledge. I am glad to pass along these references that will enable deeper dives and further research into many of the areas covered herein.

Within each section, I draw upon my own consulting work, as well as the expertise of my clients and others, to describe case examples. What does all of this look like in practice? What are some recommended practices? What are some pitfalls and things to avoid? Key concepts presented and questions for thought and discussion are listed at the end of each chapter.

My blog *Competing in the Knowledge Economy* (www.KnowledgeValueChain.com) is where I regularly refresh these ideas with new experiences gained from my lectures and my work with clients.

1.4 Notes on Style

1.4.1 Pronouns

In one of my earliest professional roles, my immediate supervisor was an accomplished and insightful woman. In respect of that experience, and to keep the pronouns herein gender-balanced, I have standardized on using masculine pronouns for the knowledge Producer or practitioner and feminine pronouns for the knowledge User or client.

1.4.2 Geography

I am based in New York City, and much of my work has been with U.S.-based organizations. While I am aware that financial standards and business practices may differ from one jurisdiction to another, such differences are not our primary focus here, and will be noted in passing only.

1.4.3 Voicing

Many of my observations herein derive from my four decades in the practice of management research and consulting – and were first documented in client

presentations or in my lectures to business or academic groups. I view you, my reader, as my client – and consequently prefer using first-person voicings (as in this sentence) where possible.

1.4.4 Language of Business

I am fortunate that my experience has led me into serving profit-making companies, both public and privately held, nonprofit organizations, and government and military agencies. I have concluded that the commonalities among these sectors are far more significant and interesting than the differences between them. I will use terms like *enterprise*, for example, to capture these common traits where possible. However, because I find the lexicon of value most well-developed in profit-making companies, I will gravitate toward using business terms – after defining and explaining them – where needed in developing my theses.

1.4.5 Interdisciplinary Approach

A client whom I had known for some time asked me in which discipline my Ph.D. had been awarded. "Real life itself" was my tongue-in-cheek answer – reflecting my finding that, for me, experiential learning has been by far the most powerful teacher. As an empiricist and a skeptic by nature, I tend to believe and trust what I see for myself over what I read.[3] I have made it my goal to work professionally in several fields, most of them long enough to log the 10,000 hours of experience said to be required to achieve mastery of – and the resulting touch of boredom with – them. A dash through them will preview some of the experiential knowledge upon which I draw in my practice, my thinking, and my writing here.

My first professional work was as a science laboratory intern (described in Section 1.1.1). This was soon followed by a short stint as an aviation insurance risk underwriter. I paid my expenses at Yale College – my tuition was paid by a corporate scholarship – by working as a rock musician and a radio disk jockey. My training in pre-medical science, psychology, and philosophy led me to a job as a research psychologist after college, where I wrote my first book (unpublished), a longitudinal ethnographic study of family dynamics and interactions within low-income urban families.

From there I went to management school, where I learned enough about quantitative methods to land a job as a senior consultant at KPMG doing

3 In addition, several of the fields I specialize in had not been invented when I studied at university.

econometric forecasting and financial modeling. The financial discipline I learned there now infuses everything I do. My experience in designing a new service for the senior leadership of KPMG led me to move to PwC to conduct (for two years each) new service design and development, competitive/market intelligence, and technology support for the marketing function. I moved from there to Opinion Research Corporation to lead a strategic research division conducting strategic analysis, qualitative and quantitative market research, and competitive intelligence.

My couple of decades running my own firm The Knowledge Agency® have spanned database design, technology journalism, market and competitive intelligence, business strategy, and knowledge management. I have always been involved in *pro bono* activities, especially in training and mentoring my professional peers. My serious avocations are music composition and recording and photography.

Along the way I have been fortunate to teach graduate students in a library school (the Palmer School at Long Island University) and in a "knowledge strategy" program, a hybrid of knowledge management and business strategy (the *Information and Knowledge Strategy* program at Columbia University).

My goal has been to retain and integrate the learnings from each of these various experiences as I move to (and sometimes through) the succeeding ones. This will explain the broad mix of disciplines that I draw upon in approaching questions of the value of knowledge. For example, the use of lenses in photography is parallel in many respects to the use of frameworks and models in consulting. My admittedly unorthodox approach will have been successful if, like the ingredients of a delicious cake, the whole eventually becomes a synthesis with more to offer than the sum of its individual parts.

I occasionally depart herein from the conventional wisdom about knowledge, sometimes in significant ways – for example, my rejection of the term *explicit knowledge* in favor of the more straightforward *information*. My observations are based on my decades-long clinical practice, and all have been tested in client engagements and in university lectures. Where such divergence happens, my goal is to explain the nature of that difference and why it is significant.

1.4.6 Equations

While some economics texts are stuffed with equations, some other of the most insightful writings have few or none (Adam Smith and John Kenneth Galbraith, for example). While equations can at best serve to provide an unambiguous shorthand as compared to words, I have included equations only where the "word" versions

are also present. Whether you are, as they say, a poet or a quant, you will find an explanation that suits your cognitive style.

1.5 Semantic Considerations

To help you achieve the fullest possible benefits from the ideas presented herein, in this section I make explicit the "heuristics and biases" that serve as the foundation for my thinking. Most of these pivot on the definition and use of certain key words commonly found in the knowledge literature – but often defined with shades (or more) of difference in meanings. Whether or not you agree with each of my choices, I hope these will enable you to test and calibrate your own perspectives against mine.

1.5.1 "Knowledge Services"

We define Knowledge Services (KS) as a "super-category" that includes the four fundamental activities of *Producing*, *Communicating*, *Using*, and *Managing* enterprise knowledge. KS encompasses several traditional enterprise functions in which knowledge plays a *primary* role: market research, competitive intelligence, library services, knowledge management, information technology, research and development, and legal research. KS also includes those many aspects of functions in which knowledge plays a *secondary* or supporting role – for example, the sales support function in which research is conducted on sales prospects prior to their being called on by a salesperson.

Instead of using the term "knowledge services worker/professional/practitioner," I have in some cases shortened that to the more familiar "knowledge worker" or "knowledge professional." In most cases, however, I have preferred where possible to indicate more precisely which role such a "worker" is playing – is he/she primarily a knowledge *Producer*, a *Communicator*, a *User*, or a *Manager*?

1.5.2 "Knowledge" Versus "Information"

We draw clear distinctions between *knowledge* and *information* along three dimensions: their "*animate-ness*," their relative *dynamism*, and their relative *scalability*. Simply put, where information is inanimate, static, and scalable – knowledge is organic, dynamic, and localized (See Table 1).

Table 1: Key differences between information and knowledge.

	ANIMATE-NESS	DYNAMISM	SCALABILITY	
INFORMATION	Inanimate	Static	Scalable	Explicit
KNOWLEDGE	Organic	Dynamic	Localized	Tacit

Information is essentially inanimate – organized data that has been captured in databases, papers, books, news articles, and so on. Information is essentially mediated – by definition it exists only as embedded in a *medium* like those mentioned.[4]

Knowledge, on the other hand, is essentially organic, and more specifically, human. What we mean when we talk about knowledge, even at enterprise scale, is invariably embedded within a person. A book on the shelf remains information – unless and until a person reads it, engages with it, understands it, and absorbs it. Then (and only then) it has been converted into that person's knowledge. When the person subsequently *socializes* that knowledge and applies it to make decisions and/or take actions, then it has become intelligence, as discussed in Section 1.5.3.

Drucker (1964, 111) expressed this key difference in his lucid and down-to-earth way: "Knowledge is a specifically human resource. It is not found in books. Books contain information; whereas knowledge is the ability to apply information to specific work and performance. And that only comes with a human being, his brain or the skill of his hands."

A second element of difference is *dynamism* – the relative speeds at which, and degrees to which, they change. Information is essentially static. I have a book sitting on the shelf; when I open it a year from now, I will expect it to contain exactly the same words and sentences that it does today.[5] If, for any reason, it does not – then it has not fulfilled my most basic requirement for a book. Information does its job by remaining reasonably static. (The most obvious counterexample, a live-streaming video, is still mediated information that, once captured, remains static.)

4 Note that we define this distinction somewhat differently than traditional views, which largely derive from Polanyi's work discussed at the end of this section.

5 This observation is subject to the finite useful lifetime of the media via which information is conveyed. Some books have lasted five centuries. The lifetime of digital media such as CDs has been measured in single-digit decades, Spoken words, which are "mediated" as sound waves in the air, radiate and dissipate upon being uttered, unless captured in a more permanent medium by some recording device.

I am continually reminded of this difference by the memory of my colleague who I know died several years ago – yet who, to this day, looks as alive and well as ever in his LinkedIn profile.

Knowledge, on the other hand, is dynamic at its essence. Knowledge does *its* job by being dynamic. Change, adaptation, and evolution of knowledge are essential elements of its character. If knowledge fails to acquire these characteristics, it cannot completely fulfill its intended purpose.

Knowledge dynamism brings with it a challenging downside, as Drucker reminds us in saying, "Knowledge is a perishable commodity. It has to be reaffirmed, relearned, repracticed all the time. . . Every knowledge eventually becomes the wrong knowledge. It becomes obsolete. . . Knowledge has to progress to remain knowledge." (Drucker 1964, 117–119).

A third key element of difference is that information is easily, inexpensively, and widely *scalable*. Thanks to digital technologies, information can be, and often is, propagated globally within a matter of seconds. Knowledge, on the other hand, is typically localized and difficult to "transmit." In a technical sense, knowledge cannot be transmitted directly at all, but must be first transformed into information – a process we'll describe in Section 6.6.1.

It is interesting to note that the ancients too sensed this important distinction between knowledge and information. There was in some quarters a reluctance to commit ideas to writing, for fear this would have the effect of stifling the acts of thinking and discussion. Thus, it's plausible that the fact that Socrates' dialogues were scribed not by him, but rather by his student Plato, was intentional for that reason. This tension has never been fully resolved, and lives on in the modern debate of codification versus personalization discussed in Section 7.6.

Worth mentioning in this context is the contribution of Michael Polanyi (1966), a physical chemist turned philosopher whose differentiation between *tacit* and *explicit* knowledge has become axiomatic, even canonical, in the field: "I shall consider human knowledge by starting from the fact that *we know more than we can tell*. This fact seems obvious enough; but is not easy to say exactly what it means." Polanyi does in spite try mightily, though – and the patient reader will be rewarded with aphoristic gems such as, "*Perception has this inexhaustible profundity*, because what we perceive is an aspect of reality, and aspects of reality are clues to boundless undisclosed, and perhaps yet unthinkable, experiences." (Emphasis added. Have a glass of wine with a friend and discuss among yourselves.)

While I find the tacit-explicit distinction fundamentally valid, I have chosen to simplify the terminology by positing *all knowledge as essentially tacit*, while reserving the name information for "that which we can tell" explicitly. We also note the corollary that *we tell more than we can write* – that is, there is

a massive editing down of knowledge as it progresses through various stages of representation, from thought to speech to writing.

1.5.3 "Knowledge" Versus "Intelligence"

We likewise draw a clear distinction between *knowledge* and *intelligence*. We define enterprise knowledge as *the end product of a process of data acquisition and analysis within a knowledge worker, but before it has been communicated to a client/decision-maker*. Intelligence we define as *knowledge that has been distributed to a person or group with the propensity and power (i.e., authority, budgets, etc.) to act upon it*.

Knowledge becomes intelligence when – *and only when* – it is communicated to someone who is empowered to then act upon it to produce value (i.e., results, outcomes, or impact). We abbreviate this with the simple equation:

KNOWLEDGE + POWER = INTELLIGENCE

Whereas knowledge is the highest stage of the Production process, intelligence is the lowest stage of the subsequent Use process. Intelligence is knowledge distributed to, and socialized among, a group that holds the organizational authority and power to apply it. Intelligence represents the platform from which we launch the making of decisions, the taking of actions, and, ultimately, the production of value.

1.5.4 "Knowledge" Versus "Power"

The distinction between knowledge and intelligence highlights the political dimension of knowledge. We all know the saying, "knowledge is power." Those of us in the knowledge professions wave it as a banner of professional pride and aspiration, or even sloganize it as a practice development mantra.

It sounds reassuring, and probably had much validity when English statesman, scientist, and philosopher Sir Francis Bacon is said to have coined it nearly 400 years ago during the Enlightenment. However, as an operating principle, it is simplistic and misleading in the modern enterprise. This has led to the less charitable, but more realistic, counter-saying that, "If knowledge *were* power, large organizations would be run by their librarians" – rarely the case.

We in the Age of Knowledge are such sophisticated producers and users of knowledge that, in an organization of any significant size and complexity, knowledge Producer and User functions are separate and highly distinct in terms

of job description, training, salaries, power, organizational locus, and overall culture. In short, knowledge people are typically not power people. These distinctions tend to result in a *knowledge-power gap* that, where present, forms one of the largest obstacles to the production of value from knowledge.

Though usually attributed to Bacon, the words "knowledge is power" have not yet been definitively located by any scholar researching his writings (which were mainly in Latin). Thomas Hobbes, who served for a time as Bacon's secretary, did say, "*The end of knowledge is power*. . . the scope of all speculation is the performing of some action or thing to be done." (Emphasis added.) The words omitted in reducing this to the slogan "knowledge is power" are key to Hobbes' meaning – which appears to be that knowledge is a *means* to power, rather than its equivalent. In this sense he is anticipating what Peter Drucker (1999) affirmed three and a half centuries later: "The purpose of information is not knowledge. It is being able to take the right action."

Knowledge services practitioners must understand and attentively manage the knowledge-power distinction so as not to threaten, nor to appear to usurp the authority of, their clients and patrons. Skillful mastery of this distinction is a key success factor in the practice of knowledge services.

1.5.5 "Knowledge" Versus "Knowledge Management" Versus "Knowledge Management Systems"

The literature of knowledge valuation, and especially the academic literature, treats the subject in various levels of specificity – some addressing knowledge management *systems* (the most specific) or the practices of knowledge *management* (an intermediate level of specificity), as opposed to the valuation of knowledge itself as an essential economic resource (the most inclusive category). Where the distinction is meaningful and made clear in the source or study cited, I will describe this.

1.5.6 "Value" Versus "Values"

The words *value* and *values*, while nearly identical in English, carry idiomatic shades of distinction that are subtle, yet significant for our purposes. I have followed the conventions delineated in *Merriam-Webster's Collegiate Dictionary, Eleventh Edition* – namely, that where *value* connotes "a fair return or equivalent in goods, services, or money for something exchanged," *values* connotes "something (as a principle or quality) intrinsically valuable or desirable." It is the

former "strong-form" sense – the *extrinsic* economic exchange value of knowledge, as opposed to its *intrinsic* value as a principle – that will be our primary focus here. It is our view that reliance on the latter "weak-form" definition is a pathway that leads us away from *knowledge empiricism* – i.e., reliance on observation and evidence – and that we thus seek to avoid wherever possible.

1.5.7 "Enterprise"

I use the term *enterprise* to mean an organization with a specified purpose or mission – a business, a government agency, a nonprofit or non-governmental organization (NGO), a military unit, etc. Even a family or household is a micro-enterprise. Enterprise is fundamentally a human activity – of people, by people, and for people. Enterprises are composed of people continually making individual and group decisions, then taking actions, under conditions of uncertainty. Like people, enterprises can be seen as having knowledge, intelligence, memories, preferences, habits, biases, blind spots – and all other strengths and weaknesses of human cognition and behavior.

1.6 Notes on Scope

Because knowledge is an all-pervasive resource, we run the risk of running short of bandwidth (not to mention, our readers' patience) if we do not carefully circumscribe our boundaries. In each of the following notes, we glance down some of the more interesting side alleys of knowledge, while describing selected resources you may use to explore these and deepen your understanding on your own.

1.6.1 Note on Technology

Information technology is obviously a key enabler of the Knowledge Era. In fact, the historical development of knowledge practices and disciplines parallels the development of these technology enablers, as discussed in Section 3.1. However, the speed at which technologies evolve is such that describing specific technologies herein could unfairly limit the lifespan of the other concepts presented. I have therefore chosen to limit discussion of specific technologies in favor of more general referencing and describing technology classes and/or trends.

1.6.2 Note on Epistemology

The branch of modern academic philosophy that addresses questions of knowledge is *epistemology*, from the Greek *episteme*, one of their words for knowledge.[6] Though my admittedly quick survey of the field reveals it as offering little of a practical nature to the organizational practitioner of knowledge services, it may prove interesting as a diversion. A very short introduction to the field (from the Oxford series by that name) is offered by Jenifer Nagel (2014). Written for the layperson, it offers a good overview of the history of, and main themes in, epistemology in 130 pocket-sized pages.

A more thorough introduction to academic epistemology is Michael Williams (2001). He includes a useful explanation as to the why the value of knowledge in an economic sense is a relatively new concept. For the ancients like Socrates, Plato, and Aristotle, knowledge was the highest pursuit in life – and worthy for its own intrinsic value. In honor of these "godfathers of knowledge," we'll call this the *classical view*: "To ask 'What is the value of knowledge?' is like asking 'What is the point of being human?' Knowledge does not have to be good for anything: for beings like ourselves, it is an end in itself. . . Modern philosophers tend to take a more utilitarian position. The modern thought is that knowledge is valuable because it gives us power, particularly over the natural world." This modern view has become known as the *instrumental view* of knowledge pioneered by Descartes and Bacon during the Enlightenment, and which soon after became the basis for experimental science and technology.

Williams points out that the distinction may be too facile, and that both the ancient and the modern views could be viewed as instrumentally valuable: "For both ancients and moderns, knowledge is power. But whereas for the moderns this means power over the world, for the ancients it means power over oneself." In this sense, the ancient western view is not unlike the Hindu view, wherein self-knowledge (*atman*) is seen as the highest possible goal of study.

We wholeheartedly and unabashedly endorse the modern instrumental stance – *What can knowledge do for us?* will be our guiding theme throughout. I pledge to be relentlessly pragmatic and will leave further discussion of modern epistemology to those who find it more rewarding than do I.

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6 The other knowledge-related Greek words are *techne*, which is akin to our craft, and *sophia*, akin to our wisdom.

1.6.3 Note on the Sociology of Knowledge

One day in the spring of 1968, when I was studying pre-medical science at Yale, I wandered into a small bookstore on Chapel Street in New Haven and was captivated by the title *The Sociology of Knowledge* by Karl Mannheim. Though I have not directly used that as a source herein, it was my first encounter with a book about knowledge – the very idea of which seemed vastly important and radically new at the time.

Sociologists have considered knowledge from a sociological, or even anthropological, point of view. In general, the basic questions being addressed concern how societal relationships, and in particular those concerning hierarchies and power differentials, affect the development of knowledge. Berger and Luckman (1966) open their survey of the field with this definition: "Reality is socially constructed and. . . the sociology of knowledge must analyze the processes in which this occurs. . . What is 'real' to a Tibetan monk may not be 'real' to an American businessman. The 'knowledge' of the criminal differs from the 'knowledge' of the criminologist."

Different societies have differences, sometimes huge ones, in what they take for granted as knowledge – and these differences evolve over time. The sociology of knowledge explores these differences, along with "the processes by which any body of 'knowledge' comes to be socially established as 'reality.'"

Considering that knowledge, akin to belief systems, is socially determined (or at least, influenced) begs the larger questions of *socio-epistemological dynamics*, namely *How does socially constructed knowledge change over time? What causes that change? What factors foster it? What impedes it?* It's sobering to consider that in the year 1000, most of the world's educated people "knew" that the earth was flat – while by 1600, few did.

Thomas Kuhn's monumental work on the history and sociology of scientific change, *The Structure of Scientific Revolutions*, bears mention here. Kuhn is best-known for popularizing the term *paradigm*, which he defines as "a set of recurrent and quasi-standard illustrations of various theories in their conceptual, observational, and instrumental applications. . . [as] revealed in [the scientific community's] textbooks, lectures, and laboratory exercises." (Kuhn 1962, 43) Kuhn's primary insight is that a scientific paradigm (for example, the "knowledge" introduced by Ptolemy and held for millennia that the sun revolves around the earth) shifts when the observed facts no longer fit the dominant view of things – but not for that reason alone, and not until a new paradigm replaces it. The shift happens because the social consensus that binds the believers in a paradigm to that paradigm (and to each other as colleagues) weakens as the cohort physically retires and eventually dies off. The universe itself did not change

when Copernicus and others discovered that the sun is the center of the solar system – but how scientists (and, eventually, everyone) *saw* the universe did change. An old paradigm is replaced by a new paradigm, supported by a new consensus and new rules, most often within a refreshed community of professional peers.

Understanding more about exactly how this *paradigm shift* occurs would be instructive by analogy to anyone trying to effect changes of any kind within an organization – which includes most of us who are external or internal consultants. Kuhn's sobering conclusion that, in effect, it's not new evidence, but rather a changing (out) of the guard, that leads to the adoption of new paradigms may help us temper our expectations as to how quickly and how completely genuine transformations in organizational behavior can happen.

Knowledge is a foundational element of what constitutes a society. An organization (similarly to a scientific community) can be studied as a micro-society, with its own culture, internal rules, values, rituals, and mores. Understanding how such *enterprise knowledge* is produced and maintained is essential to understanding how the enterprise produces value – and to how that value can be leveraged and enhanced. Drucker's mantra "knowledge is the business" (more about which in Section 3.7) comes to mind here.

A rigorous application of the core concepts of the sociology of knowledge to the problems of organizational intelligence would be a fascinating project likely to be productive in identifying and managing internal "ideologies" and habits of thought that foster organizational blind spots and *competitive myopia*. Though I am not aware of any such formal studies, I will herein consider the effects of social and power relationships within organizations on the production, communication, use, and management of knowledge.

Worth noting here is the work of the French philosopher Michel Foucault, of whom it was said that his intelligence literally knew no limits. His *History of Madness* (Foucault 2006) is a painstakingly-researched history of the evolution of the concept of madness in three main stages: (1) its depiction during the Renaissance as a form of divinely-inspired *disorder* (i.e., "possession by demons"); (2) its depiction during the seventeenth and eighteenth centuries as a *crime* deserving of incarceration; and (3) its modern depiction as psychiatric *disease* treatable with medicines and other therapies.

What excited me, who as an undergraduate wrote a thesis on the implications of Foucault's (and others') work on trends in psychiatric diagnosis, was the core idea that *the ways in which we as a society see things change over time – and that this affects (or even determines) how we respond to and manage those things*. I began to develop the notion that by understanding how that

change works, we can influence and accelerate it. I have since then designed various ways of operationalizing this core idea in my work with clients. This insight now forms a key element of my professional practice.

Foucault long examined the highly charged relationships between knowledge and power, and in particular the institutional power that encourages and enforces a certain view of knowledge formation. In *Discipline & Punish*, he cites seventeenth century prisons as among the first institutions to gather data about individuals and their lives in order to gain the powers to discipline and punish them. These were soon followed by the military, schools, and hospitals as knowledge-generating engines that achieved power through "the accumulation of documents, their seriation, the organization of comparative fields making it possible to classify, form categories, to determine averages, to fix norms." (Foucault 1978, 190). One may observe that this *brute force* power over individuals, based on knowledge of them, has in the twenty-first century been supplemented by firms like Google and Facebook who synthesize *economic* power from knowledge about individuals, the data to generate which is mainly self-supplied by those same individuals.

1.6.4 Note on the Economics of Information

There is another complex branch of "value of knowledge tree" that the diligent student should at least be aware of: the economics of information. Mirowski and Nik-Khah (2017) have recently produced an excellent history of this field. They point out that beginning around World War II, discussions about economic markets began framing them as processors of information – a concept that now is fundamental to several branches of modern economics: "Appeals to information and knowledge pop up almost everywhere these days: the *efficient markets hypothesis* in finance, *common knowledge* in game theory, *rational expectations* in macroeconomics, *asymmetric information* in principal agent theory, *adverse selection* in mechanism design, *focal points* in behavioral economics, and so on." (Emphases added.)

During the War, there was a great amount of study of the decision-making process, and information's role in it. This became the foundation of the discipline of operations research – which, though it was used first in warfare, was later adapted for peacetime goals (the scheduling and deployment of ambulances and fire engines, for example).

Claude Shannon's pioneering information theory, introduced at Bell Labs in 1948, was created with an explicitly economic goal – the growing need to render

telephone transmission more accurate and efficient. Shannon achieved this by separating the semantic nature of communication (i.e., its meaning) from the vagaries of physical transmission along a phone line. He identified the five key elements of any communication of information (Shannon 1948):

(1) the **source** that produces the message,
(2) the **transmitter** that produces a signal suitable for transmission,
(3) the **channel** or medium of transmission,
(4) the **receiver** that reconstructs the message from the signal, and
(5) the **destination**, the person or thing for whom the message is intended.

Shannon also described the *noise sources* that act upon the signal to degrade it over time and transmission steps – in much the same way that, in physics, the Second Law of Thermodynamics describes *entropy* as the tendency for physical objects to degrade (i.e., dissolve, decay, decompose, etc.) over time. Shannon is credited with introducing the concept of the *binary digit* or bit, the smallest unit of information – the counterpart of the atom in the physical world. His work help lay the foundation for the digital innovations that soon followed.

After Shannon, information as a concept was soon adapted to many other fields, including economics. One of its main applications there has been the design of markets and market mechanisms that contain some kind of embedded structural intelligence: "The economist's task is now to build markets to handle the cognition that agents cannot – or. . . 'smart markets.'" Among other policy applications, this principle was used by game theorists as the foundation of the electromagnetic spectrum auctions held by the U.S. Federal Communications Commission in the early 1990s.

Mirowski and Nik-Khah point out that this intense focus on information may ironically have served to downplay the economic role of knowledge: "Economists' fascination with information has inadvertently debased their treatment of knowledge – first, for the agent [in a market transaction] and then, ultimately, for the economists themselves. Now all we have left is *information*." (Emphasis original.) By delineating the distinctions between, and intimate relationship between, information and knowledge, we will attempt herein to correct that imbalance.

As Machlup (1980, 15) elegantly points out, "Choice is at the core of economics. . . Stocks of knowledge and flows of information guide the choices and decisions that result in economic action. . . This is by no means a new discovery; it has always been obvious and taken for granted." This last sentence appears to be his rationalization of the inescapable fact that serious treatments of the specialized economics of knowledge and information were relatively rare before his own work

in the early 1960s. Perhaps, much as fish are said to not understand that there is something called water, economists were slow to realize the centrality of "K and I" to all of economics.

Once they did, though, the floodgates opened up. Machlup (1984, 312–313) offers these 17 subject groupings as a taxonomy for the economics of knowledge and information in published academic literature:

1. The Economics of Knowledge and Information: General
2. Production and Distribution of Knowledge: Knowledge Industries, Information Services, Information Machines
3. Ignorance, Chance, Risk, and Uncertainty as Factors in the Explanation of Individual Choices and Particular Economic Institutions and Phenomena
4. Uncertainty, Risk-Aversion, Venture Spirit, Innovativeness, and Alertness as Factors in the Explanation of Entrepreneurship and Profit
5. New Knowledge (Invention, Discover) and Its Application (Innovation, Imitation) as Factors in Economics Growth
6. The Transfer of Technology and Know-How
7. Economic Forecasting
8. Cost and Value, Private or Social, of Information and Alternative Information Systems
9. Decision Theory and Game Theory
10. Decision-Making by Consumers with Incomplete and Uncertain Knowledge
11. Decision-Making by Workers and Job Seekers with Incomplete and Uncertain Knowledge
12. Decision-Making by Private Firms, in Various Market Positions, with Incomplete and Uncertain Knowledge
13. Policy-Making by Governments and Public Agencies with Incomplete and Uncertain Knowledge
14. The Formation and Revision of Expectations and Their Role in Economic Dynamics
15. The Role of Information Knowledge, Expectations, Risks, and Uncertainty in the Functioning of Markets and the Formation of Prices
16. Prices as Information System for Resource Allocation ad Product Distribution in Market Economies and Planned Economies; National Programming and Planning
17. Human Capital: The Accumulation of Knowledge and Skills

This list essentially defines the body of knowledge for the economics of knowledge and information, and demonstrates the broad reach of this discipline into many aspects of enterprise behavior and management.

1.6.5 Note on "Knowledge Sharing"

In much of the management literature and practice of knowledge management, it is seen as a goal to increase the *knowledge sharing* within an organization. At the risk of seeming arbitrarily unorthodox, I intentionally avoid that term herein, as I have in my professional practice.

The reasons are twofold: first, I have arrived at the position that all knowledge is by nature human and tacit, and as such is incapable of being shared directly. It must be first "down-converted" to information by the sender or producer, where it can be transmitted, then "up-converted" by the receiver or user back into knowledge – a critical process I call the *K-I-K translation* (See Section 6.6.1).

Second, I will argue herein that knowledge is a valuable enterprise resource; in fact, in the Knowledge Economy in which we find ourselves, that knowledge is potentially *the most valuable of all enterprise resources*. And that knowledge is therefore something to be maintained and stewarded carefully, much as are other resources. Given that knowledge is something we can (and do) sell, we would rightly be thought foolish or short-sighted to give it away or share it in the commonly understood sense of that word.

I realize – in fact, I honestly hope – that not everyone reading this or using the ideas herein is working in a capitalist economy and society, as I am. This in fact may qualify as another of the cultural biases that you will encounter herein.

I have spent much time in the field of competitive intelligence, where information and knowledge are treated as highly proprietary – and to be "shared" only intentionally, and on a carefully permissioned, need-to-know basis. Many of the ideas herein I arrived at through my client research in intellectual property piracy and misappropriation – where the ownership rights attaching to ideas are seen as fundamental, as much so as with physical properties.

I have as a result elected to use, instead of *knowledge sharing*, the more process-oriented terms *communication* and *distribution* – though I also support using similar terms like *transfer* and *transmission*.

1.7 Key Concepts in Chapter 1

economic context
knowledge
animate-ness
scalability
value conversation
knowledge services
dynamism
intelligence

economic context
value
extrinsic
empiricism
classical view
tacit knowledge
socially constructed reality
paradigm
competitive myopia
value conversation
values
intrinsic
epistemology
instrumental view
explicit knowledge
socio-epistemological dynamics
paradigm shift
information theory

1.8 Questions for Discussion

- What are the differences between *knowledge* and *information*?
- What are the differences between *knowledge* and *intelligence*?
- What are the differences between *value* and *values*?
- What is the instrumental view of knowledge?
- In what ways is knowledge socially constructed?
- How does a paradigm shift occur? Can it be accelerated, and if so, how?
- What things that we "know" to be true today might not be seen as such in the future?
- Why have economists largely ignored knowledge and focused instead on information?
- Can knowledge be shared? Should it be shared?

2 Knowledge as an Enterprise Function

Enterprise knowledge, as many of us first experience it in our work lives, is a *function* – it is something that organizations "do." We either work in a knowledge field, or we have clients in the field. While knowledge may be a discrete function represented by a block on an organization chart, it is more often either (1) a "federation" of several different discrete functions that appear on such a chart, and/or (2) a sub-component of many of the functions that appear on such a chart.

2.1 Purpose and Mission of Knowledge

Any organizational discipline – like organizations themselves – benefits from having a stated mission that is clear, focused, and inspiring. A knowledge function – especially given its intangible and sometimes misunderstood, or even mysterious, nature – gains credibility from defining its role in a clear and readily-available statement of mission and purpose.

Over the course of many years of writing proposals and giving lectures, I have drawn various analogies and metaphors for the role of knowledge within an enterprise framework. What follows are descriptions of several of these, each of which offers a perspective on the value of knowledge. While I still consider all of these valid, I am now especially attentive to selecting *which* analogy will be most effective with the audience in any given situation.

2.1.1 The Enterprise Nervous System (ENS)

It's often instructive to *anthropomorphize* aspects of enterprise knowledge – that is, to find analogies and parallels between organizational knowledge and individual human knowledge. Organizations are obviously purposeful groups of human beings, so the fact that such analogies are valid and useful is not entirely surprising. Thus, we speak of the "head" of a firm or a department, the functional "arm" within a larger group, or the "eyes and ears" of an organization.

Human perception begins with sensations in the sense organs – our faculties of sight, hearing, smell, taste, and touch react to *stimuli* in the environment (i.e., light, sound, and so on). These sensations are converted into nerve impulses – electrical signals that are transmitted to the brain, where they are processed, sorted, compared with memories of previous sensations, and finally converted into some kind of *response* (a thought or movement, for example).

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IBM and other technology vendors adopted the ENS metaphor for data systems as early as the 1990s; it continues to be in use, probably due to its vivid and compelling nature. It is not a far stretch to see data as analogous to the initial sense impulse (i.e., stimulus), which then travels through some nerve-like organizational and technological channels to a central processing and analytic facility – an enterprise "brain" – where it is converted into decisions and actions (i.e., responses) that ultimately produce results, outcomes, and impacts.

The earliest Knowledge Management (KM) mission statement that I included in corporate training lectures (Powell 2001a) reads: *The mission of KM is to provide actionable Data, Information, Knowledge, and/or Intelligence to support organizational competitiveness*. I posited KM as the "brains" of the organization – receiving data that comes into the organization from various sources, and then processing it for decisions and actions – much as the brain processes inputs from sensors and nerves in your eyes and legs before you take a step forward.

In my early work, I took this biological analogy one step further. My interest in, training in, and employment in the field of biology preceded that of the other disciplines I have explored. One area that particularly interested me was evolutionary biology. Many of its lessons can be readily adapted to business evolution and competitiveness. And, within that perimeter, I found the evolution of animal nervous systems curiously analogous to that of organizational knowledge.

In evolutionary terms, the modern human brain is the highest level of a chain that began about 700 million years ago with jellyfish-like creatures, who have a decentralized *nerve net* to process impulses. Then 500 million years ago, earthworm-like creatures appeared that have small brain-like clusters of nerves, or *nodes*. Around 100 million years ago, centralized, larger brains began to appear in vertebrates like reptiles and birds.

These modern animals' nervous systems were characterized by decentralized, differentiated inputs (i.e., sense organs like eyes, ears, and nasal passages) feeding into centralized processing (i.e., the brain). What was the evolutionary value proposition? Compared with the more primitive jellyfish- and worm-like creatures, these "modern design" animals have highly developed senses, more rapid locomotion, and a more sophisticated ability to learn and adapt. This is a major determinant of their respective positions on the food chain; in short, eagles eat earthworms.

In the animal kingdom, nerve structure determines the ability to move quickly and gather food efficiently. In the business world, I reasoned by analogy, knowledge structure determines the ability to be competitive, i.e., efficient and effective. While many modern organizations behave "neuronically" like earthworms – with far-flung clusters of knowledge, but only primitive linkages between them – we

need to behave more like eagles, using decentralized data inputs combined with centralized processing and analytics.

The *data topology* of corporate computing progressed from mainframe computers used in the 1960s and stand-alone personal computers in the early 1980s to client-server networks in the late 1990s and cloud-based computing in the twenty-first century. In parallel fashion, the *knowledge topology* of the organizational intelligence function – which was my particular focus in that work – migrated from central units physically sitting next to the seats of power (usually, the CEO) to more decentralized intelligence functions sitting within business units, but coordinated in some way from the top down. The result was, in other words, a federated model – with strong local autonomy governed by coordination from the center.

Knowledge about any given subject can come into an organization via any one (or more) of the *boundary-spanning* functions in the organization, i.e., those whose personnel interact on a regular basis with people outside the organization's formal boundaries. In a typical organization, this *knowledge community* (Figure 1) spans functional boundaries, and might include people from market research, competitive intelligence, the library, information technology, field sales, customer service and support, research and development, the legal department, investor relations, and government affairs.

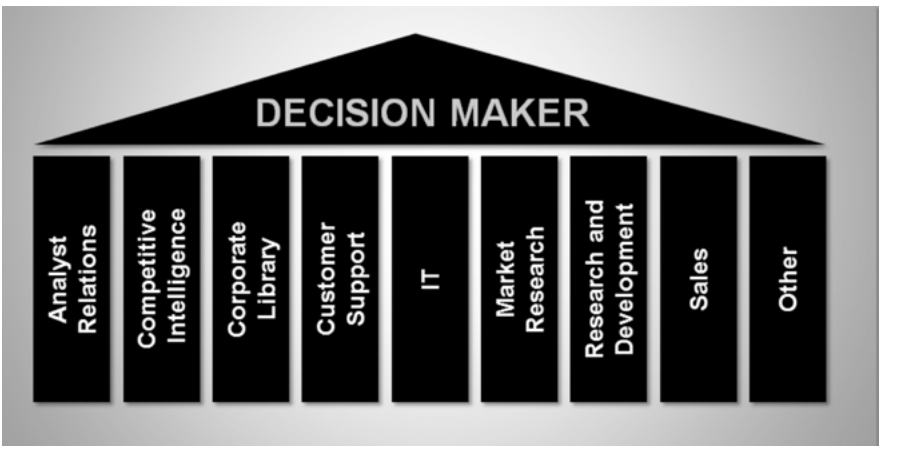

Figure 1: The enterprise knowledge community.

Where this "community" is in practice heavily siloed, as is often the case, I refer to this as a *knowledge archipelago* – a far-flung system of loosely-connected islands – with reference and homage to the information archipelago described by Harvard

professor Warren McFarlan et al. (1983). Each of the functional areas that make up an organization's knowledge community typically reports through a different line in the organization from the others and has different metrics and ways of being managed. Consequently, rather than using central command-and-control management, the knowledge community must rely on network management approaches and techniques.

A network containing one or more subject-matter appropriate representatives from each of these functional groups can be created and maintained. Such a *community of practice* can be facilitated and implemented using enterprise software platforms such as SharePoint. Complexity, often in considerable amounts, is introduced when such networks scale up to span lines of business and/or geographies. Network analysis and design and astute content management practices are required in order to ensure that such a monumental effort does not sink under its own weight.

2.1.2 Gatekeepers to the Epistemic World

Another useful construct is the distinction between the *phenomenal world* – the world of phenomena, or things as they are – and the *epistemic world* – the world as represented in data, information, knowledge, and intelligence (from the Greek *episteme*, knowledge). This distinction, and the relationships between these two worlds, have proved of great interest to philosophers since Plato (e.g., in his cave metaphor[7]) to the modern era (e.g., in the film *The Matrix*). The great Jorge Borges, a master of the short story and a librarian by profession, created a fanciful morsel *On Exactitude in Science* in which the map of a certain geographic territory is drawn literally at scale – such that the map becomes as large as the territory itself.

Many symbolic representations – a map, for example – are useful mainly because they are *not* at the same scale as the thing being represented. One of the major functions of such a representation is to shrink the spans of time, space, and scale such that they can be contained within a document or other knowledge artifact, and thereby be made available to, and comprehensible by, the information consumer – "the world in our hands," so to speak. An intelligence briefing

7 As told in *The Republic*, Book 7, the citizens dwelling in Plato's cave have grown up seeing shadows cast on the wall by a fire in the cave, and have come to accept them as "things as they are." To these unenlightened souls, the shadows cast on the cave wall *are* reality. When they move out of the cave and for the first time see things as they actually are in the sunlight, they are temporarily blinded. They refuse to believe their eyes – and insist that the shadows in the cave are the true reality.

report, for example, is a micro-scale representation of a real-world situation under study. A detailed 100-page report can create within the user's mind a relatively complete picture of a given topic.

Each of the knowledge resources available to an enterprise represents some phenomenon of interest to its buyer, client, or user. Collectively, these *content assets* of the enterprise form the epistemic world which, to a greater or lesser extent, represents or models the "real world as it is." Thus, each enterprise knowledge worker is in this respect a model-builder – as each report, briefing, database, or email is a micro-model of what is being described. One large determinant of the quality of such a model is the extent of its representativeness – the degree to which it answers the question *Does what you're telling me fit the reality of what is?*

To many who are knowledge services clients, the epistemic world may seem complex, opaque, and even forbidding. Some may not even be fully aware that it exists. Knowledge services professionals, on the other hand, have been trained in how to negotiate the epistemic world – how to access it, how it works, what "languages" it responds to. They are therefore ideally suited to be explorers of this world, traders with it, tour guides within it, and even ambassadors to it. In this sense, knowledge workers are the gatekeepers to the epistemic world. To the extent this world offers value to the enterprise, as it is our goal to demonstrate herein, then the knowledge worker holds the keys to unlocking and actualizing that value – a great source of value in itself.

It's interesting that in some modern information and media enterprises, the distance between the epistemic and the phenomenal grows vanishingly small – the representation itself becomes the phenomenon, the thing of value (e.g., advertising-based digital and social media companies like Google and Facebook). In other cases, we could envision an *epistemic wrapper* around a phenomenal business model, to unlock whole new sources of value. For example, Amazon could be seen as a warehousing and distribution business – encased in a complex epistemic wrapper consisting of a convenient website, an integrated ordering and inventory system, and a user recommendations database. Uber could be seen as a car-dispatching business encased in its complex epistemic wrapper consisting of a convenient ordering front end, a GPS-based vehicle tracking application, and an integrated billing system.

The epistemic wrapper need not be exclusively technology-based. Often simple written instructions and/or instructional videos about how to effectively use our product or service will add substantially to their value to the user.

Building such an epistemic wrapper around an existing business model is a strategy that has the potential to produce great efficiencies, a superior user experience, and high payoffs. In its ultimate extension, the epistemic representation *generates* the phenomenal event, or at least seems to. When you click the

correct sequence of buttons on Amazon, a product shows up on your doorstep – sometimes within hours. When you click the correct sequence of buttons on your mobile phone, a car and driver appear within minutes. This *epistemic-phenomenal inversion* is what makes a well-designed customer experience seem like magic.

2.1.3 Uncertainty and Risk

Another way to look at the value of knowledge is that it enables the management of the risk inherent in making business decisions. The economist Frank Knight (1921) was the first to draw the distinction between *uncertainty* and *risk*, saying that whereas the former is inherently unmeasurable, the latter is, by definition, measurable and measured. He notes that, while in common parlance the two terms are used interchangeably, this is a "fatal ambiguity," since in a technical sense they are quite different: "The practical difference between the two categories, risk and uncertainty, is that in the former a distribution of the outcomes in a group of instances is known. . . while in the case of uncertainty, this is not true. . . because the situation dealt with is in a high degree unique. The best example of uncertainty is in connection with the exercise of judgment or the formation of those opinions as to the future course of events, which opinions (and not scientific knowledge) actually guide most of our conduct." In everyday terms, we disparage such opinions as "gut feel," and seek to avoid them as the basis for the making of sound decisions.

A key element in the world of enterprise is the continual making of investments and "bets" about the future and other things that are unknown and even essentially unknowable. When developing next year's budget, how can we possibly know with any certainty how the broader economy will move, what the demand for our services or products will be, and so on? The "knowledgeable" organization does these things based on experience, research, measurement, and other knowledge-based activities designed to convert uncertainty into risk – such that the measured risk can then be monitored and reduced.

Risk as Knight defined it is essentially a quantified distribution of possible outcomes – frequently a normal or "bell curve" distribution (Figure 2). The upside risk is what we call *opportunity*, while the downside risk is known as *threat*.

Such a distribution is characterized by its "narrowness," which is quantitatively defined as the *standard deviation* of the results. The "tighter" or narrower the distribution around an expected result, the smaller the *confidence interval* of our result, and the closer the forecast to what actually happens. Though completely accurate forecasts are not possible, the role of knowledge is to achieve

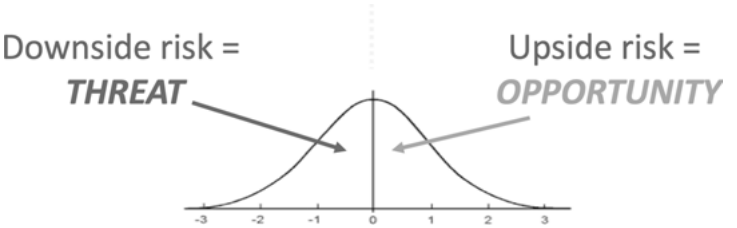

Figure 2: Risk distribution.

such a narrowing of the distribution of expected outcomes, thus reducing the risk. The result is more accurate estimates that allow resources to be allocated more efficiently – thus adding value by virtue of the incremental knowledge.

Worth mentioning here is *Bayes' Theorem*, which essentially states that estimated probabilities of future events should be continually revised based on new incoming information. One common application of this is in public health studies. In any given population, we may estimate that the incidence (that is, probability) of a given disease (measles, for instance) is X%. However, if we empirically test a sample of cases within that population and find that the sample incidence of measles is actually Y%, this new information provides an opportunity to update our previous "naïve" estimate to something that more closely reflects the actual situation within the population being studied.

In many cases, Bayesian thinking implies that the collection and processing of decision-relevant information should ideally be a *continuously iterative* process. The sooner and more frequently that additional knowledge is added back into the decision-making, the tighter the distribution of anticipated outcomes, and the more economically beneficial the decision. That said, such continual feedback is not always feasible in the real world, where there are typically alternating cycles of data collection, analysis, reporting, and decision making.

There is a whole industry, insurance, built around applying knowledge to perform risk management rigorously and thoroughly on an enterprise scale. Insurance companies develop and maintain vast logs of case experience so they can manage their exposure to risk more effectively. Health insurance companies, for example, develop deep expertise in the incidence of various diseases, the likely amounts of expenditure needed to treat each, and the likely outcomes. This *actuarial science* is a highly specialized and closely guarded body of knowledge that determines the policy premium prices charged by these companies, and thereby their profitability. Financial success in insurance requires mastery of this knowledge-based activity – a rare example in which the knowledge base directly drives enterprise profitability and value.

Organizations in any industry benefit from elevating rigorously informed decision-making over "those opinions as to the future course of events." Though the connection to value may be less direct and dramatic than it is with insurance industry, *better decisions* is usually touted as one of the main benefits of knowledge management. An informed, fact-based decision is likely to be better than one based solely on opinion or intuition in that it is more accurate and more likely to account for all the factors that could affect the outcome – and therefore more likely to produce value.

2.1.4 A Meta-Knowledge Taxonomy

Even when an organization realizes it could benefit from knowledge, it is often challenging to know how to initiate the process. Presented in this section is a simple tool for doing this.

Knowledge services is often seen as a reactive facility – *Contact us, tell us what you want, we'll find it*. This time-honored attitude limits unnecessarily the value that can be added through helping to *design and build* the knowledge-seeking and -producing activities that will optimize enterprise value. The determination of what knowledge is needed (as in the ISO 9000 specifications described in Section 2.1.7), and the identification and assessment of the benefits and costs of acquiring that knowledge, are critical steps in adding value to the knowledge process. I call this *meta-knowledge* – knowledge about knowledge – and have devised this simple taxonomy, in matrix form, to approach it (Table 2).

Table 2: Meta-knowledge taxonomy.

A. THINGS WE KNOW		**B. THINGS WE DON'T KNOW**		
A1. True	A2. False	B1. Need-to-Know (MRK)	B2. Nice-to-Know	FIRST-ORDER KNOWLEDGE
C. THINGS WE DON'T KNOW THAT WE KNOW		**D. THINGS WE DON'T KNOW THAT WE DON'T KNOW**		SECOND-ORDER KNOWLEDGE

We start by defining, in any given business situation, *Things we know* (Column A) and *Things we don't know* (Column B). Our basic goal is to devise and execute a knowledge development program that systematically moves items from Column B into Column A. Before executing a research program, Column B itself must be divided into two sub-columns – Column B1, unknown things deemed essential or

Need-to-Know – what we will call *Minimally Required Knowledge* (MRK); and Column B2, unknown things deemed nonessential or *Nice-to-Know*. What differentiates these two is essentially an ROI calculation; items that have high benefit and low cost are informally known as "low-hanging fruit" and will certainly appear on our research agenda. Conversely, items that are low-benefit and high-cost are unlikely to make the cut. These conclusions are usually reached by methods of expert judgement and intuition, rather than by rigorous analysis.

Low-cost items could, for example, include online searches. High-cost items typically include primary research, for example, speaking with a subject-matter expert. The relative benefit of a "unit" of knowledge is typically defined by the *outcome-relevance* of that knowledge ("Will it make a difference?"), the potential *impact* of the decision itself ("What is at stake?"), and the extent to which that knowledge is *novel*, i.e., not currently possessed in any form.

The *Things we know* column also has two sub-columns: A1, Things we know that are true, and A2, Things we "know" that are actually false – the *hidden assumptions* that are the progenitors of myths, dogmas, biases, orthodoxies, and other bad mental habits – the things that block our attainment of "true knowledge." Identifying and testing such hidden assumptions can be a key value-adding element in knowledge work.

Thus far we have been discussing *first-order knowledge* – things that *we know that* we either know, or don't know. There is also *second-order knowledge*, or meta-knowledge – things that (now Quadrant C) *We don't know that we know*, or that (Quadrant D) *We don't know that we don't know*. These are by definition tricky, and it takes some skill and experience to surface them. Quadrant C represents a major value-enhancing opportunity for knowledge professionals – as there is typically knowledge siloed in one organizational niche that could be useful in one or more others if they were made aware of it. Surfacing and enabling such opportunities can be done through a periodic knowledge elicitation exercise like a "knowledge fair" or "knowledge jam" and/or through ongoing scans through current electronic project files.

Quadrant D – *Things we don't know that we don't know* – might as well be labelled "Here be dragons" in our mapping of enterprise knowledge. This is the danger zone where knowledge initiatives that fail do so most frequently. The best way to minimize the risk of this occurring is to expand the *cognitive perimeter* of the enterprise – by, for example, consulting with experts located outside the enterprise. New viewpoints, even those coming from insightful non-experts, can help break through the organizational habits and inertia that can clog the "mental arteries" of the enterprise.

Regrettably, human cognition has a built-in bug (or is it a feature?) that psychologist Daniel Kahneman (2011, 201) calls the *What you see is all there is*

(WYSIATI) rule – the tendency to deal with limited information as if it were complete: "You cannot help dealing with the limited information you have as if it were all there is to know. You build the best possible story from the information available to you, and if it is a good story, you believe it. Paradoxically, it is easier to construct a coherent story when you know little, when there are fewer pieces to fit into the puzzle. *Our comforting conviction that the world makes sense rests on a secure foundation: our almost unlimited ability to ignore our own ignorance*." (Emphasis added.) Thus, we humans are inherently unreliable in second-order knowledge, Quadrants C and D of our matrix – and can add great value by understanding this natural shortcoming and building in careful consideration of these unknown (and, at least sometimes, unknowable) factors.

2.1.5 "The Information Executives Need"

An approach that I have found useful is a User needs-driven approach based on ideas presented by Drucker (1995). Drucker's high-level summary outlines the information needed for enterprises to create wealth:

- **Information Needed to Manage the Current Business** – *tactics*
  - Foundation information – cash flow and liquidity measurements, including basic financial ratios
  - Productivity information – economic value added (EVA) and benchmarking
  - Competence information – different for each organization, though competence in *innovation* is common to all organizations
  - Resource allocation information – for capital and human resources
- **Information About the Environment** (the "significant outside") – *strategy*
  - Markets, customers, and noncustomers
  - Technology – in one's own industry and others
  - Worldwide finance
  - World economy

Drucker's article blazes a trail into the wilderness of *knowledge strategy*, a topic we'll explore in Chapter 7. He points out that information about the business environment – *outside information* – is both critical for gaining desired outcomes and relatively difficult to acquire. While we note that he was writing just as the commercial Internet took hold, we note also that the resulting proliferation of data has not always yielded a commensurate increase in reliable knowledge about the environment (which we herein call the *strategic ecosystem*).

Drucker points out that a lack of systematic gathering and organizing of outside information is a leading cause of business failures – in that *assumptions* about key factors such as taxes, social legislation, market preferences, distribution channels, intellectual property rights, etc. may be left unquestioned and unchallenged. His requirements for such a system of inquiry include (emphases added):

- It must lead executives to ask the **right questions**, not just feed them what they expect
- It must present this information to executives on a **regular** basis
- It must require executives to systematically **integrate** this information into their decision-making

Drucker then specifies two key roles of the knowledge professional: "Even big companies, in large part, will have to hire outsiders to help them. *To think through what the business needs requires somebody who knows and understands the highly specialized information field*. There is far too much information for any but specialists to find their way around. The sources are totally diverse. Companies can generate some of the information themselves, such as information about customers and noncustomers or about the technology in one's own field. But most of what enterprises need to know about the environment is obtainable only from outside sources – from all kinds of data banks and data services, from journals in many languages, from trade associations, from government publications, from World Bank reports and scientific papers, and from specialized studies."

Drucker continues, "Another reason there is need for outside help is that *the information has to be organized so it questions and challenges a company's strategy*. To supply data is not enough. The data have to be integrated with strategy, they have to test a company's assumptions, and they must challenge a company's current outlook." (Emphases added.)

Thus, Drucker saw knowledge as essentially an *agency* function ("outsiders"). When I founded my company as "the knowledge agency," this was what I had in mind. However, I now realize that, under certain conditions, the agency function can be fulfilled equally well by staff resources within the enterprise. Whether this agency resource sits physically within or outside the organization, or some combination of both as is often the case, is not so important.

What does matter is that this role serve as an effective *proxy* for the enterprise ecosystem – the strategic outside. To do this, Drucker notes these two key capabilities, both of which he deems essential:

- The ability to **navigate** within the "highly specialized information field," and
- The ability to **apply** the resulting information to tests of assumptions and current strategies.

I have observed that, while knowledge professionals are typically well-trained and relatively comfortable with the former of these capabilities, they typically are less so with the latter. Too often the application of information is deemed "out of scope" by knowledge professionals and left entirely to the User executive – who is typically too busy to execute this effectively, and herself may lack proficiency in one (or both) of the two key capabilities. Adding proficiency to their own knowledge-applying capabilities represents a huge value-adding opportunity for knowledge professionals. "Testing assumptions and current strategies," as Drucker puts it, is a role that no one else in the enterprise hierarchy is typically tasked with – or trusted with. This role may lie outside the perimeter of what is traditionally considered "knowledge services" – and hence represents a growth and development opportunity for the field.

Knowledge budgets, personnel, and other resources are always constrained at some level; therefore, it is critical that they are allocated effectively to achieve optimal results. I have elsewhere (Powell 1993, 191–192) argued that:

- organizations should allocate their information budgets between "outside" and "inside" topics roughly *in proportion to the impacts* that outside versus inside factors have on desired outcomes, and that
- relative to that value-weighting criterion, most organizations tend to vastly *over-weight toward inside factors* over outside factors.

My experience is that they do this for reasons of expediency, i.e., because of the greater *availability* of inside information – and not because they have consciously decided that inside factors prevail in determining outcomes (which would be an unusual circumstance.)

2.1.6 The Knowledge Value Proposition

Another useful way to think about knowledge, as with any enterprise resource, is to answer the questions, *What does knowledge do for us? What is its job? If it were a stand-alone product, would we buy it – and, if so, why, and for how much?* These are the ultimate expressions of the *instrumental* view of knowledge and help us distill the value proposition for knowledge.

The more directly the User is involved in answering these questions, the better will be the result. In fact, the omission of the simple step of meaningfully engaging Users is (in my experience) by far the single most common cause of knowledge initiative failures. And even when this step is undertaken, it is too often done in a non-effective way. Polling knowledge Users with variants of the question, *What information do you need?*, however well-intentioned, typically

does not surface useful answers. Most Users will answer to the effect that the information they have already is fine. This is primarily because they are often unaware of the information that is available "out there" that could be helpful to them.

If you went to the doctor and her first question was, instead of *What is bothering you?*, something along the lines of *What drugs would you like me to prescribe for you today?*, you would likely think it unprofessional as you initiate a search for a new doctor.[8] The doctor is trained to hear a user need (i.e., a symptom) and "translate" that need into a prescribed course of treatment.

By analogy, a knowledge professional needs to be able to surface a User need and translate that into an information "prescription." This is best accomplished by leading with diagnostic questions about User's job, her challenges, her incentives, and what keeps her sleepless at night (see the *Knowledge User Discussion Guide* in Appendix B for an example of how to do this). Leading with questions about what information is needed sends the signal that the knowledge "professional" is merely an *information order-taker and fulfillment service* – a role that has some value, but not nearly the value of the consultative and prescriptive services that he is increasingly expected to provide.

Your knowledge clients can use your work for any number of reasons. It is important that as a knowledge services provider, you determine (1) how they currently use your work, and (2) how they would like to use your work going forward. In each case, I have found it productive to identify the *core value question* that each work product answers.

While *productizing* knowledge services is a key step in enhancing value – which we explore in Section 6 – it is equally important to describe the *value question* that each knowledge work product answers. *Why is this useful*, *why do we need it*, *how does it help us?* In Powell 2015b, I identified common knowledge services work products (i.e., the "What?") and the core value question answered by each (i.e., the "Why?"). These are described in Table 3.

The knowledge professional can guide the development of a mutual understanding with his client as to what, in any given engagement, each core value question is. What problem is the client worried about that knowledge will help solve? Once the core value question, or set of questions, is specified, then work product can be developed, and the quality of that product can be continually monitored against how closely it fulfills these user expectations.

8 Except the United States, where direct-to-consumer advertising of pharmaceuticals has made this kind of question all too common.

Table 3: Core value questions.

KNOWLEDGE SERVICES WORK PRODUCT ("WHAT?")	CLIENT'S CORE VALUE QUESTION ANSWERED ("WHY?")
Assurance	"Are we on the right track?"
Benchmarking	"How do we measure up?"
Early Warning Opportunities Identification	"What potential surprises do we want to avoid?" "Are we leaving money on the table?"
"Shadow R&D"	"Has this been tried before?"
Due Diligence	"Is this investment a good deal?"
Fiduciary Stewardship	"What is best for our stakeholders?"

2.1.7 International Organization for Standardization (ISO)

The global arbiters of formalized management standards and excellence have (though only relatively recently) begun to acknowledge knowledge and its pivotal role in the modern enterprise. This is a huge benefit to the knowledge practitioner, in that the role formerly played by "creative justification" can now be played by rigorous codified standards and procedures to meet them.

The International Organization for Standardization (ISO) is an independent, non-governmental international organization with a membership of 162 national standards bodies. ISO serves as a coordinating and governing network for these national bodies that together cover most of the industrialized world.

The ISO website (www.iso.org) reads in part, "ISO creates documents that provide requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose. . . Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges."

Two of the ISO standards are of special interest to the knowledge services community: ISO 9000 and ISO 30401.

ISO 9000 is a quality certification used by over one million organizations worldwide. Its 2015 revision (ISO 9001:2015 Clause 7.1.6) introduces knowledge as a driver of quality. This standard describes four key roles to be fulfilled by knowledge staff:

1. **Determine knowledge.** Determine the knowledge necessary for the operation of the Organization's processes and to achieve conformity of products and services.
2. **Maintain knowledge.** Maintain and curate that knowledge.
3. **Provide knowledge.** Make it available to the extent necessary to achieve the above goals.
4. **Refresh knowledge.** When addressing changing needs and trends, consider the Organization's current knowledge and determine how to acquire or access any necessary additional knowledge and required updates.

The standard describes organizational knowledge as knowledge specific to the organization; it is generally gained by experience. It is information that is used and shared to achieve the organization's objectives. Organizational knowledge can be based on:

a. **Internal Sources** (e.g., intellectual property, knowledge gained from experience, lessons learned from failures and successful projects, capturing and sharing undocumented knowledge and experience; the results of improvements in processes, products and services); or
b. **External Sources** (e.g., standards, academia, conferences, gathering knowledge from customers or external providers).

This clause, which is entirely new in the 2015 standard, is especially noteworthy for two reasons: (1) it recognizes, and thereby legitimizes, knowledge as a driver of enterprise quality and, by extension, value; and (2) it explicitly considers the roles of the organization's mission and strategies as a determinant in the *Determine* and *Refresh* aspects of the knowledge management role. It thereby also recognizes and legitimizes the role of knowledge as a strategic lever within the enterprise's portfolio of resources. The traditional technology-centric approach to managing knowledge tends to emphasize the tactical *Maintain* and *Provide* aspects of the role, often to the exclusion of its more strategic *Determine* and *Refresh* aspects.

ISO 30401:2018 sets requirements and provides guidelines for establishing, implementing, maintaining, reviewing and improving an effective management system for knowledge management in organizations. All the requirements of this document are applicable to any organization, regardless of its type, size, or the nature of the products and services it provides.

The standard's sections 0.2 and 0.3, many elements of which address, whether directly or indirectly, the issues of knowledge's value to the enterprise, are reprinted verbatim below from the ISO website (the full standard can be purchased online).

0.2 The Importance Of Knowledge Management

a. The aim of work is to produce valuable results. Valuable results are derived from applied knowledge. Organizational knowledge is becoming a key differentiator for effectiveness, increased collaboration, and competition.
b. Knowledge work is increasingly important in many societies and organizations. Many economies aspire to become knowledge economies, where knowledge is the main source of wealth. In this context, knowledge becomes a core asset for organizations. Knowledge is especially important in many areas: it allows effective decisions to be made, supports the efficiency of processes and contributes to their enhancement, creates resilience and adaptability, creates competitive advantage, and may even become a product in its own right.
c. An increased access to knowledge will create opportunities for the professional development of people in the organization through learning, practices, and exchanges.
d. Organizations can no longer rely on the spontaneous diffusion of knowledge to keep up with the pace of change. Instead knowledge must be deliberately created, consolidated, applied, and reused faster than the rate of change.
e. Geographically dispersed and decentralized organizations, conducting the same processes and delivering the same services in multiple locations, can gain tremendous advantage through sharing practices, expertise, and learning across organizational boundaries.
f. Workforce attrition and turnover in today's society has implications for knowledge management. In many organizations, critical knowledge is often siloed and/or retained by experts, at the risk of being lost when the organization changes or these experts leave.
g. Effective knowledge management supports collaboration between different organizations to achieve shared objectives.

Knowledge is an intangible organizational asset that needs to be managed like any other asset. It needs to be developed, consolidated, retained, shared, adapted, and applied so that workers can make effective decisions and take aligned actions, solving problems based on the experience of the past and new insights into the future. Knowledge management is a holistic approach to improving learning and effectiveness through optimization of the use of knowledge, in order to create value for the organization. Knowledge management supports existing process and development strategies. As such, it needs to be integrated with other organizational functions.

0.3 Guiding Principles

a. Nature of knowledge: knowledge is intangible and complex; it is created by people.
b. **Value: knowledge is a key source of value for organizations to meet their objectives. The determinable value of knowledge is in its impact on organizational purpose, vision, objectives, policies, processes, and performance. Knowledge**

management is a means of unlocking the potential value of knowledge. [Emphasis added.]

c. Focus: knowledge management serves the organizational objectives, strategies, and needs.
d. Adaptive: there is no one knowledge management solution that fits all organizations within all contexts. Organizations may develop their own approach to the scope of knowledge and knowledge management and how to implement these efforts, based on the needs and context.
e. Shared understanding: people create their own knowledge by their own understanding of the input they receive. For shared understanding, knowledge management should include interactions between people, using content, processes, and technologies where appropriate.
f. Environment: knowledge is not managed directly; knowledge management focuses on managing the working environment, thus nurturing the knowledge life cycle.
g. Culture: culture is critical to the effectiveness of knowledge management.
h. Iterative: knowledge management should be phased, incorporating learning and feedback cycles.

2.1.8 Baldrige Framework

In ways somewhat similar to ISO, the Malcolm Baldrige National Quality Award recognizes U.S. organizations in the business, healthcare, education, and nonprofit sectors for performance excellence. The *Baldrige Excellence Framework* is designed to "help your organization – no matter its size, sector, or industry – answer three questions: (1) Is your organization doing as well as it could? (2) How do you know? And (3) What and how should your organization change?" The awards committee holds a rigorous evaluation in seven major areas of organizational management and performance, worth a total of 1,000 points. *Information and Knowledge Management* is one of these, which in the 2017–18 iteration of the criteria was worth a total of 45 points, or 4.5 percent of the total.

The Information and Knowledge Management (which here I will abbreviate IKM) section is itself divided into two sub-sections: *Data and Information* and *Organizational Knowledge*. Those subsections are in turn divided into the following five questions considered by the awards committee:

Data and Information

- **Quality**: How do you verify and ensure the quality of organizational data and information?
- **Availability**: How do you ensure the availability of organizational data and information?

Organizational Knowledge

- **Knowledge Management**: How do you build and manage organizational knowledge?
- **Best Practices**: How do you share best practices in your organization?
- **Organizational Learning**: How do you use your knowledge and resources to embed learning in the way your organization operates?

Though the *Framework* does not so state explicitly, I have encouraged clients to interpret the 4.5 percent benchmark as an admittedly rough estimate of the contribution to enterprise value by IKM. To illustrate how this can be applied, the average *market capitalization* (a simplified measure of enterprise value) of the Forbes 2000 (the 2000 largest traded companies in the world), measured on March 29, 2018, was US$28.5 billion, with a range from $16 million to $926.9 billion. Applying the 4.5 percent Baldrige IKM ratio, we arrive at an average IKM value of $1.28 billion for each large company, with a range from $720,000 to $41.7 billion. These "knowledge value-added" numbers far surpass the IKM budgets of most organizations within my direct experience.

In addition to its market cap, the *complexity* and *industry* of the enterprise are key variables that affect the potential contribution of knowledge to enterprise value. Consequently, this all-in calculation should be used carefully and only in the absence of more granular data – approaches to generating which we introduce in Section 5.

2.2 Knowledge Activities-Assets Mapping

I have long maintained that knowledge consulting is similar in many respects to the practice of medicine. In each, you gather facts about your "patient," analyze those facts to make some diagnosis, prescribe a course of action intended to improve the situation, and follow up later to see what worked and what didn't.

Medical science has been developing about 500 years longer than knowledge science, and as such there are a range of diagnostic tools available in the former that are not (yet) available in the latter. When you visit your doctor with some complaint, she is likely to ask you to describe your symptoms and then to physically examine you. Her next step is typically to order a set of laboratory tests to confirm a certain tentative hypothesis. This is the tangible evidence upon which the diagnostic and prescriptive processes stand.

Management consulting deals with more abstract issues and events than does medicine. In consulting I have often found it challenging to quickly and accurately develop a "before" picture that my subsequent intervention will attempt to

change. Knowledge as a resource is as abstract as it gets – so knowledge consulting piles one set of abstractions upon another. It can be a formidable challenge to "see" what is happening in terms that are as concrete and tangible as possible.

To do so, I often render things tangible through diagrams and drawings[9]– something I learned through studying science. I recently developed the following Activities/Assets framework, which was useful in developing a picture of what was happening. I use this framework to create a baseline inventory of the knowledge processes operating within my client. Systems thinkers will recognize Assets as roughly equivalent to *stocks* and Activities as akin to *flows*.

2.2.1 The Four Fundamental Knowledge Activities

There are four basic activity categories in knowledge: Production, Communication, Use, and Management.

- **Production** – the sourcing, acquisition, composition, analysis, and synthesis by Producers of data, information, and knowledge
- **Communication** – the distribution of knowledge to its User(s)
- **Use** – the application by Users of knowledge to make decisions, formulate actions, and create value in the form of results, outcomes, and impact
- **Management** – planning, optimizing, advocating, developing resources, governing, evaluating, etc.

The corresponding verb forms are Produce, Communicate, Use, and Manage. The "agent" forms – i.e., the work roles – are Producers, Communicators (though often this activity is assigned to a non-personal agent), Users, and Managers.

This schema is based on the framework presented by Machlup (1962). Machlup uses the first three of these categories, while using the term *Distribution* instead of *Communication*. We prefer the latter term because it implies a *common* or shared understanding within a *community* of producers and users – rather than a one-way transfer or dissemination of information, as Distribution might connote. We have added the fourth activity, Management, as an integrative overlay of the other three.

Note that this four-activities schema is a simplified version of the Knowledge Value Chain described in Chapter 4. It follows an economic model, with a knowledge supply side (i.e., Production) and a demand side (i.e., Use) – with an

9 In private, I have been known to refer to these somewhat primitive renderings as "cave paintings." Some of these appear as figures herein.

interface between the two (i.e., Communication) and a binding "wrapper" around the whole (i.e., Management.)

2.2.2 The Five Fundamental Knowledge Assets

Assets consist of human assets (i.e., "actors" or people) and other assets. There are five broad asset categories: Content, Producers*, Channels, Users*, and the Charter. The two asterisked items are the people, the three others are inanimate assets.

Knowledge assets can be mapped to knowledge activities as shown in Table 4.

Table 4: Knowledge activities and assets categories.

KNOWLEDGE ACTIVITIES	KNOWLEDGE ASSETS
PRODUCTION	***PRODUCERS**
	CONTENT – made versus bought
COMMUNICATION	**CHANNELS** – technology vs. human; active versus passive
USE	***USERS** – communities; individuals; internal versus external
MANAGEMENT	**CHARTER** – policies versus practices

Content

Production is based on a body of Content, which itself has two components – *explicit content* (i.e., information) and *tacit content* (i.e., knowledge). Information content itself has two components, digital and non-digital (which in many cases may be thought of as pre-digital as these resources become increasingly digitized). Content assets are further described in the knowledge balance sheet (see Section 3.6.2).

Producers

The Content is managed by Producers, the knowledge professionals responsible for acquiring and/or crafting and making available the knowledge product.

Channels

Distribution occurs by means of Channels, the conduits through which the knowledge (or more exactly, information describing knowledge) flows. Channels may be characterized along two dimensions: *digital-non-digital* and *active-passive*. The resulting four types of Channels are:

- **Digital active** channels enable distribution directly from Producer to User. This includes email, text messaging, and messaging though work group applications like Slack.
- **Digital passive** channels are central warehouses where content assets can be placed for later retrieval by User. A database, website, blog, content management system (CMS), or online repository are examples.
- **Non-digital active** channels allow real-time transmission directly from Producer to User. A meeting or phone or video call are examples.
- **Non-digital passive** channels would include an operating manual. These are increasingly rare in a modern organization because of the inherent limitations on their availability and utility.

A recent British study of the knowledge economy (Brinkley 2009) found these methods being used to share and capture knowledge (Table 5):

Table 5: Methods used for sharing and capturing knowledge.

METHODS USED	PREVALANCE OF METHODS (% USING)
Talk informally to colleagues	90
Use the internet	60
Ask supervisor/manager	60
Socialize/converse with others	44
Read procedure manual	43
Attend an internal training session	42
Use the intranet	36
Talk to outside experts	34
Read technical material	34
Hold 'brainstorming or 'whiteboard' meetings	29
Attend an external training session	26
Read professional journals/trade magazines	26
Contact a chat/information exchange group	23
Attend events/trade shows	21
Attend induction meetings	18
Publish written material	15

Note that both formal and informal methods can be used effectively. For maximum impact, channels may be combined. For example, a regular broadcast email, supplemented by a weekly video call, can be an effective way to keep a work team informed.

Users

Users typically form the primary client base for knowledge – though there may also be other stakeholders, as described in Section 2.6. Knowledge Users may be characterized along two dimensions: *internal-external* and *communities-individuals*, implying the following four categories:

- **Internal communities** are, for example, User groups like departments that use a given knowledge product.
- **Internal individuals** are individual Users, as well as sponsors and champions for knowledge. A *sponsor* is someone who in effect is the *economic buyer* for the knowledge – her budget is affected – but not necessarily its end user. A *champion* is someone who, though neither user nor buyer, is a stakeholder or even advocate, often at the executive level.
- **External communities** are, for example, customers of the enterprise as a whole. Though these may not always be seen as direct clients of the knowledge services team, ultimately, they are the source of most value to the enterprise – and as such deserve careful consideration in assessing the value proposition for knowledge.
- **External individuals** may also be enterprise customers – the people, as opposed to the organizations.

Charter

The Knowledge Charter describes and codifies key aspects of the knowledge services function:

- **operational** aspects, such as work processes, procedures, taxonomies, and sources, and
- **strategic** aspects, such as policies, permissions, and governance.

Special attention should be paid to instances where the *actual* practices deviate significantly from the *stated* policies, procedures, etc. Such deviations should be identified, corrected, and monitored.

The Activities-Assets framework is relatively simple to apply and provides a template upon which a detailed knowledge inventory can be conducted within a client organization. The resulting inventory document specifies and describes each significant element within each of the four major knowledge activities categories and five major knowledge asset categories.

2.3 Knowledge Sustainability

Organizations behave, in an economic sense, much like individual people do. There is something called the *wealth effect* that causes people, when their investments are doing well, to spend money more freely, as if their paper earnings were income – and, conversely, when their investments are down, to cut back. This may be neither a recommended nor a rational practice, but it does empirically describe the way many people tend to behave.

And so it is with organizations. When the economy is thriving, companies invest in a variety of new initiatives, sometimes without having a clear ROI goal in mind. When the economy is struggling, or even uncertain, companies tend to (1) cut back, especially on things that are less than directly tied to revenue production, and (2) scrutinize outlays more closely, especially regarding their ROI and fit with strategic goals.

Knowledge programs are usually among those first affected in an economic downturn. That is, they are *recession-sensitive*. At least partly responsible is the fact that people managing such initiatives are too often not trained in, or even mindful of the need for, establishing and/or defending the ROI of their efforts. Consequently, the expectation that such programs should "earn their keep" by producing a positive ROI is too often not well-established.

The business cycle – with all its ups and downs – continues to be a major driver of organizational life. And knowledge, like everything else, does not draw a "pass" when it comes to economic reality. When knowledge is seen as an overhead expense, rather than as an ROI-positive investment, it succumbs easily to the budget knife and is thus *unsustainable* in the long run.

When a strong wind comes, the trees with shallow roots are uprooted and blown away. The trees with deep roots are grounded enough to survive the impact and "weather the storm." In the same way, knowledge programs that are grounded in economic reality will survive strong economic winds intact – they are sustainable. I characterize sustainable knowledge as *an investment that directly addresses the value-producing needs of the enterprise, and as such is subject to the same ROI tests that other investments must satisfy*.

You might ask, "When there is an economic downturn, isn't that exactly the time organizations should be investing in knowledge – to compensate for losses in other areas?" This makes sense logically, and would be the expected response if organizations always behaved entirely rationally. Alas, there is much research to show that they do no such thing. And my personal experience largely supports this conclusion.

2.3.1 The Knowledge Paradox

Why is *grounding knowledge in economic reality* such a persistent challenge? Since most things in organizations, both the good and the bad, start from the top, we start with the defining characteristics of leadership. Key aspects of an enterprise leader's role consist of (1) inspiring and motivating the work team, and (2) assuring that the enterprise as a whole is functioning well. Key tools in each of these aspects of leadership are metrics (for example, Key Performance Indicators and operating results). These are useful in advance as goals and targets, and after the fact as tests of *How are we doing?*

With knowledge, meaningful metrics that directly link to enterprise value are all too often not in place. As a result, though there may be "soft" consensus that knowledge has value, demonstrating and testing that assumption with any rigor is difficult. This is primarily for the reasons that: (1) knowledge is often not simply a discrete box on an organization chart, but rather is widely *diffused* throughout other functions, and (2) knowledge is not only intangible, it's actually *invisible* to the many organizational leaders who take a strictly financial view of things. This in effect creates a *double invisibility*, in that:

- knowledge is seen as everyone's job – and, therefore, is no one's; and
- knowledge does not appear directly on the enterprise financial balance sheet (for more on this, see Section 3.6).

The *knowledge paradox* is that, though knowledge has great value (averaging 44% of enterprise value by one recent study), it is effectively invisible – and therefore resistant to being led or managed in any conventional sense.

Is there a way forward out of this paradox? I have found that there is, and it's this: knowledge is most readily made visible and measurable through its tangible effects – its results, its outcomes, and its impacts. Enterprise knowledge accrues value only to the extent that it is being engaged and used to produce enterprise value – those "things that matter" to the organization.

Close attention should be paid by knowledge professionals to assuring that the effects of their work are made "real" – tangible, visible, and measurable – to their clients and to others in positions to support and underwrite their work.

2.3.2 The Fundamental Source of Knowledge Failure

It has been widely reported (see Section 6.4.1, for example) that large proportions of knowledge projects fail to meet the expectations of their Users and sponsors. My own experiences toiling in the "emergency rooms of failing knowledge

initiatives" are partly what inspired me to develop the KVC framework described in Section 4. In short, the core problem I have observed in many of these failed efforts is that they consider knowledge apart from, rather than integral to, the everyday challenges and core activities of the enterprise.

Where knowledge does not directly support User and enterprise value on a sustained basis, knowledge initiatives cannot produce significant value – and will eventually wither and be cut back during the next economic downturn that inevitably comes. Knowledge is not an island, complete unto itself; it must produce "insight" among decision makers – followed quickly by innovation and/or other benefits for the sponsoring organization.

Many knowledge projects that fail do so because failure is built into their DNA. They are, from their earliest stages, divorced from the economic and competitive realities of the enterprise, its leadership, and its strategies. Knowledge projects conceived and/or executed in such a *value vacuum* are wired to fail. They cannot possibly succeed – no matter how richly-funded or well-staffed – because they do not fully consider the User/consumer of the knowledge.

When knowledge initiative architects do not understand the user's business challenges, they cannot understand how knowledge can positively address those challenges. Even worse, they sometimes attempt to engage the User as non-value-added resources (for example, in providing data input, when Users should be doing what they are best at and what they are paid to do).

The core mission of knowledge services must address real people doing real jobs more effectively and efficiently. Its tenets must be tangible, empirical, and grounded in the sometimes-mundane realities of organizational life. To the extent it meets these conditions, knowledge will succeed as an essential business discipline.

Conversely, to the extent knowledge's core mission is to create elegant abstract models and frameworks, it may succeed in the "Ivy Towers" – or may eventually end up as anodyne intellectual musings, a modern version of medieval scholasticism. But in either of these latter cases it would fall tragically short of realizing its potentially huge impact in the world of enterprise and in society at large.

2.4 Barriers to Value

One effective approach to increasing value is to systematically identify the barriers or obstacles to value production, and then eliminate or mitigate them. Several ways I've developed for doing this are described below.

2.4.1 Knowledge "Producer Pain Points"

The Producer Pain Points (PPP) approach was one I developed to engage knowledge clinic participants quickly. It's often the first thing I do with a working group. Much as a doctor's first question is typically something on the order of, "Where does it hurt?", the PPP approach starts with two questions designed to elicit things that positively and negatively impact the work experience:

- **Value Positives**. What three things most enable or help you to do your job efficiently and effectively?
- **Value Negatives** ("Pain Points"). What are your three biggest problems/issues/challenges/concerns in doing your job?

I have participants write these down, one point per white index card, without signing their names. I review and discuss the results in real time with the group. After being entered into a database for analysis, this becomes a baseline for the diagnoses of strengths and weaknesses.

Typical PPP comments among knowledge Producers tend to cluster around several core challenges to the credibility, the aspirations, and even the existence of the knowledge professional:

Credibility Challenges

- "I have trouble getting people to believe and act on what I've found."
- "My value is unclear to the people in our organization who matter."
- "I don't understand how I'm supposed to add value."
- "I'm invisible."

Aspirational Challenges

- "I'm stuck at the bottom of the pyramid as a data-fetcher – and no one seeks my analysis or interpretation of what I've found."
- "I can't get a 'seat at the table' where decisions are being made."

Existential Challenges

- "I'm constantly on data overload, because I'm not sure which data is relevant."
- "I'm continually having to do more with less budget in order to keep the function from being 'dis-established.'"

These examples are paraphrased from actual study responses. A typical knowledge clinic quickly surfaces dozens of these, which we then group for analysis

using the Knowledge Value Chain and other frameworks, identify problem clusters, and formulate actions to address them.

2.4.2 KVC "Weak Link" Barriers

I have conducted numerous studies in which I have mapped elicited pain points to the steps in the Knowledge Value Chain in order to enable rapid diagnosis and remedy of the underlying problems causing them. It was surprising to me at first that, relatively consistently across these studies within different organizations, the two largest barriers to value were almost always the same:

- **Value Downlink.** The "value signals" coming from the top are not clear to the knowledge Producers – and sometimes not to the Users themselves.
- **Value Uplink.** The communication that represents the transfer from the Producer to the User – which in the KVC we call the conversion of knowledge into intelligence – is sub-optimal.

From the perspective of value production, these are the two riskiest parts of the process. And the former leads directly to the latter in many cases – if people are not clear as to their value, then it's much harder for them to do value-adding work and much harder to explain their work to Users in terms the User will understand (i.e., related more to value production than to the work processes completed). This creates the credibility challenges described in Section 2.4.1. Further discussion of these KVC weak links can be found in Section 4.3.4.

In any knowledge project, I have always strongly recommended that an explicit *shared understanding* be developed in advance regarding the value the project is expected to produce for the User and other value-sensitive stakeholders. In my own practice, I have this written clearly into our contracts. Even when a contract is not needed, having a clear and even formalized statement of value provides a guide throughout the effort, and a check at the end to see whether the value goals have been reached.

I was in a meeting with about two dozen of the senior leadership of a large Japanese trading company describing how knowledge value originates from the top. The conversation suddenly fell silent. At the next break, my host took me aside and explained that within this globally successful organization, it was neither completely clear how anyone individually created value – nor even exactly what the overall enterprise value proposition is. Anyone working there, and especially senior leadership, is not actively encouraged to notice this – and if they do, are not encouraged to discuss it. I have observed this in other companies as well, and have developed the axiom that *enterprise value flows from*

the top downward. Without that clear direction and guidance, knowledge projects will not be as fully focused on value as they would otherwise be.

2.4.3 Hierarchical Knowledge-Value Gaps

I had a client once who was using our KVC model to explain his group's knowledge work to his board of directors. He said to me, "Tim, can you send me a copy of your KVC graphic – except that I'd like you to tear it in half horizontally in the middle. I will put the peak and the base at the opposite end of my slide to indicate how far apart culturally the Users (decision makers) are from the Producers (knowledge professionals)." I agreed, and this led me to the recognition of the *hierarchical knowledge-value gap*.

From a sociological/anthropological point of view, Producers and Users could be seen as members of different enterprise "tribes" or sub-cultures. They typically have different educational credentials (the former MLSs, the latter MBAs), they are paid on different scales, they have different levels of power and authority – they even speak different "languages" in a sense. While Producers are fascinated by geeky talk about new technologies and data trends, Users tend to be more focused on the management and strategic challenges within their organization.

The most important difference is that the two tribes care about different things – not least because they are incentivized that way. Where a Producer/knowledge professional will be recognized and rewarded based on a "job well done," Users/executives, especially those higher up in the hierarchy, are compensated based on how they add value to the enterprise – its operating results, its brand and reputation, its stock price, and so on.

So, it is with good reason that each of the two halves has little understanding of what the other does, or how it produces value. In many cases, they even take each other for granted or think that the other's work is trivial or inconsequential. As a result, the two need some "translation" to fully understand each other. I have proposed that Producers think of themselves as foreign travelers or even ambassadors when venturing into User-land.

When we travel to a place new to us, we typically want to:

- learn the **language** (i.e., lexicon and key ideas)
- learn the **currency** (i.e., what is valued and measured)
- learn to **navigate** (i.e., how to get things done)
- explore the **territory** (i.e., leave our comfort zone).

Parallel steps could guide the way Producers approach their clients in the "User tribe" – all with the goal of reducing the gap. I have seen a systematic

program of simple outreach visits by knowledge professionals to their current and potential clients be effective in terms of explaining what the knowledge function does, what specific services it offers, how it can help, how to engage with it, and the like.

I had another client who asked me to render the KVC model on its side, rotated 90 degrees. "We want this to not appear so hierarchical," was her reasoning. This request I resisted, since in most organizations – and this is certainly true of the European pharmaceutical giant in which she worked at the time – hierarchical power structures still exist, even in this era of relatively flattened, networked-based enterprises.

2.4.4 Space-Time Knowledge-Value Gaps

Another client I worked with is in the education services field. The good news was that knowledge was a key element of the enterprise value model; the work of the knowledge services was integral to the final revenue-generating product of the organization, and the directness of this connection was good for the knowledge professionals. The bad news was that, in speaking with knowledge Users, I came realize that too often they did not understand the contribution of the Producers, and/or acknowledge it when they did understand it.

My KVC Clinic sponsor, the head of the knowledge services unit, looked at the KVC triangle (see Figure 6) we had inscribed on a white board, and remarked, "We, working at the bottom of the chain, produce value – so why does the word VALUE appear only at the top of your triangle?" This led me to understand the important distinction between *potential value* and *actualized value*. The potential value being produced by my client and her team remained latent until it was eventually converted into firm revenues by another business unit up to 18 months later – at which time, few Users remembered the knowledge source or took the time and effort to properly attribute the value back to the Producers. They had a *space-time knowledge-value gap*.

Value proximity describes this nearly universal tendency toward relatively greater attribution of value by the User to production relatively closer to the User. Conversely, when the application of knowledge is removed from the Producer by distances of either space or time (or both), lesser value is attributed. People in that case naturally tend to diminish the role played by knowledge, or to overlook it entirely. As a general rule, I have observed that the value generated by knowledge tends to be attributed in inverse proportion to the distance (in time and space) between its production and its use. That is, the

greater the distance travelled by knowledge from Producer to User, the lower the attribution of value to its source, the Producer.

When knowledge is in effect a raw material of the final work product, its contribution – even when essential and foundational – is thus too easily overlooked or minimized. The *attribution* of value by clients is every bit as important as the production of value itself, if not more so. To foster this, clients need to be systematically reminded of the sources of their success, lest they forget and/or overlook the contributions of knowledge.

Lev (2001) too notes this phenomenon: "In the industrial and agricultural economies, most of the value of business enterprise was created by transactions – the legal transfer of property rights. In the current, knowledge-based economy, much of value creation or destruction precedes, sometimes by years, the occurrence of transactions."

In this case, we created value proximity between the knowledge Producers and their busy clients by stimulating *value attribution* by those Users back to the Producers. We achieved this by designing a program of *knowledge branding*, essentially reminders of the work that the Producers had done, and that was integral to the work product itself. This consisted of logo-containing work templates and email signatures that would accompany each client work product and communication. At the same time, direct and high-level contact (e.g., regular meetings between knowledge services leadership and client business unit leadership) was initiated. Together, these had the effect of dramatically increasing "virtual" value proximity – a perceived closer bridge between the production and the actualization of value.

2.5 Knowledge Services Maturity Model

Organizations, like people, are instinctively social and competitive. They like to benchmark themselves against peer organizations and the general "state of the practice." One tool I created for a client has proven very useful in this regard – the Knowledge Services Maturity Model™ (Figure 3).

I had noted a general tendency for knowledge services organizations to evolve over time to positions of adding greater value to their clients by way of greater integration with client workflow. I reasoned that by making this life-stage transformation a conscious process, it could be assisted and accelerated. Working with dozens of clients, I noticed four stages of strategic integration: Hub, Analyst, Scout, and Partner – each characterized as follows:

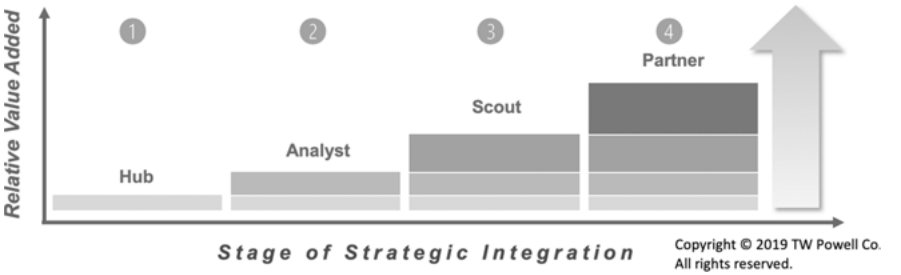

Figure 3: Knowledge services maturity model.

- **Stage 1: Hub**
  - Serves as a contact point and repository
  - Fulfills user research requests
- **Stage 2: Analyst**
  - Summarizes, synthesizes, and analyzes findings
  - Develops insights and implications
- **Stage 3: Scout**
  - Scans for current developments inside and outside the industry
  - Identifies emerging issues, threats, and opportunities
  - Forecasts future developments and scenarios
- **Stage 4: Partner**
  - Serves as an integrated advisor to the decision-making team
  - Anticipates needs and collaboratively sets research agenda
  - Generates ideas and validates hypotheses

At the Partner level, the knowledge team may even be *embedded*, such that one or more member of the team is dedicated to the client. This sometimes takes the form of being physically co-located within the client facilities.

The model is accretive; while each stage adds value and capabilities to the previous stage, the capabilities of that previous stage are retained. While I have found few organizations that use these exact names formally for their knowledge resources, I have found almost universally that they recognize the validity of the overall concept. When I first showed the model to clients, I was surprised to find that their first reaction to the model was typically a spontaneous self-rating like, *We're approximately a 2.5*.

Taking that cue, I now incorporate this more formally to develop a work group consensus along two dimensions: (1) where are we today, and (2) where do we want to evolve to in the short term? As most of the groups I have worked with

are closely aligned within the group along these two dimensions, this exercise provides us with a collective aspirational road map.

2.6 Knowledge Stakeholders

For any given knowledge initiative, there may be any number of direct and indirect stakeholders. It is essential to think through (1) how each views the value of knowledge, and (2) what the nature and level of their involvement with the development and operation of the knowledge initiative needs to be. Initiatives with larger budgets and greater strategic impact tend to reach into higher levels within the organization. My working hypothesis, absent evidence within any given organization to the contrary, is that the lower levels of the hierarchy tend to lean *knowledge-centric* – knowledge is seen as a benefit in itself – whereas the higher levels lean *value-centric* – knowledge is seen as a means to a value-based end (i.e., result, outcome, or impact).

Ascending the hierarchy, the typical stakeholders are:

1. **The Producer.** The knowledge services professional and his work products (projects, inquiries, reports, etc.) stand at the foundation of the chain.
2. **The User.** The internal client is the consumer responsible for applying the knowledge product toward some enterprise goal. The User typically has different value criteria than the Sponsor-Champion, described below. The User, for example, typically cares more about whether or not a presented solution works effectively than whether it is cost-effective or "worth it," as a Sponsor might. We explore User value more deeply in Section 5.3.
3. **The Sponsor-Champion.** The sponsor is a person, usually at an executive level, through whom the knowledge initiative reports. She is the sponsor in the sense that it is her budget from which knowledge costs are paid. In this sense, she is also the *economic buyer* for the knowledge offering. She may in addition be a champion in terms of advocating for the knowledge function, brokering its engagements at the executive level, and seeking greater opportunities for the function.

   In my experience, a knowledge initiative is most often sponsored within one of the following organizational domains: IT, Human Resources, Library, or Strategy. Since each of these domains operates differently from the others, the nature of the sponsorship determines to a large extent how the knowledge initiative will be conceived, executed, and valued. An IT-centric knowledge initiative, for example, will likely focus on software, databases, cloud

architecture, and so on. An HR-centric knowledge initiative will tend to emphasize training, coaching, and mentorship. The Library will focus primarily on content, especially text-based resources. Strategy-centric knowledge programs will be better integrated with enterprise strategies but may be less tied in with the basic knowledge resources than the other approaches.

4. **Executive/Board Levels.** The three constituencies described above are central to the enterprise knowledge "universe." However, they are not its only components, and to neglect these higher levels is to delimit unnecessarily the contributions to value of which the knowledge function is capable. I have run "elevator pitch" tests with clients and students in which I challenge them to describe in one minute's time the essential purpose of their work. If they start in with technical or content jargon (e.g., databases, taxonomies, and architectures) I stop them to insist that they focus on enterprise needs, challenges, and strategies. Whether or not such conversations occur in real life, it is good to carry that sense of enterprise mission and purpose with one as a guide at all times.
5. **Enterprise Stakeholders.** To expand on the preceding, it is not asking too much of knowledge that it show tangible benefit to the stakeholders of the enterprise as a whole. Economic value comes into a business primarily through its *customers* and its *owners* – so it behooves knowledge to have thought through the nature of their contributions to the return on these investments. Enterprise *employees* represent another key stakeholder group – how does knowledge benefit them? And the *community* for the enterprise – and even *society* at large – are other beneficiaries of knowledge worthy of serious attention.

On the last point, Drucker is clear: "Knowledge *per se* is useless in business (and not only in business); it is only effective through the contribution it makes outside of the business – to customer, markets, and end-uses." (Drucker 1964, 111). While we support his strong-form statement of knowledge value as use-value, we allow that some "internal" stakeholders may be acting on behalf of, or as proxies for, external enterprise stakeholders.

For any single element of knowledge, each of these key stakeholder groups may value it in significantly different ways and to different extents. In such cases, the value proposition is not absolute, but is relative to each stakeholder's own priorities, goals, and incentives. This *value relativity* makes it critical to understand such priorities, and their differences, among key stakeholders.

2.7 Key Concepts in Chapter 2

knowledge topology
knowledge archipelago
phenomenal world
epistemic wrapper
uncertainty
opportunity
confidence interval
meta-knowledge
first-order knowledge
cognitive perimeter
value proposition
ISO 9000
knowledge activities
knowledge producers
knowledge content
knowledge charter
knowledge paradox
barriers to value
hierarchical KV gap
value attribution
knowledge services maturity model
knowledge-centric
economic buyer
knowledge community
community of practice
epistemic world
epistemic-phenomenal inversion
risk
threat
Bayes' Theorem
minimally required knowledge
second-order knowledge
hidden assumptions
core value question
Baldrige Framework
knowledge assets
knowledge users
knowledge channels
knowledge sustainability
producer points of pain
knowledge-value (KV) gap
space-time KV gap
knowledge branding
knowledge stakeholders
value-centric
value relativity

2.8 Questions for Discussion

- What are the pros and cons of the "federated" model for a knowledge community?
- Is it possible to know what we don't know? What are some ways we can approach this?
- Do decision makers know what information they need? Can they articulate this?
- How can we determine the optimal balance between "inside" and "outside" information?
- What is the value of capturing "best practices" in knowledge?
- What are some ways we can we accelerate the evolution of a knowledge services unit through the four stages of strategic integration?
- Why is knowing our knowledge stakeholders important? Why do they not all look at value in the same ways?

3 Knowledge as an Economic Resource

Knowledge is not only a *function* within the enterprise; it is also an economic *resource* available to the enterprise. Organizations buy knowledge – in the form of hiring smart people, purchasing relevant data, and building systems to manage it – then use it to produce operating results, outcomes, and impact – in short, economic value.

Virtually all of us reading this book are *knowledge workers* – we produce our work mainly with our heads, not with our hands (with software and computers serving as prosthetic extensions for our heads). We achieve our work largely through the manipulation of symbols: words, numbers, analyses, reports, presentations, emails, and the like.

And we are a large group. A study done in the U.K. (Brinkley 2009) found that 33% of the knowledge economy workforce does many knowledge tasks, 27% do some knowledge tasks, and only 40% do few knowledge tasks. Given that, it is amazing how little is known about how knowledge work works. If you were entering the business of, say, making aircraft, you would want to have at your disposal as much knowledge and information as possible about aerodynamics, fossil fuel combustion, metallurgy, plastics, and any number of other disciplines that contribute to your product, both directly and indirectly. Our corresponding knowledge about knowledge – a critical production resource, as we explore in Section 3.5 – is woefully inadequate by any modern industrial standard.

3.1 A Brief History of Knowledge as an Economic Resource

There was a time when I thought that studying history was a waste of time – since I was always more interested in the future of things. Fortunately for me, Yale required all undergraduates to study at least some history. I chose the history of science, which I found fascinating and which has proved to be a solid foundation for my understanding of epistemic history.[10] I have since realized that to study the future is to study the past – since without knowing the direction

10 Thomas Kuhn (1962) notes the irony that scientists are rarely taught about the history of science. Once a paradigm shifts, the new paradigm is assumed to be the way things are, with an implied sub-text that that's the way they have always been. (See Section 1.6.3.) The trajectory of discovery is lost, and with it, an opportunity to sense where things are headed in the future. I found the same disregard for history at work in my management training.

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and speeds of the trajectories and "vectors" we are moving on, we cannot know where we are headed, and when we might arrive.

Discussions of the value of knowledge are almost as old as discussions of knowledge itself – as far as we know, since our ability to record any such discussions has only been present since the dawn of written language around 3200 BCE. We'll use this as the earliest possible marker for our considerations of the economic role of knowledge.

3.1.1 The Knowledge Economy – Its First 52 Centuries

But first, let's back up – way back, to the very beginning. The current consensus is that our universe is about 13.8 billion years old, with our relatively young earth making its first appearance in the third act – about 4.5 billion years ago. The first primates did not appear until 55.8 million years ago – the most recent 1.2% of the earth's lifespan. Modern humans (*Homo sapiens*) appeared only 200,000 years ago – a mere sliver of time in the grand scheme of things.

At some point between 70,000 and 30,000 year ago, Sapiens began doing amazing things – inventing tools (like boats, oil lamps, bows and arrows, and needles) – and symbols (art, language, stories, and shared beliefs). This period, known as the Cognitive Revolution (Harari 2015), was likely the result of a genetic mutation that eventually enabled Sapiens to defeat his rivals, the Neanderthals, and to travel and settle widely. Most importantly, it enabled the social cooperation that is still the key to our civilization – and to our very survival.

Writing, in the form of hieroglyphics on clay tablets, made its appearance only 5,200 years ago (around 3200 BCE) – thus enabling modern "symbolic" man for only about 2.6% of our species' time on earth. This marks the first use of information as we know it. And many sources have documented that this first use was driven by the need for financial records of valuable assets like grain inventories, contracts, and (by some accounts) slaves. One is led directly to the hypothesis that language was more than a mere by-product of commerce, but rather was invented *in order to support* the production of economic value.

For the remaining 97.4% of human "history," there exists no history in the sense of a written record. Our relative cultural unease with the concept of the value of knowledge can in a real sense be attributed to the relative novelty of the recognition of knowledge as an economic resource.

Of the first 52 centuries of the knowledge economy as we've defined it, the first 50 centuries were dominated by "print," i.e., physical media. Clay tablets were replaced by paper scrolls around 150 BCE, a huge breakthrough in terms of portability, though not in terms of durability. Paper scrolls were unwieldy

and required *sequential access* – to get to page 200, you had to unroll the entire scroll to that point. They were replaced by the far handier random-access *codex* – the bound book – by around 100 CE. Many important books were still being written and illustrated by hand until the widespread adoption of movable type around 1450 – another breakthrough that lowered the price and increased the availability of books dramatically, thereby driving the democratization of knowledge (as well as its dark-side counterpart, propaganda).

The 50 centuries of print roughly corresponded with the agricultural economy – as we as a society moved from being hunter-gatherers to being farmers. When in the nineteenth century the industrial economy appeared, information technology evolved rapidly to electronics – though at first what we now call *analog* electronics. The telegraph made its appearance in 1844, enabling global communications at the speed of light. This proved to be a huge boon for both commercial and personal communications – seen as equally significant in its time as the much later invention of the Internet. Some at the time hailed the telegraph as the technology that would end wars forever, since all parties would be able to quickly work out their differences – a forecast so tragically short-sighted that it needs no further comment.

Radio and television, introduced around 1920 and 1928 respectively, are advanced analog electronic technologies that were soon transformed into the supporting pillars of the hugely profitable and influential broadcast media and advertising industries.

What we commonly think of as the modern "Age of Information" began in the early 1960s, which not coincidentally was the dawn of the age of *digital* information. The rollout of the IBM series 360 computer – so named for its business-friendly versatility – is the milestone I use to mark the dawn of the digital era – and of the modern knowledge economy.

Thus, the age of digital information – now about six decades old – represents only about 1.2% of the time during which written information has been available – and 0.03% or 1/3200th of the time *Homo sapiens* has existed. Though digital information seems ubiquitous today, its impact is somewhat offset by its relative novelty in the scheme of things. Note especially in Figure 4 that the formal recognition of the knowledge economy in 1962 was preceded (by nearly three decades) by the development of the systems we currently use to account for enterprise assets (i.e., GAAP in the U.S.) – the consequences of which misalignment we examine in Section 3.6.1. We still have many opportunities ahead of us to improve our value-adding uses of information.

The digital era, of course, has marked its own watershed events. The wide introduction of the personal computer in 1982 quickly put digital technologies within reach of most organizations, large and small, including families and

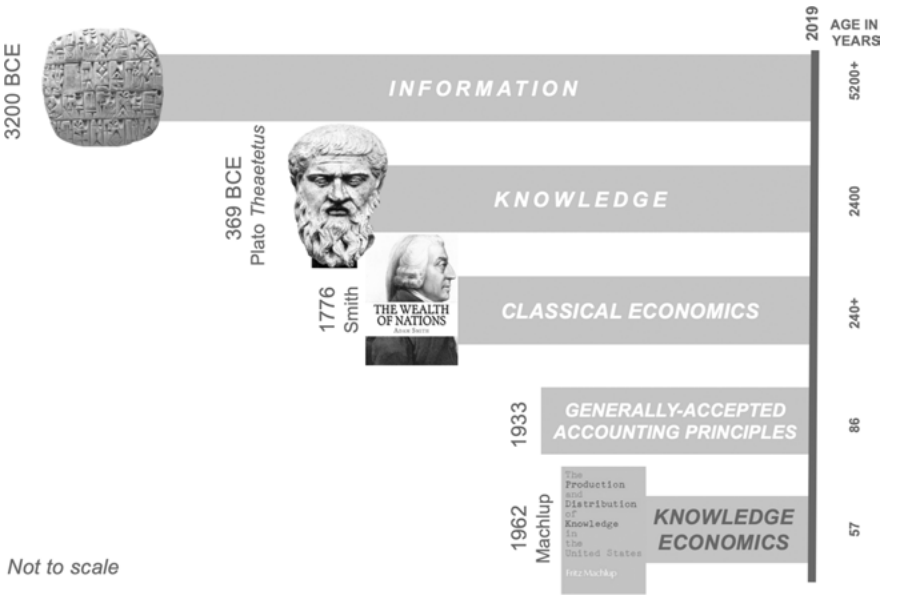

Figure 4: Pivotal events in knowledge economics.

individuals. The commercial availability of the Internet around 1994 began to open the instant global connectivity that by now we take for granted. And the introduction of the smartphone in 2007 eventually put all this technology within reach of a majority of the world's seven and a half billion people.

Not surprisingly, this technology development timeline shows striking parallels with the evolution in the ways in which we think about knowledge as an economic resource.

3.1.2 Plato

But information, as we have seen in Section 1.5.2, is not the same as knowledge. When did our *meta-knowledge*, our knowledge about knowledge, begin to develop? The first known examination of knowledge – i.e., the first to be written and survive – is Socrates' dialogue with the mathematician Theodorus and his star pupil Theaetetus, recorded by Plato as *Theaetetus* (369 BCE). No one, aside from those present, knows exactly what Socrates said – and only those who read ancient Greek will know, of that, exactly what Plato recorded. Though different translations and exegeses vary on certain nuances of meaning, there is wide consensus

that this text and its companion dialogue *Sophist* represent the cornerstones of western thinking about knowledge, i.e., philosophy.

Theaetetus records a lively and wide-ranging conversation between smart and thoughtful people. There seems to be no agenda, and no clear findings result for the value-hungry student of knowledge (recall that in this enlightened Hellenic society, knowledge was seen as a benefit in itself). One charming metaphor for personal knowledge is provided by Socrates, wherein he compares "pieces of knowledge" to a flock of wild doves, captured and held in a large cage. That is, they are available for our use when needed, but they cannot be said to be possessed in a literal sense.

While Socrates was speaking of caged doves as representing individual "knowledge units," i.e., thoughts, his analogy seems even more apt as a representation of organizational knowledge – where the already-considerable complexities of knowledge are compounded exponentially. It is said that the human assets of the enterprise go home at night, and to the extent that all knowledge is human (which I've argued in Section 1.5.2), the entire knowledge base of the organization walks out the door every night – albeit with the expectation they will return the following workday. Both the personal and the organizational applications of the cage of doves metaphor emphasize the organic and dynamic nature of knowledge.

Knowledge is defined by Socrates as "true belief with an account." The *account* is defined as what distinguishes a given thing from other things – with names, definitions, and sub-components figuring prominently (one can sense them hovering on the cusp of defining systematic empiricism, but that has to wait for Plato's student Aristotle to really gain traction). True belief (which is left undefined) without any such account is said to amount to mere *sophistry*. True belief can be transformed into knowledge by adding such an account – which roughly corresponds to our modern term *evidence*.

At the end of the conversation, the wise men conclude that they are "still pregnant" on the subject of knowledge, and have so far delivered only "a bag of wind, and not worthy of being fed and watered."[11] Understanding this, the principals agree to meet the following day to continue the conversation. With such an "inconclusive conclusion," one justifiably wonders why *Theaetetus* is still being studied 2,500 years later. The dialogue's meta-message appears to be that the *process* of discovering the truth is the paramount thing – even more important than the nature of the truth itself.

11 This reminds me of some initial client meetings in which I have participated – producing lots of enthusiasm and digressions, but without much to show for it in the way of tangible progress – though business meeting summarizers are rarely so candid.

The record of the follow-on meeting purportedly held the next day (though transcribed some years later), between the same conversers, now joined by an unnamed "Visitor," bears out this interpretation. In the dialogue *Sophist* (360 BCE), the primary goal is to identify those characteristics that distinguish the sophist from the philosopher (note that these both derive from the Greek *sophia*, wisdom). The former seems to be one who – while proclaiming to possess knowledge, even to the point of making his living that way – possesses only belief, without the account (i.e., the evidence) to support it. The sophist, instead of understanding things as they are, understands only images of things – what other people say, for example. The philosopher has knowledge – true belief along with the account to justify it. His understanding extends beyond images into things as they are.

There is also the implication that while the sophist's version of knowledge is static and delimited, the philosopher's knowledge is dynamic, interactive, and ever-expanding. For the sophist, knowledge is a destination; for the philosopher, knowledge is a journey. As the Visitor – who turns out to be the smartest person in the room – remarks, "When something is known it in turn is having something done to it; . . . insofar as it is being known, it is to that extent being changed, namely through the fact of its having something done to it."[12]

There is an interesting discussion of the nature of expertise – starting with its basic division into *productive expertise* (i.e., making things through farming or manufacturing) and *acquisitive expertise* (i.e., buying things). They proceed to build a basic taxonomy of economic behaviors that includes concepts akin to modern marketing and retailing. This discussion in the *Sophist* represents arguably the earliest known documentation of the intimate relationship between knowledge and economic activity.

A brief discussion on the nature of ignorance yields the aphoristic gem, "Not knowing something but thinking one does. . . is probably the origin of all the mistakes in thinking any of us makes."[13]

I challenge modern knowledge professionals to take heed of the distinctions Socrates was making. The most successful practitioners – the ones that add the greatest value – are the ones (1) whose work is evidence-based and (2) who view knowledge as a perpetual quest, rather than as a destination to be

12 Among other potential applications of this profound insight, this anticipates the modern Heisenberg Uncertainty Principle, which states that the act of measuring an event in nuclear physics changes that event to some degree.

13 Note that this anticipates the modern Dunning-Kruger Effect (Kruger and Dunning 1999), namely that "incompetence. . . not only causes poor performance but also the inability to recognize that one's performance is poor."

defended or a flag to be waved. Such "knowledge leaders" are better compared to restless organizational philosophers than to sophists – content to rest smugly on their unjustified beliefs.

3.1.3 Sun Tzu

It is unlikely that the Chinese scholar Sun Tzu had direct access to Plato's writings. Nonetheless, a few decades later, his *Art of War* (300 BCE) in effect gives us the first known *payoff table* for knowledge investments. Sun's guide is arguably the first document that describes the use of spies and intelligence in conflict. He describes three knowledge conditions, each describing the knowledge possessed of the self and of the other (i.e., the adversary), and for each giving a predicted outcome. His was a guide for warriors, and therefore his value proposition concerned whether his client won or lost a particular conflict – which in Sun's view depends directly on the amount and type of knowledge possessed by each rival. For each of these, we can then estimate the implied win ratio (i.e., the ROI or value) as shown in Table 6.

Table 6: Payout table based on Sun's *Art of War*.

KNOWLEDGE CONDITION	KNOWLEDGE OF THE SELF	KNOWLEDGE OF THE OTHER	OUTCOME	IMPLIED WIN RATIO (VALUE)
1	Not knowing oneself	Not knowing the other	In every battle, certain defeat	0%
2	Knowing oneself	Not knowing the other	One victory for one loss	50%
3	Knowing oneself	Knowing the other	In 100 battles, no danger	100%
4	Not knowing oneself	Knowing the other	"Competitive myopia"	?

The first and last columns above are our interpretation; the others come directly from Sun (2009). He does not treat the potential fourth knowledge condition, in which one has knowledge of the other but not of the self. Though this seems at first like a logical impossibility, I have observed clients whose obsession with beating their rivals in effect blinded them to their own shortcomings – a condition I call *competitive myopia*.

Sun also does not address the game-theoretic implications of his insights, leaving one to ponder the outcome if a "knowledged-up" warrior was to meet someone equally well-prepared. Nevertheless, Sun's proposition that military victory depends primarily on the principal's situational knowledge – rather than on the respective amounts of war making hardware, the field conditions, or any numbers of other tangible factors – seems remarkably modern. Perhaps for this reason, his work is still studied as a foundational text of military and business strategy.

3.1.4 Francis Bacon and the Enlightenment

Plato's student Aristotle continued the quest for knowledge, with even more emphasis than his teacher on empiricism, the evidence of the senses. His methods in hindsight seem like the precursors of scientific thought, the systematic quest for evidence-based knowledge. However, Aristotle's teachings hardened over the centuries into *doctrine* – to be learned and followed, not questioned – which is more akin to sophistry than to true knowledge as we have defined it.

It took another eighteen centuries, until the Enlightenment starting around 1500, for Aristotelian science to be overthrown by a radically new way of producing knowledge. Instead of resulting from dialogues among smart people, knowledge was now to be produced by empirical observation subjected to rigorous testing – which we now recognize as the *scientific method*. Francis Bacon, himself more a statesman than a scientist, is generally credited with being the thought leader of this movement, though Isaac Newton, Galileo, Descartes, and others also played key roles.

This revolution in knowledge (i.e., science) produced a revolution in technology (i.e., the applications of that knowledge), which in turn produced vast changes in the world's economy (i.e., the Industrial Revolution and the generally rising economic fortunes of the world's people).

Economic historian Joel Mokyr has written several books and papers documenting this profoundly transformational period in human thought and achievement. "What changed in this age was the culture – the beliefs and attitudes of the educated elite toward useful knowledge, how to acquire it, how to distribute it, and what it could do. Such changing beliefs led to new institutions reflecting them, and those institutions fed back into the beliefs. The net result was that by the middle of the eighteenth century the attitudes toward technology-driven material progress had changed dramatically, a phenomenon I have called in earlier work the Industrial Enlightenment and which was a foundation of the Industrial Revolution." (Mokyr 2017).

Two specific attitudinal changes Mokyr mentions are instructive for the modern enterprise:

- **Openness**, the new "willingness to absorb and exploit foreign ideas." The not-invented-here syndrome gave way as the openings to the world created by the age of discovery and the Crusades led to the adaptation in Europe of important technologies from other centers of civilization: China (porcelain), India (textiles), and the Muslim world (Arabic numerals). (See Section 7.5 for a discussion of the analogous modern concept of open innovation.)
- **Questioning** of wisdom and knowledge received from earlier generations. Bacon and others attacked classical science as based on mere syllogisms and authority; they called for a new reliance on observation and experimentation. "Curiosity, which had been condemned by scholastic writers as sinful, began to acquire a more positive meaning. . . [as] the fear of the new as disruptive and disturbing was replaced by a fascination with novelty."

Mokyr's eloquent epilogue summing up his insights begins, "Nations and their economies grow in large part because they increase their collective knowledge about nature and their environment, and because they are able to direct this knowledge toward productive ends. But such knowledge does not emerge as a matter of course. While most societies that ever existed were able to generate some technical progress, it typically consisted of one-off limited advances that had limited consequences, soon settled down, and the growth it generated fizzled out. In only one case did such an accumulation of knowledge become sustained and self-propelling to the point of becoming explosive and changing the material basis of human existence more thoroughly and more rapidly than anything before in the history of humans on this planet. That one instance occurred in Western Europe during and after the Industrial Revolution," a circumstance he attributes broadly to the Enlightenment and its unprecedented linking of intellectual and commercial development.

Another of Mokyr's insights worthy of mining is what he calls Cardwell's Law. Perhaps more a theory than a law, this is the observation (attributed to historian Donald Cardwell) that "technology in any economy crystallizes at some point, and progress slows down and then fizzles out. The stagnation occurs because the status quo can suppress further challenges to entrenched knowledge and blocks nonmarginal advances using a range of means, from the threat to persecute heretics and the burning of their books, to subtle but effective mechanisms, such as meritocracies in which the key to personal success was the uncritical expertise in the existing body of knowledge inherited from the past."

These insights are worth understanding because they can be adapted directly to modern organizations. When an organization restricts the flow of knowledge

from outside the enterprise, and/or reveres received knowledge as the "way things are and will forever be," these are warning signs that *knowledge stagnation* is underway – which will likely become the new norm unless countermeasures are actively engaged. Just because the natural state of knowledge is to be dynamic does not mean that modern-day bureaucratic Sophists cannot devise ways to block that progress.

3.1.5 The Idea of Useful Knowledge

In Peter Burke's magisterial histories of knowledge (Burke 2000, 2012, and 2016), he points out that the term *useful knowledge* appeared in the literature somewhere around 1750. This represented a pivot from the "knowledge for knowledge's sake" of the classical era to the more pragmatic instrumental view that prevails into modern times. Without the ideal of useful knowledge, there can be little serious consideration of the value of knowledge – as intellectual history bears out there was not.

By the late nineteenth century, research and other knowledge-producing activities began to be characterized as being "for the benefit of mankind," albeit typically in some relatively abstract way. Burke points out that the idea of useful knowledge was not always favored among traditional producers of knowledge, who saw applied research "as inferior to the 'pure' product, untainted by association with commerce or politics." Since then, he continues, "the rise of interest in useful knowledge on the part of association, armies, corporations, governments and other institutions has increasingly placed the supporters of pure knowledge on the defensive." Debates on the optimal balance between pure research and applied research remain alive today, at both the enterprise and societal levels.

3.1.6 Adam Smith

Classical economics has as its bible *The Wealth of Nations*, written by Adam Smith in 1776. This foundational text describes practices still used to great advantage in the modern enterprise – to name two examples, the division of labor and rates of profit.[14] Smith starts by describing the two distinguishing features of a nation's economic output – and we're again tempted to draw analogies we can scale to individual

14 It is perhaps best-known for the concept of the *invisible hand* that produces the optimal outcome for everyone if everyone pursues their own self-interest – though this concept is scarcely mentioned in either this book or Smith's other writings.

firms. These features are (1) "the skill, dexterity, and judgement with which its labour is generally applied," and (2) "the proportion between the number of those who are employed in useful labour, and that of those who are not so employed." He further notes that the former – which clearly describes types of knowledge – is the more influential of these two factors.

On the subject of the value produced by labor – which we can say by extension includes intellectual labor – Smith says, "There is one sort of labour which adds to the value of the subject upon which it is bestowed: there is another which has no such effect. The former, as it produces a value, may be called productive; the latter, unproductive labor. Thus the labor of a manufacturer adds, generally, to the value of the materials which he works upon, that of his own maintenance, and of his master's profit. The labour of a menial servant, on the contrary, adds to the value of nothing."

Smith explains the wage differences paid for skilled labor versus "common" labor as follows: "When any expensive machine is erected, the extraordinary work to be performed by it before it is worn out, it must be expected, will replace the capital laid out upon it, with at least the ordinary profits. A man educated at the expense of such labour and time to any of those employments which require extraordinary dexterity and skill, may be compared to one of those expensive machines. The work which he learns to perform, it must be expected, over and above the usual wages of common labor, will replace to him the whole expense of his education, with at least the ordinary profits of an equally valuable capital. It must do this, too, in a reasonable time, regard being had to the very uncertain duration of human life, in the same manner as to the more certain duration of the machine" (Smith 1991, 90).

Anachronistic language aside, Smith here makes two important points: (1) that value-adding production activities in effect pay for themselves – i.e., they are investments that produce ROI – whereas non-value-adding activities are expenses on which a significant return is neither expected nor forthcoming; and (2) education and the acquisition of "extraordinary dexterity and skill" are seen to be value-adding investments – so long as the educated worker remains alive (a period Smith acknowledges as "uncertain" relative to the predictable life of a machine).

Regarding Smith's first point, if you re-envision knowledge activities as a specialized form of manufacturing – a hypothesis explored in Section 4.6 – it follows that those knowledge-related activities that add enterprise value are seen more positively in economic terms than are those that do not. The essence of value maximization consists of the ability to (1) distinguish between these two types of activities, and (2) maximize value-adding activities, while minimizing value-neutral and value-eroding activities.

In short, classical economics, as described by Smith, Ricardo, Hume, and others, treats the fundamental resources of production as *land* (i.e., natural resources, including plants and equipment, raw materials, physical inventories, etc.), *labor*, and *capital*. This basic construct sufficed through the nineteenth century and first half of the twentieth. Not until then was the stage set for the full recognition of the fourth fundamental resource – *knowledge*.

3.1.7 The First Modern Wave – 1962–1994

"The Sixties" were a time of great change and growth worldwide – in culture, in politics, in personal and organizational mores and behavior, and in technology. Our modern thinking about knowledge evolved amidst this ferment.

3.1.7.1 Machlup 1962

Modern thought about knowledge as an economic resource began with the work of Princeton University economist Fritz Machlup, in particular his landmark 1962 study *The Production and Distribution of Knowledge in the United States*. Machlup had been studying the U.S. patent system, the economic mechanism whereby intellectual achievements are converted into intellectual capital, ready to be monetized: "I became interested in the total effort the nation had been making, at conspicuously increasing costs and decreasing benefits, to create and disseminate scientific knowledge."

Machlup realized that, "The production of knowledge is an economic activity, an industry if you like. Economists have analyzed [many other industries] but they have neglected to analyze the production of knowledge" (Machlup 1980). Without conducting further data collection, he recast existing government economic data to ingeniously re-envision the U.S. economy as consisting of knowledge-producing industries on the one hand, and other industries on the other. In the former category he included the following existing industries, each noted by its 1958 gross product:

- Education (US$60.2 billion)
- Communications media (US$38.4 billion)
- Information services (US$18.0 billion)
- Research and development (US$11.0 billion)
- Information machines (US$8.9 billion)

Machlup's analysis revealed that, by 1958, total knowledge expenditure of US $136.4 billion was already 28.5% of the US$478.3 billion U.S. economy, and

growing rapidly – a conclusion that at the time shocked its author and most others aware of it. Note that this was a decade or so before digital technologies became widely deployed in large organizations.

Even if this proportion had held for the subsequent six decades – while there is every reason to think that it has grown significantly since then – this would make the global knowledge industries worth nearly US$23 trillion in today's US $80 trillion global economy – larger than the economy of any single country.

Machlup's insight was monumental in both effort and impact. Perhaps only a fellow economist could appreciate the excitement hidden within his dry declaration that, "The 'promotion' of knowledge from the rank of an exogenous independent variable to that of an endogenous variable dependent on input, on the allocation of resources, is an important step" (Machlup 1962, 5). This means knowledge had finally taken its place alongside land, labor, and capital as a fundamental economic resource – a huge conceptual leap forward. As one contemporary reviewer put it, "The very concept of a knowledge industry contains enough dynamite to blast traditional economics into orbit." Another commented, "Without any fanfare or claim that this book is about economic growth, Professor Machlup has made a major contribution to this branch of economics" (Machlup 1980).

3.1.7.2 Drucker

Other leading thinkers took note almost immediately. Two years later, Peter Drucker wrote in *Managing for Results*, arguably the first book on modern business strategy, memorable phrases like, "Knowledge IS the business" (Drucker 1964). This single aphorism, which at the time was little short of revolutionary, distills the knowledge-value linkage to its essence. Ever the popularizer, Drucker went on to coin several other terms we today take for granted: *knowledge society*, *knowledge economy*, and *knowledge worker*.

Drucker returned often to the theme of knowledge during his long and productive career. He was later to lay down a challenge that has formed the underpinning of much of my own work: "How knowledge behaves as an economic resource, we do not yet fully understand; we have not had enough experience to formulate a theory and test it. We can only say so far that we need such a theory. *We need an economic theory that puts knowledge into the center of the wealth-producing process*" (Drucker 1999b, 183; emphasis added).

3.1.7.3 Porat

In 1977 Marc Porat expanded his Stanford doctoral dissertation into *The Knowledge Economy*, a full-blown study sponsored by the U.S. Department of Commerce.

Using 1967 data and methods somewhat different from those of Machlup, Porat measured knowledge as contributing over 46% of U.S. output.

3.1.7.4 Machlup 1980

Independently of Porat's work, Machlup had by 1972 decided that his own pioneering work deserved updating. Using 1975 data, in 1980 he published *Knowledge: Its Creation, Distribution and Economic Significance, Volume I*. By the time of his death in 1983, he had completed three of eight planned volumes of this landmark work. The constructs *knowledge production*, *knowledge use*, *knowledge stocks and flows*, and *knowledge markets*, which have been enormously beneficial to students of the value of knowledge, originate with this source. I especially recommend close readings of three chapters for those wishing to dive more deeply: Chapter 9 "Stocks and Flows of Knowledge," Chapter 10 "The Economic Cost of Knowledge," and Chapter 13 "Uses, Value, and Benefits of Knowledge."

While Machlup and his teams measured the *costs* of information and knowledge with impressive granularity, he remained skeptical of efforts to measure the *benefits* produced: "Many writers on knowledge and information have proposed research designed to measure the value of knowledge and the social benefits derived from it. A few enterprising ones have actually embarked on such research and have come up with 'findings' quite flattering to those who have had a part in producing knowledge or rendering information services. Unfortunately, most of these proposals, let alone the findings, are rather ill conceived, unsound, or even fantastic" (Machlup 1980, 202).

3.1.7.5 Others

By the 1980s, the excitement about information had begun to be adopted by innovative business leaders. Walter Wriston, CEO of Citibank, famously said, "Information about money has become almost as important as money itself." This insight led him to introduce the first network of automatic teller machines (ATMs) and other innovations that transformed the U.S. banking industry.

3.1.8 The Second Modern Wave – 1995–2008

In the modern era, it is virtually impossible to discuss knowledge without discussing the many technologies that support its production, communication, use, and management. As interest in the productive applications of knowledge periodically waxes and wanes, it is remarkable that these waves of interest seem to coincide with major watersheds in information technology. The first wave

discussed above roughly coincided with the introduction of mainframe computing to the organizational landscape during the 1960s.

The second modern wave of interest in knowledge occurred during the 1990s, when the Internet was unleashed for commercial exploitation. Dozens of books and papers were issued each year as the field, now dubbed *knowledge management*, began to go through the "inflated expectations" phase of its hype cycle. We examine here a few of the more influential writers with respect to comments they made specifically about the economic value of knowledge-specific activities.

3.1.8.1 Nonaka and Takeushi

Nonaka and Takeushi's *The Knowledge-Creating Company* was widely read and highly influential. Written at the peak of Japan's influence in the economic world, it attributed the much-envied innovativeness of Japanese companies primarily to their well-honed abilities in organizational knowledge creation, which they defined as "the capability of a company as a whole to create new knowledge, disseminate it throughout the organization, and embody it in products, services, and systems" (Nonaka and Takeushi 1995).

TKCC drew the direct causal connection: *knowledge creation -> continuous innovation -> competitive advantage*. "What is unique about the way Japanese companies bring about continuous innovation is the linkage between the outside and the inside. Knowledge that is accumulated from the outside is shared widely within the organization, stored as part of the company's knowledge base, and utilized by those engaged in developing new technologies and products."

Nonaka and Takeushi contrasted the Japanese view of organizational knowledge with the then-prevailing Western view. Whereas Western companies treated knowledge as the explicit information that can be stored in databases and processed by computers, Japanese companies saw this as only the tip of the knowledge iceberg. They treated tacit knowledge – including insights, intuitions, hunches, ideals, values, and emotions – as equally important as images and symbols, if not more so. They realized that effectively managing tacit knowledge is both critical and difficult, and that its key requirement is the effective *conversion* of tacit personal knowledge to explicit organizational knowledge.

This conversion was captured in their SECI model, which is still in use today, and which describes four modes of knowledge conversion:

- **Socialization** (tacit to tacit) – "A process of sharing experiences and thereby creating tacit knowledge such as shared mental models and technical skills." Problem-solving meetings and apprenticeships are examples of socialization.

- **Externalization** (tacit to explicit) – "A process of articulating tacit knowledge into explicit concepts." Concept creation through dialogue or collective reflection are examples of externalization.[15]
- **Combination** (explicit to explicit) – "A process of systemizing concepts into a knowledge system." The exchange of information through documents, meetings, telephone conversations, and email exchanges are examples, as are formal education and training programs.
- **Internalization** (explicit to tacit) – "A process of embodying explicit knowledge into tacit knowledge." Individuals internalize the knowledge gained through the other conversion modes, in effect "learning by doing."

When the time dimension is added, SECI becomes a spiral through which knowledge is created. Detailed case studies illustrate the real-life examples though which the model was developed, with implications that benefits were realized. Discussion of tangible costs and benefits of these knowledge initiatives, however, remains frustratingly elusive.

3.1.8.2 Sveiby

Former publishing executive Karl Erik Sveiby was perhaps the first expert of the modern era to directly tackle the question of knowledge as an economic resource at the enterprise level. His *The New Organizational Wealth* (1997) set a practical tone for many books that followed – to which the one you are now reading aspires to be a worthy addition. Though his case examples are now dated, his insights are still applicable and vibrant.

3.1.8.3 Davenport and Prusak

Davenport and Prusak's *Working Knowledge* (1998) was highly influential in its time and remains one of the most useful single-volume introductions to the practices of knowledge management. The reader gets no farther than the introduction before impressive tangible knowledge benefits are mentioned:

- the $1 million per day saved by pharmaceutical firm Hoffman-LaRoche by streamlining the application process for new drugs;
- reductions in mortality rates for heart surgery from sharing ideas and practices at a group of medical centers in New England; and

15 Note that this use of the term *externalization* differs from its more recent use by Susskind and Susskind (see Section 7.5).

– reduced costs to provide technical support at Hewlett-Packard through codification of responses.

After this strong start, however, the reader is left with rich case history discussions of *what* to do and *how* to do it – and less about *why to do it* or the benefits to be expected. The authors do list the following criteria they used for judging success in knowledge management projects:

– Growth in project resources (e.g., staffing and budgets)
– Growth in volume of knowledge content and usage (e.g., number of documents)
– Likelihood that the project will extend beyond an individual or two to become an organizational initiative
– Comfort in the organization with the concepts of "knowledge" and "knowledge management"
– Some evidence of financial return, either for the knowledge activity itself or for the larger organization, with the caveat that "This linkage need not be rigorously specified and may be only perceptual. . . Several [projects] lacked financial benefits today, but they had plans to develop them in the future."

This almost casual mention of financial return seems, in hindsight, a missed opportunity. I wonder whether, when two years later the "dot-com" recession hit the U.S. economy, and many knowledge projects and people were brutally cut back, the authors wished they could have re-ordered this list.

3.1.8.4 Stewart

Thomas Stewart's work on knowledge has arguably been read by more people than most other authors on the topic, given his role as a senior editor at *Fortune* and his advanced awareness of the economic importance of knowledge. His book *The Wealth of Knowledge* is a lively, literate, fast-paced tour through the value-producing aspects of knowledge as practiced within leading global organizations. Though some of its cases are dated, its lessons are not – and the reader is rewarded with a non-stop stream of useful and far-seeing insights. For example, "The field of intellectual risk management basically doesn't exist – and needs to, since intellectual risk is the real threat twenty-first century companies face. . . Risks to intellectual assets and processes now dwarf traditional sources of risk" (Stewart 2001). Some examples of these valuable, but intangible, assets are:

– Your reputation or brand
– Your business model
– Your intellectual property

- Your network
- Your human capital

We note that these "intellectual assets" extend well beyond the realm of traditional knowledge management, or even knowledge services – and may be variously managed by brand managers, by the legal team, by IT, or by human resources. A primary challenge, then, is that these *super-knowledge assets* are typically managed operationally – not strategically in a coordinated manner, as would befit their enormous value to the enterprise.

A couple of chapters toward the end – including the ironically-titled "Generally Unacceptable Accounting Principles" – discuss the economic value of knowledge, and how difficult and controversial it is in practice. Stewart quotes then-U.S. Securities and Exchange Commission (SEC) chairman Arthur Leavitt as saying, "We have long had a good idea of how to value manufacturing inventory or assess what a factory is worth. But today, the value of R&D invested in a software program, or the value of a user base of an Internet shopping site, is a lot harder to quantify. As intangible assets continue to grow in both size and scope, more and more people are questioning whether the true value – and the drivers of that value – is being reflected in a timely manner in publicly available disclosure" (Stewart 2001, 270).

The current consensus is that public disclosures do not, by a wide margin, reflect the true value of knowledge-based companies – a situation discussed in Section 3.6. Intangibles valuation problems, which persist to this day, were largely responsible for the collapse in prices of many "dot-com" stocks in 2000–2001. Perhaps even more importantly for the knowledge practitioner, these measurement and attribution challenges tend to scale down to individual knowledge initiatives. That is, if the value of knowledge is misunderstood at a macro level (i.e., the enterprise and/or economic society as a whole), such misunderstandings drift downward to the micro level (i.e., the individual knowledge initiative or knowledge professional).

3.1.9 The Current Era – 2009-present

This modern era coincides with the explosive "mobilization" of knowledge triggered by the introduction of the Apple iPhone in 2007, and with the gradual recovery from the Great Recession of 2007–2009.

3.1.9.1 St. Clair

Knowledge services evangelist Guy St. Clair (2017, 109 ff.) describes clearly that the success of individual knowledge activities depends to a large degree on the

extent to which a *knowledge culture* has been created from the top. And this in turn depends on how clearly the connections have been drawn between knowledge activities and the value-producing activities of the enterprise as a whole. Clearly the senior leadership has to champion, and perhaps even sponsor, knowledge activities for them to have maximum impact. But the knowledge professional can enable and assist this in several key ways:

1. **Establish the value proposition for knowledge.** What is the goal? What are the anticipated benefits? This includes "identifying the bottom-line impact of the knowledge culture, asking such questions as: what outsourcing can be avoided? what costly project staff can be reduced? what reductions in travel, meeting arrangements, and other related expenses will be eliminated?"
2. **Focus on projects that will achieve notice.** Especially in the short term, focus on "low-hanging fruit" projects that will clearly build success for the organization. "Make it relevant. Whatever savings are being demonstrated or products proven to be worthwhile, they must relate *exactly* to the successful achievement of the parent organization's mission."
3. **Identify partners and sponsors.** Knowledge is a team sport – and building the right team, including managers from key stakeholder areas and senior leadership, is paramount for success.
4. **Perform an opportunity assessment/knowledge services audit.** St. Clair describes various methods for achieving this key step. In Section 7.3 I describe the method my firm uses in our own work, which are not dissimilar to his.
5. **Build the business case for knowledge services.** This includes a statement of need and a charter describing the vision, mission, and values for the effort. I describe my own approach to this important step in Section 6.3.
6. **Pursue the ideal.** Early successes typically nudge the organization's culture in a knowledge-centric direction. Knowledge ideals are forged into pragmatic knowledge products and services. Once these are recognized as adding value, they gradually become practices that are adopted by the entire organization.

We present research and recommendations throughout this book that operationalize many of St. Clair's points.

3.1.9.2 Others

Though a complete review of the knowledge management literature is beyond the scope of this book, there are some good literature reviews readily available on the Internet (e.g., Omotayo 2015; Kumar and Gupta 2013; Serenko and Bontis 2004 – which includes a quantitative citation analysis).

And, as for what the future of knowledge may hold – the best way to *predict* the future is to *create* it. . .

3.2 Knowledge Exceptionalism

One of several major obstacles to understanding and managing knowledge as an economic asset is *knowledge exceptionalism*, the long-standing – though misleading – belief that knowledge is fundamentally so different from other resources that it defies traditional methods of economic assessment. Contrast is typically drawn (for example, in Susskind and Susskind 2015, 189–191) between goods (i.e., physical products) and knowledge along several dimensions:

- **Rivalry.** Goods are *rival*, meaning that once consumed, there is less available for others. Mathematically, we can represent this as 1 – 1 = 0. Knowledge, on the other hand, is non-rival; once given to someone else, it also stays with the giver and adds to the taker's store. I quantify this miraculous paradox as 1 – 1 = 2.[16]
- **Excludability.** With goods, it is relatively easy to prevent people from consuming unless and until they pay. At a grocery store, you select your goods, then pay at the check-out counter. Since knowledge is non-excludable, it is difficult to prevent someone who has paid, for example for legal advice, from passing that along to someone who has not. We note, however, that there are laws designed to create barriers to the natural non-excludability of knowledge – for example, the systems of patents and other intellectual property protections, and the laws against insider trading of securities.
- **Value upon re-use.** Physical things tend to get worn out and need repair the more they are used. Knowledge is preserved, or even rendered more valuable, in being re-used. It has been documented, for example, that the quality of outcomes from a particular medical operation improves directly with the number of times a given surgeon has performed it – "practice makes perfect."

A fourth distinguishing characteristic is sometimes cited for knowledge – its ability to be *digitized*, where physical goods cannot. In our view, this distinction mistakes information – which can be digitized, then reproduced and distributed quickly and widely – with knowledge, the reproduction and transmission of which is typically a slow and labor-intensive process.

16 Another way of thinking of this is that whereas exchanges of goods are inherently *zero-sum*, exchanges of knowledge are *positive-sum*.

The Knowledge Value Chain model (see Section 4) posits the working hypothesis that knowledge is *non-exceptional* as an economic asset – that its production is a specialized type of manufacturing process – complete with raw materials (i.e., data), work in process (i.e., information, knowledge, and intelligence), and final products (i.e., enterprise results, outcomes, and impacts).

We reject knowledge exceptionalism in all its forms, including when applied to an organization itself. The self-congratulatory expression *We have a knowledge culture* may betray a lack of awareness of the fact that we all now live and work in a knowledge economy – whether or not we choose to acknowledge and take advantage of that.

3.3 Fundamental Tests of Value

In working with knowledge-producer clients, I use ten simple tests for the value of data and for the value of the analysis that typically follows it. Note that since none of these addresses the costs of data or analysis, strictly speaking these are *benefits*, not the value – a distinction we explain in Section 5.1.4.

Note that what we think of as analysis may have two complementary aspects – an *analytic* aspect, wherein we break things down into smaller parts, and a *synthetic* aspect, wherein we put them back together in new and more useful ways. In our projects, we refer to this as "*analysyn*," reflecting the reality that the knowledge work may oscillate back and forth between analysis and synthesis, or even blend them.

3.3.1 Tests of Value for Data

Five factors distinguish one set of data from other, even before considering what further processing it has undergone. Whether formally or informally, I subject all data to this "TRAN(E) test":

- **Timeliness:** *Is the data current?* Like radioactive atoms, all data have a "half-life" – a period beyond which their usefulness becomes progressively much more limited. They say that yesterday's newspaper is good only for wrapping fish – because the "news" it contains is no longer "new." As conditions change, informational descriptions of such conditions must be refreshed at a corresponding rate – or lose their potency.

  If you're a stock trader, stock pricing data is essentially useless by the time it's published "for the rest of us" 20 minutes after the fact. By that time, any market-moving information is already reflected in the stock price –

especially given that many trades are now executed within microseconds by automated trading systems.

- **Relevance:** *Does the data help solve my problem?* If the value of data is perceived in relation to its applicability in making a particular decision (as the KVC postulates), then the data must be germane to that decision. This is harder to measure than timeliness, and consequently it's here where many decision processes come unglued. Often this is because the process owners are trying to assess relevance from the bottom up (i.e., data), rather than from the top down (i.e., value, result, or benefit).
- **Accuracy:** *Is the data correct and reliable?* The data must be correct, focused, factual, unbiased, and representative. It must be "the whole truth, and nothing but the truth". Data is rarely 100% accurate – just as data is rarely 100% timely or relevant. Value is contextual, and the requirements for accuracy, and the corresponding tolerances for inaccuracy, vary considerably depending on the application of the data.
- **Non-redundancy:** *Is the data "new"?* In addition to being timely, the data must be previously unknown and therefore novel to the recipient. This may be related to, but is not the same as, its timeliness. If data, no matter how fresh, tells us something we already knew, then – regardless of the amount it cost to produce it – it is redundant and has little informative value. (This criterion derives from Shannon's mathematical theory of communication, described in Section 1.6.4. See also Section 5.3.3.)
- **(Exclusivity).** *Who else has access to the data?* In some cases, the data must be exclusively accessible to have value. However, data exclusivity is not always a requirement for value. Data about, for example, which prescription drugs interact unfavorably with other drugs has value to everyone who needs that information in order to act on it (for example, your doctor or pharmacist, in writing or filling prescriptions). The data scales across Users and is no less valuable because other people have it too.

Other data derives its core value from exclusivity. Data exclusivity forms the basis of the *insider information* about stock trading that is highly valuable – and typically illegal. If I know for a fact that company X is about to be acquired, and few other people know it too, I can buy up shares of X at a relatively low price. Once the transaction is announced, and the information becomes more widely known, the price of X stock typically goes up considerably (to roughly the acquisition price) – and I have lost my advantage.

Economists call these distributional imbalances *information asymmetries*. The disciplines of military and economic intelligence derive much of their value through such asymmetries. Having knowledge that others do not possess,

and thus being empowered to act preemptively upon that knowledge, provides a powerful competitive advantage.

3.3.2 Tests of Value for an Analysis

Many organizations pride themselves on their "bias toward action". As a result, analytic disciplines like business planning have lately had to work harder to justify themselves. "Paralysis by analysis" is a peril, since too much analysis may unnecessarily delay a decision; analysis itself consumes people, their time, and other resources.

Why do organizations need analysis? In Powell (1996), I describe these five basic purposes that analysis serves in the decision-making process:

- **Reduce the number of decision variables (the "big data" problem).** Most organizational decision makers would be quickly overwhelmed by the total volume of relevant data available for consumption. The information explosion currently sees the amount of available business data double approximately every five years. At the same time, there is no evidence that the human mind is expanding in a corresponding way to accommodate all this information. Some psychologists put the number of distinct things that human beings can keep actively in mind at one time at "seven plus or minus two" (i.e., between five and nine things) (Miller 1956). One of the analyst's tasks is to reduce the volume of material that the decision maker must sift through, with the result that she can spend time making decisions that otherwise might be spent absorbing facts.
- **Compensate for lack of data (the "small data" problem).** In the real world, analysis may be called upon to create conclusions where, in a laboratory setting, there would be deemed to be insufficient data. Strategy analysts pride themselves on their ability to notice trends before they become trends, and to see phenomena developing at the periphery. In any complex system, it has been said that "a butterfly flapping its wings today in Tokyo may cause a rainstorm tomorrow in New York." Similarly, in a complex system such as our economy, something that seems insignificant today – perhaps an obscure patent filing – could prove to be the beginning of a whole new industry to compete with our own. Analysis is often called upon to make sense of small, noisy, unruly data sets.
- **Provide connections among data.** Data elements must be related to each other in a way that offers a vision of a larger whole – as the pieces in a mosaic begin to make sense only when you back up and look at the big picture. Ancient mariners who gazed into the night sky realized that there

were far too many stars to make sense of them *en masse*. They "created" constellations – arrangements based on human and animal forms that literally connected the dots. From then on, the night sky became a rotating procession of familiar figures – and much easier to comprehend.

- **Provide a context for data.** Analysis provides the "so what" for information. It relates the information to enterprise purpose, mission, values, and strategies. It relates information to other information.
- **Create narratives: stories, hypotheses, insights, and meanings.** Analysis takes information and ultimately makes a "story" out of it, i.e., a working hypothesis that can be acted upon. For example, Wall Street securities analysts boil down a lot of financial data and pronouncements from company management into a simple "buy, sell, or hold" recommendation. In doing so, they also create a "story" about the company that tells the investor something about *why* she should buy, sell or retain the stock. Likewise, corporate competitive analysts create stories about the business environment. These stories become invaluable in communicating the results of their analysis to decision makers. A good story ties the facts together and builds credibility for the analysis.

In assessing the value added by an analysis, I use these five general criteria:

- **Understandability.** *Did your client "get" what you said*? This ranges from basic legibility and intelligibility to the flow and logic of the analytic reporting.
- **Credibility.** *Did your client believe what you said?* This may depend as much on the level of trust built up with the client over previous interactions as with the content of the analysis itself.
- **Comprehensiveness.** *Did you explain all of the relevant data?* If any data are to be excluded from the analysis, that should be noted along with the reason for doing so (e.g., the data were thought to be flawed for some explained and acceptable reason).
- **Relevance.** *Does your analysis help solve the problem at hand?* All of this work should be driving toward solutions and up the value chain toward decisions and actions. "Paralysis by analysis" can be avoided by maintaining this linear orientation.
- **Persuasiveness.** *Is your analysis enlightening and compelling?* Is it sound enough to support the making of decisions? Does it enable people to take actions? This can have as much to do with the quality and value-relevance of your presentation as with the content itself.

A shortfall in any one or more of these criteria will diminish the value added by the analysis.

3.4 A Brief Lexicon of Value

In working with the value of knowledge, I became fascinated by the concept of value in its entirety. I offer this lexicon of "value-speak" terms that I have used and/or created in solving client problems. Most of these terms apply to other value-producing assets as well as to knowledge.

3.4.1 Value

Value measures what you get for the cost incurred – in the U.S., we informally call this the "bang for the buck." Economists say it's the benefit/cost ratio, and our basic formula **VALUE** = **BENEFIT**/**COST**. derives from this insight.[17] Greater value describes getting a greater return (of something) for a given outlay of money. A *value investor* is one who likes to buy low, then sell high. A *value stock* is one that seems underpriced in the market relative to its accounting book value.

3.4.2 Value Creation or Value Production

The originating act of value, and the holy grail of MBAs worldwide. "Creation" sounds a bit miraculous – and value is nothing of the sort, it's just hard work – so we prefer the term "production."

3.4.3 Value Life Cycle

Value is transient and should not be treated carelessly – it can come and go, sometimes rapidly. Much like other living organisms – products, business models, companies, even whole industries have life cycles – they are born, they grow, they thrive, they ebb, they die. The value life cycle is an entirely natural process – even predictable, once you understand it.

3.4.4 Value Map

A document depicting the connections between an entity's financial statements (or other performance metrics) and the business ecosystem factors that enhance or impede value production.

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17 See Section 5.2.1 for the more sophisticated discounted cash flow (DCF) method for measuring ROI.

3.4.5 Value Metrics and Value Markers

Quantitative and qualitative indicators of value, respectively. For example, in studying public health, we find that the number of people who smoke and the number who are obese are tallied in each U.S. state by the U.S. Centers for Disease Control and Prevention. These are value-relevant metrics if, for example, you're a health insurance plan or government agency that will be eventually paying the medical bills for these people.

3.4.6 Value Vector

A description of the direction and velocity in which a quantitative value metric or qualitative marker is trending. I had a vivid personal illustration of this recently. A young doctor who lives in our building found out I was studying value shifts in the healthcare field. He knocked on my door with a paper and pencil in hand and said, "I have young kids, and I need to plan for their education and future. I know I make a lot of money now in the specialty I'm in, and I know that will likely not last. I want you to help me figure out how soon my income could fall, and how far, and how fast." That's value vectoring at its most pragmatic.

3.4.7 Value Signaling

The practice in most organizations of communicating value through metrics published to key constituencies – financial statements for economic value, for example, and Corporate Social Responsibility (CSR) statements for societal value (see Section 5.1.1).

3.4.8 Value-Based Competition

The observation and practice that a rival is not confined only to a competitor who makes what you make, but could be an entirely new technology that provides the same value or benefit that your product does. If you're a cigarette company, for instance, smokeless tobacco products, or even alternative nicotine delivery systems like e-cigarettes, are customer value-homologous substitutes for your product, and should be monitored as diligently as a direct competitor.

3.4.9 Value Dynamics

The study and science of how and why value changes; this subsumes most of the other terms here, and is treated further in Section 7.7.

3.4.10 Value Proposition or Value Model

A statement of what is on offer and to whom, with particular attention to how value is produced from the point of view of each targeted constituency. The **User Value Proposition (UVP)** describes the value proposition as it relates to Users, the most important constituency.

3.4.11 Value Alignment

A measure of the responsiveness of a value proposition or business model to the current needs of Users and other stakeholders. Over time, there is a natural tendency for these to fall into dis-alignment, which then needs to be corrected through an active intervention (see Section 7.7).

3.4.12 Value Chains

We buy from suppliers, who buy from their suppliers, who buy from their suppliers. . . and so on throughout the input or **Supply Chain.** We sell to our customers, who sell to their customers, who sell to their customers, throughout the output or **Demand Chain.** At each stage, both benefits and costs are added. Our goal is to add, at each stage, relatively greater net benefit than cost.

3.4.13 Value Waves

Because the world's collective economy is built on supply and demand chains, a value shift in one inexorably causes ripple shifts in all related others, both forward (i.e., to customers), backward (i.e., to suppliers), and sideways (i.e., to competitors and ancillary products). When horses-and-buggies went out of style more than a century ago, so did buggy-whip manufacturing (i.e., an ancillary product). When recorded media (records, tapes, and CDs) began to go out of style in the early twenty-first century, so did record stores (i.e., the demand chain). The widespread changes caused by the 2014–2015 slide in the price of crude oil from more than US$100 per barrel to about one third of that provide a vivid, and quite painful, example of what in that case was a *value tsunami*.

3.4.14 Value Portfolio

A group of knowledge projects – or any other kinds of projects – can be seen much like a portfolio of financial investments. Some are higher risk and

higher return, others lower risk and lower return. Choices and trade-offs must be made, given the inevitable constraints on capital that face us all. And, like a financial portfolio that should be rebalanced periodically due to changing conditions, the knowledge portfolio should be dynamic. It should be periodically examined and possibly re-allocated based on current conditions (see Section 5.3.6).

3.4.15 Value Proximity

The connection – or lack thereof – between the production of knowledge and the realization of enterprise value. Reducing these knowledge-value gaps can itself generate value (see Section 2.4.4).

3.4.16 Expense and Investment

Both terms detail the cost part of the value equation **VALUE = BENEFIT/COST**. Any given use of funds can be positioned as an *expense*, which is written off during the current reporting period, or as an *investment*, which is often capitalized for accounting purposes, and for which a return on investment is expected. *Capitalized* means that instead of writing off the entire expense at one time, the investment is amortized or depreciated, i.e., written off over a period of time, usually its useful life.

3.5 The Fourth Resource

Classical economics recognizes three primary factors of production: Land, Labor, and Capital. Land (i.e., natural resources) includes all physical resources, such as raw materials and plant and equipment. Labor (i.e., human resources) and Capital (i.e., financial resources) make up the rest of the classical enterprise balance sheet – the one still prescribed by modern accounting systems like GAAP and IFRS.

The fourth factor, Knowledge (i.e., epistemic resources) includes data, information, knowledge, and intelligence as used in the production process. The awareness of this resource, as mentioned in Section 3.1.1, began only in the mid-twentieth century – several decades after the introduction of modern accounting systems, which still have not been fully modified to accommodate them.

Table 7 shows these resources:

Table 7: The primary factors of production.

PRIMARY FACTOR OF PRODUCTION	RESOURCE TYPE	UNDERLYING SCIENCE
LAND	Natural resources	Physical sciences – chemistry, physics, engineering
LABOR	Human resources	Labor economics
CAPITAL	Financial resources	Financial economics
KNOWLEDGE	Epistemic resources	Knowledge economics

Looking at this table, I make two observations: first, that the list is ordered by the time frames during which our knowledge of the resource was largely discovered and developed – the *physical sciences* describing natural resources starting in the seventeenth and eighteenth centuries; *labor economics* starting in the nineteenth century and into the early twentieth; *financial economics* in the latter twentieth century. The twenty-first century is, by that timetable, slated to see the development of a science of *knowledge economics*. We are doing our part!

A second thing worth noting is that the resources as ordered range from the extremely tangible (i.e., physical resources) to the extremely intangible (i.e., epistemic resources). Human and financial resources fall somewhere in between – not able to be weighed on a scale, but at least able to be represented by metrics such as hours worked in the former case and currencies in the latter. Perhaps the closest analogous metric in knowledge work is the *charged hour* of the knowledge practitioner, e.g., doctor, lawyer, or consultant.

One could even argue that the primary role of epistemic assets is to empower and "envalue" (i.e., render valuable) more tangible assets – since, absent knowledge, many such assets would have little economic use. Spender (2014) notes that, "The things economists are comfortable with, such as the expense of a beer-bottling plant or newspaper press, are only valuable because there are people with knowledge of how to operate and maintain them. But the firm does not own their knowledge, as it owns the plant and the press. *The values of all corporate assets are always mediated by and conditional on people's know-how*, something not easy to identify, control, or price." (Emphasis added.)

On a macro-economic scale, the growing dominance of intangible assets has led to the realization that we now have "capitalism without capital," the title of a fine overview of this phenomenon (Haskel and Westlake 2018). In most of the world's advanced economies, investment in intangibles rivals, or has even overtaken, investment in tangible assets. This presents challenges for

analysis, investment, and public policy – since the traditional ways of looking at and measuring things don't work so well anymore.

On a macro scale, intangibles have different characteristics from tangibles. Haskel and Westlake describe the four main ones[18]:

- **Intangible investment tends to represent a sunk cost.** With a tangible asset like a piece of equipment, the organization can sell it off if and when it no longer meets their needs. There are not such ready secondary markets for "used knowledge."
- **Intangible assets generate spillovers.** Preventing others from using your useful ideas that "spill over" simply by virtue of being used is harder than getting them to not use your physical property, for example your factory. In the latter case you can put locks on the building and have people arrested if they try to break in. With your ideas, you can patent them and then pursue people legally who infringe them – but this is a more laborious and slower process than protecting your physical property.
- **Intangible assets tend to be scalable.** The Coca Cola Company, for example, holds its brand and its formulas for the product, and licenses them to the manufacturers of the product, i.e., local bottling companies worldwide. Apple runs on a similar model, wherein Apple products are "Designed in California" and patented, then manufactured by contractors in low labor-cost geographies, primarily China. When demand for Coke or Apple products fluctuates, the outsourced manufacturer bears the cost of tooling up (or down), hiring (or firing) people, etc. The intellectual property holder is relatively immune to these variables, since the IP scales quickly and flexibly.
- **Intangible assets tend to have synergies (complementarities).** They are often more valuable when used in combinations than when used individually. We mentioned in Section 2.1.2 the epistemic wrappers that have been used to transform previously unexciting business models into economic powerhouses. Renting out a room in your house, with a technology front end, became Airbnb. A car hailing service became Uber. A warehouse distributor became Amazon.

These macro distinctions also scale back down to the intra-enterprise level, i.e., individual knowledge products or projects. For example, given that knowledge is a sunk cost, there may be ways to redeploy existing knowledge in new ways that provide new benefits at little additional cost. I have had successes in identifying

18 Note also here the differences between knowledge and other assets described in Section 3.2.

opportunities to re-purpose existing knowledge, most frequently across different silos within the same enterprise.

3.6 Accounting for Knowledge

It is widely held that measurement is the first step toward management of any economic resource. Accounting systems are the formal tools available for doing this on an enterprise basis.

3.6.1 GAAP/IFRS – Goodwill

Knowledge-friendly executives are typically comfortable in openly saying enlightened-sounding things to the effect that, "Knowledge is our most important asset" – but the reality on the ground is too often quite different. In fact, many intellectual and knowledge capital "assets" are, for accounting purposes, not assets at all – they are *expense* items. This has two important and pernicious effects:

- It reinforces the expectation that knowledge is, in fact, not an investment with an expected return, but rather an **expense** on which no return is expected, and that is not directly related to revenue generation (i.e., it is an overhead expense – never a strong position to be in at budget time)
- It renders knowledge effectively **invisible**, especially to shareholders and financial executives who manage from financial statements

In the United States, the dominant financial accounting system is Generally Accepted Accounting Principles (commonly referred to as GAAP). GAAP was created during the 1930s, with the purpose of helping to prevent a recurrence of the economic conditions that had led to the Great Depression worldwide. Though it seems largely to have worked in that regard, it is less and less relevant to organizations in the modern Knowledge Economy, which had its origins in the 1960s.

This lack of accountability for knowledge and other intangibles is also an issue in Europe. According to the European Central Bank, "Intangible assets are non-monetary assets without physical or financial substance. They encompass a broad range of highly heterogeneous assets, including human capital, innovative products, brands, patents, software, consumer relationships, databases and distribution systems. Some of these assets enable firms to obtain productivity gains and efficiencies from new technologies and, as such, play a strategic role in a firm's value creation. . . In euro area countries and other advanced economies, investment in intangibles has grown strongly in recent decades. Over the last 20

years, growth in intellectual property products. . . has outpaced growth in tangible investment in the euro area. . .[due to] factors such as the increase in global competition, the sectoral shift from industry to services, the expansion of the digital economy, changing international specialisations in the area of production, new business models (e.g., for tax optimisation purposes) and general technological advances." (Andersson and Saiz 2018)

Professor Baruch Lev of New York University has been instrumental in trying to get the accounting profession to update its rules and reporting for intangibles – so far to little avail. As he points out, "The U.S. accounting rules are clear: Internally-generated intangibles – through R&D (patents and trademarks), marketing (brands, customer relations), development (business processes), or training (human resources) – are treated like regular expenses (charged immediately to income), whereas the same intangibles, if acquired, either directly, like patents or brands, or through corporate acquisitions (R&D-in-process, customer lists) are considered assets and capitalized and, then, some are amortized" (Lev and Gu 2016, 83). Such items appear as "goodwill" on a corporate balance sheet, typically with little detail or further justification.

The distinction between the accounting treatment of developed versus acquired intangible assets is made because the latter are seen to have been priced "objectively" by a buyer in an arm's length transaction. While this reasoning has some logic to it, it leaves a huge gap in that non-acquired intangible assets are simply expensed – in effect, because there is no agreed-upon means to determine their value. Because knowledge capital is now such a large component of total capitalization – 50% or more of total enterprise value in some cases – this causes distortions in traditional valuation methods so large that companies end up relying on estimates or non-GAAP measures that discourage direct "apples-to-apples" comparisons with other entities. EBITDA, to cite one often used and egregious example of a non-GAAP metric, stands for *earnings before interest, taxes, depreciation, and amortization*. This is a genteel way of saying it *omits* consideration of interest, taxes, depreciation, and amortization costs – which are real costs, and which would (of course) reduce earnings in nearly all cases if counted. Thus, the use of EBITDA as a reported metric has the effect of making things appear rosier than they actually are.

One could think of total enterprise value (as determined by market forces[19]) as consisting of two components: assets that are counted under GAAP, and those that are not. The former consists of tangible assets that are categorized on the balance sheet (as plant, equipment, inventories, financial assets, and so on). The latter

19 And we note that some researchers find that the market undervalues intellectual assets, as described in Section 3.7.2.

consists of intangible assets – including "knowledge" and intellectual capital – that are treated as Goodwill, and usually not further categorized, if they have been acquired in a business combination – and simply absent if they have not been. So, the enterprise value of knowledge can be represented mathematically as:

ENTERPRISE KNOWLEDGE = **TOTAL ENTERPRISE VALUE** – **GAAP ASSETS** (**excluding Goodwill**).

Note that we need to add back the knowledge assets that are accounted for as part of Goodwill.

The net situation is that intellectual capital is treated in vastly inconsistent ways, depending on whether it has been acquired (where it counts as Goodwill and is then capitalized) or is the result of internal development (where it is neither clearly accounted for, nor capitalized, but rather expensed). Where it has been acquired, the acquisition price is assumed to be the asset value – with little independent verification of this value. It is a fact of economic life that some intellectual capital items are purchased during bidding wars at prices vastly inflated over their ongoing value as assets. This can happen when, for example, brands that once commanded market premiums are no longer seen as appealing in the marketplace. In this case, known as *intangible asset impairment*, GAAP requires the asset to be written down (or written off entirely), which in turn requires some independent assessment of its ongoing real value.

Perhaps even more surprisingly, one study (Laney 2018) found that 80 percent of corporate executives interviewed thought that the information assets of their organization *were* represented within Goodwill or elsewhere on the balance sheet – when it was highly likely that many of them were not: "Even among enterprises whose core business is the buying and selling of information (e.g., TransUnion, Onvia, HG Data, IMS Health, A.C. Nielsen, and IRI), information assets are nowhere to be found on their balance sheets."

3.6.2 The Knowledge Balance Sheet

One can hardly fault financially-oriented managers – which is many of them – for thinking that knowledge, being in effect invisible, is not important or practical – or, worse, some fanciful idea dreamed up by predatory consultants. They are simply using the tools they have to do the jobs to which they are assigned.

Knowledge practitioners need to take every available opportunity to give managers the tools to see our work and work products – literally. We must render our work tangible, visible, and clearly linked to enterprise strategies and outcomes.

I call one tool I developed to do this the Knowledge Balance Sheet™ (KBS) (Powell 2017a). Please note that (1) this is a managerial tool, not an actual financial reporting statement, and that (2) it focuses on the Content asset only (as described in Section 2.2.2).

The KBS (Figure 5) consists of four major content asset classes, each containing asset categories. The asset classes are Purchased Knowledge, Produced Knowledge, Protected Knowledge, and People Knowledge. Note that the first three of these categories are more properly referred to as information, with the last being "true knowledge" (as described in Section 1.5.2).

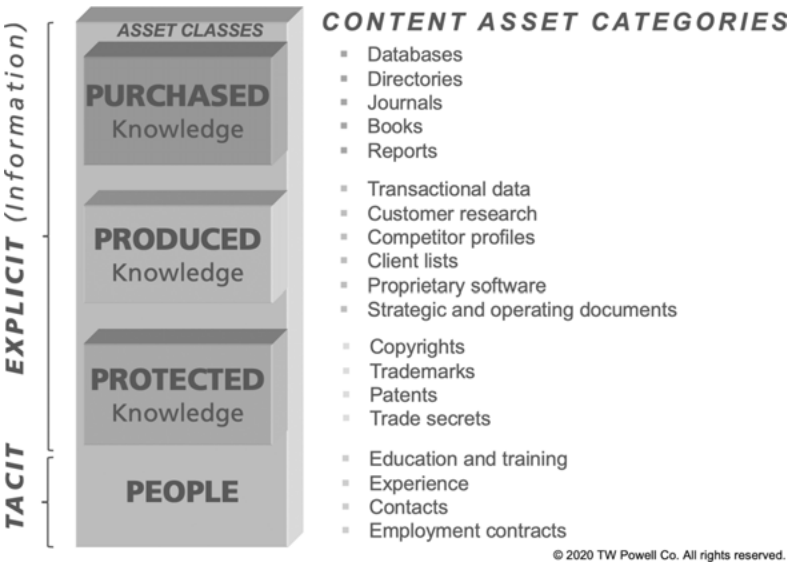


Figure 5: The knowledge balance sheet.

The content assets within each asset class are:

- **Purchased Knowledge** – assets that are purchased from information publishers and vendors, e.g., databases, directories, journals, books, and reports
- **Produced Knowledge** – assets that are produced internally in the course of doing business – e.g., transactional data, customer research, competitor profiles, client lists, proprietary software, and strategic and operating documents
- **Protected Knowledge** – legally-sanctioned intellectual property, e.g., copyrights, trademarks, patents, brands, and trade secrets
- **People Knowledge** – true "tacit" knowledge, e.g., education and training, experience, contacts, employment contracts, and non-disclosure agreements

A few management problems are immediately obvious. First, while the purchased items may be readily valued by their purchase price, the other assets are much more difficult to value properly (hence they are usually treated as expenses, as discussed previously).

Second, these assets are literally scattered all over the enterprise landscape in terms of where and how they are purchased and managed. Purchased Knowledge is most often the domain of the library or of operating units. Produced Assets are often siloed within the unit that produces and uses them – with little transparency or accountability across business units. Transaction and customer data could be within Sales, competitor profiles within Competitive Intelligence, software within IT – and other assets buried, who knows where? Protected Knowledge is usually the domain of the Legal department and/or outside counsel. And People Knowledge is usually managed within Human Resources.

This patchwork of knowledge silos and fiefdoms is what I earlier referred to as the *knowledge archipelago* so prevalent in most complex organizations (see Section 2.1.1). This is much more amenable to emerging network-based management techniques than to more traditional top-down command-and-control approaches.

3.7 "Knowledge IS the Business"

Peter Drucker's *Managing for Results* sets a high bar for the Knowledge Era: "Knowledge IS the business. . . Physical goods or services are only the vehicle for the exchange of customer purchasing-power against business knowledge." He presciently draws the relationship between enterprise knowledge and enterprise value, even weaving in competitive differentiation, in saying, "It is only in respect to knowledge – of all kinds, from scientific and technical knowledge to social, economic, and managerial knowledge – that a business can be distinct, can therefore produce something that has a value in the market place" (Drucker 1964, 5). This single sentence crystallizes Drucker's thoughts on the economic power of knowledge, and I use it often in speaking with business and academic audiences.

3.7.1 Embedded Knowledge

In any economic transaction of buyer and seller, there is a subtle yet important distinction between how the seller and the buyer each see the exchange. The seller sees it as the deal he has to close in order to boost revenue; the buyer sees it as a solution to her problem. As Harvard Professor Theodore Levitt

famously said, "People don't want to buy a quarter-inch drill – they want a quarter-inch hole!" In the age of Uber, we might envision a time when people no longer desire car ownership – they simply desire a ride from here to there.

If Drucker is correct that people are essentially buying our knowledge when they buy our product, it is crucial to understand this distinction. If knowledge is what we sell, and the product is what they are buying – how do these two relate to each other? How, in other words, is our knowledge *embedded* in our product? There are cases where the product and the knowledge supporting it are nearly identical – legal services or management consulting, for example. But even there, there are tangible representations of the "knowledge product" that are important signals of value – for example, the furnishings of the office, the dress and grooming of the professionals, and the printed and bound versions of the work products.

For most products, however, the supporting knowledge is deeply embedded. A tablet of a prescription drug, for example, could represent years of accumulated knowledge acquisition – in the form of molecule discovery, development, clinical trials, regulatory filings, sales and marketing, and the management of all these business processes. Not surprisingly, this effort structure is directly reflected in the cost structure. While the marginal cost to manufacture the pill may be, say US$5, the cost to the buyer could easily reach ten times that amount – based on an allocation of all these other costs, plus the manufacturer's profit and a shareholder return.

A complete framework for knowledge-based innovation is discussed in Section 6.1.

3.7.2 Knowledge Intensity

Though all industries contain a knowledge component, the proportion of total enterprise value attributable to knowledge – the *knowledge intensity* – varies widely. A primary determinant of this is the industry in which the enterprise competes.

In arguing for greater enforcement of intellectual property ownership and rights for U.S. companies, economists Hassett and Shapiro (2012) found that, based on data from the U.S. Bureau of Economic Analysis (BEA), the value of the intellectual capital in the U.S. economy was at least US$7.67 trillion in 2011. U.S. GDP that year was US$15.53 trillion – so intellectual capital represented about half of GDP. But they also captured a significantly broader measure, the value of all intangibles, defined as intellectual capital plus "'economic competencies' – the value of the firm-specific and task-specific skills and knowledge of an industry's managers and employees, as well as other intangible assets such as brands." By this broader measure, intangible assets in the U.S. economy totaled at least US$13.75 trillion in 2011 – nearly 90% of overall GDP!

As for industry distributions of intellectual capital, "Considering publicly-held firms, the industries with the highest values of intellectual capital, as expected, are those associated with very large investments in R&D, innovation and highly technical products, including software, pharmaceuticals, and energy. For example, the market value of publicly traded firms involved in energy . . . comes to $773 billion. Similarly, software and its services hold an estimated $749 billion in intellectual capital, followed by insurance and other finance at $745 billion, capital goods at $632 billion, and pharmaceuticals, biotechnology and life sciences at $532 billion."

The entire distribution by industry is as follows:

Table 8: U.S. intellectual capital and intangible assets by industry (2011).

INDUSTRY	INTELLECTUAL CAPITAL (US$ Billions)	INTELLECTUAL CAPITAL AS A SHARE OF MARKET VALUE	INTANGIBLE ASSETS (Intellectual Capital + Economic Competencies) (US$ billions)	INTANGIBLES AS A SHARE OF MARKET VALUE*
Energy	$773	38%	$1,385	68%
Software and Services	$749	53%	$1,344	95%
Insurance and Other Finance	$745	39%	$1,336	70%
Capital Goods	$632	48%	$1,134	86%
Pharma, Biotech, Life Sciences	$532	52%	$954	94%
Technology Hardware and Equipment	$495	47%	$888	84%
Food Beverage and Tobacco	$443	58%	$794	104%
Media	$378	75%	$678	135%
Materials	$349	47%	$627	85%
Healthcare Equipment and Services	$348	54%	$625	96%
Telecommunications Services	$292	72%	$523	129%

Table 8 (continued)

INDUSTRY	INTELLECTUAL CAPITAL (US$ Billions)	INTELLECTUAL CAPITAL AS A SHARE OF MARKET VALUE	INTANGIBLE ASSETS (Intellectual Capital + Economic Competencies) (US$ billions)	INTANGIBLES AS A SHARE OF MARKET VALUE*
Retailing	$267	44%	$478	78%
Diversified Financials	$212	20%	$381	35%
Semiconductors and Equipment	$191	43%	$343	78%
Household and Personal Products	$182	61%	$327	109%
Consumer Services	$170	50%	$306	90%
Food and Staples Retailing	$161	42%	$288	75%
Transportation	$142	49%	$255	87%
Real Estate	$139	30%	$249	54%
Banks	$133	24%	$238	43%
Automobiles and Components	$133	62%	$238	112%
Consumer Durables and Apparel	$104	46%	$187	83%
Commercial and Professional Services	$91	56%	$164	101%
Utilities	$4	1%	$7	1%
TOTAL	**$7.67 trillion**	**44%**	**$13.75 trillion**	**79%**

*We refer informally to this ratio as *knowledge intensity*. *Market value* is roughly equivalent to the term *enterprise value* that we use herein.

Thus, "intangibles represent at least 70 percent of market value of 19 of the 24 industries, or more than three-quarters of industries, and at least 100 percent of the market value of six of the 24 industries, or one-quarter of industries. This tells us that some intangible assets may be systematically undervalued by investors, especially the firm-specific economic competencies of employees."

This data shows that, in the U.S., by either measure knowledge makes a huge contribution to enterprise value. It is a reasonable assumption that most developed economies would demonstrate a similar pattern among industries. Industries that are highly knowledge-intense tend, with good reason, to "care" more about knowledge than those that are not. It is my personal observation, albeit anecdotal, that knowledge budgets here are higher, and the business case for knowledge is more readily proven. Knowledge professionals consequently tend to shoulder greater responsibility, wield greater influence, and enjoy correspondingly more robust careers within industries that are relatively more knowledge intense.

3.8 Knowledge Markets

A knowledge market is an exchange mechanism that supports the matching of knowledge sellers (i.e., Producers) with buyers (i.e., Users). As with a market for financial products or industrial goods, there may be a human broker who matches the buyer and seller and mediates the exchange. However, the "broker" in a knowledge market is most often an electronic board where sellers can list what they have on offer and buyers can list what they are seeking.

Across organizations, there are commercial entities that offer this service for a fee. Yet2.com, for example, offers opportunities to in-license (i.e., buy) or out-license (i.e., sell) technologies in a range of industries. They also offer technical advice and assistance in, for example, setting up portals that companies can use to receive, filter, and assess innovation-related suggestions made to them. Other organizations that serve as forums for the exchange of ideas include ICEX, The Conference Board, and IQPC.

That said, "The market for know-how is riddled with imperfections and unassisted markets are seriously faulted as institutional devices for facilitating trading in many levels of technological and managerial know-how. . . This can be expected to remain so until know-how becomes more commodity like." (Teece 1998)

Within an organization, knowledge exchanges are most often made by barter – *You help me here, I'll help you there – and give you a good recommendation*. Knowledge practitioners can enable these exchanges via internal share boards built upon SharePoint and similar technologies.

3.8.1 Knowledge Pricing

The market mechanism is ideal for exchange when there is a knowledge value capture mechanism in place, such as a patent. Intellectual properties, patents,

trademarks, and copyrights are routinely bought and sold, whether on markets as individual transactions, or as components of larger transactions. Where there is no such value capture mechanism, the pricing of knowledge becomes more problematic – primarily because there is no commonly-accepted *unit* of knowledge (Plato's cage of doves notwithstanding). With consumer or industrial commodities, for example rolled steel, there is a quote price by unit (i.e., weight, in that case). Whether one measures weight in kilograms or pounds, whether one measures price in euros or dollars, there is an equivalence set in world markets that allows global trade in such materials to occur.

With knowledge, there is no directly equivalent unit of knowledge. In the nearly-pure-knowledge industries of consulting and law, the closest thing to that is the *hourly billing rate* of the knowledgeable person – the fee that is due for an hour of that person's time. Within a given industry, these fees can range by a factor of ten or more, depending on the person's training, experience, and overall attractiveness in the marketplace. Note that in a consulting or law firm, such hourly fees consist of a charge for the professional's knowledge plus a charge for firm expenses – office rent and utilities, support personnel, capital expenses like office equipment, etc. – which may total as much as, or more than, the expertise fee.[20]

3.8.2 Data Ownership

The construct of knowledge markets begs the fundamental question: *Who owns data?* For example, any given electronic health record can be viewed in two fundamental ways – as doctors' notes or as patient data. In the former view, the data is assumed to belong to the medical practitioner and/or the provider institution for whom she is employed. In the latter view, the data is seen as fundamentally belonging to the patient. The health data privacy laws in the U.S. (the Health Insurance Portability and Accountability Act of 1996, known as HIPAA) seem to lean toward supporting the latter interpretation. Of the many manual forms that a visit to a U.S. doctor entails, most of these are waivers of the HIPAA privacy restrictions, such that multiple medical providers may share data for treatment, and such that data may be shared with third-party payors.

20 In an interesting parallel to this, the U.S. military uses a method called *knowledge value added* that in effect measures knowledge as the time to learn a particular process, multiplied by the learner's imputed salary for the time spent learning (LaRocca 2008).

The obvious extension of "my data is mine" is the idea that, while I retain ownership of my data, I also may in effect choose to license it to others for their use. This in turn begs the question of *Should patient data be licensed as other intellectual properties are licensed – i.e., with fees being paid for access and use?* This question applies not only to health records, but also to all customer research and data, including that compiled by market research firms and social media companies. The question of the value of data becomes less an academic exercise and more a structured assessment of the economic value of the epistemic asset.

In a related issue, the licensing policies of major scientific publishers have recently come under attack as some scientists have moved toward advocating an *open access* model for scientific research findings – which are currently published in high-fee subscription academic journals. This is a particularly thorny ethical issue when public revenues are used to fund the original research, which then becomes a profit engine for the publisher.

3.8.3 Intellectual Capital

We note that the system of legal safeguards called *intellectual capital* – patents, trademarks, and copyright – serves both as a barrier to unfettered access and use of such property, but also as a way of protecting and enhancing the value of such property. Intellectual property rights are embedded in the U.S. Constitution, Article I, Section 8, Clause 8 that grants Congress the power "To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." The architects of this clause were said to draw upon the writings on property rights of the Roman Republican politician and philosopher Cicero (1913, 2.73): "Everyone shall have what belongs to him and. . . private citizens [shall] suffer no invasion of their property rights by act of the state."

Perhaps the most dramatic example of the value of intellectual capital is in the pharmaceutical industry, where the economic advantage conveyed by patent protection upon a given formulation is enormous. Vondeling et al. (2018) conducted a meta-analysis of 16 studies to determine the economic effect on pricing of prescription drugs going off-patent in mix of countries. Their top-line finding was that, "The number of drugs included within different studies ranged between 1 and 219. The identified studies indicated that drug prices decreased significantly after patent expiry with drug price ratios ranging from 6.6 to 66% 1–5 years after patent expiry". The drug knowledge *per se* – the R&D, the manufacturing methods and costs, the sales and

marketing know-how – had not changed at all in going off-patent. All that had changed was the ability to command a premium price for that knowledge in the marketplace – as manifested in price drops ranging between one-third and fifteen-sixteenths of the original market price. This, especially to a financial executive, is a working definition and vivid metric of the value of knowledge. Using these numbers and the DCF method described in Section 5.2.2, plus some allowance for *price elasticity*, i.e., the tendency for volumes to increase as prices decrease, one could compute the incremental value of a given patent.

Patents, trademarks, and copyrights (i.e., *protected knowledge* as discussed in Section 3.6.2) have the most readily identifiable value[21] because there are active markets for them. These however are small, uncoordinated markets (i.e., unlike the large markets for stocks and bonds) consisting of brokers for buyers and sellers of these properties, and who also often provide asset valuation services.

3.9 Key Concepts in Chapter 3

sequential access
account (true belief)
productive expertise
Cardwell's Law
useful knowledge
knowledge culture
rivalry
re-use
synthesis
knowledge culture
relevance
non-redundancy
insider information
understandability
comprehensiveness
value creation
value life-cycle
value metrics
value signaling
value-based competition
value proposition
value alignment
supply chain
value waves
random access
sophistry
acquisitive expertise
knowledge stagnation
knowledge economy
knowledge exceptionalism
excludability
analysis
"analysyn"
timeliness
accuracy
exclusivity
information asymmetries
credibility
persuasiveness
value production
value map
value markers
value vector
value dynamics
value model
value chain
demand chain
value portfolio

21 Or, more specifically, *price* – a distinction discussed in Section 5.3.3.

value proximity
sunk cost
scalable
Generally Accepted Accounting Principles (GAAP)
goodwill
purchased knowledge
protected knowledge
embedded knowledge
knowledge markets
intellectual capital
epistemic resources
spillovers
complementarities
IFRS
knowledge balance sheet
produced knowledge
people knowledge
knowledge intensity
knowledge pricing
price elasticity

3.10 Questions for Discussion

- Why was the instrumental view of knowledge such a breakthrough?
- Why did it take 200,000 years for humans to develop digital technologies?
- Why was it not until 1962 that the economic value of knowledge was formally recognized? What was the significance of that recognition?
- In what ways is knowledge different from other economic resources? In what ways is it similar?
- What are the fundamental tests of value for data?
- What are the purposes of analysis? What are the fundamental tests of value for analysis?
- Is it important that we formally and accurately account for enterprise knowledge? Why?
- What does the knowledge intensity of an industry tell us?

4 The Knowledge Value Chain

Among the earliest memories I have of world events are two that, in hindsight, started me down the path I have now traveled. On May 1, 1960, a U.S. U2 spy plane was shot down over the USSR. It had been on a routine mission to photograph the ground from an extremely high altitude, which it could do with pinpoint accuracy. A short time later, in October 1962, photos produced by similar aircraft detected that Soviet missiles had been installed in Cuba, about 90 miles from the U.S. mainland. This precipitated the "Cuban missile crisis," which by contemporaneous accounts brought the two nations close to the brink of nuclear exchange. I recall having recurring nightmares about nuclear war during this time. The drama finally resulted in a capitulation by the USSR and a resumption of "normal" tensions with the U.S.

Through this, I became aware that quite possibly these photos had saved my life. As a result, I was concerned to read, a few years later, that the data coming in from spy planes – which was soon augmented by that from orbiting satellites – was simply too voluminous for analysts to process in a timely way. Thus, we can say that "big data" has been with us as a challenge since (at least) the 1960s. And getting the optimal balance between data and analysis seemed to be the way to produce the "value" of knowing what was happening in time to take countermeasures. This vivid experiential lesson stayed with me through years of professional practice.

Much later in 1996, when I started my consultancy The Knowledge Agency®, I worked for five years developing and delivering a series of lectures and workshops called *Knowledge: The Engine of Value*. By its last iteration in 2001, the Knowledge Value Chain® made up only a little over five percent of my slides. But over time it became the centerpiece of my thinking about the linkage between knowledge and value. I still use it often with clients and students. I believe its durability can be attributed to:

- its relative **simplicity** and memorability;
- its focus on continuous **improvement**; and
- its ability to be applied in a **range** of situations, many of which are described in my 129-page monograph *The Knowledge Value Chain® Handbook* (Powell 2014). We make the *Handbook* available on our website (both hard copy and PDF) and through Amazon, and we recommend that the reader wishing to implement activities based on the KVC obtain that resource.

I can trace my earliest thinking about the KVC partly to a comment that my beloved operations research professor, Art Swersey, used to make at the beginning

https://doi.org/10.1515/9783110593044-004

of a case discussion. Art would advise us to "Assume you can call God and thereby have perfect information in advance about this situation." Eliminating the details and friction of gathering data, of rejecting unacceptable data, and the like made the flow of the analysis part of the case much more straightforward – downright utopian! When I later began conducting competitive analysis and market intelligence studies, I quickly realized that it is these "devils in the details" that can make or break a project. Subsequently, when I began teaching and writing about competitive intelligence, many of my discussions (like that of other teachers) concerned such details of how and where to find information.

There was much less attention among my clients and students to the questions of, *Why do we need this information? Once we have it, what will we do with it? How will it help us achieve better results?* I believe this was mostly because it is commonly thought (and almost always practiced) that knowledge services professionals do not need to know *Why?* in order to do their jobs effectively – an assumption I will consistently challenge herein. So, before we "do all the doing" of collecting and analyzing data and information, I often find it illuminating to revisit my professor's hypothesis: *Assume we already have all the information being sought – then what would we be doing differently?* Under this kind of scrutiny, "need-to-know" questions will rise to the top of the pile, and "nice-to-know" ones will sink to the bottom (see Section 2.1.4). The acquisition of knowledge that has no usefulness can be curtailed, often at great savings of time, effort, and resources.

4.1 Knowledge Process

In business, as in life, *process* as a tool of understanding and improvement is important – some (and I am one) would say, all-important.

4.1.1 The Information Metabolism

During my early preparation to (putatively) enter the field of medicine, I became enamored by *process* and its central role in human life. Enamored as I was then of organic models, I later conceived of the flow of information within organizations as an *information metabolism*. Apparently, I was the first to publish this analogy (Dou 2019), and was delighted to find that other researchers found it useful. In my article of that same name, I quoted a client, a research manager at a large U.S. bank, as saying: "We buys lots of information, but don't use it well. It stays in local organizational pockets and doesn't get integrated well into what

we do. We don't get maximum value out of it. Before long, it's stale, and we've missed the opportunity to create value." (Powell 1995)

I heard similar things so often from clients in different industries that I developed a hypothesis that information was "ingested" (i.e., purchased), then "digested" in a transformative process that converted some of it into organizational value (i.e., energy and tissue) and left the rest as waste. Just as digestion was seen as a combination of macro activities (like biting and chewing) and micro activities (like cellular absorption), knowledge was seen to have macro aspects (e.g., analysis) and micro aspects (e.g., communication with decision makers.)

The capacities to acquire information and to use it effectively were seen as related, but distinct. Some organizations could acquire information well, but not process or use it as effectively. As a result, they would become "information fat." Others were good at processing but did not have access to enough information – they would become "information starved." In still others, the metabolism would be balanced between acquisition and use: "A well-architected process ensures that information will not just fade in value, but will be absorbed and become part of the competitive knowledge base of the organization, and eventually be transformed into actionable intelligence wherever and whenever it is needed" (Powell 1995, 44).

I concluded that the knowledge professional plays the role of the *enzyme* – the catalytic agent directly responsible for (1) engineering the mix of raw data and processing/ analytic capacity on a continual basis, and (2) monitoring the quality and flows within the information metabolism (though I now see these, especially the latter, more effectively as roles for the managers of the knowledge function, or perhaps as a project brief for an outside agency). I proposed that an *information audit* be conducted periodically to "identify bottlenecks, overlaps, and opportunities for greater leverage. It should result in corrective actions that in turn both lower costs and increase the effectiveness of the [knowledge] function."

Eventually I found in working with clients that this organic model of the information metabolism worked less effectively than a more mechanistic model I had been developing – the *business intelligence value chain*, which I developed over time into the Knowledge Value Chain®.

4.1.2 The Value Chain

When I studied at the Yale School of Management, I took all the courses then offered in operations research and production management. There I learned to apply tools related to manufacturing *things*. Though I have never worked directly in a manufacturing environment, many of the tools I learned in studying

manufacturing I have adapted to the world of "knowledge manufacturing," further discussed in Section 4.6.

One of these tools is the construct of *value chains* – which I first learned as a way of analyzing manufacturing costs. Each step of a manufacturing process has a discrete *cost* that can be either directly measured or deduced by analyzing and allocating pools of costs (such as overhead, for example). Value chain analysis in this context enables you to see where costs are highest and lowest, where they are fluctuating over time (if time is a factor captured in your analysis), and so on. It was a short step from here to assuming that each step also has a *benefit* attached to it – though in fact such stepwise benefit is typically not directly measurable, and in fact most productively thought of as an idealized construct.

Harvard professor Michael Porter described a value chain at the enterprise level, a collection of activities performed by a company to create value for its customers (Porter 1985). This consists of primary activities and support activities, as follows:

- **Primary activities** – inbound logistics, operations, outbound logistics, marketing and sales, and service
- **Support activities** – firm infrastructure, human resources management, technology development, and procurement

My contribution has been to apply the value chain construct in yet another way – to the production and use of epistemic resources: data, information, knowledge, and intelligence – and the value that flows from these resources. I define *value chain* as "a series of activities that together, in sequence, produce economic value." (Powell 2014)

4.2 The DNA of Decision-Making

One of the most interesting jobs I've had was as a research director at Find/SVP, part of a global commercial intelligence network. I led teams that ran hundreds of projects in market research and competitive intelligence, ranging from single-day projects to those that took several months to execute. One of my roles for each project was to write a project plan describing the scope and research approach for the project, the project team, the timelines, the costs and benefits, etc. This was the primary selling tool for the project – *Here is what you're going to get from us* – and the basic tool I then used to manage the project while underway.

I did this carefully, since getting a client to buy into a clear project plan is much easier than working after the fact to figure out why the project did not meet that client's expectations. When I started doing this, each project seemed

unique – and I handcrafted each plan. Several years later – probably around the 10,000-hour mark that it's said is required to achieve mastery of any practice – I began to have a higher level of understanding of the anatomy of each project. I began to realize that they were, at the "DNA level," not unique at all – but shared (more or less) the same elements, arrayed in (more or less) the same sequence. Data elements were collected, processed, and analyzed, and the results were communicated to the client.

Though this was a reasonably good description of the Production stages of a project, it did not describe its Use at all – discussing the findings, making decisions, and taking actions based on the research, all of which are required in order to fully realize the benefit of the knowledge work product.

After working through several early iterations, I arrived at the Knowledge Value Chain (KVC) (Figure 6), for which I was eventually awarded a U.S. trademark. The KVC describes the linkages between (1) how an enterprise produces *value* and (2) how it acquires and processes *knowledge* – that is, how it "thinks". The KVC builds upon the following key observations about knowledge flow:

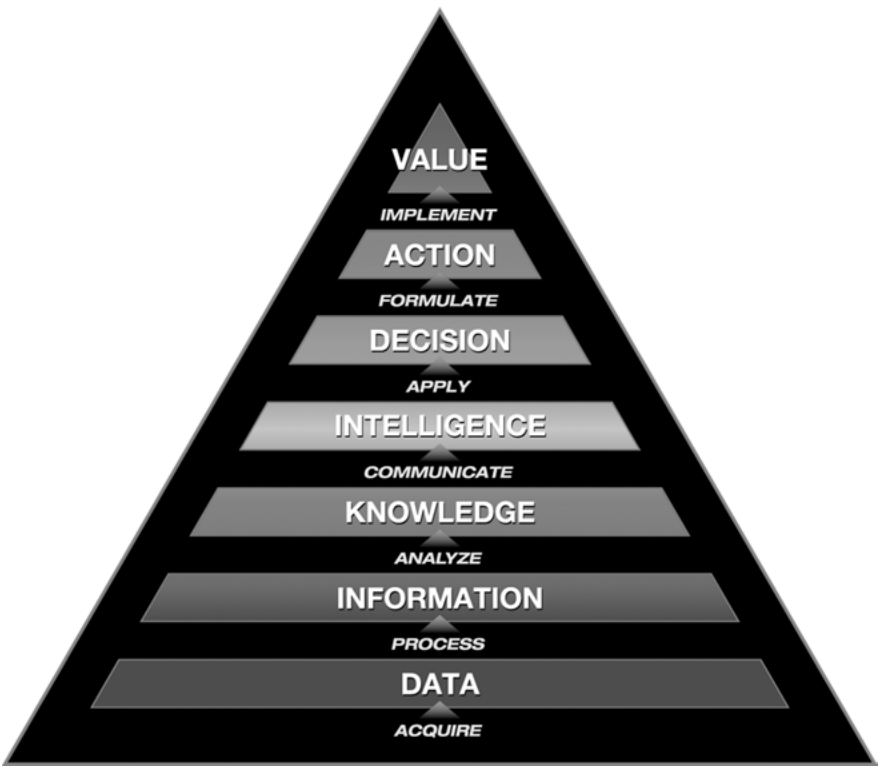


Figure 6: The Knowledge Value Chain®.

- **Knowledge is a linear process.** In contrast to "cyclical" models of knowledge development,[22] the KVC is a linear model. As with manufacturing, the KVC uses a series of steps to define a final product. This implies that you must understand the destination before you start the journey. And that destination is not simply the approval of your decision maker client (though that may be a good real-world proxy for the true payout). The true payout from a knowledge process is the final *business outcome* that results from that process.
- **Knowledge is a serial process.** The steps in the process are "wired in series." As with a chain of jewelry, when one link in the value chain is broken, by definition the chain itself is broken. A failure at any step is replicated in all later steps. For example, a great analysis of faulty data will produce a misguided conclusion. The old adage "garbage in, garbage out" makes this point memorably.
- **Each step in the knowledge value process is integral and essential.** If you short-circuit a knowledge process by skipping steps (which you might be tempted to do in order to save time or other resources), you risk failing to create value – or possibly even destroying value. The classic example is when a decision is made without sufficient information to support it. The result is more a matter of luck than of strategic management. While it is possible to have some success in the short term under these conditions, over the long haul the odds are stacked against being able to do it consistently.
- **Knowledge value chains interact.** Organizations contain hundreds or even thousands of KVCs, many of which interact with other KVCs. These interactions may provide opportunities for value development. One huge set of opportunities for value is the re-use or re-purposing of existing data or information. To do this effectively, you need to map these various KVC processes, formally and systematically if possible, in order to identify and optimize these interactions. This is particularly productive in cases where new knowledge has been created. As an example, when you finish a research project for a decision maker, it is helpful to find out (with your client's consent) who else in the organization could benefit from the information.

22 A widely-used example is the U.S. intelligence community's *intelligence cycle* model.

4.3 Details and Features of the Knowledge Value Chain®

The KVC is described in detail in *The Knowledge Value Chain® Handbook* (Powell 2014). Its focus is on identifying and fixing the "breaks" and weakened links that often occur. The *Handbook* identifies 67 common points of KVC failure, and how to prevent and correct each of them. Some of the major features of the framework are described below.

4.3.1 KVC States and Transforms

A *state* is a stage of processing in the KVC. The KVC contains seven states:

1. **Data** – the basic facts and figures that result from a data acquisition initiative
2. **Information** – data that has been cleaned and organized
3. **Knowledge** – information that has been analyzed
4. **Intelligence** – knowledge that has been communicated to a User or decision maker
5. **Decision** – a choice among competing options based on the preceding steps
6. **Action** – decisions that have been formulated into tactical and strategic initiatives
7. **Value** – organizational results, outcomes, and impact

A *transform* is an action step needed to move from one KVC state to the next. It requires expenditures of effort, resources, and time. There is typically a *gate* between each transform, i.e., a formal or informal assessment and decision as to whether it is worth moving to the next transform. The KVC contains nine transforms, each named below by both its noun and verb forms:

0. **Planning/Plan** – develop an initial shared understanding with the client.
1. **Acquisition/Acquire** – gather data according to the research plan.
2. **Processing/Process** – organize and clean data so that it is ready to be analyzed.
3. **Analysis/Analyze** – pull data apart (analysis) and put it back together (synthesis) to give an insightful view of the situation.
4. **Communication/Communicate** – transmit the analysis and backup information to a decision maker or automated decision-action agent; also known as *distribution*.
5. **Application/Apply** – using intelligence and decision criteria, arrive at a decision supported by the intelligence.
6. **Formulation/Formulate** – plan actions to implement the decisions.

7. **Implementation/Implement** – execute the action plans designed to put into practice the decisions made.
8. **Feedback/Feed Back** – following implementation and value production, collect data on an ongoing basis and feed it back into the KVC.

There is an overarching KVC step that supports all of the transforms, the *management* of each aspect of the effort.

KVC transforms 1–3 are collectively known as *knowledge production*. KVC transforms 5–7 are collectively known as *knowledge use*. Note that in most cases, the production occurs at vastly different times, locations, and scales than the use (see Section 2.4.4). An essential aspect of the *industrialization of knowledge* consists of the capture and scaling of production across many instances of uses and users. "Produce knowledge once, use it many times" is the basic formula for a successful enterprise built on knowledge.

The KVC is technology agnostic. Over time, the technologies engaged at each transform change, sometimes greatly – but the process structure and "DNA" do not. Technologies may entirely replace certain formerly human parts of the chain. For example, "once upon a time" trading stocks consisted of assessing your positions, deciding to make adjustments, calling your broker on the phone, having him put in an order that was executed at some subsequent time. Now, thanks to the large-scale automation of most aspects of the process, it's instantaneous. And thanks to algorithmic trading, even the decision step (i.e., to buy or sell shares of stock) is handled automatically, for example in quantitative hedge funds.

But even though the process may be algorithmic and instantaneous, this does not mean that the underlying knowledge production no longer exists. The capture and analysis of data and the formulation of trading rules (i.e., actions) are accomplished at some earlier time, captured into heuristics and algorithms, and inventoried for use at some later time. The "decision-making" remains essentially human – replete with imperfections and biases – but in the automated case it is captured and "canned" for deployment later, at the time an action must be taken.

The obvious challenge when the lowest steps of the chain, especially data asquisition, are automated through the use of sensors or other programmatic sources is the massive amount of data that is thereby collected (or "generated," perhaps a more appropriate term. See Section 4.5). When massive data volumes, velocities, and variability are present, this is the "big data" problem much discussed in the press.

4.3.2 KVC Flow Modes

The KVC can be used in each of three *flow modes* – Plan mode, Produce mode, and Present mode. In each of these cases, it is best to use the KVC in the "direction" in which it is most effective.

- **Plan –** downward chain. In planning, the value to be achieved (i.e., results, outcomes, and impact) should be considered first; then a program to best accomplish that can be designed. The key decisions to be made can be identified, with the intelligence, knowledge, information, and – ultimately – supporting data specified.
- **Produce –** upward chain. During the subsequent knowledge production process, data are gathered, then cleaned and organized to form information, analyzed to form knowledge, and communicated to form intelligence. It's important that actions be based on sound decisions, that in turn depend on sound epistemic resources. The chain, in other words, is traversed upward toward the eventual production of value.
- **Present –** downward chain. During a presentation to a client decision maker, knowledge professionals are often tempted to begin with a discussion of what steps they took, what sources they used, how long things took, what happened, what went right and wrong, and so on. All of the things, in other words, that delay getting to the decision maker's key point of interest – *What did you find, what does it mean, and how does that affect me/us?* Once you train yourself to address the value drivers of your work first, you will immediately find your client much more engaged. Once you gain her attention with the big news, only then (and possibly not even then) will you gain her attention to the details of your work process and flow. The chain, in other words, is revealed downward only in as much detail as is relevant and engaging to the client – and no more than that (though of course you are prepared with all the supporting details if they are called for).

4.3.3 Value Positives and Negatives

If the KVC seems complex, that's because it has many moving parts that interact with each other, sometimes in unexpected ways. Each of the nine transforms is a potential opportunity for failure (if you're a pessimist) or improvement (if you're an optimist.) For each transform, there are: (1) *value positives* – factors that increase the value of the transform, and, by implication, the value of the overall KVC, and (2) *value negatives* – factors that decrease the value of the transform and, by implication, the value of the overall KVC. As with manufacturing, the net

value produced by the entire process equals the summation of the net value produced by each transform within the process.

In effect, the KVC borrows elements of business process management (BPM) and total quality management (TQM) and applies them to knowledge. Much of my work with clients consists of identifying specific value-enhancing and value-eroding elements within their unique KVCs. My KVC "user's manual" describes many of these as they relate to the strategic intelligence process, and even contains a model KVC Scorecard™ to assess them quantitatively. (Powell, 2014)

4.3.4 KVC Failure Points

In our experience working with clients around the world in many types of organizations, two KVC transforms consistently present heightened risk with regard to value production:

- **The Communication transform.** The transformation between the Knowledge state and the Intelligence state is where value loss frequently occurs. This is most often because the knowledge professional, who is handing off a knowledge product to a decision maker, is not fully aware of (1) the importance of the knowledge product and/or (2) the uses(s) to which that product will be applied. This typically results in the over- or under-production of knowledge relative to its intended purpose. Too often there is a *You don't need to know* attitude that serves both the professional and his client poorly. I advocate openness and transparency in this transaction, which can be facilitated by (1) developing and documenting a shared understanding during the Planning stage of the process and (2) developing *meta-communications* that explain the knowledge being transferred – for example, what were the sources used, how was the knowledge developed, how understandable is the deliverable, and how reliable is the knowledge assessed to be?
- **The Planning transform.** Often related to the above, the value signals coming from the knowledge client may be unclear. This is especially true for enterprise-level KVCs. What is the purpose and mission of the organization? How does knowledge production and use support that? Where and how does this specific project fit in? These existential knowledge issues may be out of the direct control of the knowledge Producer, and may come from the top levels of the organization. This is an issue for top management to resolve – though too often the work of the knowledge professional must proceed apace even in the absence of such resolution.

Note that these are the transforms that result in the KVC "weak link" value barriers discussed in Section 2.4.2. These failure points were foreseen by Drucker (1964, 222) in saying, "Every knowledge worker makes economic decisions. . . to make the right decision the knowledge worker must know what performance and results are needed. In turn, the knowledge worker must be 'excited'. . . He cannot be supervised. He must direct, manage, and motivate himself. And that he will not do unless he can see how his knowledge and work contribute to the whole business." This speaks to the need for knowledge practitioners to be engaged in their work, and to the key role played by clear and compelling leadership in fostering such engagement.[23]

4.3.5 KVC Scalability

One great advantage of the KVC is that it is highly adaptable and scalable to fit a range of situations:

- **The work product level** (i.e., *micro-knowledge*). KVC analysis has been used to re-align knowledge reports and presentations to better meet the needs of client decision makers.
- **The work process level** (i.e., *meso-knowledge*). The KVC has been used to identify resource imbalances that can be corrected by the development of training programs and/or personnel realignments. Section 4.7 describes a case in which we used the KVC to identify new internal markets for a knowledge services function.
- **The enterprise level** (i.e., *macro-knowledge*). The KVC has been used to drive the development of knowledge strategies at the business unit or enterprise-wide level. Section 7.7.2 describes a case example of how we used the KVC to realign enterprise knowledge resources at a time of great organizational change.

It is entirely conceivable that the KVC could be scaled up to the *industry* level, where it would function among multiple enterprises. Beyond that, there is the *societal* level. Both of these remain unexplored territory as of this writing.

23 This explicit linkage of strategy to execution forms the basis of the *hoshin kanri* strategic planning process.

4.4 The Knowledge Plan

A knowledge plan is perhaps the most important single document in any knowledge initiative. This is because:

- Most knowledge projects are built **prospectively** – that is, they are specified in advance, then built to that specification. It is therefore paramount that such specifications be detailed as clearly as possible, and that all key stakeholders agree on them in advance.
- Knowledge is **abstract** – it is intangible, has few commonly-accepted metrics, and typically does not appear on enterprise financial records. A written plan makes it all the more concrete and credible.

In working with clients in a wide range of sectors and situations, I have developed the following project plan template. Note that this was developed for use by consultants in working with non-employer clients, but could easily be adapted for use by internal staff personnel.

1. EXECUTIVE SUMMARY – one-page summary of key points covered in the plan

2. PROJECT SCOPE

Client Background (optional for internally-prepared plans – but worth thinking about even then)

- Industry/purpose – Why does the enterprise exist? What mission does it serve?
- Size and major lines of business – How big is the enterprise (e.g., by revenues, stores, or customers/clients served)? What are its major products or services?
- Growth and profitability – How fast is the enterprise growing? Is it profitable? If it is a nonprofit, is the budget growing?
- Ownership/funding structure – Is it a public company? Venture-backed? Government agency? Nonprofit? How does it access capital?
- Major enterprise strategies – What major initiatives are underway? What are stakeholders expecting from this enterprise?

Statement of Sponsor Problem or Opportunity

- From initial discussions with the client

Project Objectives

- Specifically, what will be accomplished?
- Exclusions, if any (i.e., what is considered "out of scope"?)

3. PROPOSED APPROACH

Data Collection Plan
- Primary research – e.g., surveys, interviews, observations
- Secondary research – e.g., literature reviews

Analytic Plan
- Knowledge frameworks
- Integration of data sources
- Analytic approach

Schedule and Milestones
- Project deliverables – reports, briefings, etc.
- Workstreams for each team member
- Person-hours estimated to complete each major task
- Status reports
- Client meetings

Potential Project Risks and Contingencies
- For each potential risk: Risk Severity, Risk Likelihood, and Mitigation plan if encountered

4. PROVIDER TEAM

Team Staffing and Credentials – their backgrounds, what each will contribute
Roles and Responsibilities

5. CLIENT TEAM

Roles and Responsibilities – for each client stakeholder

6. PROJECT COSTS (see Section 5.1.4)

Project Tangible Costs – hardware, software, licensing fees, personnel, consultants, etc.
Project Intangible Costs

7. PROJECT BENEFITS (see Section 5.1.4)

Project Success Metrics – How will you measure the success of this effort?
Key Performance Indicators (KPIs) Impacted – Will this impact any existing client success metrics? Which ones, and how might they be impacted?

Other Outcome Metrics – Are there other ways in which the success of this project will be assessed (for example, client satisfaction, stakeholder engagement, etc.)?

4.5 Sources of Data

Since the entire KVC rests upon data, it is imperative that data acquisition be conducted with diligence and integrity. There are six major sources of data, divided into two broad categories, *active collection* and *passive collection* (Figure 7).

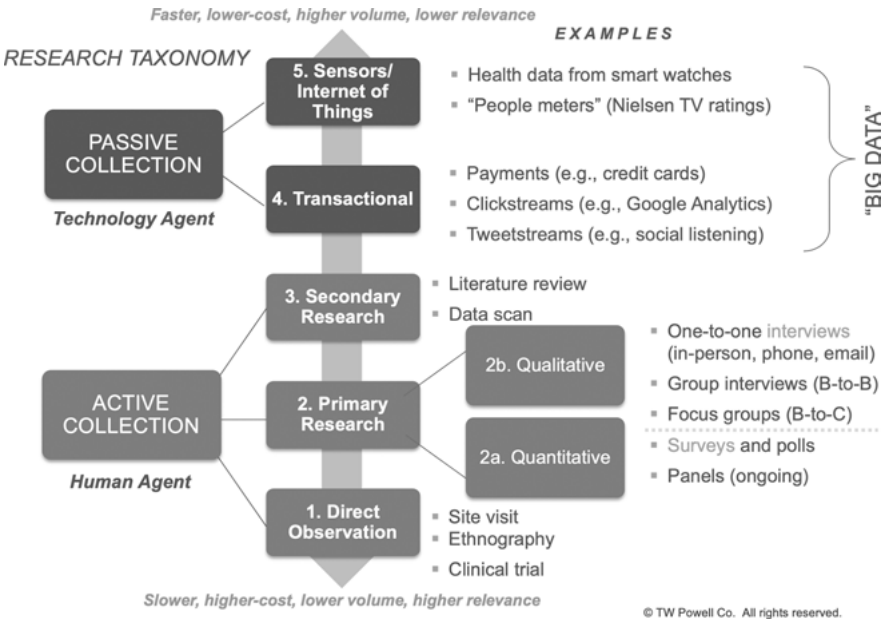


Figure 7: Map of potential data sources.

Active Collection – using a human agent

1. **Direct Observation** – site visits; ethnographies; clinical trials
2. **Primary Research**
   a. **Primary Quantitative** – surveys and polls; standing panels
   b. **Primary Qualitative** – one-to-one interviews (in-person, phone, email); group interviews; focus groups
3. **Secondary Research** – literature scans; data scans

Passive Collection – using a technology agent

4. **Transactional** – payments histories (e.g., for credit cards); clickstreams (e.g., Google Analytics); social media streams (e.g., social listening)
5. **Sensors/Internet of Things** – e.g., health data from smart watches; "people meters" (Nielsen TV ratings)

As one reads downward on this list (which inverts the order shown in Figure 7), these techniques range from relatively *slower, higher-cost, lower volume, and higher decision relevance* toward the top, to *faster, lower-cost, higher volume, and lower decision relevance* toward the bottom. These are all valid techniques, and effective when used in appropriate situations. They may be especially effective when used in combination (for example, when combining initial focus group data with data subsequently collected from a larger-scale survey).

4.6 Knowledge Manufacturing

The KVC framework builds on the core hypothesis that knowledge production is not only *not* "exceptional" (see Section 3.2), but is in fact most productively viewed as a manufacturing process, albeit a specialized one – complete with raw materials (i.e., data), work in process (i.e., information, knowledge, and intelligence), and final products (i.e., enterprise value in the form of results, outcomes, and impacts).

To the extent that this hypothesis is valid, we can then use the many existing insights into manufacturing that have been documented by scholars of that discipline. Manufacturing concepts that we can directly apply in the study of knowledge-based processes include:

- **Incremental value added.** Each of the transformational steps from data to outcomes can be examined separately, and some assessment made of its incremental added benefit and cost. Though it may not be feasible to do this on a strictly quantitative basis, at least at first, the exercise will still yield important qualitative insights.
- **Productivity.** The productivity of an organization's knowledge-based processes is a primary driver of its performance and competitive differentiation. In manufacturing, productivity is defined as the ratio of output to input (for example, person-hours required to produce one automobile), each of which can be measured relatively accurately. While the metrics for knowledge productivity are considerably "fuzzier" at present than they are for manufacturing, the concept itself may ultimately prove just as valuable (see Section 5.3.1.)
- **Quality assurance.** Just as in manufacturing, quality can be built into the knowledge process. The alternative can be to find out, for example, when a

research initiative has been completed, and resources expended, that it contains the right answers – to the wrong questions. One form of quality assurance consists of establishing and maintaining frequent touchpoints with the decision maker on the project status (from both sides). This helps to avoid "process surprises."

- **Load balancing.** Too often a knowledge process is off-balance in terms of human and/or content resource assignments. A common example is that too much time is devoted to data acquisition, and too little to analysis and communications. Load balancing enables you to identify and clear the production bottlenecks that may be dragging down the whole process, and to re-assign resources in order to clear those bottlenecks.
- **Just-in-time (JIT).** JIT manufacturing came into practice because there is a cost of inventory associated with each raw material and purchased component. This cost is, typically, the financing cost of purchasing the item, plus the cost of the physical space in which it is warehoused. For information, the inventory cost is typically not the "warehousing" cost – that's almost negligible, outside of the costs associated with hard drives and cloud storage.

  One of the primary cost elements associated with information is its obsolescence cost – its inexorable tendency to become continually less representative of the "real world," hence less valuable over time. The world changes constantly, while information is inherently static. Hence we say that, just as there is a time value of money, there is a *time value of information*. Any piece of produced information begins to "decay" in terms of its representativeness (and, therefore, usefulness) as soon as it is produced. Some information decays more rapidly – *Who wants yesterday's papers?*, as the song goes – some less rapidly. We can think of static information as having a declining utility function.

  As a result, it is useful to consider "just-in-time" knowledge – the production of knowledge at the last possible moment to minimize the risk of obsolescence. Maybe all those last-minute information requests serve some economic purpose, after all!
- **Inventory**. This view of information as a perishable asset raises other considerations, including:
  - which information we should keep "in inventory" (i.e., as a *stock*);
  - which we should produce on demand (i.e., as a *flow*); and
  - what is the current value of the information we have in inventory?

  The value of the inventory can vary depending on its nature; for example, maintaining a current list of resources may prove nearly as valuable as having the resources themselves – assuming those resources are available to be readily engaged when needed.

- **Auditing.** Physical inventories of raw materials, work-in-process, and finished goods are periodically subjected to structured verification processes called audits. Your knowledge inventory should be, too. In this way you can determine what you have, what condition it is in, what you have too much of, where there are current gaps, where there are likely to be future gaps, and so on.

4.7 Case Example – Repositioning Knowledge Services – Educational Services Industry

An example of how we used the KVC in a client situation will illustrate the power of this simple framework. Our client was a nonprofit education services organization widely known and admired for its decades-long leadership position. The organization's library, recently named the Knowledge Services (KS) unit, was physically housed in the same building as, and in direct proximity to, the CEO of the organization – a sign of how highly the knowledge function is regarded in that organization.

My firm TKA conducted a KVC Clinic with KS Producers that ran over several days, and featured lectures, data collection exercises, and open-discussion problem-solving discussions. In this case, TKA also conducted knowledge User interviews, without the presence of the Producers.

One of our major findings was that the value proposition for Users had shifted, over time, upward on the Knowledge Value Chain. Whereas KS had previously been seen as a provider of data – facts, citations, articles, etc. – over time, Users now found it more expedient to collect these things for themselves using Google searches. Using the Competitive Ecosystem model discussed in Section 7.7.1, a Technology Innovation was the driving vector.

At the same time, the Users did have more evolved needs upscale on the KVC, namely:

- **processing** of the research results (e.g., organizing and arranging the raw findings)
- **analysis** of the results
- data **quality control** – for example, assessing the reliability of sources and methods
- **training** and coaching on "best known methods" for doing research and searches efficiently and effectively

Upon seeing these findings, the Producers began to redefine themselves in the minds of their Users by devising ways to transform themselves from "data-fetchers" – generally agreed to be a lower value-added function – into knowledge coaches, advisors, quality experts, and thought leaders – activities perceived by clients as having relatively higher value. The KS team began to clarify and refine their service line, and to devise new services to satisfy these evolved User needs.

When we conducted a brief follow-up study six months after our initial clinic, I was amazed at the transformation that the knowledge services group had undergone. They were involved in higher-level projects than previously – software evaluations, for example, and more work of an advisory nature. Not only were their client Users happier with their work products, the knowledge Producers found themselves doing more inherently interesting work – and having their job satisfaction and career advancement accelerate as a result. The KVC had been elevated into one of seven major corporate initiatives for the entire organization. KS had, in effect, *repositioned* their services – and themselves as a unit – significantly higher on the knowledge value chain.

4.8 Applications of the Knowledge Value Chain

The two main applications of the KVC remain training knowledge Producers and conducting structured consulting interventions, some of which are described in detail herein. Clients have also pushed us to apply the KVC in other ways to solve their problems. Some of the additional use cases in which we have applied the KVC framework include:

- **Key Knowledge Indicators (KKI) dashboards.** Knowledge metrics are essential for managing knowledge processes. Section 5.1 includes a detailed discussion of knowledge metrics, including a dashboard case study.
- **Research design and management.** The KVC can be used not only to execute research projects and functions, but also to plan and manage such activities. We have done this at the enterprise level, as well as at the department and project levels.
- **Workflow improvement.** A major pharmaceutical company used the KVC to integrate the flow of product intelligence across R&D and sales teams. This resulted in a knowledge re-purposing that increased productivity and competitive effectiveness.
- **Business process improvement.** A global information and media firm integrated KVC-based metrics directly into a Six Sigma process improvement

initiative that includes their corporate intelligence function. This resulted in a more efficient and effective intelligence process.
- **Business model innovation.** A web-based information aggregator used the KVC to demonstrate how its information product would offer value to customers and generate revenue. The result formed a key element of pitch presentations to potential investors.
- **Senior team awareness.** A pharmaceutical research organization uses the KVC to educate their senior management and board of directors – knowledge users – about the process by which intelligence is produced.
- **Career enhancement.** Knowledge, intelligence, and research professionals tell us that applying the KVC has helped them identify skills gaps and differentiate themselves in their own career development.
- **Program evaluation.** A global NGO used the KVC to optimize its program evaluation policies and practices.

4.9 Key Concepts in Chapter 4

information metabolism
state
data
knowledge
decision
planning
processing
communication
formulation
feedback
value positives
active collection
micro-knowledge
macro-knowledge
repositioning
value chain
transform
information
intelligence
action
acquisition
analysis
application
implementation
industrialization of knowledge
value negatives
passive collection
meso-knowledge
knowledge manufacturing

4.10 Questions for Discussion

- Can you think of examples from your own experience that fit the KVC framework?
- Are there examples of knowledge value that do not fit the KVC framework?
- Why is it important that value be driven from the top of the organization?

- Why is having a detailed knowledge plan so important?
- What are the trade-offs between various data sources? When should each one be used?
- In what ways is manufacturing a useful model for knowledge production? In what ways is it lacking?

5 Increasing Knowledge ROI

With the background understanding of the preceding four sections, we can now address the core challenge of producing greater value and increasing the ROI of knowledge.

5.1 Knowledge Metrics

It is a widely held business belief that *What you would manage, first you must measure*. While one could argue whether or not this is strictly true in all circumstances, it is repeated often enough – and is believed and practiced by enough people – to warrant taking seriously.

We discussed in Section 2.3.1 the *knowledge paradox* – that knowledge, while a valuable and mission-critical asset, is in effect "invisible" to formal enterprise accounting and most other management metrics (Key Performance Indicators, for example). This creates a frustrating paradox for conscientious knowledge resource managers. Imagine that we were in the oil drilling business, to pick an example, and found ourselves unable to measure the amount of oil being produced. We would throw up our hands in despair! But this is the situation in which we as knowledge professionals too often find ourselves.

Before deciding whether and how to measure knowledge performance, it is important to answer these questions proposed by economic historian Jerry Muller (2018):

- What kind of activity are we measuring?
- What are the costs of measurement?
- What are the costs of not measuring?
- Who is asking for the metrics?
- How will the metrics be used?
- How, and by whom, are the metrics to be developed?
- Will metrics solve our problem?

Metrics work, because people perform to them – especially when they are incentivized to do so. This is usually a good thing, but it can become a source of *unintended outcomes*. Once a metric is in place, it can become a source of *goal diversion* if people are focusing just on meeting the metric, rather than on fulfilling the purpose behind it.

Metrics seems objective, because they are numbers and, as such, simple and easily comprehended. But the phenomena represented by those numbers are

https://doi.org/10.1515/9783110593044-005

usually complex and at least somewhat subjective. Measurement of business process may therefore involve a large amount of interpretation and even negotiation. Numbers have power, power is political – and consequently, intra-organizational conflicts and even "civil wars" often involve disputes over key numbers.

Multi-company studies of the effectiveness of knowledge management programs have generally found a tenuous connection in practice between knowledge programs and enterprise performance. In their study of the U.K auto industry's KM practices, for example, Ibrahim and Reid (2009) concluded that, "In most of the organisations studied, the link between KM, business benefits and bottom line is almost axiomatic, especially amongst those who are enthusiastic advocates of KM . . . There is an absence of linking mechanisms between value and measurement . . . It is still unclear how KM adds value or even impacts on business performance." They attribute this in part to the lack of standard metrics and measurement methodologies for the value of knowledge, which in turn is in large part due to the lack of standard criteria for what even constitutes a knowledge program.[24]

There many models currently in use for the valuation of information assets. Laney (2018) describes several of these models and their applications. These work primarily at the level of information, or even data (e.g., percentage of records deemed to be correct) and in our view are related to, but should not be identified with, knowledge metrics.

We will advocate herein for a knowledge measurement approach that (1) uses standardized, accepted financial metrics and methods for computing value and ROI (i.e., the DCF model) and that (2) ties such metrics closely to enterprise value, i.e., the metrics that the organization uses to gauge all of its other activities.

5.1.1 The Enterprise Value Metrics System

According to North and Kumta, "At present, there is no comprehensive methodology for measuring organizational knowledge." (North and Kumta 2014, xxiii). As true as this may be, knowledge professionals are still called upon to provide metrics for what we do for the enterprise – as are most business disciplines. In so doing, we must be guided by the *enterprise value metrics system* – the aggregate set of metrics that the enterprise uses to measure its own performance and

24 Nevo and Chan (2007) have produced a useful taxonomy of 114 knowledge management systems that range from artificial intelligence and digital libraries to email, illustrating the wide range of information systems that self-describe in the literature as knowledge related.

to communicate that performance to interested stakeholders. Knowledge metrics tend to be successful to the extent that they are consistent with, and supportive of, the existing system of metrics used by the overall enterprise. To the extent, on the other hand, that knowledge initiatives have their own specialized metrics that are not tied to enterprise goals and strategies, they tend to be misunderstood, under-resourced, and significantly less successful.

Organizations maintain elaborate methods and systems of *value signaling* – the ways in which the organization communicates its value to its major stakeholders and other interested constituencies. The enterprise value system (Figure 8) consists of *outward-facing metrics* – those used to communicate value to outside stakeholders – and *inward-facing metrics* – those used to communicate value internally (e.g., to employees.)

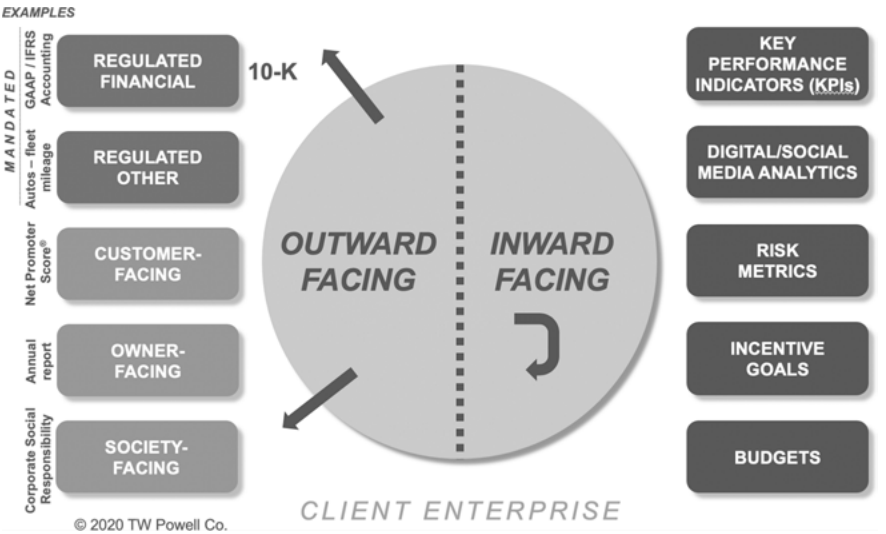


Figure 8: The enterprise value metrics system.

Outward-facing metrics include both those mandated by financial and other regulators and non-mandated metrics. Here are examples of each:

Outward-Facing Metrics – Mandated

- **Regulated financial** – These include the GAAP or IFRS financial statement that must be filed periodically with national, regional, and/or local regulatory authorities.
- **Regulated other** – These include, for example, auto and truck fleet fuel mileage and emissions data.

Outward-Facing Metrics – Non-Mandated

- **Customer-facing** – Metrics are generated with the primary intention of attracting and acquiring new customers – for example, standardized quality ratings on autos (which may be produced by an independent third party like JD Power).
- **Owner-facing** – Shareholder annual reports include many other metrics that are neither regulated nor required. Pharmaceutical companies, for example, report the number of new drugs in their development pipeline.
- **Society-facing** – Companies may have a set of metrics they report as part of Corporate Social Responsibility (CSR) initiatives.

Inward-Facing Metrics

- **Key Performance Indicators (KPIs)** – Other metrics, often non-financial, may be kept, e.g., customer satisfaction ratings.
- **Digital and Social Media Analytics** – Page views, engagement measures (e.g., likes, comments, and reposts), and conversion rates are tracked and analyzed.
- **Risk Metrics** – Companies monitor a variety of financial and operational risk metrics.
- **Incentive Goals** – These targets help determine a group's and/or individual's performance compensation.
- **Budgets** – This tool, the primary purpose of which is the allocation of scarce resources, can also be used to motivate and reward performance.

There may be other categories of metrics additionally in use in any given organization. Understanding what these are and how they are used is a critical step in understanding the culture of the organization. Acquiring or creating an inventory of value metrics currently in use should be among the first steps undertaken in designing knowledge metrics. Knowledge metrics should support these other metrics as directly as possible. In section 5.3.2 we present a process designed to achieve this linkage effectively.

In working with different industries, one notices that the *dominant metric* of an industry may be one that is unique to that industry. This is typically because it is that single number that is deemed (by industry insiders and important outsiders like securities analysts) to be most highly indicative of enterprise value, as measured by profits, revenues, and stock price. Once a metric achieves dominant status, it tends to be the metric on which all of a given industry's players focus and compete. Table 9 shows some examples:

Table 9: Dominant metrics by industry.

INDUSTRY	DOMINANT METRIC
Aircraft manufacture	Pending aircraft orders
Pharmaceuticals	New drugs in development
Retail	Year-on-year same store sales
Social media	Active or engaged users
Universities	Applicant acceptance rates
Technology companies	Enterprise valuation per employee

5.1.2 Inputs, Outputs, and Outcomes

Process metrics of any kind – not just for knowledge – fall within one of three related categories: *inputs*, *outputs*, and *outcomes* (Figure 9). The first of these is a cost category and the latter two are benefits. Understanding these distinctions, and how they interrelate, is key to designing knowledge metrics.

- **Knowledge inputs** include the costs of personnel, consultants, technology hardware, data services, license fees – the kinds of items that would typically be found within budgets. The most common source for these is vendor price lists and/or invoices.
- **Knowledge outputs** include the benefits of pages served, active users, reports prepared, page accesses, document downloads, user engagements, etc. Outputs measure the *What?* of knowledge services.
- **Enterprise outcomes** include the benefits of the results and impact of the knowledge initiative. These can include *direct outcome metrics* like return on investment and Key Performance Indicators, as well as *indirect outcome metrics* that can be developed by surveying users and/or by collecting case testimonials from Users. Outcomes measure the *So what?* of knowledge services.

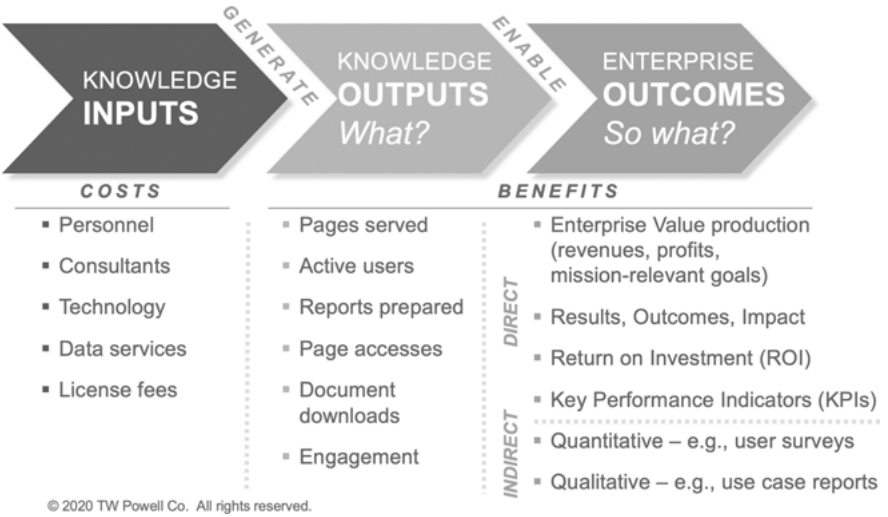


Figure 9: Inputs, outputs, and outcomes.

The distinction between outputs and outcomes is illustrated perfectly by a student consulting project that I supervised while teaching at Columbia University. The client was a U.S. company that makes laser surgery devices used in cancer operations. The presenting problem was these multi-million-dollar devices were prone to breaking down and time-consuming to fix. The result was a lot of downtime for the machines, during which they were neither being used nor being fixed, due to backlogs in the service department. This resulted in delays in providing care and complaints from the users of the equipment – the physicians treating cancer patients. The "value" result had two components, an *economic outcome* (i.e., revenues delayed and profits decreased) and a *societal outcome* – those factors affecting society at large (i.e., illnesses prolonged and lives lost).

The Columbia team conducted an assessment (i.e., the *input*) that determined that one of the primary root causes of the service backlog was the complexity and lack of immediate availability of the more than 600 pages of technical documentation needed to fix each machine. The team designed a central documentation platform that could be used to serve the documentation quickly worldwide; this was the *output* from their effort. The result was expedited servicing and reduced machine downtime. This in turn resulted in expedited care and happier client physicians. The net value result following the intervention included *economic outcomes* (i.e., revenues accelerated and profits increased) and *societal outcomes*

(i.e., illnesses shortened and lives saved). Both types of outcome were seen as positive by company management and shareholders.

In all of this, it's tempting to create new metrics to measure and discuss knowledge. This should be avoided where possible, in favor of linking as directly as possible to the *enterprise value system* discussed in Section 5.1.1. As consultant Nick Milton, advises, "Use the standard measuring and accounting tools that the business uses; do not invent a new measurement system for KM. You also need to turn these metrics into monetary value." (Milton 2014)

Measuring outcomes is often best achieved indirectly, specifically by interviewing or surveying client Users. In so doing, it's crucial to maintain the credibility and source of the claim being made: "*It is important for the relevant business manager* [i.e., the knowledge User] *to go on record*, state the value that KM has helped deliver, and explain where it has come from . . . Then people will take it seriously. If the knowledge manager [i.e., the Producer] states the value, then it can be received as being a sales job, propaganda, or wishful thinking." (Milton 2014, emphasis added)

The principles of value are being applied in a range of knowledge-based service industries. U.S. healthcare, for example, is making a major push away from "fee-for-service" care – which measures *outputs* such as procedures performed – toward "value-based care," which measures *outcomes* such as death rates for heart attack, heart failure, and pneumonia and the complication rates for hip and knee replacements. Published value-of-care metrics (on the "Hospital Compare" website from the U.S. government) provide the ratio for these outcomes (i.e., the benefits) compared to the costs of care for over 4,000 hospitals – such that one health services provider can be compared to another prior to selecting a site for treatment.[25] These metrics also serve as an incentive for providers to lower their costs and improve their outcomes – in other words, to raise their ROI.

5.1.3 Economic and Societal Outcomes

The medical devices case study in Section 5.1.2 illustrates a critical point about value metrics. It has long been thought that economic value was achieved at the expense of societal value, with businesses focusing exclusively on the former and government agencies and NGOs focusing exclusively on the latter. There

25 From the website medicare.gov/hospitalcompare. Accessed August 18, 2019.

was generally thought to be a zero-sum tradeoff between economic and societal outcomes.

It is increasingly seen that there are *hybrid organizations* whose mission is to achieve economic value and societal value at the same time and resulting from the same set of activities. For this reason, this is sometimes called the "double bottom-line." One example is the electric car company Tesla, which makes money for shareholders while at the same time providing the benefit to society of reducing carbon emissions.

5.1.4 The Benefits and Costs of Knowledge

The value of knowledge is a function of both the benefits and costs of that knowledge. Though there are different mathematical expressions of value that we explore in Section 5.2, they each depend on these two variables. In its most simple expression, value (V) is the benefit (B) divided by the cost (C):

$$\textbf{VALUE} = \textbf{BENEFIT}/\textbf{COST}, \quad \text{or} \quad V = B/C.$$

Value is the "what you get" (i.e., benefits) in return for a given outlay of funds (i.e., costs).[26] Benefit and cost are therefore our *value levers* – those things that we manage in order to increase ROI. Using simple mathematics, we can see that V is maximized by maximizing B and/or by minimizing C. The most robust value production generally results from addressing both the B and C parts of the formula simultaneously.

There are two critical aspects of this formulation (see Figure 10):

- **Tangibles versus intangibles.** With both costs and benefits, there are both tangible and intangible manifestations. The former are "hard" – direct and more readily measurable. The latter are "soft" – indirect and relatively difficult to measure. While both types provide real value, tangible costs and benefits are by definition easier to "see," and therefore easier to justify. In general, where possible it is best to convert intangibles into tangibles by developing measures for them.

  Cost are things that, in order to increase value, we endeavor to minimize. *Tangible costs* of knowledge include hardware, software, license fees, personnel costs – the kinds of things that appear on a budget and/or a

26 Note that, while this simple form is intuitively appealing, it can introduce serious distortions, as discussed in Section 5.2.1.

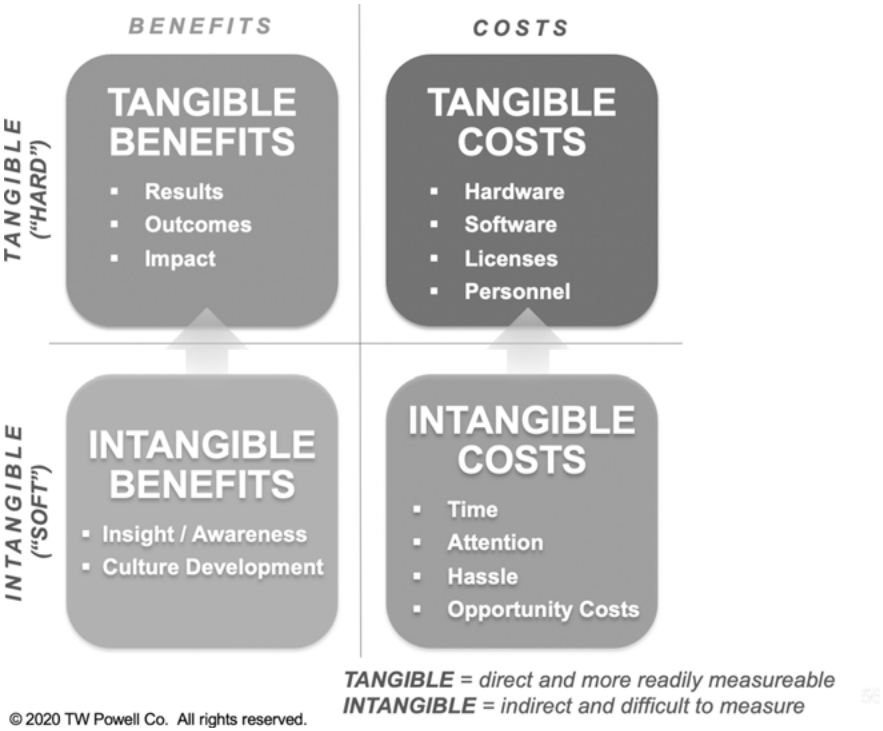


Figure 10: Knowledge costs and benefits.

vendor invoice. *Intangible costs* of knowledge include, for example, the time, attention, and inconvenience that a user could experience in consuming the service.

Benefits are things that we strive to maximize. Unfortunately, these are generally harder to measure than the related costs. *Tangible benefits* of knowledge are things that produce results, outcomes, or impact – an "acronymic" reminder that greater ROI is always our destination. *Intangible benefits* of knowledge are things like insights and awareness, enterprise culture development, and better decision-making. Other examples of knowledge benefits are listed in Section 5.3.2.

– **Incrementalism.** Whether measuring costs or benefits, be they tangible or intangible, what matters is the *incremental* value produced, compared to what would have been produced without the knowledge initiative.

5.1.5 Case Example – Key Knowledge Indicators (KKI) Dashboard – Law Library System

We served a legal library client in the position of needing to petition their financially-oriented management for extra manpower – while at the same time getting comments from that same management team to the effect, *We really don't understand what you do*. Using the time-tested wisdom of "When in Rome, so as the Romans do", we advised them to "When addressing finance people, do as finance people do." That is, try to see the situation from their perspective, and communicate with them accordingly. As with any human "tribe," one must address them in a way that is friendly and that they comprehend. While knowledge people so often trade in words and ideas, finance people most often trade in numbers and charts. One can reach them most effectively by using metrics, the language of value (as I titled one of my more popular Columbia lectures).

In much the same way that Key Performance Indicators (KPIs) can be used to measure enterprise results outside of (or in addition to) formal financial reporting, Key Knowledge Indicators (KKIs) can be identified that capture the essence of the knowledge services performance. These will typically be a mix of the inputs, outputs, and outcomes metrics described in Section 5.1.2.

When this is done on a one-shot basis, this is the basis of a management report that describes the basic operations and productivity of the unit. Its full power, however, is realized when it is done on a dynamic, periodic basis. In this way it can become a *dashboard* – a tool to reflect trends over time and to allocate resources, illustrated in such a way that even a time-stressed executive can focus on the key issues.

In this case, our KKI dashboard was built along basic structure of *Buy -> Make -> Use*, a variation on our basic Activities model (see Section 2.2.1) that reflects this particular library's stated functions. We started with a simple spreadsheet that enumerated, for each Activity, the Asset(s) involved, with operating data describing each. These data were gathered from vendor reports and from internal operating statistics. By using simple metrics and charts in her presentations to management, our client immediately achieved successes in justifying her need for more personnel.

5.2 Calculating Knowledge ROI

We'll describe two relatively simple ROI models: a static model and a time-based model. The static model, while easily explained and understood, fails to account for the *time value of money*, a concept revered by trained financial professionals.

The time-based model is ideal for proposing a new knowledge project or initiative – and also can be used effectively to cost-justify an existing one.

5.2.1 Static Model (Benefit-Cost Ratio)

The benefit/cost ratio is relatively simple and may be adequate for quick and informal assessments. The formula is **V = B/C**, where V equals value, B equals benefits, and C equals costs. ROI (return on investment) is the most powerful and widely accepted metric of value. Both B and C are most often measured on a cash flow basis, with B representing *cash in* (i.e., incremental revenues and/or savings) and C representing *cash out* (i.e., incremental outlays). The benefit-cost ratio is sometimes represented as a multiplier; a project with a 3X return generates three times as much cash flow as it consumes.

Though intuitively appealing, especially to non-financial types, this simple method can under certain conditions be grossly misleading. Because it deals in multiples, rather than in absolute value quantities, it "rewards" smaller investments with a higher ROI multiple. This would logically lead one to invest a smaller amount, or even to disinvest in order to "juice" the return – an unfortunate outcome for all concerned.

5.2.2 Time-Based Model (Discounted Cash Flow)

For more serious and accurate assessments, an ROI analysis should be based on absolute numbers (not multiples) and on the time value of money. Both of these conditions are satisfied by *discounted cash flow* (DCF) analysis, also known by its mathematical representations, *net present value* (NPV) and *internal rate of return* (IRR).

The time value of money means that if you invest (wisely) a dollar today, it will be worth more than that tomorrow, still more the following day, and so on. Its value increases over time. Conversely, a dollar you receive today is worth more than a dollar you will receive tomorrow, because (at least in theory) you could invest it overnight and earn some interest; so, by this time tomorrow, you should have a little more than a dollar. And there is always a small chance that, by dint of some financial calamity, our anticipated "dollar plus" will not be there at all when tomorrow comes.

In the real world of projects, financial returns are rarely received in a lump sum – they are typically earned gradually, over time. We could invest now (negative cash flow at time 0, or t_0) and again a year from now (t_1), then show a

little positive cash flow in year two (t_2), even more in year three (t_3), and so on. Investments, just like planted seeds, typically take some time before they bear fruit. Discounting the cash flows is a mathematical way of adjusting for the fact that we'll receive some of the return in the future – and that in the meantime, we will not yet have the use of those funds. Value is in this case specified as *net present value* (NPV) – the discounted value today of a future stream of cash flows.

The formula is

$$\mathrm{NPV} = \sum_{t=0}^{n} \frac{(B_t - C_t)}{(1+r)^t}$$

where B = incremental benefits
C = incremental costs
t = time
r = discount rate (typically, the weighted-average cost of capital, or WACC)

The cash flow for each period *t* (in this case, each year up to the nth year, where n is typically three to five years) is calculated as **$\mathbf{BENEFITS_t - COSTS_t = NET\ CASH\ FLOW_t}$.** Note in the table below that for the base period (often called Year 0) there is not yet any benefit, only an investment. Table 10 shows the net cash flow for each period. The stream of net cash flows are then discounted at the rate *r* to yield the net present value. Internal rate of return uses the same data, but calculates the return rate as a percentage, rather than as an absolute number. These formulas are automated within Excel and in professional financial calculators and calculator applications.

Table 10: Schedule of costs and benefits.

	YEAR 0 (INITIAL)	YEAR 1	YEAR 2	YEAR 3	YEAR N
BENEFITS (cash out)		$Benefit_1$	$Benefit_2$	$Benefit_3$	$Benefit_N$
COSTS (cash in)	$Cost_0$	$Cost_1$	$Cost_2$	$Cost_3$	$Cost_N$
NET CASH FLOW	Net_0	Net_1	Net_2	Net_3	Net_N

The value of the discount rate *r* can typically be supplied by the corporate finance department. Known technically as the *weighted-average cost of capital (WACC),* it serves as an agreed-upon enterprise benchmark against which potential new investments are evaluated.

More specifically, for each period t, the benefits and costs might look as in Table 11.

Table 11: Costs and benefits for period t.

	YEAR t
TOTAL BENEFITS (Cash Outflows) (= $Benefit_t$)	**$**
Revenue enhancements	$
Cost reductions	$
(Non-financial metrics)	(List only)
(Qualitative benefits)	(List only)
TOTAL COSTS (Cash Inflows) (= $Cost_t$)	**$**
Labor	$
Hardware	$
Software	$
Data	$
Other	$
NET CASH FLOW (= Net_t)	**$**

Non-financial and qualitative benefits are, by definition, intangible benefits. *Non-financial benefits* are the subject of various kinds of business scorecards and Key Performance Indicators now in place in many organizations. Examples include the percentage of revenues from new products and employee turnover. For a knowledge process, an example of a non-financial benefit would be the customer satisfaction scores derived from surveying the clients of the knowledge process and its products. Though non-financial and qualitative benefits are worth discussing, they cannot be directly incorporated into a financial ROI analysis. However, it may in some cases be possible to arrive at an estimated financial equivalent for a non-financial metric.

Qualitative benefits are assumed to exist, yet in practice typically are not measured because either they cannot be measured reliably (for example, "better decision making"), or because economically it is not worth the cost of doing so.

Cash flows for each period should ideally be estimated independently of each other; however, in many cases, they are based on the same value formulas, and as such may contain only incremental variations. For example, benefits may "ramp up" over several periods before maturing to their full potential.

Certain costs (for example, vendor charges) tend to increase over time, whereas others (for example, training) may decrease based on an *experience curve* that makes this function progressively more efficient over time.

Cash flows, both positive and negative, should be estimated as conservatively as possible. Wildly optimist assumptions will usually be detected in the reviews of the project proposal, and the chance to go back with a revised model may be limited. To preserve your precious credibility, it's better to estimate costs on the high side and benefits on the low side. If the project proves feasible under those rigorous conditions, then it is robust and will afford you some margin for error. See Section 6.3.2. for a discussion of the related technique of sensitivity analysis.

You can build credibility by expressing estimates of future benefits and costs as *ranges* of values. A good practice is to run three versions of your model: one *optimistic* (i.e., costs low, benefits high); one *most likely* (i.e., midpoints of the ranges); and one *conservative* (i.e., costs high, benefits low – as described above). Bear in mind that prospective valuation is more a matter of informed estimation than of scientific measurement.

There are seven specific work steps in developing a business case for knowledge using the discounted cash flow model:

1. **List** the incremental **costs**.
2. **List** the incremental **benefits**, in a qualitative sense.
3. **Measure** (or estimate) the economic value of the incremental **costs**.
4. **Measure** (or estimate) the economic value of the incremental **benefits**.
5. **Plot** these incremental costs and benefits over the life of the project.
6. **Calculate** the value of the initiative using a *discounted cash flow* (DCF) model.
7. **Benchmark** the DCF value against the corporate *hurdle rate* that new projects must meet in order to be considered for funding.

Your case will be strongest to the extent you are able to execute all seven of these steps. In fact, the DCF model depends on having all seven steps completed – since without any one of them, you can't accurately run the quantitative model. In that case, you'll be left using "trust us" arguments that are not as convincing as empirically justified arguments.

However, even if you are not able to calculate each quantitative cost and benefit, the exercise of going through each of the seven steps itself has value in that it:

- Guides you in thinking through the specific **problems** that knowledge is expected to address in your organization
- Helps you think through the specific **roles** that knowledge will play
- Challenges you to think through and **document** the costs and benefits of these roles

- Challenges you to **measure** or quantitatively estimate those costs and benefits, wherever possible
- Helps you communicate the **feasibility** of undertaking the initiative
- Helps you determine the **scope** of the initiative (for example, how many people should be assigned?)
- Helps you develop **metrics** for the initiative that can be used to evaluate the effectiveness and efficiency of knowledge after implementation

5.3 Strategies for Increasing Knowledge Value

There are three basic approaches for increasing knowledge value, as measured by ROI:
(1) **decreasing absolute cost** or investment;
(2) increasing benefit through **process optimization**; and
(3) increasing benefit through **strategic impact**.

Cost reduction, unfortunately, is too often the first choice of financial managers, especially during periods of economic stress. The temptation to reduce headcount and other resources is especially strong when the benefits delivered by such resources are not clear – and this does increase "static" ROI, at least in the short run. We'll focus most of our discussion on the two remaining value-building approaches, each of which increases ROI by producing benefits enhancements.

5.3.1 Process Optimization

Process optimization consists of doing things more effectively, or more efficiently, or both. In everyday terminology, this means *doing things right*. One key metric for this is knowledge productivity:

KNOWLEDGE PRODUCTIVITY = OUTPUTS/INPUTS (see Section 5.1.2 for definitions)

Measuring and increasing knowledge worker productivity is a challenge faced by all modern knowledge-based economies. As Drucker (1999a) says, "The most important contribution management needs to make in the 21st century is . . . to increase the productivity of *knowledge work* and *knowledge workers*. The most valuable assets of a 20th-century company were its production equipment. The most valuable asset of a 21st-century institution (whether business or nonbusiness) will be its *knowledge workers* and their *productivity*." (Emphases original)

He goes on to point out that, a little over a century previously, manual labor productivity was something of a mystery, much as knowledge work productivity is now. Through the work of F.W. Taylor and others, basic physical work motions were described, measurements were made, standards were developed – and, as a direct result of these advances in "work science," manual productivity rose steadily through most of the intervening period.

According to Drucker, "Six major factors determine knowledge-worker productivity.

1. Knowledge-worker productivity demands that we ask the question: '*What is the task*?'
2. It demands that we impose the responsibility for their productivity on the individual knowledge workers themselves. Knowledge Workers have to manage themselves. They have to have *autonomy*.
3. Continuing innovation has to be part of the work, the task and the responsibility of knowledge workers.
4. Knowledge work requires continuous learning on the part of the knowledge worker, but equally continuous teaching on the part of the knowledge worker.
5. Productivity of the knowledge worker is not – at least not primarily – a matter of the *quantity* of output. *Quality* is at least as important.
6. Finally, knowledge-worker productivity requires that the knowledge worker is both seen and treated as an 'asset' rather than a 'cost.' It requires that knowledge workers *want* to work for the organization in preference to all other opportunities." (Emphases original.)

The alert reader will note that Drucker's point five seems at odds with my productivity formula presented above. Though I did meet the great man while I was in management school, this minor disagreement was not part of our discussion. For the knowledge practitioner or manager of knowledge practitioners, I conclude that measuring the *quantity* of outputs and their *quality* through, for example, routine User surveys and informal User feedback are equally important. However, I would characterize the latter as *User experience (UX)* metrics, rather than as productivity.

Knowledge Process Optimization represents a huge, and often untapped, opportunity for ROI gains. Writing elsewhere, Drucker (1964) notes, "Special attention needs to be paid to planning knowledge work, which demands more analysis, more direction, and a more sharply focused plan of action than other work . . . Only in a few businesses is knowledge work thought through and purposefully directed."

The vast majority of knowledge training and consulting focuses on process optimization – doing things right, more efficiently, and more effectively. The *Knowledge Value Chain® Handbook* (Powell 2014) is full of specific examples of

how to do this and case studies of how it was achieved. Process optimization relies on factors primarily *within* the control of knowledge professionals and their immediate managers.

5.3.2 Strategic Impact

Strategic impact consists of focusing resources where they will create the greatest return. The way to accomplish this is to bring knowledge into alignment with business strategies. In everyday terms, this means *doing the right things*. The metric for this is:

"TRUE" ROI = OUTCOMES/INPUTS

In contrast with process optimization, strategic impact relies on factors often *outside* the control of knowledge practitioners and their managers. Knowledge services are often demand-driven – an "order" for a certain knowledge set is placed by an executive user. However, knowledge services is not equivalent to being "knowledge servants." To the extent that knowledge professionals become order-takers and -fulfillers, as opposed to trusted advisors, they surrender their professionalism and reduce their role to what one of my clients dismissively calls "stick fetchers." That's a role best left to dogs and "go-fers."

In order to deliver the maximum value of which they are capable, knowledge professionals must take the lead – or, at least, the co-lead alongside the client – where knowledge is concerned, rather than being passive recipients of work orders. Knowledge professionals must ideally learn to *anticipate* client needs before they are explicitly expressed – not just respond to them after they are expressed. This is consistent with the ISO definition of knowledge roles (especially Determine and Refresh, see Section 2.1.7), and will be discussed further in Section 7.

Various studies have shown the benefits of knowledge initiatives. Ranked roughly in descending order of strategic impact, the following enterprise-level benefits often appear on these lists:

- Increased innovation
- Enhanced revenues
- Cost savings
- Better decisions
- Reduced cycle time
- Increased quality
- Increased productivity
- Increased social capital
- Increased employee engagement

Though most KM attention is given to large, complex organizations, even small and medium-sized enterprises (SMEs) can benefit. In a literature review and meta-analysis of papers covering knowledge management in SMEs, Edvardsson and Durst (2013) found the following benefits described:

- Organizational success (e.g., growth in sales, fewer losses, increased productivity, and process improvements)
- Employee development (e.g., skill increase, learning, and staff retention)
- Improved customer satisfaction (e.g., customer loyalty and reputation)
- Innovation, creativity, and knowledge creation
- Improved external relationships with other firms, and
- Strategic fit between KM practice and human resources management policy with respect to organizational performance.

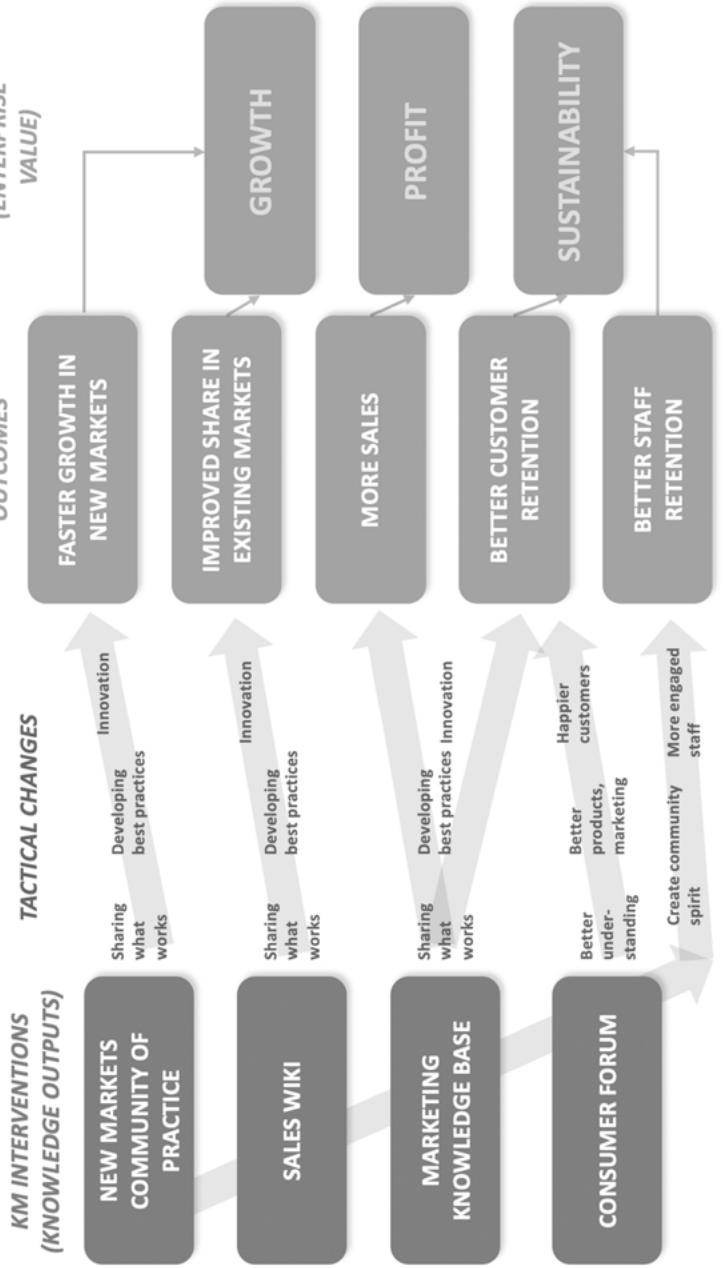
Several of these benefits – or in some cases, all of them – may accrue to any given knowledge initiative. But they will vary in two significant ways: their *strategic impact* and their *attributable measurability*.

Strategic impact describes the relationship between a knowledge initiative and the overall mission of the enterprise. In a profit-making company, the most strategically impactful knowledge directly affects the bottom line – innovation, revenues, and costs. The shorter the distance between knowledge and perceived value, the greater the strategic impact of that knowledge.

Consultant Nick Milton (2016) advocates a technique he calls *benefits mapping*, and we have found it effective in our own work. For example, as shown in Figure 11, a knowledge intervention might yield the output of a "new markets community of practice" with the tactical goal of sharing what works, developing best practices, and driving innovation. The measurable outcome in this case would be "faster growth in new markets" – this is how you could demonstrate how well it is working. This all feeds into the strategic goal of driving growth – a high-level enterprise objective.

This technique clearly gives the answer to the inevitable budget-time question, *What are we doing here?*, that so many knowledge practitioners dread. If the answer is clear and otherwise satisfactory, the budget stays intact – and possibly even rises as senior executives see how all that "mysterious knowledge stuff" fits into what they are trying to accomplish strategically. It has the additional benefit of motivating the knowledge workers themselves, who understand how what they are doing fits into the enterprise purpose, mission, strategies, and goals.

The most successful knowledge initiatives always link directly back to and support initiatives boosting enterprise value. Enterprise strategy should drive knowledge strategy, as we'll discuss in Chapter 7. Too often the two are weakly linked, or not linked at all – which breaks the value chain right at the top.



Adapted from Nick Milton and Patrick Lambe, *The Knowledge Manager's Handbook: A Step-by-Step Guide to Embedding Effective Knowledge Management in your Organization* (2016)

Figure 11: Benefits mapping.

The challenge in all this is *attributable measurability*, which answers two questions: (1) is this benefit capable of being measured, and (2) to what extent did knowledge contribute to the gain? For example, incremental revenues provide a clear benefit to most organizations and are routinely measured as part of financial reporting. However, the question remains to what extent knowledge can rightfully lay claim to some portion of this gain. This is best accomplished through post-action reporting to gauge the proportion of a given "win" that the knowledge Users attribute to the knowledge.

Equally important is mapping knowledge "dis-benefits" – those barriers to value that slow or impede ROI improvements (see Section 2.4).

As noted elsewhere, knowledge initiatives are so diverse as to defy well-meaning attempts to create a common set of metrics to fit them all. A thoughtful framework for potential metrics supporting one important set of knowledge initiatives, community of practice (CoP) creation and maintenance, is provided in Wenger et al. (2011).

5.3.3 Non-Linearity of Benefit, Cost, and Value

Both the costs and the benefits of knowledge are non-linear over a scaled range. Given our relationship of **VALUE** = **BENEFIT**/**COST** (see Section 5.1.4), this implies that value itself is also non-linear. Knowing how to manage against this *non-linearity* is a critical success factor in creating greater value.

Let's suppose you are conducting market research interviews. Vendors who conduct this kind of research typically charge by the numbers of completed interviews. And let's suppose for the sake of illustration that you are conducting these interviews in serial tranches – such that, after each group of 100 interviews, we decide whether to conduct the next 100, and so on. If you conduct 100 interviews, at $X per completed interview, and then you decide to conduct another 100 interviews, you will approximately double your data collection cost (though there may be some volume discount, in which case the cost is not strictly linear as you scale up).

The benefit – the information you gain from the interviews – is not linear at all, in my experience. With each of the initial interviews, you tend to receive much greater benefit than the $X cost expended – as you move from knowing absolutely nothing to knowing a little bit. But then, as you begin to get the sense of whatever it is that you are studying, some additional interviews tend to tell you more of the same – incrementally adding less new knowledge in any substantive sense. In economic terms, the *marginal benefit* added by each interview trends progressively smaller. The aggregate cost curve takes on a reverse

S-shape, sometimes falling sharply at an *inflection point* where the marginal benefit drops quickly as you get the sense you are "saturated" like a sponge and not learning anything new (Figure 12).

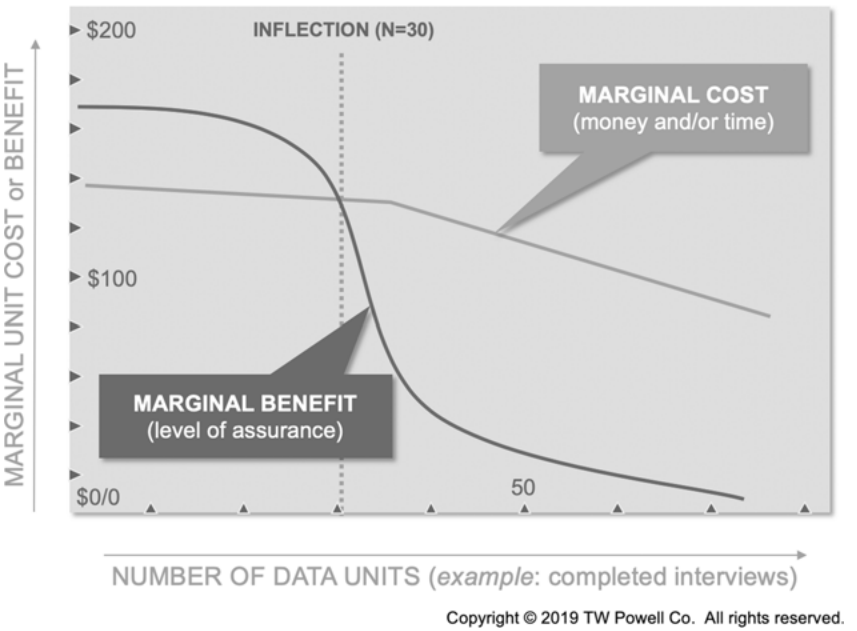


Figure 12: Marginal costs and benefits.

In other words, there is a knowledge *sweet spot* where the ratio between costs and benefits (i.e., the value) is maximized. Too little knowledge means shooting in the dark; too much knowledge means you have wasted some of your organization's time and money. Predicting the arrival at this benefit-cost inflection point, or at least being able to sense it at the time it is reached, are key skills of the advanced knowledge practitioner – and usually learned by experience. How much information is needed to support the decision that is being made? You are almost never in a situation where you have perfect information – and therefore you are always making decisions in a less than completely optimal information sphere. This also involves knowing the *risk tolerance* of the decision-maker client – how narrow is the *confidence interval* that is permissible around the answer? (See Section 2.1.3)

Distinctions should be noted here of the similar-sounding – but very different-meaning – terms price, cost, and value. Let's say in the example above, the vendor charges US$150 per complete consumer interview; that is his *price*. His *cost* (which covers the salary or fee of the interviewer, the rent and utilities of the office space used, the cost of support personnel, a profit margin for the research company, etc.) will be somewhat less than that, say US$125. These are likely to be relatively constant over a range of interview volume levels, though there may be some volume discount.

The *value* (or, strictly speaking, the *benefit*, which measures the knowledge we have gained and separates out the cost dimension) of each interview could vary considerably, as noted above. The first few interviews will bring us much new knowledge; hence each is likely to have a value that far exceeds its US$150 price. As we gather more interviews, each one is likely to yield progressively lower marginal benefit. At the inflection point where the marginal benefit falls below the marginal cost, the interview process is no longer economically optimized, and should be curtailed. In the example illustrated above, this inflection occurs around the thirtieth completed interview. The obvious "catch" here is that, while marginal cost may be easy to measure (e.g., from vendor invoices), the marginal benefit is often less clear. This results in a natural tendency to over-collect data relative to the amount of data reasonably needed to make a decision.

5.3.4 The Fundamental Sources of User Value

According to the Knowledge Value Chain framework, all actualized knowledge value directly involves the User of knowledge. Knowledge left unused is knowledge that by definition has produced no User value, and therefore no value at all. It is hence vitally important to understand how the User herself produces value, and how the knowledge provided fits into and enhances that User's value proposition.

In reviewing many cases of User value, I came to the conclusion that, at the most fundamental level, there are three clusters of value-producing effects that knowledge has: enhancing *opportunities*, avoiding *threats*, and saving or amplifying *resources*, as shown in Table 12.

"Saving or making money" is in my experience the first thing that comes to mind when people think of the potential benefits of their work – since, where it is valid, it is a powerful form of benefit. But the others are valid too, and not to be overlooked. Time, effort, and attention are equally as valid as money as resources to be saved.

Table 12: Primary sources of user value.

PRIMARY SOURCES OF USER VALUE	EXAMPLES
Opportunities enhanced	Help me do my job
	Help me reach my goals
Threats avoided	Solve my problem
	Overcome my obstacle
Resources saved and/or amplified	Save time
	Save effort
	Save attention
	Save or make money

"Making money" is most often interpreted, especially in a group new to knowledge economics, in the direct sense of *monetizing* a body of knowledge and selling it as a commercial product (as further discussed in Section 6). However, knowledge may also play a valid and significant economic role as a *loss leader* for another product or service that is the actual revenue generator. During the early twentieth century, the U.S. stock brokerage firm Merrill Lynch was the first such firm to build substantial investment research capabilities. High-quality Wall Street research was "given away" to clients (or prospective clients) of the lucrative stock trading and investment management businesses. This knowledge-based model was hugely successful, and during the late twentieth century became the dominant model for the brokerage industry. Today the model has faded somewhat due to the "democratization" of investment research through investment newsletters, blogs, and other independent sources.

The strategy of stimulating User engagement with "free" but useful content is widely employed, and is often known as *content marketing*. This is closely related to the *freemium* revenue model, wherein a free product contains prompts for add-ins for which money is charged.

5.3.5 Case Example – User Value – Global Consultancy

Early in my independent consulting career I informally referred to myself as "Doctor Know," since I was often brought in after some massive knowledge project had gone awry. In one case, a large global consulting firm had invested in a

knowledge management system that was not producing the desired effects. I was hired to figure out why. After speaking with a range of knowledge Producers and Users, my primary conclusion was one that since then I have too often come to see as the root cause behind breaks in the knowledge value chain. And that is that Users were never fully involved in the design and operation of the system. They never "bought into" its goals, but rather had these visited upon them by the designers (who had been engaged by the IT department). This mistake (and its variants) ranks in my experience as the leading cause of knowledge failures.

In this case, the design error was compounded by the fact that, as in many knowledge processes, the Users were also expected to be involved in knowledge Production. My client had created a large best practices database to which Users (who were line consultants) were expected to input data as part of closing out each consulting project. It's a good idea in theory – but I have yet to see it work effectively. The reason here was that when the final engagement documentation was being prepared, line consultants had already received their next assignment, and were mentally "checked out" of the assignment they had just completed. To compound the problem, the database work was seen as not benefitting them directly, and as not an organic component of their workflow. They saw the task as a waste of their valuable time – and treated it with commensurate disdain and carelessness. The quality of the results was sub-par, and the system quickly gained a reputation as containing low quality and marginally useful information. Usage declined, resulting in a "doom loop" that only reinforced the poor quality of the database contents.

In hindsight, the system designers could have started with a hands-on look at the workflow and incentives of the User-Producers – the line consultants. If the system had worked for them, it would have worked – since Users are the source of all value. But without their support, it was doomed from the outset.

My experience is unfortunately more the norm than the exception. Pfeffer and Sutton (2000) note that, "One of the main reasons that knowledge management efforts are often divorced from day-to-day activities is that the managers, consulting firms, and information technologists who design and build the systems for collecting, storing, and retrieving knowledge have limited, often inaccurate, views of how people actually use knowledge in their jobs." A small but timely investment in understanding Users and usage can yield huge value returns.

5.3.6 The Knowledge Portfolio

Any knowledge program can be viewed as a portfolio of discrete but related knowledge resources – some having comparatively higher ROI and higher risk, others having lower ROI and lower risk (as discussed in Sections 2.1.3 and 6.3.2).

As with a portfolio of financial assets, the knowledge portfolio must be balanced, then revisited and rebalanced periodically as business conditions change. The case study in Section 4.7 is an example of this – where relatively lower client value projects were replaced with work of greater value to Users. This rebalancing can eventually affect:

- The types of **people** being hired or contracted
- The **training** and professional development they receive
- The information **resources** purchased or licensed

Worth mentioning here is *Pareto's Law*, the observation that, in general, 80% of the effects result from 20% of the causes. This applies to the value of knowledge resources. Whether the numbers are actually 80/20, 90/10, or 70/30, the general principle holds that a large proportion of the value is produced by a smaller proportion of the knowledge resources. Make it your business to determine which are the high-value resources, and to tend them carefully! Treating all knowledge resources with equal attention, though well-intentioned, often results in a loss of overall efficiency.

5.3.7 Case Example – Dynamic Value Model Generator – Expertise Location System

Throughout my career, I have done my best work when responding to the sometimes unconventional and impossible-sounding requests of my clients. Soon after founding TKA, I worked with a brilliant entrepreneur who had heard me speak at a large knowledge industry convention on the general topic of "all enterprise knowledge is human" – a finding that the intervening years have only served to reinforce. Chances are that I said something to the effect that, "Even better than knowing is knowing who knows." His start-up company had developed an *expertise location system* that would help internal sources of knowledge become more transparent and available. The driving engine would be skills and experiences inventories developed and maintained at the individual employee level. I thought – and continue to think – it was a brilliant approach, and agreed to help him in exchange for a small fee and an equity position in his company.

The means by which he wanted to operationalize this idea struck me as equally brilliant. His vision was that his salespeople would go into each sales call armed with a laptop and a spreadsheet-based financial value model. They would then gather data in real-time from the prospect, plug it into the model, and come out with a rough ROI calculation while sitting in the meeting. The model would be infinitely iterative – that is, one could test, for example, *What are the results if costs run 5% lower or 10% higher than we expect?* The model

would also allow sensitivity analysis, answering the question, *Which variables have the greatest effects on the bottom line?* The model could be iterated and refined over time as new factors came to light.

Using the financial modelling skills that I had honed at KPMG, I built for them a "dynamic value model generator" capable of being customized on the fly to the situation and needs of each individual client. Our overall assumption was that by building a business case tailored for the client, they would quickly see the investment's economic value – not as an abstract concept, but as a target that could be reached. The sales process would become less a process of persuasion, and more a process of empirical evidence, economic logic, and client co-creation.

Journalists Hertzberg and Virzi (2002) heard about my work, contacted me, and eventually published my model in *Baseline* magazine. Table 13 summarizes the costs we considered. Our base case was a client company of 40,000 workers,

Table 13: Value model generator – schedule of costs.

COSTS	Item	Assumptions*	Startup Costs	Annual Costs
Hardware	Client/server architecture	Multiprocessor server	$15,000	–
Software	System license	10,000 seats	75,000	$20,000
Labor	Training	One hour at $33/hour for each of 10,000 users; 1,500 new users trained yearly; outside trainer fee included	355,000	62,000
	Data population	Profiles for 10,000 users. Average user spends 30 minutes/ year adding data	165,000	177,375
	IT support staff	2 people to start; 1 ongoing	130,000	65,000
	Internal marketing	Project champions needed	500,000	150,000
TOTAL COSTS			**$1,240,000**	**$474,375**

*Note that the costs table includes both out-of-pocket costs of hardware, software, and outside trainers, but also the "sunk" costs of internal labor for training and data input. Including such internal costs provides the most rigorous test of the financial feasibility of the project.

one quarter of whom would be trained on the system, having annual revenues of $10 billion. It was a large company, in other words, where the needs this system would address typically tend to be especially pressing.

Note that the costs table includes both out-of-pocket costs of hardware, software, and outside trainers, but also the "sunk" costs of internal labor for training and data input. Including such internal costs provides the most rigorous test of the financial feasibility of the project.

Table 14 summarizes the benefits expected in Year 5 of the program:

Table 14: Value model generator – schedule of benefits.

BENEFITS	Item	Assumptions*	Value in Year 5
Enhanced revenues	Increase in number of sales proposals	Year 5 sales gain of 1.5% from a base of $10 billion. Firm net margins of 8%	$12,000,000
Displaced costs	20% reduction in consultants' fees	Current spending on related consulting projects: $5 million	1,000,000
Displaced costs	Reduce personal turnover from 15% to 13.5%	System simplifies shuffling of staff, reducing severance and recruitment costs	3,432,000
TOTAL QUANTIFIABLE BENEFITS IN YEAR 5			**$16,432,000**

*Note that in each of the two preceding tables, most of the assumptions driving costs and benefits could be situationally varied within the model. Each time a new client-specific assumption was entered, the value of the positive or negative cash flows would change correspondingly, as driven by the underlying spreadsheet logic.

One item in the benefits table is especially measurable and "attributable" – the million-dollar-per-year cost savings due to reducing reliance on outside consultants. Home-grown knowledge is sometimes seen, usually without justification, as inferior to that which has been "imported" with great fanfare and at great expense. This posture is not only financially costly, but also diminishes the self-esteem and perceived value of internal employees. "If only we knew what we know," as one-time Hewlett-Packard chief Lew Platt was fond of saying, internal resources could be used more effectively, and these expenses could be reduced.

Table 15 summarizes the anticipated net cash flows (i.e., benefits minus costs) for each of the first five years running the program:

Table 15: Value model generator – net cash flows.

NET CASH FLOWS				
Startup and Year 1	Year 2	Year 3	Year 4	Year 5
-$1,214,375	$2,025,625	$4.525,625	$8,525,625	$15,957,625

Note that the project as configured is expected to lose money in its first year of deployment, begin making money during Year 2, and generate accelerating positive cash flows thereafter. The Benefit-Cost Ratio in Year 5 is 33.6. At a discount rate assumed to be 10%, the Net Present Value is $19.6 million, and the Internal Rate of Return is 134.4%.

These are strong numbers, and one would think that a company whose product promises such outstanding performance would perform exceedingly well. However, this model was developed right around the time that the "dot-com" recession of 2000–2001 was taking its heavy toll on knowledge projects, and most other client projects of a non-revenue nature. My expertise location client did not survive that recession – though their human-centric product approach and our innovative approach to value-based selling remain viable to this day.

5.4 Key Concepts in Chapter 5

unintended outcomes
value metrics system
key performance indicators (KPI)
knowledge inputs
economic outcomes
hybrid organizations
benefits
tangible
incremental value
static ROI model
net present value (NPV)
process optimization
strategic impact
attributable measurability
value non-linearity
inflection point
monetizing
content marketing
knowledge portfolio
goal diversion
value signaling
dominant metric
knowledge outputs
societal outcomes
value levers
costs
intangible
key knowledge indicators (KKI)
time-based ROI model (discounted cash flow)
internal rate of return (IRR)
knowledge productivity
"true" ROI
benefits mapping
marginal benefit
risk tolerance
loss leader
freemium
Pareto's Law

5.5 Questions for Discussion

- If you don't measure something, what barriers does that present to managing it?
- What are various ways in which organizations signal about how they produce value?
- What are the downsides of metrics?
- Why are outcome metrics more persuasive than output metrics?
- What are the trade-offs between economic goals and societal goals?
- How can we use value levers to increase ROI?
- What are Key Knowledge indicators (KKI), and why are they important?
- In what ways is a time-based ROI model superior to a static one?
- What are the two fundamental approaches to increasing knowledge ROI?
- Why is mapping the benefits of knowledge important? What challenges does it present?
- What is value non-linearity? How can you use it to increase the value of knowledge?
- Is monetization of knowledge assets the only way to produce value? What other approaches are possible?
- How does the knowledge portfolio framework help you to increase ROI?

6 Knowledge to Value

You like to cook. The blending of various tastes and textures fires your imagination to experiment with new combinations of ingredients and preparation methods – many of which result in tasty surprises. You enjoy the process so much that you do it a lot, and become progressively more proficient at it. You begin to enjoy entertaining your friends and family by serving them home-cooked gourmet meals – one of the few true luxuries left in a world where professionally-prepared restaurant food is just a phone call away. Your friends begin mentioning that your cooking is of professional quality – and that you should consider opening a restaurant to spread the wealth of your talents beyond your immediate circle.

Cooking is analogous to knowledge production. In our private kitchen, we select and gather raw ingredients (*data*), assemble and transform them by cooking (*processing and analysis*), and end up with a delicious meal (*knowledge*) that we serve (*communicate*) to our guests (*users*). We have produced what economists call *hedonic value* – the pleasure gained from consuming – but not economic value, as no consumer's money has changed hands.

What if, succumbing to the entreaties of our friends, our goal extends to producing economic value by opening a commercial restaurant? What are the additional steps required to achieve that? One would need to create menus, locate and lease or buy a location, acquire furniture and fixtures, hire people to cook, serve, and clean – and many other details before one could transition from being a good cook to being a good professional food purveyor.[27] After executing all these intervening steps between a tasty meal and a paying customer, you will finally have produced economic value.

Let's extend our cooking analogy to knowledge services. Let's suppose we have mastery of a body of knowledge that may be of interest to some audience – that is, it may have "commercial potential." What are the steps required to develop a body of knowledge into a viable product? I have been asked this question so often – and also have done this professionally – that I developed an extended lecture and management workshop (Powell 2015a and 2016, respectively) to describe a simple, structured process (Knowledge-to-Value, or K2V)

27 We note that those steps involving having a physical retail presence have been potentially eliminated by the recent urban trend toward using food trucks to serve customers on the street and *ghost kitchens* that simply prepare food for delivery by online delivery services such as UberEats. Restaurant dining is thus becoming yet another industry transformed by a digital front end.

https://doi.org/10.1515/9783110593044-006

for doing this. This approach synthesizes the approach I developed over several client engagements – and adds some things that I wish I had done.

In encouraging knowledge practitioners to behave in a more business-like way, I often advise them to play the mind game of assuming they are in their own business – with a payroll to meet, rent and utilities to pay, and so on. Even if one is not contemplating a stand-alone business, the K2V exercises can be in useful in attuning a service offering to current User needs.

6.1 A Framework for Knowledge-Based Innovation

Innovation is arguably the most-mentioned benefit sought in knowledge initiatives (see Section 5.3.2). Innovation is seen to drive enterprise value in direct ways, and knowledge is a key driver of innovation. We'll start by looking at the desired end of the process, then back up to look at the execution of the process.

The K2V process represents the operationalization of the Druckerian principle that products represent the means of exchange by which we manifest and sell our knowledge. The end goal of the K2V process contains these five essential elements (Figure 13):

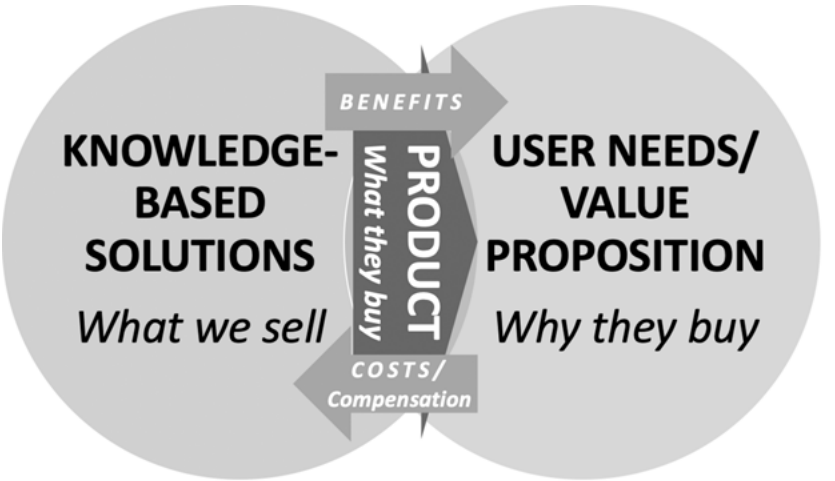


Figure 13: Knowledge-based innovation framework.

- **Knowledge-Based Solutions** – *What we sell* – a body of supply-side knowledge-based capabilities for potential commercialization. For example, in the case of the Uber example, the solution consists of a GPS-based car dispatching system, contract personnel management system, and payment system wrapped into an attractive mobile application.
- **User Needs** – *Why they buy* – a set of demand-side needs, problems, and opportunities that drives our (potential) client into the marketplace in search of fulfillment. Also referred to as the User Value Proposition (UVP). For example, for Uber, the need is the desire to get from here to there quickly, inexpensively, and conveniently.
- **Product** – *What they buy* – the specific product or service feature set and pricing with which we go to market. This includes two sub-elements, the **Benefits** conferred by the product, and the **Costs** or Compensation for the product. For Uber, the product is the ride itself.

The exchange of value occurs when the perceived benefit the user receives is traded for the compensation for the product. Net value is produced when that benefit exceeds the cost; value is destroyed when the benefit fails to reach the level of the cost.

It sounds simple enough – and it can be if the K2V roadmap described in the next section is understood and followed. Similar steps could be followed for *content marketing*, an approach where knowledge is used not as a revenue center, but as a "free" resource to bring potential users into the ecosystem for a related revenue-generating product or service.

6.2 The K2V Roadmap

The process of building our body of knowledge into a viable product contains two major stages, *Discovery* and *Development*. Each stage has a sub-focus addressing, in turn, internal capabilities (*Enterprise*, i.e., the client organization) and external driving factors (*Ecosystem,* i.e., the "significant outside"). The resulting four phases can be shown in a matrix as in Table 16.

6.2.1 Knowledge Discovery (Phase 1)

We begin by focusing on the enterprise (that is, our organization); the driving question is *What do we know?* This is an exercise in meta-knowledge, that is, in developing knowledge about our body of knowledge – identifying it, classifying

Table 16: Knowledge-to-Value (K2V) roadmap phases.

		STAGE	
		DISCOVERY	**DEVELOPMENT**
FOCUS	**ENTERPRISE**	**Phase 1** – Knowledge Discovery	**Phase 3** – Product Development
	ECOSYSTEM	**Phase 2** – Market Discovery	**Phase 4 –** Client Development

it, organizing it. In effect, it is an inventory of our knowledge, which is an essential element of sound knowledge practice.

There are various techniques of *knowledge elicitation* designed to surface knowledge that is essentially tacit unless further acted upon. In Section 3.1.8 we described the SECI model developed by Nonaka and Takeushi (1995). This four-step process can be used to first elicit, and then socialize, tacit knowledge.

My Columbia University colleague Katrina Pugh (2011) describes an event-based knowledge elicitation event (the "knowledge jam") that surfaces and puts to work such hidden knowledge using the following core steps:

1. **Select** – identify and prioritize knowledge jam subjects, beneficiaries, and sponsors
2. **Plan** – plan each knowledge jam cycle as a "project"
3. **Discover/Capture** – engage knowledge originators and brokers in a real-time event, or "conversation"
4. **Broker** – translate the jammed know-how for re-use
5. **Reuse** – apply the jammed knowledge to improve enterprise outcomes, including efficiency, innovation, revenue, and job satisfaction

I have described this as a process of *knowledge mining* – searching for flecks and nuggets of knowledge in the wilds, bringing them together as raw ingots – eventually transformed into the beautiful and valuable gold of useful enterprise knowledge. The details of knowledge discovery are context-sensitive and depend somewhat on the nature of the organization and its strategy (as discussed in Section 7.6). It is my experience that, as a general rule, the knowledge discovery process is most effective when it is built into the fabric and workflows of the organization, rather than treated as a special, one-off event. The holders of the knowledge must be actively involved – even to the point of being self-reporters of their knowledge (as was true in the expertise location case example described in Section 5.3.7).

6.2.2 Market Discovery (Phase 2)

Concurrently with the internal discovery is the external discovery of the ecosystem, with particular attention to client needs and existing competitive offerings. The driving question here is *What are they buying?* Market and competitive intelligence and analysis is a highly evolved specialty, a comprehensive description of which is beyond the scope of this work.[28] A mix of techniques will typically yield the most accurate results. These could include:

- **Customer Research** – for example, surveys, focus groups, and panels
- **Ecosystem Scans** – a review of all relevant external factors that could affect the product, for example market trends, competitive offerings, technology trends, broad social and demographic trends, and legislation and litigation
- **Web Analytics** – digital and social media tracking and analytics that can recognize patterns and yield insights

Understanding the knowledge *value proposition* is critical here. Successful practices or even entire businesses can be built around a clear understanding of the *value questions* being asked by a client. For example, Morningstar built an entire business around answering the core value question, *Which mutual funds should I buy?* Similarly, Consumer Reports built a business around answering the core question, *Which household products are economical and effective?* The firm Gartner answers the core question, *Which technologies should our organization invest in?* (For more on value questions, see Section 2.1.6.)

In considering launching a potential new product, you will need to answer several key questions about your potential market:

- What **kinds** of organizations (or individuals) experience the problem we are solving?
- **How many** organizations have this problem?
- **How much** are they willing to pay for a solution?
- **Who** is the organizational buyer for a solution?
- What **other solutions** are currently or potentially available?

Answers to these questions will yield key market characteristics, market sizing, and potential marketing themes. In addition, it is crucial to identify and study several other factors in the competitive ecosystem; these are described in Section 7.7.1.

28 The inquisitive scholar is referred to my earlier book, *Analyzing Your Competition (Fourth Edition)*, and there are other excellent books on this topic.

The two phases of the Discovery stage should ideally be conducted simultaneously and have a dynamic interchange between them. The goal of each part is to lead into the development phase – that is, for the enterprise, which aspects of our knowledge base can be refined into a product with which we can approach the market?; and for the ecosystem, which characteristics of the market in general suggest target client segments and actual clients?

Following the two phases of the Discovery stage, there should be a pause to assess the findings. Several major questions should be considered: *Does there seem to be a viable market for us? How big is it? How profitable? How fast is it growing? Are there synergies with our existing businesses? What are the challenges we could face? How do we propose to overcome them?*

Also to be considered at this stage is the *degree of innovation* desired, along two dimensions, product and market. The optimal go-to-market strategy could vary significantly depending on the answers to these questions. The following summarizes the opportunities with regard to innovation (Figure 14):

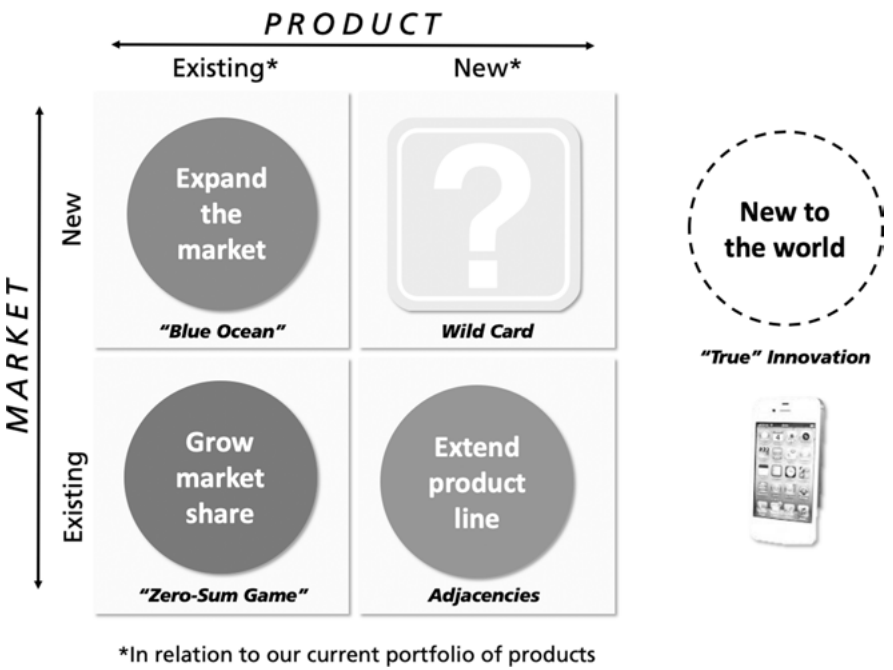


Figure 14: Product-market innovation matrix.

- **Grow market share.** Here we try to sell more of an existing product to existing market(s). The only way to achieve this is to take market share away from a rival – a zero-sum strategy also known as "red ocean" after the waters darkened with the metaphorical blood of battling competitors.
- **Expand the market.** This "blue ocean" or positive-sum strategy avoids head-to-head competition by finding new markets for our existing products. But this requires developing new distribution channels, which can be a costly process.
- **Extend our product line through adjacencies.** Here we are developing new (for us) products and selling them into a market that already exists for us. We can typically use our existing distribution channels and trade relationships to introduce the new product.
- **Introduce new products into new markets.** This "wild card" strategy has uncertain outcomes due to its two-fold risk, and should be used with caution and a high degree of reliable market intelligence.
- **Bring something "new to the world."** New products for us may be things that already exist in the marketplace from other providers. Once in a while a true innovation comes along that no one sells or has even seen before. The introduction of the Apple iPhone in 2007 represented such a rare event.

6.2.3 Product Development (Phase 3)

During Phase 3, we turn our focus back to the enterprise – our organization. Here the key question evolves into *What are we selling?* Product development typically goes through at least these five development steps:

1. **Concept and Design** – This could include wire models of software products, or flow diagrams for services.
2. **Model and Prototype** – A working model of the product is used in early customer testing ("alpha test").
3. **Test Market** – Larger scale testing of an advanced prototype is conducted ("beta test").
4. **Iteration** – Cycles back through *Design -> Test -> Redesign -> Retest* are conducted until a final product is ready for launch.
5. **Launch and Rollout** – The final product is sent into the marketplace.

Note that we use the word "product" to denote both tangible goods and services. This process can be structured as a formalized, gated, sequential process. However, organizations often find it preferable to use an *agile development* process – that is, to launch a *minimum viable product* (MVP) as early as possible,

then update and refine it through user feedback and rapid successive iteration cycles.

Chesbrough (2006, 63–64) points out that, "Firms can create and capture value from their new technology [i.e., knowledge] in three basic ways: (1) through incorporating the technology in their current business, (2) through licensing the technology to other firms, or (3) through launching new ventures that exploit the technology in new business areas." This *monetization strategy* – the path toward knowledge value actualization – is primary among the critical issues that need to be addressed.

Other questions that are integral to product success and that should be addressed during this phase include:

- **Business Model** – What is the product feature set? What is the revenue and pricing model? What is/are the price point(s) offered? Is the target a mass audience, or is the product customized to the needs of a few users?[29]
- **Go-To-Market Strategy** – What markets are we targeting first? What kinds of staffing and other delivery capabilities do we need? How will distribution be handled? What alliances do we need? Are there licensing opportunities? What kind of digital and non-digital marketing and branding do we need? What is our product name and positioning? What competition will we face?
- **Competitive Barriers** – How can we trademark our product to prevent competitive inroads? Should we use patents or trade secrets to protect our invention?
- **Scale and Scope –** How readily does the product scale across targeted industry verticals? How readily does it mesh with the scope of other services we now offer? What opportunities for scaling and scoping are suggested?

The answers to these questions, and the execution that follows, are just as important as the core knowledge itself – perhaps more so. As Chesbrough points out, "A mediocre technology pursued with a great business model may be more valuable than a great technology in a mediocre business model."

Note that due both to the inherence tacit-ness of knowledge and to the inherent scalability of information (see Section 1.5.2), knowledge must typically be converted into information before being productized. This can be done be creating white papers, reports, videos, blog postings, webinars, podcasts, events, and so on – all of the things that should be part of a *content marketing* campaign but with more depth, as now the content *is* the product.

29 These business model criteria are similar to those proposed by Chesbrough (2006, 64–65).

When *positioning* knowledge services – that is, describing in advance the benefits that Users can anticipate receiving – I am reminded of pioneering work in services marketing conducted by my brilliant colleague Christopher Lovelock (1991). Lovelock observed a guiding principle I call *tangibility inversion* in the marketing of products and services. When marketing a tangible product – an automobile, for example – primary emphasis is best given to the intangible, experiential aspects of product ownership – fun, enhanced prestige, access to social opportunities, and so on.

When marketing intangibles, just the opposite is true – you gain more by emphasizing their tangible aspects, something Lovelock called "managing the evidence." I tell my students and people working for me that in marketing *knowledge consulting*, we are managing a compound intangible – something so doubly abstract as to seem ethereal or even mysterious to some. To counter this not-unreasonable perception, we emphasize the tangible aspects of knowledge – the branding, the work process, the report quality, the quality of personnel and presentation – in short, anything that renders our abstract service more tangible and concrete.

6.2.4 Client Development (Phase 4)

In the final phase, we return to the ecosystem to bring our knowledge-based product offering to market. Now all the investment of time and other resources of the first three phases will begin to bear commercial fruit. Here the driving question is, *Why are they buying?*

I developed a four-step *User engagement ladder* (Figure 15) that our consultants and clients have found useful. Each client goes through its own development stages, albeit at varying speeds, before creating an ongoing relationship and revenue stream for the knowledge provider:

1. **Awareness** – Here the potential client acknowledges, *I have heard of you*. This is the result of what are traditionally known as *positioning* activities.
2. **Attention** – Here the client's attitude is, *I'm interested in what you are offering*, or even *I have a current need you could possibly fulfill*. This is the result of what is traditionally known as *marketing* activities.
3. **Project** – At this point, the client transitions from being a prospective user or "prospect" to being a User. She in effect says, *Let's work together, let's transact business*. Economic value changes hands. This is the result of what are traditionally known as *selling* activities.

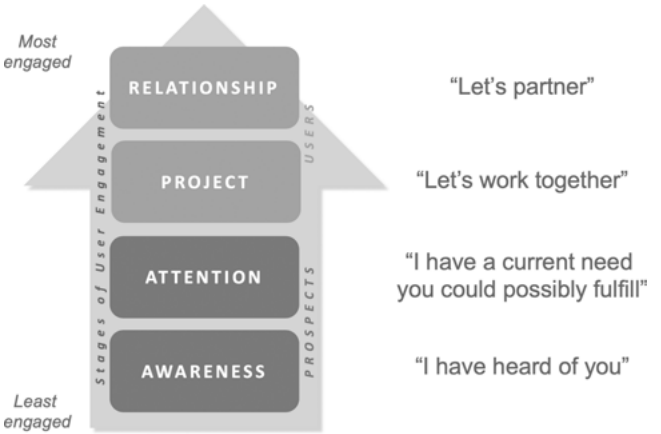


Figure 15: User engagement ladder.

4. **Relationship** – Economic value changes hands repeatedly, and the client has arrived at the attitude, *Let's partner; I consider you a trusted member of my team*. This is the result of post-sale *service* activities.

The climbing of this ladder requires consistent investments of time and resources over periods of time – sometimes months or even years. It is essential that the provider know, for each client or potential client, upon which rung of this development ladder that client sits at any given time – and what "nudges" may induce her to move to a higher rung.

6.3 Building the Business Case

Whether your knowledge initiative is a stand-alone product, an enterprise initiative, or a new hire, you will need to be comfortable with justifying and defending its budget, which itself can be challenging: "The justification and business case for undertaking a knowledge management initiative can often seem as difficult, or potentially even more onerous, than the execution of the KM program itself. Not surprisingly, this has either resulted in a completely aborted attempt to continue, or else prompted the 'build it and they will come' attitude in place of a proper analysis. The primary reason for this difficulty is a lack of understanding of the relationship between the nature of KM and its inherently indirect impact on business processes and outcomes" (Yelden et al.

2004). Note the benefits mapping method described in Section 5.3.2 to tie knowledge to enterprise strategies and goals.

Most decision makers in the modern organizational world are evidence-based – they seek empirical evidence to support their decisions, and are generally responsive to such evidence. In selling knowledge services – or just about anything else – it is essential to have a customer value model in mind. Specifically, what benefits will the user receive, and what is the economic value of each of these benefits?

6.3.1 Externalities

In Section 5.2 we discussed two value models that includes *tangible*, quantifiable factors and take into account *intangible* factors that are less susceptible to being quantified. In addition to these factors, there are also *externalities* that can impact a decision regardless of its strictly economic merits:

- **Capital availability** – Even where a project promises a clear ROI, capital is always constrained at some level. That is, organizations sometimes cannot fund every project at a given time that has a hurdle-clearing ROI.
- **Level of project risk** – An ROI calculation is a forecast, and as such is subject to all the potential variability that forecasting entails. The estimated downside risk may in some cases be too steep for a risk-averse audience.
- **Competitive pressures** – Organizations are social creatures, and as such respond to all the social pressures that we all, as humans, do. They are especially sensitive to peer pressure – *our rivals are doing such-and-such* serves as a potent motivator to naturally competitive corporate decision makers.
- **"Non-rational reasons"** – This oxymoronic term sums up the real-world reality that, even in the world of organizations, instincts and hunches sometimes overpower rationality.[30]

30 Organizations are composed of individuals, and individual decisions are known to be subject to the "heuristics and biases" first documented by Tversky and Kahneman (Kahneman 2011). An experienced market researcher with whom I spoke weights emotional factors in consumer decision making three to four times *more* highly than rational factors. A form of 80/20 rule in favor of non-rational factors may be at work here. While organizations may claim to be more rational than individuals, there is substantial evidence that the opposite is the case (e.g., "groupthink" and the madness of crowds.)

6.3.2 Scenarios and Sensitivity

Any model being presented for serious consideration should include at least three variations – the best case (i.e., the most optimistic), the worst case (i.e., the most pessimistic), and the most likely case (which typically lies somewhere between those two). In each case, it is the set of driving assumptions – that is, the *scenario* – that is varied.

The assumptions behind each scenario should be made explicit and clear so that these can be calibrated and tested as necessary. In particular, it is recommended to avoid *hidden assumptions* wherever possible – factors that have in fact been assumed, but that are not made explicit as such. Because these are, by definition, "out of view," they are essentially functionally similar to *unknown unknowns* and therefore not subject to the control of the model builder. Consequently, they represent a major source of unanticipated errors (see Section 2.1.4).

Closely related is the *sensitivity analysis*, wherein assumptions are tested for the impact they have on the model output. For example, if we are forecasting the ROI of a knowledge investment, as in the expertise location example in Section 5.3.7, we may find that the estimated ROI varies especially greatly with the amount of time spent by each employee on training in using the system. We can therefore focus on managing that variable, for example, by producing instructional videos.

In general, a sound sensitivity analysis will help you to:

- refine and communicate your **assumptions**,
- estimate the **range** of potential outcomes (i.e., the confidence interval),
- estimate the level of **risk** for the project,
- identify those **variables** that most strongly affect the outcomes, and
- build **credibility** for your projections.

6.3.3 Project Risk

Managements are typically sensitive to the level of risk implied by a project. The ROI profiles from two hypothetical projects (A and B) are contrasted in Table 17.

These two projects have the same "most likely" ROI – 70%. However, Project A has an upside risk limited to a 100% gain, where Project B has a potential for a 200% gain. However, Project A is safer, in that its worst-case downside is a 20% gain, here Project B has a potential loss of 20%. To summarize, Project B has a wider range of anticipated risks on both the upside and the downside. If the decision makers are risk averse – as many are – they will prefer the safer

Table 17: Risk profiles from two hypothetical projects.

SCENARIO	RISK PROFILE – Return on Investment (ROI)	
	PROJECT A	PROJECT B
Best Case ROI	100%	200%
Most Likely ROI	70%	70%
Worst Case ROI	20%	–20%
Overall Risk Level	Lower	Higher

Project A. If, however, the decision makers have a relatively greater *risk appetite*, they will prefer the potentially higher returns of Project B.

6.4 Selling Knowledge

In teaching graduate students at Columbia University and elsewhere, I came to realize that many of them were smart, hard-working, and fully capable of delivering superior results using knowledge. The "missing link," as I saw it, was that they were not nearly as fluent in translating the value so produced into terms that their client organization would understand, encourage, and fund. Knowledge is too often managed as "nice to have," rather than as the key resource that most people who work with it realize it is. How do knowledge professionals translate the value they add into enterprise terms? How do they construct the business cases, both formal and informal, for what they do?

Regardless of the merits, both financial and otherwise, of a knowledge initiative, there is still ample room for the time-honored art of persuasion. Getting a client to commit to a project is basically a form of *selling*. As a general rule, selling depends as much (and sometimes more) on the nature and propensities of your potential *client* as it does on the features of the *product* you are selling. It is essential to determine the needs and preferences of the buyer of knowledge services, and to tailor the services around those needs and preferences. In my experience, the most powerful sales tool for any product is a clear and persuasive demonstration of the value that the product will deliver to the User. When such demonstration is available, it is often said that "the product sells itself." Though it seldom is entirely that easy, fact-based persuasion is often more effective (and less tiring for all parties) than arm-twisting. (See the related *value-pull* approach described in Section 6.5.)

In my experience, there are often pre-existing biases within the client with regard to knowledge. I call this range of biases, both positive and negative, the *belief spectrum*. These beliefs are usually unstated and may even be latent, i.e., unconscious to the person holding the bias. They tend to cluster into two large groupings, *knowledge believers* – who tend to take knowledge "on faith" and have an inherent belief in its value – and *knowledge skeptics*, who require more empirical evidence and persuasion.
Knowledge believers tend to fall into two sub-groups:

- **Knowledge advocates** – Whose attitude toward knowledge is, "We will invest in knowledge regardless of ROI."
- **Knowledge friends** – "We 'get' knowledge. It works. We like it."

Knowledge skeptics fall into three sub-groups:

- **The open-minded** – "Show us the money. We need to prove knowledge ROI."
- **The closed-minded** – "What is knowledge, anyway? It sounds theoretical, fanciful, and discretionary."
- **The jaded** – "We tried knowledge before, and it doesn't work."

A brief initial conversation is typically sufficient for a skilled practitioner to discern where on the belief spectrum the immediate client falls. However, there are almost always other stakeholders in the process, as described in Section 2.6. In order to optimize chances for success, it is critical to know, for each key stakeholder:

- where on this belief spectrum each falls, and
- what opinions each holds as a result of the stakeholder role.

Knowing this can allow communications to be tailored to the biases of each key individual.

6.4.1 Knowledge Disappointment

In any sales process, it is good practice to anticipate potential *objections* (i.e., reasons not to buy) in advance, so that one can more readily overcome them. Knowledge projects historically have a relatively high rates of disappointment relative to expectation – and understanding this provides an empirical basis for countering objections. A KPMG study (Parlby 2000) reports that, "Organisations do not understand – and are not supporting – the full implications of KM implementation. The 36% of respondents who said that the benefits had failed to meet expectations were asked why. The most often cited reasons included:

- lack of user uptake owing to insufficient communication (20%);
- failure to integrate KM into everyday working practices (19%);
- lack of time to learn how to use the system or a sense that the system was too complicated (18%);
- a lack of training (15%); and
- a sense that there was little personal benefit in it for the user (13%).

In short, KM brings its own challenges, which organisations are failing to address. Even those companies with KM programmes complained about problems such as:

- the lack of time to share knowledge (62%);
- failure to use knowledge effectively (57%); and
- the difficulty of capturing tacit knowledge (50%)."

These reasons for project failure are all ones I have personally observed in clients during the two decades since this thorough report was written. These potential warning signs can be used to manage client expectations.

6.4.2 Managing Expectations

In almost any organizational endeavor – and especially those in which outcomes are highly uncertain – the ability to set and manage client expectations are critical factors for success. Performance – of an initiative, a work group, or an individual – is most often measured relative to some standard that represents the expectation to be met. If such measured performance exceeds expectations, the result is net happiness among the client audience. If performance falls short of expectations, the result is disappointment among the audience.

Note that any given level of performance can be seen either as exceeding expectations, where the expectations are set realistically – or as falling short, where the expectations are set too high. "Under-promise and over-deliver" is a rule of thumb to bear in mind in this regard. Companies use such guidance in describing their future earnings to investors. Knowledge practitioners can likewise use it to describe status to their "investors" — the clients, sponsors, and champions who keep them in business.

The Knowledge Planning process and resulting document (as described in Section 4.4) are critical aspects of expectations management. The Plan represents the "contract" agreed upon by all parties that spells out expectations as clearly as can be done in advance. Any significant unplanned variance from expectations should be communicated quickly, attentively, and transparently. For

example, if a key deliverable deadline will be missed, that should be stated clearly as early as possible – along with a revised schedule, a reason for the delay, and a characterization of that reason as either an ongoing challenge that needs to be managed, or as a one-time anomaly that has now been addressed.

It's important that individual differences among clients be informally assessed and actively incorporated into the expectations-management process. Knowledge is an intangible and abstract product, delivered at some future time – and as such may require greater (and more frequent) assurance to some clients than to others. Clients new to the process in particular often benefit from special handling – and, in fact, creating a "guide for new knowledge users" is a recommendation I've made to clients.

6.5 Knowledge-Push Versus Value-Pull

The dizzying pace of technology developments has made the life of the average knowledge worker better in many respects than it was back in the 1960s, when I entered the workforce. However, there are times when it seems that knowledge technologies are "solutions in search of a problem" – deployed in ways that leave it unclear what organizational problem they are solving. This is *knowledge push*, wherein the solution is driving the adoption. Adoption is more ideally driven by *value pull* – the need to solve the client's problem (i.e., the value proposition – the results, outcome, and impact).

A knowledge-push approach leaves you vulnerable to the possibility that you have mischaracterized the root problem up front – which I have found to be the case more often than not. A value-pull approach gives you the flexibility to pivot to alternative sources of value during your engagement. In most cases, "value" in this context is synonymous with "User value" (see Section 5.3.4).

Determining what constitutes User value seems deceptively simple. At best, we usually make the well-intentioned effort of asking Users what they want. However, this puts us perilously close to becoming order-takers. What's more, it just doesn't seem to work very well – because Users typically do not know what they want or need, until they see it. Steve Jobs famously said, "It is not the customer's job to know what he needs – *it is our job*." This is more subtle and difficult than just polling customers for what they want – though this should be included as part of a User value intelligence process. As professionals, we need to be able to determine what they need – and what they will need in the future – before they know they need it. We do that by asking – or observing – what problems and challenges they have (as illustrated in the sample Knowledge User Discussion Guide in Appendix B).

Value is produced at the intersection of our solution (i.e., what we sell) and the User problem (i.e., why they buy), as shown in Figure 13. Without both pieces of this puzzle in place and aligned with each other, overall value is diminished.

6.6 Scaling Enterprise Knowledge

When automobiles were first produced in the late nineteenth century, they were assembled in job shops – small workplaces where teams of a few people built cars by hand, a few at a time. Henry Ford and others came along in the early twentieth century and revolutionized the way this work was done – in assembly lines, which took manufacturing to new levels of scale and production volume, with corresponding decreases in prices.

Today, much knowledge work is accomplished in ways analogous to nineteenth century manufacturing – by small teams working in close collaboration. To manage and compete effectively in the knowledge economy which we now inhabit will require us to develop effective ways to *industrialize* or scale our work. We are reminded of Drucker's visionary words on the importance of knowledge worker productivity as a management imperative (see Section 5.3.1).

6.6.1 The K-I-K Translation

Though they are closely related, there are important differences between knowledge and information (as discussed in Section 1.5.2). As a general rule, information scales rapidly, easily, widely, and inexpensively, whereas knowledge does not. Digital technologies enable information to be distributed at the speed of light, with little loss of meaning ("signal"). Information is thus the medium of transmission for knowledge.

Too many organizations make the fundamental error of conflating knowledge with information. As a result, in purporting to manage knowledge, they end up managing information about knowledge – with the corresponding lack of value-added. An example I see repeated often is the best practices database that attempts to capture and offer for re-use the practical experiences of knowledge workers. At best, they are information bases, where the information, once "captured," too often remains so and unable to be re-converted to knowledge in any systematic or meaningful way. These efforts usually fall short of expectations, not because their intentions are not good, but primarily because they fail to understand the fundamental distinctions between information and knowledge.

In the idealized world of the science fiction film *The Matrix*, a person's entire body of knowledge can be captured and instantly downloaded to another person. If only it were so! In the real world, the transfer and scaling of knowledge is a slow and laborious process. For a doctor to "download" into her head the knowledge needed to even begin practicing medicine, it takes at least a decade of study and training – and the investment of hundreds of thousands of dollars.

In the real world, *knowledge itself cannot be directly transferred*. The step of transferring Person A's knowledge to Person B involves first translating that knowledge into information – words spoken or written, audio or video recordings, databases, etc. This "K-I translation" is labor-intensive – as I can attest as I experience this process first-hand in composing these words. Once my knowledge has been captured as words on this page (i.e., as information), then you (dear reader) are invited to execute a reverse "I-K translation" in order to unpack the information and capture it as knowledge of your own – reciprocal processes that we recognize, respectively, as teaching and learning.

MIT professor Cesar Hidalgo states this distinction thus: "Information can be moved around easily in the products that contain it, whether these are objects, books, or webpages, but knowledge and knowhow are trapped in the bodies of people and the networks that these people form. . . At the individual level, accumulating knowledge is difficult because learning is experiential. That is, we accumulate knowledge and knowhow mostly through practice, such as on-the-job experience." (Hidalgo 2015, 79)

Both K-I and I-K translations have varying rates of fidelity of the end result. Namely, some people (and situations) teach faster and more effectively than others, and conversely some people (in some situations) learn faster and more effectively than others. Thus, there is always at least some "noise" or distortion inherent in the process. The challenge becomes monitoring that noise and managing it downward to an acceptable level.

To further complicate things, in an enterprise (for example, a business, nonprofit, or government agency), most K-I-K translations are socialized – that is, they happen in groups, often on both the originating and the receiving ends. We *Homo sapienses* are social creatures, and the ways we behave and function in groups is often at odds with how we behave and function as individuals. Social behavior and cognition are in fact so different from individual behavior and cognition – both for better and for worse – that there have arisen whole schools of organizational behavior and social psychology to attempt to understand and explain these differences. Social effects include:

- **value-enhancing social effects** – for example, the *network effect* that makes social scaling exponentially powerful as a network extends

– **value-eroding social effects** – for example, *entropy*, the natural tendency to slide toward disorder as scale increases (see Section 1.6.4).

To note a final challenge, K-I-K translations are highly contextual. The efficiency and effectiveness with which they occur are sensitive to organizational politics, power structures – and even interpersonal dynamics as basic as *Who likes, and hangs out with, whom?*

6.7 Case Example – Knowledge-Based Service Design – Global Consultancy

I worked at different times with two of the "Big Four" global accounting/consulting/tax firms in developing services for them that would be higher value (i.e., higher billing rate) than their existing service portfolio. In one case, I helped their manufacturing practice to design and develop a service to be called *Inventory Shrinkage Analysis*™ that would systematically identify and stop sources of inventory loss in high-value manufacturing environments (for example, those involving precious metals or radioactive components).

Several individuals in the practice had deep knowledge in this area, and the firm had a couple of successful engagements in its experience base. But they had reason to think that there would be a much larger market for this – and had convinced a champion at the top levels of the global firm of this, who ended up endorsing the project and funding my participation. My role as an internal consultant was to help scale their knowledge into a saleable commodity – a challenge I could not resist, being just six months out of business school.

I undertook the following steps:

1. **Internal research.** I interviewed practice leaders.
2. **External research.** I commissioned some background literature searches on the problem.
3. **Productization.** I developed a work binder describing the methodology, the work flow, and the deliverables.
4. **Marketing.** I supervised the development of a four-page brochure (this was pre-Internet, so there was no website involved).
5. **Launch.** I presented my findings and work product to the practice leaders for their review and calibration.

At that point I was approached by a rival firm to do this same kind of service development work full-time. I found the work so challenging and stimulating

that I took the rival offer – but, to avoid conflicts of interest, never followed through as completely as I might have if I had stayed.

My sense was that the product met with only limited adoption as a core service. Looking back on this experience with the knowledge of this process that I now have, I would give myself mixed grades. I did some things well enough, but others I would do better, or differently. Specifically, I would have undertaken the following additional steps:

- Spoken with existing and potential **clients** to gauge exposure to the problem, and to evaluate the benefit that would accrue to them in solving it.
- Engaged **internal leaders** throughout the development process, rather than at just a few key points.
- Offered the service in beta form to **live customers** for feedback and further development.
- Developed a portfolio of clearly defined **go-to-market** activities.

In short, I focused almost entirely on our internal capabilities (i.e., the enterprise), when I should have balanced that focus with the ecosystem view – current and potential clients, the market in general, and even competitors. In K2V process terms (see Section 6.2), I did Phases 1 and 3 reasonably well, but Phases 2 and 4 not at all well. To be fair to ourselves, we had no established service development process or template, and were just doing whatever seemed like a good idea at the time.

In failing to fully consider the User in our discovery-and-development process, we were repeating what I have since determined to be the single most common, most dangerous – and most easily prevented – error in knowledge-based service development. I offer my experience as a cautionary tale.

6.8 Key Concepts in Chapter 6

knowledge-based innovation
discovery
enterprise
knowledge elicitation
value questions
agile development
monetization strategy
tangibility inversion
externalities
sensitivity analysis
risk appetite
Knowledge-to-Value (K2V)
development
ecosystem
knowledge mining
degree of innovation
minimum viable product (MVP)
positioning
User engagement ladder
scenario
project risk
belief spectrum

knowledge believer
objections
knowledge push
K-I-K translation
knowledge skeptic
managing expectations
value pull

6.9 Questions for Discussion

- Why do we need this whole discovery-development process? Can't we just hang a "knowledge for sale" sign out and start collecting money?
- Suppose our market and competitive intelligence tells us that there is currently no viable market for our knowledge? What recourse do we have?
- How can we engage Users earlier and with less effort (i.e., fewer resources expended)?
- Why do we need to have a business case?
- Why is having a sensitivity analysis important?
- Why is knowing the project risk profile important?
- Why are knowing sales objections important?
- Why is managing expectations important?
- What are some ways to scale our enterprise knowledge?

7 Knowledge Strategy

Let's suppose our goal is neither simply to execute a value-adding knowledge *project*, nor to introduce a successful knowledge-based *product* – but rather to transform an *enterprise*, or even an entire *industry*, based on the wholesale application of knowledge. It has been done! This is called *knowledge strategy*, the union between the disciplines of enterprise epistemics and business strategy.

The *knowledge-based view of the firm* (KBV) has achieved wide attention among academic economists since the work of Nelson and Winter (especially their 1982 book *An Evolutionary Theory of Economic Change*) and others. Foss (2005) provides a brief but thorough overview of this school of thought, its literature, and its principle proponents. The theory has gotten somewhat sidetracked academically due the fact that it integrates work from several other disciplines – economics, learning theory, competitive strategy, and others. Finally, as Foss notes, "It is a task of considerable complexity to identify what is the (knowledge-related) unit of analysis of the KBV, how this unity is dimensionalized, which causal mechanisms it posits with respect to the unit of analysis, and the outcomes at the level of organization and competitive advantage that the perspective wishes to address." Elsewhere, Foss notes that, "There is little systematic empirical evidence that speaks directly to the issue of how the knowledge economy impacts on organization and strategy." In his scholarly way, Foss is saying that scholars have trouble measuring knowledge and tying it to firm outcomes – and that, frankly, we're all new at this and don't yet have a science to tell us exactly what we're doing. Not surprisingly, these are more or less the same challenges as those faced by practitioners of knowledge strategy.

In practice, knowledge strategy consists of developing and deploying enterprise knowledge and its component assets as essential and integral resources in competitive business strategy. Knowledge strategy requires actively recognizing and using knowledge as a strategic resource and as a direct bridge to competitive advantage. The skill sets and techniques of knowledge strategists must include tactical components – building online communities of practice, building SharePoint sites, deploying best practices and "lessons learned" databases, and so on – but those are elements of, rather than the essence of, knowledge strategy.

Knowledge strategy in effect turns the knowledge services success formula on its head. Where the core challenge of knowledge services is "doing things right" – providing superior responsiveness, efficient and effective service, etc. – the core challenge of knowledge strategy is "doing the right things" by answering the question, *What mix of knowledge services should we be providing, given the nature of our enterprise goals and strategies?*

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The eminent military intelligence expert Sir Colin McColl (2007) once said to me in a private conversation, "In intelligence, it's hard enough getting the right answers – but the real challenge is *asking the right questions*." I believe that his insight applies to all knowledge services. The primary responsibility of the knowledge strategist is to ensure the right questions are being asked – and that those questions are being asked right (i.e., in the ways most likely to yield the most useful answers).

Economist Sidney Winter (1987) describes two fundamental roles in knowledge-based enterprise strategy. "The key strategic [knowledge] questions are:

1. What sorts of knowledge and competence assets are worth developing and
2. How is value to be derived from those assets?"

It could be argued that some of the most successful twenty-first century businesses have now evolved beyond knowledge as a strategy – to the point where not only is knowledge core to the business, but *knowledge finally and inarguably is the business* (as Drucker foresaw over a half-century ago). Facebook, Amazon, Apple, Netflix, and Google come to mind as obvious current leaders in this development – though this playbook will certainly be followed by many others in the future.

We note here in passing that there is a closely related analogue to knowledge strategy in the public sector known as *science policy*. This addresses the allocation of public revenues to knowledge-based public works including technology innovation, national competitiveness, and advanced weapons systems development. Publicly funded research in the U.S. has led to the development of the atomic bomb, several space exploration programs, the Internet, and the Global Positioning System (GPS), to name but a few history-changing examples. Most developed countries have science policies, which in some form date as far back as the Enlightenment in sixteenth century Europe (for example, as practiced by Francis Bacon in England).

In the public sector, *national security policy* too is governed by knowledge. Sherman Kent, a history professor who took a leave of absence from Yale to help found the U.S. Central Intelligence Agency (CIA), titles the first chapter of his intelligence manifesto, "Intelligence is knowledge." He goes on to describe intelligence as "the kind of knowledge our state must possess regarding other states in order to assure itself that its cause will not suffer nor its undertakings fail because its statesmen and soldiers plan and act in ignorance." (Kent 1949, 3) The driving value proposition in this case is the safety and security of the population and its agents and allies around the world.

An interesting and recent phenomenon in both the private and public sectors is that what were formerly considered tactical knowledge issues – to be addressed by operational teams, for example in the IT department – have now escalated to

become *knowledge policy* issues of major concern to senior management and boards of directors (as shown in Figure 16). This is because the opportunities opened up by knowledge (e.g., data analytics) have become significantly more attractive at the same time that the potential threats presented by knowledge (e.g., data security, privacy, and ownership) have also escalated. Threats and opportunities are two sides of the same *risk* coin (as discussed in Section 2.1.3). In some cases (e.g., cybersecurity), these have become issues to be addressed at the "super-enterprise," i.e., industry, level. And some (e.g., privacy, data security, and the right to be forgotten) are being addressed at the public policy and legislative levels – with implications for global policy and coordination.

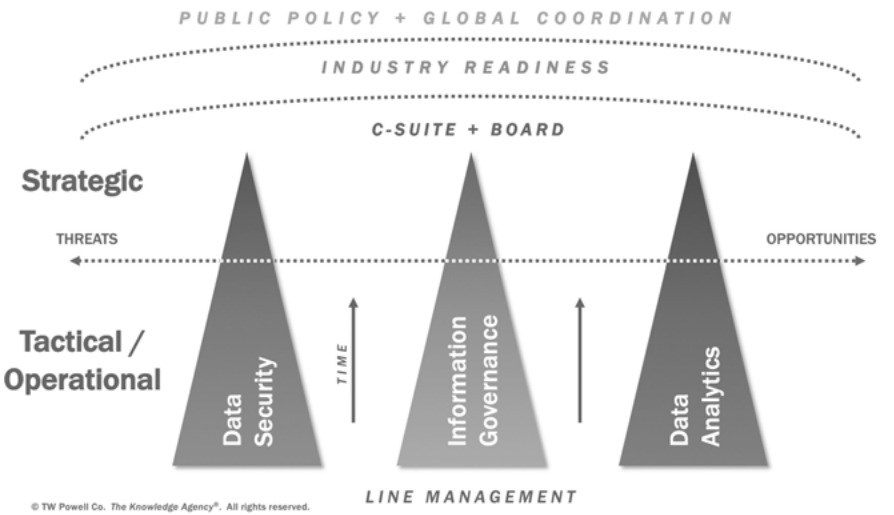


Figure 16: The escalation of knowledge issues.

When knowledge, the invisible and rapidly evolving asset, makes its debut in the boardroom, confusion typically reigns. In a crisis where headline-grabbing news about security or privacy are a factor, the company's reputation and brand equity may be at risk – which adds adverse exposure, stress, and urgency to the confusion (see Powell 2019).

Even in the absence of such urgency, managing knowledge at the strategic level is something most boards are neither accustomed to, nor trained for. According to organization theorist James March (1999), "The changing nature and importance of knowledge makes investments in knowledge critical and at the same time poses problems for making such investments intelligently. Since

the acquisition of knowledge requires time, and the relevance of possible knowledge is often difficult to know long in advance of when it is needed, organizations cannot ordinarily delay decisions about knowledge accumulation until it is needed. They invest in knowledge inventories. Optimal knowledge inventory policy is, however, difficult to specify and implement. Knowledge acquisition policy is plagued by difficulties of tradeoffs between distant returns and nearby costs and by the difficulties of balancing the mistakes of securing knowledge that is not used with the mistakes of not securing information that could have been used."

7.1 Basic Principles of Knowledge Strategy

Knowledge Strategy is a term that I began using when teaching in the *Information and Knowledge Strategy* program at Columbia University. Guy St. Clair, my series editor here, and my guiding light in general, saw a connection between my KVC model and his work on *knowledge leadership*, and brought me in to teach it to his students. Much of this section was developed as part of lectures and discussions with those students.

7.1.1 Strategy and Tactics

All of the actions of the enterprise – including, but not limited to, knowledge activities – can be divided broadly into two categories, strategy and tactics. *Strategy* is how we define our mission, goals, and direction. The archetypal strategy questions are, *What business(es) should we compete in? Where should we invest our resources? Tactics*, on the other hand, are the steps we execute in order to reach these goals: *Once we choose where we will compete, specifically how will we compete?*

Strategy and tactics can be generally differentiated along several dimensions as shown in Table 18.

Neither strategy nor tactics is superior to the other – they both need to be designed and executed well, each with close attention to the other, in order to achieve optimal outcomes. Neither are strategy and tactics discrete, mutually-exclusive categories – but rather, each exists at the opposite ends of a continuum, with gradations in-between.

Table 18: Key differences between strategy and tactics.

	STRATEGY	TACTICS
Scope and Scale	Broader	Narrower
Time Horizon	Longer	Shorter
Investment at Risk	Larger	Smaller
Level of Consideration	Senior Executives and Board	Operating Management
Time Orientation	Present and Future	Present and Past
Boundary Orientation	Outward	Inward

7.1.2 Time-Boundary Orientation

One characteristic that differentiates the strategic mindset is what I call *time-boundary orientation* (Figure 17) – an individual's (or entity's) operating attitude toward time frames on the one hand and the perimeter of the enterprise on the other. Regarding time, strategic thinking typically begins its focus with today and looks toward the future; non-strategic thinking tends to dwell on the past. Regarding perimeters, strategic thinking typically begins its focus at the boundaries of the enterprise and looks outward toward the ecosystem; non-strategic thinking tends to dwell on the internal affairs of the enterprise.

Thus, strategic thinking has an *outward-future* orientation. Every strategic decision is tested – not against what has been, nor what currently is – but against what will most likely be in the future. People who are comfortable in this realm are those who are more comfortable with relatively lower levels of certainty and controllability than individuals who are not.

7.1.3 Knowledge Leadership

The word "strategy" derives from the Greek *strategos*, defined as a military leader. Strategy is by definition the job of leaders – the challenge of "doing the right things." By extension, knowledge strategy is the job of knowledge leaders – not of knowledge managers, who are tasked with "doing things right," and who in key respects are the polar opposites of leaders.

The problem in many organizations is that we now have knowledge managers, sometimes many of them – but few true knowledge leaders, capable of envisioning, designing, executing, curating, and championing a knowledge strategy

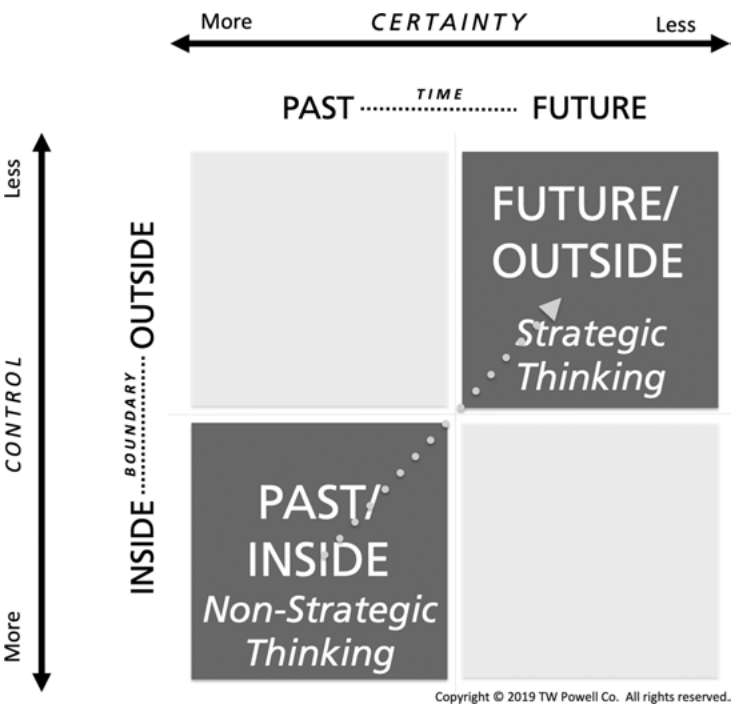


Figure 17: Time-boundary orientation.

at the enterprise level. While this may be partly due to gaps in their training, there are also powerful systemic forces impeding knowledge strategy. One of these barriers is embedded deeply within existing organizational structures. Knowledge Producers sit in a range of enterprise silos – in IT, in market and competitive analysis, in libraries, in R&D, sometimes in a dedicated knowledge management function, or even in the legal department – with little in the way of oversight or coordination among the many fiefdoms.

Much has been made in the management literature of the differences between management and leadership – and the needs to migrate patterns of thought and behavior away from the former and toward the latter. Organizational psychologist Warren Bennis (1994) describes the essential differences as shown in Table 19:

Table 19: Key differences between managers and leaders.

MANAGER	LEADER
Relies on control	Inspires trust
Administers	Innovates
Is a copy	Is an original
Maintains	Develops
Focuses on systems and structures	Focuses on people
Has a short-range view	Has a long-range perspective
Asks how and when	Asks what and why
Eye on the bottom line	Eye on the horizon
Imitates	Originates
Accepts the status quo	Challenges the status quo
"Good soldier"	Own person
Does things right	Does the right things

Management researcher Jim Collins (2001) summarized these differences as follows:

- **Competent Manager –** *Organizes people and resources* toward the effective and efficient pursuit of predetermined objectives.
- **Effective Leader** – *Catalyzes commitment* to the vigorous pursuit of a clear and compelling vision, stimulating higher performance standards.

Interestingly, these distinct job functions map closely to the fundamental ways in which the value of knowledge can be increased (Section 5.3):

- **Process Optimization** ("doing things right") – a core focus of knowledge managers
- **Strategic Relevance** ("doing the right things") – a core focus of knowledge strategists

Whereas "knowledge manager" is an accepted job title for which there is currently a vibrant market, "knowledge strategist" is (at this writing) not yet. In a recent informal study of job listings, I found that there were several dozens of active job postings for knowledge managers versus one posting for a knowledge strategist.

Tellingly, the posting for a strategist was for a leading technology firm and included the requirement for ten years' experience as a knowledge manager. Knowledge strategy, then, is best seen as a role (or set of capabilities) toward which advanced knowledge professionals can aspire.

7.1.4 Strategic Knowledge Architecture

Knowledge strategy is not the same as business strategy – but in our knowledge economy the two are becoming more interactive and tightly intertwined. A knowledge strategy should not be developed in isolation from a competitive business strategy, as too often happens. The two should be developed and implemented in close coordination, as shown in the *Strategic Knowledge Architecture* diagram in Figure 18 – and should both respond to the value model defined by the overall purpose and mission of the enterprise.

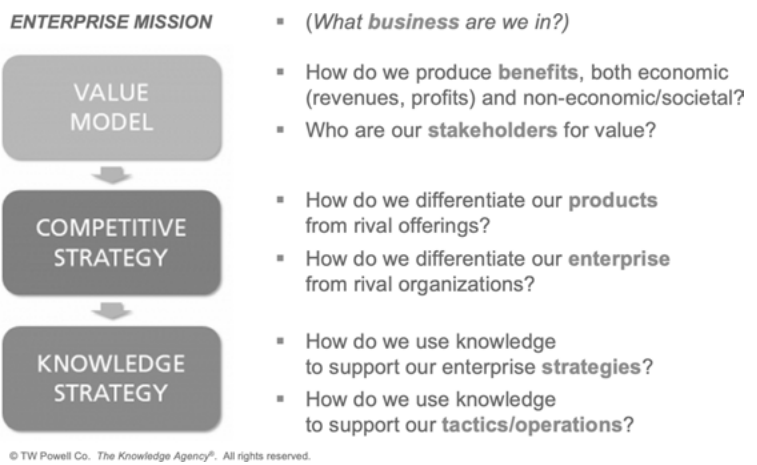


Figure 18: Strategic knowledge architecture – generic.

The Strategic Knowledge Architecture at its highest level has three elements: the enterprise *Value Model*, the *Competitive Strategy*, and the *Knowledge Strategy*. These consist of the following elements:

– **Value Model** – What is the overall purpose and mission of the enterprise? What core benefits (both economic and societal) do we offer? To what stakeholders do those benefits accrue? How is potential value actualized into revenues?

- **Competitive Strategy** – How do we compete, both at the product level and at the enterprise level? How do we differentiate our organization and our products?
- **Knowledge Strategy** – What knowledge do we need, at both the strategic and the tactical/operational levels?

As the *de facto* patron saint of knowledge strategists worldwide, Peter Drucker drew a direct connection among these elements in saying: "Economic results [i.e., the Value Model] are the results of differentiation. The source of this specific differentiation, and with it of business survival and growth [i.e., the Competitive Strategy], is a specific, distinct knowledge possessed by a group of people in the business [i.e., the Knowledge Strategy]." (Drucker 1964, 111)

Michael Zack (1999) agrees in saying, "the most important context for guiding knowledge management is the firm's strategy." Though this may seem obvious, Zack then notes the irony that "the link between knowledge management and business strategy, while often talked about, has been *widely ignored in practice*." (Emphasis added.) It is a linkage that must be actively forged in order for either discipline to achieve its maximum potential.

These categories will become clearer when we walk through an industry example. The following outline comes from the pharmaceutical industry and is hypothetical based on our background knowledge of the industry.[31] The critical first step is creating a coherent *inventory* of what knowledge already exists – which, though it should be created and continually updated by all organizations (as they do with tangible assets), is not in many cases.

7.1.4.1 Value Model – Pharmaceuticals

Simply stated, the pharmaceutical industry value model is to consistently provide innovative, effective, and profitable chemically and biologically based remedies in a specified range of diagnostic categories. Longer disease-free life, enhanced quality of life, and a healthier overall population are among its societal benefits.

The major stakeholders to whom these benefits accrue include:

- **Consumers** – patients and their families
- **Providers** – hospitals, doctors, nurses, other health professionals, and pharmacists

31 Note that in an existing company, it is rare that one is asked to create a knowledge strategy *de novo*. It is usually more a matter of making calibrations of, and adjustments to, the existing strategy to meet the changing needs of the organization.

- **Payors** – insurance health plans, pharmacy benefits managers, and government agencies (Medicare and Medicaid in the U.S.)
- **Regulators** – primarily the Food and Drug Administration (FDA) in the U.S. for new drug approvals
- **Investors** – institutional and individual owners of equity and debt instruments
- **Other –** politicians, the general public, and the press

7.1.4.2 Competitive Strategy – Pharmaceuticals

Companies compete along several dimensions at both the product and enterprise levels:

Product Differentiation

- **Molecule design and features** – protected by patents if proprietary
- **Pricing** – regulated in most countries, though not in the U.S.
- **Marketing and sales** – branding, advertising, sales force deployment

Enterprise Differentiation

- **Innovation** – discovery and development of new molecules
- **Scope of operations** – choice of diagnostic categories addressed
- **Scale of operations** – countries served
- **Sourcing** – supply chain
- **Capital markets –** sources of funds

7.1.4.3 Knowledge Strategy – Pharmaceuticals

What are the major things we need to know about to compete successfully in this business? Though each company's strategic situation may be somewhat unique, major subject areas of interest would likely include:

- **Molecules small and large**. Firms typically maintain vast databases of molecules, and drug discovery occurs largely through data modelling, rather than through test-tube experimentation as was the case previously (or trekking through the jungle, previously to that).
- **Prescriptions written**. These, which form the market share numbers for the industry, show trends by product and diagnostic category, rival products and companies, etc.
- **Input from key opinion leaders (KOLs)**. Doctors and other key health professionals are key market targets for any new product offerings.
- **Clinical trials data**. These tests are the critical milestones in the development and launch of a new molecule.

- **Patents and trademarks**. Patent and trademark protection multiply the profit-producing value of a molecule (see Section 3.8.3).
- **Regulations and compliance**. The complex and dynamic regulatory environment requires continual monitoring of, and response to, changes.

These are tactical areas of knowledge strategy – the "doing things right" part. There is also a higher driving level within a knowledge strategy – the "doing the right things" part of the strategy. This includes the *strategic narrative*, for example; what is the "story" that, as an enterprise, we wish to convey to our stakeholders? This can become part of a "vision and mission" statement, for example, or an advertising campaign.

At the next more granular level of detail, the Strategic Knowledge Architecture might resemble this one we proposed to a U.S. military agency (Figure 19). This contains these major elements (listed in reverse order of the Knowledge Value Chain model, i.e., with Producers at the top and Users at the bottom):

- The Producers and their managers
- The Content Management System, including the body of knowledge and associated metadata
- Content assets by type
- The delivery platform (i.e., "channels")
- The Users

7.1.5 Inbound, Internal, and Outbound Knowledge

In discussing knowledge strategies, it is worth considering the respective roles of inbound knowledge, internal knowledge, and outbound knowledge. These can be seen as spanning several enterprise disciplines:

- **Inbound knowledge** – market research, competitive intelligence, sales force debriefings, social media listening, etc.
- **Internal knowledge** – the library, knowledge services, knowledge management, information technology, research and development, legal scholarship, etc.
- **Outbound knowledge** (which I have sometimes referred to as "*exformation*") – content marketing, advertising, public relations, investor relations, etc.

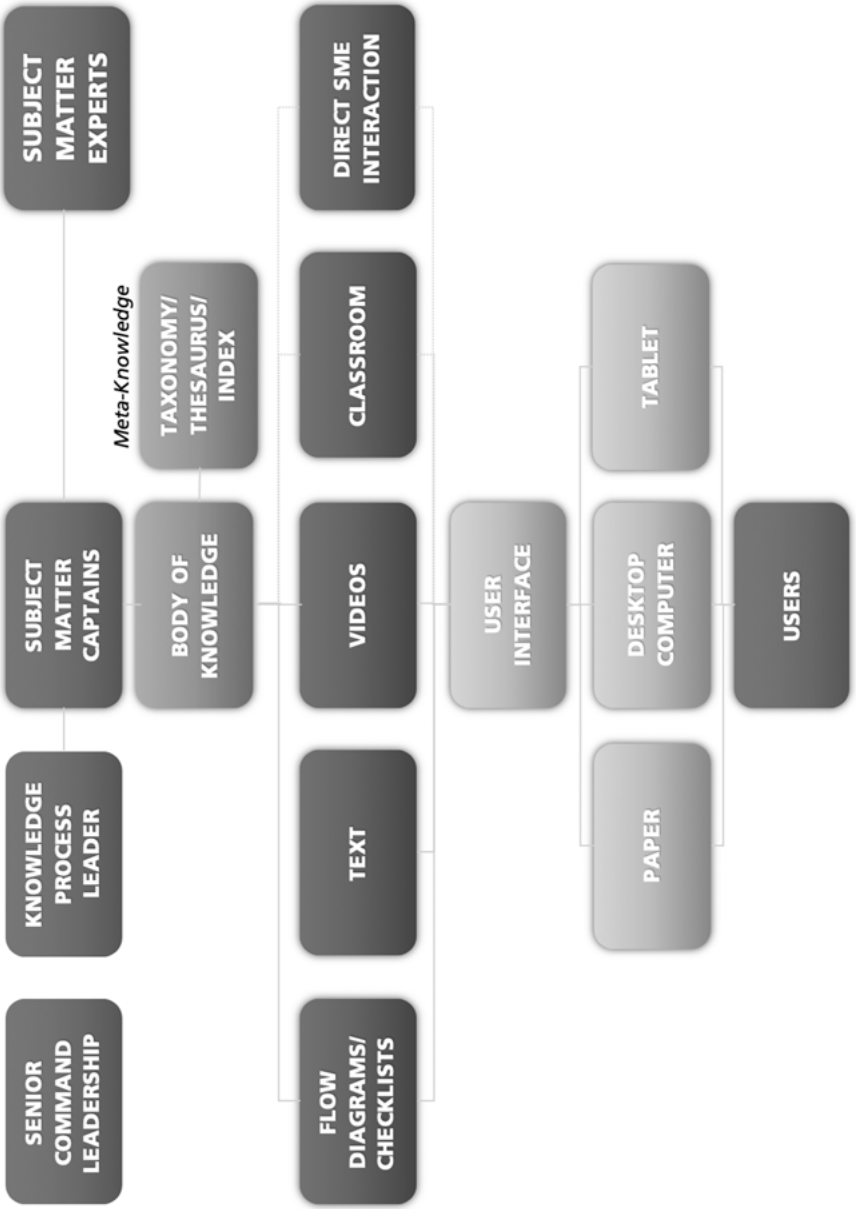


Figure 19: Proposed high-level knowledge architecture (abridged).

To the extent these disciplines coordinate and collaborate, developing a consistent enterprise approach to knowledge is feasible. To the extend they are siloed and not networked together, such development is more difficult. Since these functions typically reside in different enterprise functions, usually with different lines of reporting, such integration, when it occurs, is most often driven from high levels in the executive hierarchy.

But too often, such coordination does not occur. We recently studied, for example, the effects of the greater use of digital and social media on brand equity and the risks that accompany it (Powell 2019). A key impediment to rapid and effective response was the separation between intelligence (i.e., inbound knowledge), the legal department (i.e., internal knowledge), and social media response (i.e., outbound knowledge). Building response playbooks that put these disciplines through practice runs of realistic crisis scenarios proved to be an effective solution to this problem.

7.1.6 Scan and Target

Another important enterprise knowledge flow was suggested to me in private conversation with Dr. Mike Koenig. I have observed that my knowledge services clients, in acquiring new knowledge, do it in two complementary ways, which I call *scan and target*. Scanning consists of periodic searches for situation changes or updates to a given body of knowledge. *Alert me if X changes* and *Keep me updated on X every quarter* are typical User requests of a scanning nature. Targeting consists of a one-time deeper dive into a body of knowledge. *Tell me everything about X* is a typical targeting request. These two approaches are often used effectively together – targeting to produce a baseline report, and subsequent scanning to produce sequenced refreshes and updates of the information.

7.2 Scaling Knowledge Value

In evolutionary biology, there is a well-known principle that *ontogeny recapitulates phylogeny*. This is the observation that in "higher" life forms like mammals, the life development of each individual (i.e., its ontogeny) mirrors or recapitulates its whole evolutionary development (i.e., its phylogeny). Humans start life in the womb at conception as single-celled organisms like amoebas, following which they breathe through gill-like organs like fish, and finally when they are being born transition rapidly to breathing through lungs like amphibians. Once

they are born, of course, they are mammals. Thus, one individual's development essentially mirrors that of the entire species.

Though only partly supported by scientific evidence, this principle is nevertheless useful as a metaphor when applied to knowledge. To what extent, for example, does the study of the value of knowledge at a macro-economic level (which was where Machlup began his studies) have implications for how it can be managed at the level of the individual enterprise? And how does that in turn depend upon, and inform, the management of knowledge value at smaller levels of fineness – individual business processes, work products, and people?

It may come as no surprise that I think the interdependence is significant, in both directions; the practices of knowledge are, in many cases, scalable both "upward" and "downward."[32] Understanding how to scale knowledge practices opens up new avenues for insight and change (note that the KVC model itself can be applied at different scales, see Section 4.3.5). The levels of knowledge scale, ranked from larger to smaller, are summarized in Table 20:

Table 20: Examples of knowledge at varying scales.

KNOWLEDGE SCALE	EXAMPLE
Society	"Smart cities" initiatives to digitize city life
Industry	Machlup's original studies on the "knowledge industries"
Enterprise	Organization-wide knowledge optimization
Process	Business process knowledge optimization, e.g., marketing
Product	Developing a knowledge-based product (see Section 6.2)
Document	Creating a value-focused presentation deck

To briefly reprise Cardwell's Law, first discussed in Section 3.1.4, in societies throughout history, knowledge tends to actively develop to a point – after which it becomes first entrenched and non-dynamic, then actively resistant to development and change. This can happen in organizations, too – in such a way that knowledge devolves from being a "springboard to innovation" to being a barrier (and often a quite effective one) to innovation. *We have always done it this way,*

32 Note that this scalability of practices across various knowledge scales is distinct from the inherent non-scalability of knowledge itself, as discussed in Sections 1.5.2 and 6.6.

this is the way we do it, this is the best way it can possibly be done are refrains in a song that signals the demise of knowledge as a vibrant resource. This devolution is often slow and steady – and rarely announces itself as such.

As Mokr (2017) observes, "Breaking out of Cardwell's Law requires, above all, a community that combines pluralism and competition with a coordination mechanism that allows knowledge to be distributed and shared, and hence challenged, corrected, and supplemented." This prescription for escaping knowledge stagnation is as applicable at the enterprise scale as it is at the societal scale.

7.3 Knowledge Strategy Development Processes

While knowledge strategy is something that can evolve on its own, we recommend that an intentional structure be used to guide the development process. There may be no one "perfect" development model, and in that spirit we present herein a couple of alternatives. Whichever method is adopted, it should be adapted to the local conditions within the enterprise – firm or agency purpose, culture, values, mission, and strategies.

Knowledge maven Tom Stewart (2001, 58 ff.) describes a four-step process in developing what he calls an intellectual-capital strategy:

1. **Identify and evaluate the role of knowledge in your business** – as input, process, and output. This includes generating answers to the following questions:
   - How knowledge-intensive is the business?
   - Who gets paid for what knowledge? Who pays? How much?
   - Is this a good knowledge business? That is, does whoever owns the knowledge also create the most value?
2. **Match the revenues you've just found with the knowledge assets that produce them.**
   - What are the expertise, capabilities, brands, intellectual properties, process, and other intellectual capital that create value for you?
   - What is the mixture of human-capital, structural capital, and customer-capital assets?
3. **Develop a strategy for investing in and exploiting your intellectual assets.**
   - What are your value proposition, source of control, and profit model? What strategies exist to increase the knowledge-intensity of your business?
   - In what ways can you increase your ability to leverage your intellectual assets?

   - Can you improve results by restructuring intellectual assets (for example, converting human capital into structural capital, or vice versa)?
4. **Improve the efficiency of knowledge work and knowledge workers.**
   - Bearing in mind that knowledge work does not necessarily follow the linear path that physical labor often does, how can you increase knowledge workers' productivity?

Stewart follows what he terms the "standard" definitions[33] of intellectual capital components:

- **Human capital** – talent
- **Structural capital** – intellectual properties, methodologies, software, documents, and other knowledge artifacts
- **Customer or relationship capital** – client relationships

My own firm TKA's operational approach to developing a knowledge strategy ("Value-of-Knowledge Optimization" or VoKO) contrasts with Stewart's largely financial approach. We engage six core workflows:

1. **Supply Side Inventory.** We conduct an inventory of our client's knowledge infrastructure, including activities and assets (see Section 2.2). Data are collected primarily through Producer interviews (for which there is a model discussion guide in Appendix A), surveys, and internal document reviews.
2. **Demand Side Requirements.** We assess our client's current and future knowledge needs through qualitative User interviews (for which there is a model discussion guide in Appendix B) and/or quantitative surveys.
3. **Ecosystem Assessment.** We conduct an independent, high-level assessment of our client's competitive ecosystem to identify and assess threats, opportunities, uncertainties, and risks – and their likely impact on knowledge requirements. We have developed a framework for this, described in Section 7.7.1. Modeling of alternative scenarios is engaged in cases where the ecosystem is in moderate or extreme flux.
4. **Asset Mapping and Gap Analysis.** We map the assets and component data against the current and likely future requirements of the enterprise. In this way we identify overlaps and gaps in our client's current knowledge process and asset mix.

33 We note that in several key respects, this corresponds with our Knowledge Balance Sheet (KBS) described in Section 3.6.2. Clearly, Stewart's "human capital" corresponds exactly to "people knowledge" in the KBS. His "structural capital" includes both "produced knowledge" and "protected knowledge" from the KBS. His "customer capital" would be a component of "produced knowledge" in the KBS.

5. **Assessment and Evaluation.** Using proprietary tools and metrics, we identify our client's strengths and weaknesses at the levels of activities and assets.
6. **Program and Roadmap.** We recommend a program of improvements, including a phased roadmap for implementation. We provide tactical implementation, coaching and mentoring, and other assistance as needed.

The questions we answer are much like the ones Drucker engaged to test a knowledge strategy: "Do we have the right knowledge? Do we concentrate where the results are?. . . Does the business have the knowledge needed to give it leadership position in the market, and to earn rewards where the market values excellence?. . . Is our knowledge sufficiently built into our goods and services?. . . How can we improve? What are we missing? And how do we go about supplying it?" (Drucker 1964, 118–120).

7.4 Core Competencies

Worth noting here is Prahalad and Hamel's (1990) construct of *core competencies*, which they define as "the company's collective knowledge about how to coordinate diverse production skills and technologies." This construct explicitly links knowledge strategy to competitive strategy, with special focus on technology support, using the following general process:

1. **Clarify core competencies**
   - *Articulate a strategic intent* that defines your company and its markets
   - *Identify core competencies* that support that intent by asking:
     - How long could we dominate our business if we didn't control this competency?
     - What future opportunities would we lose without it?
     - Does it provide access to multiple markets?
     - Do customer benefits revolve around it?
2. **Build core competencies**
   - *Invest in needed technologies* to leverage these competencies
   - *Infuse resources throughout business units* to outpace rivals in business development
   - *Forge strategic alliances* to supplement internal resources as needed
3. **Cultivate a core-competency mind-set**
   - *Stop thinking of business units as sacrosanct* by working across organizational silos

- *Identify projects and people who embody the firm's core competencies* to send the message that competencies are corporate – not unit – resources, and those who embody them can be reallocated
- *Gather managers to identify next-generation competencies* and decide how much investment each needs, and how much capital and staff each division should contribute

The authors offer these tests for identifying a core competency: (1) it provides potential access to a wide variety of markets; (2) it makes a significant contribution to the perceived customer benefits of the end product; and (3) it is difficult for competitors to imitate. The authors acknowledge that "This is a deceptively difficult task. Ultimately, it requires radical change in the management of major companies" and a wholesale re-envisioning of the enterprise as not business unit-based, but rather competence-based. Japanese companies like NEC, Canon, Honda, Sony, Yamaha, Komatsu, and Casio are cited as early beneficiaries of this mode of thinking during the 1980s.

7.5 Open Innovation

Henry Chesbrough (2006) has described an open innovation model that has been used successfully at companies like Procter & Gamble, Xerox, and IBM, as well as in industries like the Hollywood film industry and investment banking, to stimulate innovation speeds and lower innovation costs. This is essentially a knowledge strategy, though Chesbrough does not use that term. It turns traditional "internal fortress" models of R&D on their head, claiming that knowledge that produces innovation can be sourced as well externally (i.e., open) as internally (i.e., closed) – and sometimes even more effectively. Chesbrough summarizes the differences between the two strategies, shown in Table 21.

Open innovation requires us to think first about what knowledge we need to compete, and then how and where we source it – rather than thinking first about how we can employ our existing ideas and intellectual talent. These differing methods are roughly analogous, respectively, to the *value-pull* and *knowledge-push* approaches discussed in Section 6.5.

Open innovation also requires us to rethink our ideas about the characteristics of our enterprise *cognitive perimeter* – should it be hardened, as traditionally thought, or guardedly permeable? Success in innovation depends on being able to develop networks and alliances through which innovative ideas will flow. It has become the stuff of legend, for example, that academic research from Stanford

Table 21: Principles of closed versus open innovation.

CLOSED INNOVATION PRINCIPLES	OPEN INNOVATION PRINCIPLES
The smart people in our field work for us.	Not all the smart people work for us. We need to work with smart people inside and outside our company.
To profit from R&D we must discover it, develop it, and ship it ourselves.	External R&D can create significant value, internal R&D is needed to claim some portion of that value.
If we discover it ourselves, we will get it to market first.	We don't have to originate the research to profit from it.
The company that gets an innovation to market first will win.	Building a better business model is better than getting it there first.
If we create the most and the best ideas in the industry, we will win.	If we make the best use of internal and external ideas, we will win.
We should control our intellectual property so that our competitors don't profit from our ideas.	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model.

University played a major role in the development of the companies that eventually became Silicon Valley.

As information lawyer Brian Kahin puts it, "What was once a relatively clear-cut distinction between open/public and controlled/private knowledge has been blurred. Boundary-spanning economic activity flourishes: joint ventures, alliances, standards, consortia, open source development. . . Ownership of knowledge is crafted to varying degrees of centralization and different configurations of openness and control." (Kahin 2006)

Not only does openness affect inbound knowledge, it affects outbound knowledge as well (i.e., its distribution or communication). Organizations or communities that depend for their collective value on the exclusiveness of their stock of knowledge will find their business models disrupted by the ever-increasing *democratization of knowledge*. Medical information, for example, is no longer to be found just in the doctor's office, but is readily available (in some form) on the Internet. Susskind and Susskind (2015) present a thorough discussion of the current and likely future impact of knowledge-supporting technologies on *externalization* – the making available online of expertise formerly available only in discussion with an expert – in various professions such as law, medicine, and management consulting. These professions, as with all knowledge work, are increasingly experiencing

pressure to make major shifts in their value propositions. If they fail to adequately address the challenges of knowledge externalization, they risk finding themselves wedded to obsolescent value propositions (see Section 7.7).

7.6 Codification Versus Personalization

Morten Hansen et al. (1999) describe two fundamentally different knowledge strategies that, two decades later, are still being debated: codification and personalization. With a *codification* strategy (also called *people-to-documents*), "Knowledge is carefully codified and stored in databases, where it can be accessed and used easily by anyone in the company." With a personalization strategy (also called *person-to-person*), "knowledge is closely tied to the person who developed it and is shared mainly through direct person-to-person contacts. The chief purpose of computers at such companies is to help people communicate knowledge, not to store it."

In their research into knowledge-intensive firms – large consultancies, computer companies, and healthcare providers – the authors found both strategies being used successfully, often within the same firm. The more successful firms, however, were the ones who focus on one of the strategies and use the other in a supporting role.

They note that at systems consultancy Ernst & Young, codification has cut the time to sell new projects as well as the time to deliver them. At strategy consultants McKinsey, on the other hand, the emphasis is on personal discussions with subject matter experts. They conclude that, "A company's choice of strategy is far from arbitrary – it depends on the way the company serves its clients, the economics of its business, and the people it hires. Emphasizing the wrong strategy or trying to pursue both at the same time can, as some consulting firms have found, quickly undermine a business."

The authors note that, "A company's knowledge management strategy should reflect its competitive strategy: how it creates value for customers, how that value supports an economic model, and how the company's people deliver on the value and the economics."[34]

They offer the following questions, the answers to which will be guides to which strategy should ideally prevail:

34 We note that this exactly reflects our Strategic Knowledge Architecture framework (see Section 7.1.3), though we were previously unaware of their work.

- Do you offer **standardized** or **customized** products?
- Do you have a **mature** or **innovative** product?
- Do your people rely on **explicit** or **tacit** knowledge to solve problems?

Again, it's the nature of the business itself that determines the best knowledge approach. In each of the binary alternatives above, the former condition indicates that a codification strategy is preferred, while the latter favors a personalization strategy.

In the spirit of resolving this apparent dichotomy, we offer the insight that codification is more accurately seen as an *information* strategy, whereas personalization is a "true knowledge" strategy (see Section 1.5.2). Once you understand how knowledge and information work together (as described in Section 6.6), it's no longer productive to see this as an either/or decision. Both are needed, both need to work together, and both need to be managed effectively in order to optimize overall results.

Many firms make the mistake of over-reliance on codification, which during the second modern wave of knowledge management (see Section 3.1.8) was widely seen as the preferred solution. In many instances, this created barriers to action, what Pfeffer and Sutton (2000) called "knowing-doing gaps." These gaps were made worse, in their view, by the practices of knowledge codification, for several reasons:

- "Knowledge management efforts mostly emphasize technology and the transfer of codified information.
- Knowledge management tends to treat knowledge as a tangible thing, as a stock or a quantity, and therefore separates knowledge as some *thing* from the use of that thing.
- Formal systems can't easily store or transfer tacit knowledge.
- The people responsible for transferring and implementing knowledge management frequently don't understand the actual work being documented.
- Knowledge management tends to focus on specific practices and ignore the importance of philosophy."

The future of knowledge value lies in personalization – supported by sound data and information practices, and scaled to industrial strength.

7.7 Value Dynamics

All of our discussions herein about key stakeholder-centric value propositions omit one key consideration: that *value is dynamic*. Value is continually in motion – any

appearance of equilibrium is short-lived and illusory. Consequently, User needs and the resulting User Value Propositions (UVP) also change continually – often incrementally and imperceptibly, but sometimes in rapid and precipitous ways – resulting in *value model misalignments,* or even *obsolescence*.[35] We have said (in Section 1.5.2, for example) that knowledge too must therefore be dynamic – at the individual practitioner, work team, and enterprise levels. This is becoming more widely recognized, for example in the ISO 9000 requirements for "refreshing" knowledge requirements (see Section 2.1.7).

"If you don't change – you *have* changed." I use this mantra often with clients to mean that, in effect, if they stand still, they are moving backwards relative to their clients' ever-evolving needs. Ideally, the UVP would be continually re-aligned with changing User needs. However, given the realities of budget cycles and organizational structures, such value re-alignments are often episodic, one-off events – if they occur at all. They can be organizationally traumatic, occurring as they typically do when things have already fallen pretty far out of alignment.

To avoid this disruption, it is important to query Users regularly, whether formally or informally, regarding how their needs may have shifted. In addition, the other stakeholders benefitting from knowledge (described in Section 2.6) may have also undergone value shifts, so wherever feasible they should be included in such assessments as well. The competitive ecosystem should also be monitored continually for changes at all tiers (see Section 7.7.1). Case examples in Sections 4.7 and 7.7.2 describe ways to mitigate value misalignments.

A corollary of the fact that value is dynamic is that it has *time* as a key determining element. What may have significant value at one time may no longer have as much value at a later time – the business model of selling books in physical retail stores, to cite an obvious example. Conversely, something that does not have much value today might have great value tomorrow – or in five years. It's the talent for finding these latter things that, if you can develop it, will always serve you well.[36] Timing is everything – and value must therefore be continually re-examined.

35 You might think of this as another example of the principle of *entropy*, the tendency for orderly things to drift toward disorder, at work (see Section 1.6.4).

36 I am writing this from my home office on the Hudson River waterfront in downtown Manhattan – properties that sold for five-figure dollar prices during the 1980s, that now command lower-to-middle seven figure prices, more than 30 times their original prices. The reasons for this fall outside the scope of this discussion – but, suffice it to say, what is agreed to have value now was not seen to have as great value decades ago.

7.7.1 Sources of Change in the Competitive Ecosystem

In Section 3.4.6 we define a *value vector* as a description of in what direction, and at what velocity, a quantitative value metric or qualitative marker is trending. "Sales were up by two percent this quarter over the same period last year" is a value vector. We call that a *dependent* vector, because it is the combined result of other *independent* vectors – for example, the fact that the economy grew by X%, that we added Y% number of sales calls to our schedule, or that we redesigned our direct-sales website. Independent vectors are also known as *drivers* and can typically be thought of as "causes." Dependent vectors can be thought of as "effects" of those causes.

What are the sources of such independent value vectors? In our knowledge strategy work with clients, we have identified ten broad categories within the competitive ecosystem (which corresponds to Drucker's *significant outside*, described in Section 2.1.5) that in most cases contain drivers of significant enterprise value change. These "orbit" around the enterprise (which is represented by the small arrow at the center of Figure 20) in three tiers that vary in impact and speed: (A) Trading Partners, (B) Other Players, and (C) Systemic Vectors.

Tier A – Trading Partners

1. **Demand Chain** – customers, customers' customers, other outbound channels
2. **Supply Chain** – suppliers, suppliers' suppliers, other inbound channels

Tier B – Other Players

3. **Rivals** – direct and indirect competitors, substitute products
4. **Enablers** – products that directly impact the value of our product (for example, wireless phone service if we are a maker of smartphones)
5. **Regulation** – legislation, litigation, case law, judgments, rulings, opinion letters
6. **Capital Markets** – access to debt, equity, and cash equivalents

Tier C – Systemic Vectors

7. **Social/Demographic Shifts** – for example, the changes in buying patterns brought on by the increasing economic power of the "Millennial" generation
8. **Technology Innovations** – for example, the broad shift toward mobile computing
9. **Geo-Political Shifts** – for example, the recent rapid ascendancy of the Chinese economy to worldwide power
10. **Business Cycle** – as discussed in Section 1.1.3, market crashes and recessions can present a major obstacle to knowledge activities

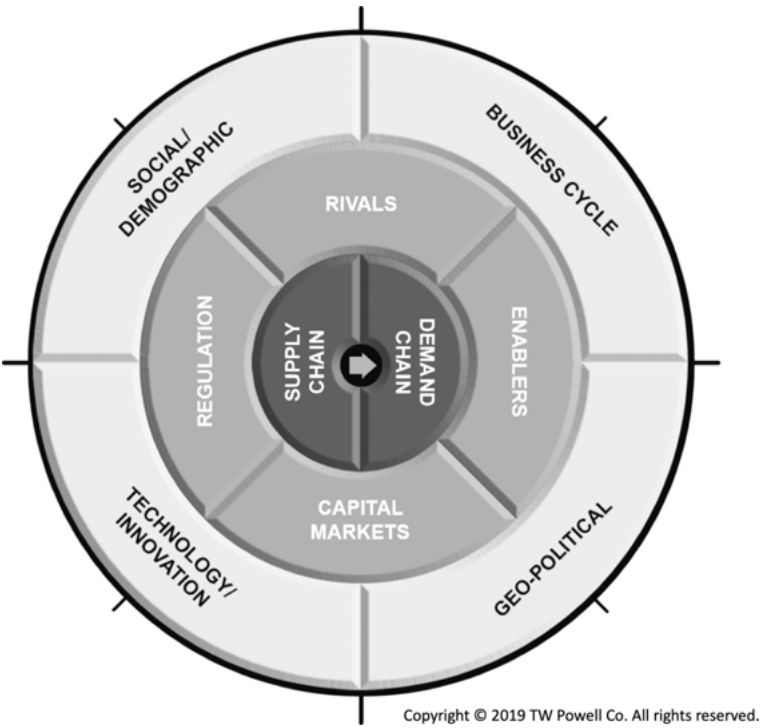


Figure 20: Competitive ecosystem framework.

The magnitude of the value impact of each tier varies. Specifically, Tier A (Trading Partners – the inner darker circle in Figure 20) have a direct value impact, and tend to be faster-moving than the other tiers. Tier B (Other Players – the middle circle) have an indirect value impact, and move at mid-pace. Tier C (Systemic Vectors – the outer circle) have a pervasive value impact that affects all players in the ecosystem. These generally are larger in scale, and slower in velocity, than vectors in the other tiers.

Once the specific relevant independent vectors (i.e., drivers) are identified within each of the ten broad categories, with the task then becoming measuring them as a baseline, weighting the importance of each, and tracking their dynamics moving forward. Note also that the vector categories often interact with each other – such that, for example, a new regulation that affects a major supplier will likely have a major effect on our enterprise.

The key in my experience is to be highly *selective* as to which vectors to track most carefully. I worked with a strategy officer at a global consumer

goods company in refining this model and was asked by him to identify the specific vectors most affecting his company. His brief was to the effect, "Tim, your team does a lot of research for us – and we have other companies working for us, too. But sometimes we are overwhelmed by the amount of data we receive. [We hear this from clients often.] We need to know what really matters to our business. What factors should we be watching?"

I thought about this and reviewed years of research files we had compiled for him and his colleagues, as well as reviewing trends in the company's ecosystem. Our analysis showed that only 15 external drivers were responsible for most of the variation in the firm's results. We were surprised that such a complex organization could be driven by such a relatively small number of drivers – and brought this to our client (with whom we had a collegial relationship) in the hopes that he would tell us what we had missed. "You have correctly identified the most important factors," was his reply. This was a global firm whose annual sales were in the tens of billions of dollars. We used these results to drive our strategic intelligence program going forward.

Some time later, I shared this model (without the specific data) with another client, a planning officer at another global consumer goods company. He agreed with the three-tier structure of the model, and offered that his company had people assigned to monitor changes within each tier – a *market research* function to monitor trading partners (Tier A), a *competitive intelligence* function to monitor other players (Tier B), and a unit within the *strategic planning* function to monitor longer-term trends (Tier C). As an internal client of these three units, the problem he experienced was that these resources were siloed and did not communicate effectively with each other. So not only were the driver interaction effects (as noted above) lost, but also the all-important big picture that ties everything together in a balanced and comprehensive landscape eluded them. They literally were struggling to see the forest, for the trees.

7.7.2 Case Example – Value Dynamics – Health Care Payor

These changes that affect the enterprise and its business strategies consequently affect the knowledge strategies for the enterprise. As a case example, we worked with a large U.S. healthcare insurance system to forecast knowledge requirements in a highly dynamic situation – namely, the industry changes to be brought on by the Affordable Care Act, the then-new legislation governing the

U.S. health payments industry. Using scenario-based models, we made recommendations as to the future information and knowledge needs of the enterprise and its key business units.[37]

Our research resulted in a four-level segmentation for knowledge resources (i.e., activities and assets), each of which presented a distinctive set of value-enhancement opportunities:

- Resources that, though not needed in the past, would be needed in the future (i.e., **augmentation** opportunities)
- Resources that, though needed and purchased in the past, would be needed less, or not at all, in the future (i.e., **cost savings** opportunities)
- Resources that, though needed and purchased in the past, would need further analysis or other internal development to achieve their maximum usefulness (i.e., **development** opportunities)
- Resources that were in place and adequate as they were – though these sometimes presented opportunities for building client **awareness** and/or usage.

7.8 Case Example – Knowledge Strategy – Amazon

Many enterprises have been upended by shifts in their industry's business model brought on by the knowledge economy, and many more will be disrupted in the future. One enterprise that perhaps most fully epitomizes the profound value-moving potential of knowledge is Amazon. Our research reveals three fundamental ways in which Amazon has uniquely leveraged knowledge to gain unparalleled competitive advantage through producing superior stakeholder value: (1) industry structure disruption, (2) user experience design, and (3) employee development.

Today Amazon is a company that operates in a growing list of countries (over 30 at this writing) in an ever-expanding range of retail sectors that includes books, DVDs and CDs, video and audio downloads, software, video games, electronics, apparel, furniture, food, toys, and jewelry. It has now expanded well beyond retail to include video streaming services, self-branded electronic devices (Kindle readers and Echo smart speakers, for example), cloud services (AWS), TV and movie production, same-day delivery, and logistics and fulfillment for other

37 While our approach was successful, the situation was so dynamic – with modifications to the law still occurring nearly a decade later, at this writing – that its impact within the client was shorter-lived than it would have been in a more stable situation.

companies. There is little reason to think that Amazon's scope and scale of operations will not continue to expand in the future.

When Amazon debuted in 1994, however, it sold only one product in only one market – books in the U.S. According to Stone (2013), who corroborates contemporary reports in the trade press, founder Jeff Bezos made a conscious, data-driven decision to enter that industry after studying a range of twenty possibilities. The reasons included: (1) books are commodities – a copy of a book from a given store is identical to the same title from another store; (2) there were many more books in print (about three million) than any single retailer could possibly carry in stock; and (3) there were two primary distributors of books (Ingram and Baker and Taylor), so a new retailer could deal with them instead of directly with the thousands of publishers. In fact, there was a database that listed the huge virtual inventory of books – *Books in Print* from R.R. Bowker, the source of the identifying ISBN number that books carry.

Books in Print essentially formed the lower half of Amazon's Knowledge Value Chain.[38] What about the upper half, the production of User value? Here's where Bezos' brilliance as a businessperson comes in. The standard wholesale price of a typical book at that time was 50 percent of its retail list price. At first, Amazon held no inventory of books. When a book order would come in, they would order it from the wholesaler, then when it arrived, ship it back out to their ordering customer. Their prices were discounted up to 40 percent off list price for bestsellers, and 10 percent off on other books, so their gross profit margin on bestsellers was only 20 percent, as opposed to a 100 percent margin for what would soon become known as "brick-and-mortar" retailers. However, Amazon's costs were much lower, primarily due to the fact that they had no physical stores – and, therefore, no rent, no construction costs, no utilities (HVAC, light, power), no hourly salespeople, no cash registers, and so on. These are major expenses for the retail sector – which traditionally runs on thin profit margins. One by one, the other retailers found themselves unable to compete with this new model and began to go bankrupt.

Today, Amazon has its own huge and growing network of warehouses, as well as a burgeoning fleet of ground and air delivery vehicles, so its economics have changed significantly. But the fact remains that they are systematically "obsoleting" the retail part of the demand chain, category by category – providing direct-to-consumer wholesaling at greatly reduced prices to the customer. For years Amazon did not earn significant profits with this model, but as a

38 Amazon is not at this writing, nor has it ever been, a client of The Knowledge Agency®.

strategy they have since succeeded in expanding into businesses that are highly profitable – cloud services, for example.

A second major way in which Amazon uses knowledge to create User value is with a superior and socialized user experience (UX). The customer reviews and recommendations system was innovative and integral from the beginning. The customer experience is consistently satisfying, tracking every aspect of the experience – from browsing to finalizing a selection, to purchasing, to shipping, to returns where needed, to selling back used items. Every element of this experience is enriched with email and/or text updates, so you always know where things are.[39]

A third major way in which Amazon builds enterprise value on knowledge is their (apparently genuine) commitment to continual staff development. Their website reads, "Career Choice [their tuition assistance program] is available to Amazon hourly associates who have been employed for one continuous year. With this program, the company pre-pays 95% of tuition and fees for associates to earn certificates and associate degrees in high-demand occupations such as aircraft mechanics, computer-aided design, machine tool technologies, medical laboratory science, dental hygiene, solar technician and nursing, to name a few. We exclusively fund education only in areas that are in high demand according to sources like the U.S. Bureau of Labor Statistics, and *we fund those areas regardless of whether those skills are relevant to a career at Amazon*." (Emphasis added.)

7.9 Key Concepts in Chapter 7

knowledge strategy	*knowledge-based view of the firm (KBV)*
science policy	*national security policy*
knowledge inventory policy	*knowledge acquisition policy*
strategy	*tactics*
time-boundary orientation	*knowledge leadership*
strategic knowledge architecture	*inbound knowledge*
internal knowledge	*outbound knowledge*
scan and target	*ontogeny recapitulates phylogeny*
core competencies	*open innovation*
democratization of knowledge	*externalization*
codification	*personalization*

39 As a long-time Amazon user, professional "knowledge agent," and now an Amazon shareholder, I can report that of the User value tests present in Section 5.3.4, Amazon meets every single one of the eight for me.

value dynamics
value vector
dependent vector
competitive ecosystem
value model obsolescence
driver
independent vector
significant outside

7.10 Questions for Discussion

- What is knowledge strategy? How does it differ from competitive strategy?
- What is knowledge policy? What are its various types?
- Why should knowledge practitioners work closely with business strategists? Why does this often not happen?
- Can you be trained to think strategically?
- Can you be trained to be a leader?
- How can the knowledge "big picture" give us insights into the granular details of knowledge? How is the reverse also possible?
- What is a value vector? How can we predict the size, direction, and timing of value vectors?
- Who could be the next Amazon? What are some industries that would benefit from disruption?

Appendix

A Knowledge Producer Discussion Guide

The DEPARTMENT group of COMPANY has engaged The Knowledge Agency® (TKA) to help us focus and develop our knowledge strategy. TKA would like to speak with each of you privately and confidentially about your role, things about your work that are working well, and things that you think could be improved. There's no preparation needed – and there are no wrong answers. This will take about 45 minutes.

Questions for execution teams:

1. What is your **title** and role at COMPANY? How long have you been in that role?

2. What are your **activities** in a typical day? Proportion of time spent on each?

3. What knowledge **resources** (i.e., databases, systems, reports, publications) do you use frequently? (COMPANY and external) For each one, how do you use it? What works well about it? What needs improvement?

4. Which other COMPANY people/roles do you **interface** with most frequently?

5. What COMPANY **meetings** do you attend regularly? How often?

6. What three things most **help** you in doing your job? Why?

7. What three things do you find least helpful, or most in need of **improvement**? For each one, how could it be improved?

8. Any other comments?

9. May I get your direct phone number and work email address in case I need to follow up with you?

Thanks for your time and insights.

https://doi.org/10.1515/9783110593044-008

Additional questions for leadership:

1. What is the **value** that COMPANY provides its clients and stakeholders? How do you measure that?

2. What is the role of **knowledge** at COMPANY? Is it "mission-critical?"

3. What is DEPARTMENT's **role** in that?

4. Which **other departments** play critical roles?

5. How does DEPARTMENT **add value** to COMPANY's purpose/mission? How do you **measure** that?

6. What are the three things about DEPARTMENT that add the **greatest** value?

7. What three DEPARTMENT things add the **least** value and/or are most in need of improvement?

*KEY RESOURCES INVENTORY – Within each asset category, please provide a detailed list of individual assets. (*Indicates a "people" asset.)*

KNOWLEDGE ACTIVITY	KEY KNOWLEDGE ASSETS
PRODUCTION	***PRODUCERS**
	CONTENT – made versus bought
COMMUNICATION	**CHANNELS** – technology vs. human; active versus passive
USE	***USERS** – communities; individuals; internal versus external
MANAGEMENT	**CHARTER** – policies versus practices

B Knowledge User Discussion Guide

1. What is your **role** at COMPANY?

2. How does that function fit into the overall **mission** of COMPANY?

3. What are some major ways in which you use **information** in your work?

4. Are you a **client** of DEPARTMENT (the COMPANY Knowledge Services unit)?

5. Approximately **how many times** during the past year have you used DEPARTMENT services?

6. In what **other ways** do you also get information you need for your job? (E.g., get it myself; user another COMPANY resource; use an outside vendor, etc.)

7. Can you estimate, of your overall work-related information needs, what percentages you **fulfill** through these various sources:
   a. ___ COMPANY Knowledge Services
   b. ___ Other internal COMPANY resource(s) _____
   c. ___ Do it myself
   d. ___ Outside vendor
   e. ___ Other _____
   = 100%

8. How would you rate your **awareness** of the services DEPARTMENT provides? (indicate one)
   ___ (4) I have detailed awareness of what DEPARTMENT offers
   ___ (3) I have overall awareness of what DEPARTMENT offers
   ___ (2) I have limited awareness of what DEPARTMENT offers
   ___ (1) I know little of what DEPARTMENT offers

9. What are the **ways** in which you become and remain aware of DEPARTMENT services? (indicate all)
   a. ___ The COMPANY website
   b. ___ DEPARTMENT training
   c. ___ DEPARTMENT outreach (describe) _____
   d. ___ Word of mouth (e.g., another COMPANY non-DEPARTMENT employee)
   e. ___ Other _____

Test familiarity with DEPARTMENT collateral materials.

10. Are there certain **types** of information needs that you find are best fulfilled by the DEPARTMENT unit? (name all)

11. In general, how **satisfied** have you been with the services provided by [DEPARTMENT]? (indicate one)
    ___ (4) Extremely satisfied – beyond my expectations
    ___ (3) Satisfied – met my expectations
    ___ (2) Somewhat dissatisfied
    ___ (1) Extremely dissatisfied
    ___ Not applicable

12. What are the main **reasons** behind your answer?

13. When you were **satisfied**, was there a way you could express that?

14. When you were **dissatisfied**, was there a way you could express that?
    a. Were you able to get the situation **corrected**?
    b. What specific things do you feel could have been done **better**?

15. What are the (three) biggest **challenges** you routinely encounter in accessing the information you need to do your job effectively?

16. In general, how **important** to you is getting the best information to do your job? (indicate one)
    ___ (4) Essential
    ___ (3) Very important
    ___ (2) Somewhat important
    ___ (1) Of little or no importance

17. For the following five characteristics of the information you need, how **important** is each of them? (indicate one for each characteristic)

    a. **Timeliness**
    ___ (4) Essential
    ___ (3) Very important
    ___ (2) Somewhat important
    ___ (1) Of little or no importance

b. **Relevance**
___ (4) Essential
___ (3) Very important
___ (2) Somewhat important
___ (1) Of little or no importance

c. **Accuracy**
___ (4) Essential
___ (3) Very important
___ (2) Somewhat important
___ (1) Of little or no importance

d. **Non-redundancy**
___ (4) Essential
___ (3) Very important
___ (2) Somewhat important
___ (1) Of little or no importance

e. **Exclusivity**
___ (4) Essential
___ (3) Very important
___ (2) Somewhat important
___ (1) Of little or no importance

Any other comments?

C Index of Strategies for Using Knowledge to Build Enterprise Value

This section provides a cross-reference for the major value-building strategies discussed throughout the book.

VALUE-BUILDING STRATEGIES	SECTION REFERENCE(S)
Enhance the "epistemic wrapper" around a physical product	2.1.2
Become more familiar with the enterprise applications of knowledge	2.1.5
Assess knowledge programs and initiatives against ISO standards	2.1.7
Assess knowledge programs and initiatives against Baldrige Awards standards	2.1.8
Render knowledge programs and initiatives tangible, visible, and measurable	2.3.1
Identify and assess current and future knowledge activities and assets	2.2, 3.6.2, 7.3
Link knowledge programs and initiatives directly to enterprise purpose, mission, goals, and strategies	2.3.2, 5.3.2
Identify and reduce hierarchical value gaps between knowledge Producers and Users	2.4.3
Identify and reduce organizational space and time-to-market value gaps between knowledge Producers and Users	2.4.4
Position knowledge services as a strategic partner of enterprise leadership	2.5
Understand the varying goals and incentives of key knowledge stakeholders	2.6
Continually test data for fundamental value attributes	3.3.1
Continually test analysis for fundamental value attributes	3.3.2
Account for knowledge as carefully and thoroughly as you would tangible economic assets	3.6
Reduce or eliminate the collection and analysis of data expected to have little or no consequence for decisions and actions	4.0
Diagnose and correct failures in knowledge workflow	4.6
Reposition knowledge services to reflect ongoing changes to the User Value Proposition (UVP)	4.7, 7.7.2

(continued)

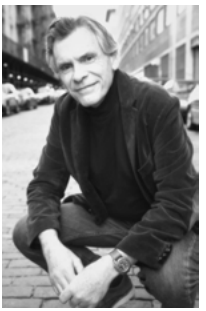
VALUE-BUILDING STRATEGIES	SECTION REFERENCE(S)
Understand, measure, and communicate knowledge inputs, outputs, and outcomes	5.1.2, 5.1.5
Optimize the entire knowledge flow process, including knowledge worker productivity	5.3.1
Increase the strategic impact of knowledge activities	5.3.2
Understand and use knowledge value inflection points	5.3.3
Understand and operationalize the fundamental sources of User value	5.3.4
Use free knowledge as a “loss leader” to enhance the value of a core product	5.3.4
Use dynamic discounted cash flow (DCF) modeling to assess the value of knowledge initiatives	5.2.2, 5.3.7
Build monetization scenarios around bodies of knowledge	6.1, 6.2
Build a clear, persuasive business case for knowledge	6.3
“Sell” knowledge services the way you would any other service	6.4, 6.5
Use knowledge scalability to drive knowledge impact upwards and downwards	6.6, 7.2

D Core Propositions – The Value of Knowledge

These ten points distill the most important findings I have presented herein, Detailed discussions may be found in the sections referenced.

1. **Enterprise is fundamentally a human activity – of people, by people, and for people.** Organizations are composed of people making individual and group decisions under uncertainty, and exhibit the strengths and weaknesses of human cognition and behavior. (Section 1.5.7)
2. **Knowledge and information are fundamentally different.** All knowledge is tacit, organic, and dynamic. Information is the explicit, inorganic, static manifestation of knowledge. (Section 1.5.2)
3. **Knowledge is an economic resource – it has costs and benefits.** *Knowledge value* describes the relationship between knowledge costs and knowledge benefits. (Section 5.1.4)
4. **Knowledge generates actualized enterprise value only in being applied**. Prior to being used or applied, knowledge has potential value. The actualized value generated by knowledge is inversely proportional to the distance (in time and space) between its production and its use. (Section 2.4.4)
5. **The value of knowledge is stakeholder-centric and stakeholder-contextual.** Different users for a knowledge element may value it in different ways and to different degrees. (Section 2.6)
6. **Knowledge is *not* power.** Knowledge must work within the power structure, rules, strategies, and metrics of the enterprise. (Section 1.5.4)
7. **Knowledge value development is a process that occurs in time and that consumes resources.** It has a series of gated steps and a beginning, a middle, and an end. (Section 4.1)
8. **Knowledge strategies scale**. Value principles that apply at a macro level (e.g., the enterprise) may be applied at a micro level (e.g., the work product), and vice versa. (Sections 4.3.5 and 6.6)
9. **Knowledge represents the majority of enterprise value in many industries** – yet it rarely shows up in formal financial statements. (Section 3.7.2)
10. **Value is dynamic and is affected by a number of ever-changing factors.** Value propositions must be continually calibrated, refined, and aligned. (Section 7.7)

About the Author



Timothy Wood Powell is president and founder of TW Powell Co. *The Knowledge Agency*® (www.KnowledgeAgency.com), a boutique management research and consulting firm focused on strategic analytics and knowledge strategy. His *Value of Knowledge*™ lectures, workshops, and clinics have been enthusiastically received by audiences worldwide.

Tim's professional experience integrates enterprise strategy, intellectual property security, competitive intelligence, knowledge management, new business design and development, marketing and market research, and financial modeling and forecasting. *"I am especially interested in the impact of knowledge on enterprise performance, competitiveness, and value – a theme that forms the foundation of my consulting practice and that I explore in my blog* Competing in the Knowledge Economy.*"*

In addition to many articles, book chapters, and recurring columns, Tim has authored books on the business applications of technology (*The High Tech Marketing Machine*) and on competitive analysis (*Analyzing Your Competition – Third Edition*). His monograph *The Knowledge Value Chain® Handbook* describes an ROI framework for enterprise knowledge.

Prior to entering private practice, Tim worked in a range of client services and firm management capacities with consulting firms PwC, Opinion Research Corporation (ORC), and KPMG. In a consulting and research career spanning four decades, he has served more than 100 client organizations – among them Abbott Laboratories, Altria, American Express, CIT, Ecopetrol, General Electric, Highmark BCBS, McGraw-Hill, Petrobras, Nestlé, Revlon, Sony, the State of New York, Travelers, the US Navy, John Wiley, and Xerox – as well as smaller firms and start-ups, where he has held board and advisory responsibilities. Prior to his business career, he served as a research psychologist with nonprofits and as a financial and operations analyst with government agencies.

Tim is a Senior Fellow of The Conference Board's Marketing and Communications Center. He served for four years as an instructor in Columbia University's innovative *Information and Knowledge Strategy* program. He is currently a Guest Lecturer in the Business Certification and Postbaccalaureate Studies Programs of Columbia's School of Professional Studies. He developed and taught a graduate course, *Enterprise Intelligence: A Value-Based Approach,* for the Palmer School of Library and Information Science at Long Island University. He has lectured at the BU Questrom School of Business, Columbia Business School, NYU Stern, Rensselaer at Hartford, Rutgers, and the Yale School of Management, as well as industry and professional events worldwide.

Tim loves his work, but when he's not working, he enjoys writing and playing music, capturing photographs, hiking, volunteering and mentoring, investing, practicing yoga, and playing with his grandsons and cats.

He holds a BA from Yale College (with majors in pre-medical sciences, psychology, and philosophy) and an MBA from the Yale School of Management (with concentrations in operations research, finance, and production management), with additional graduate studies in business (NYU Stern) and psychology (New School).

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Other books by Timothy Powell

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My professional family is rivalled in importance only by my personal family. My father James Rennie Jim Powell was a navigation officer in the U.S. Navy during World War II. He taught me many useful and fun things. One of the earliest I remember is what the horizon is – as useful conceptually in navigating life as it is useful physically in navigating oceans. Dad taught me a respect and even reverence for the truth – such that, to this day, for better and for worse, my word is my bond. A business writer himself, he was a lover of books, especially those about arctic exploration and those by H.D. Thoreau.

My mother Elizabeth Clay (Kay) Thurman Powell gave me her love of exploratory learning – I remember her admonishing us to "Look it up" at the age when most children are being reminded to "Eat your peas." Mom introduced me to the first library with which I fell in love – the Swarthmore, Pennsylvania (USA) Public Library. A business editor, her love of words and etymology led her to write and publish her own informative and amusing newsletter, *Word Watching*.

My sister Susan Powell Murphy often generously lends her editorial expertise to my work and patiently listens to my ideas. Her recent medical challenges have turned her into an expert researcher who makes recommendations to her doctors.

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My mother's younger brother Dr. John Neal Thurman gave me great encouragement when I published my own monograph a decade ago in saying, "The most advanced work in my field (medicine) is self-published – don't let that stop you."

My mother's father Dr. Edgar Neal Thurman, a Ph.D. chemist who worked for DuPont, including on the Manhattan Project after World War II, and my father's father Robert Carlyle Powell, who conducted market research for a Philadelphia newspaper, perhaps had some remote genetic effect on the contents herein – though I didn't get to know either of them well.

It was my mother's mother, Julia Gardner Ross Thurman, whom I knew as "Mimi," who had the greatest grand-parental impact on me. The daughter of the editor of a small-city newspaper and herself a schoolteacher, she was a voracious reader and fascinating conversationalist. She kept a personal diary from the time she was a teenager, a discipline I adopted under her influence.

Two long-time family friends were especially important to me. Thomas Ball Marshall was like an uncle, as close as any non-family member. His dedication to scholarship lasted through his career as a polymers chemist at DuPont and through his entire life. His unforced and generous hospitality to me and my family cannot be measured. John Murta Adams was my other "uncle" – architect, neighbor, interlocutor, and counselor – and the person who convinced me to apply to Yale, his alma mater.

My beloved teachers at Nether Providence High School (Wallingford, Pennsylvania, USA), first among them Joseph Profeta (biology) and Joseph Canamucio (calculus), gave me a good push. Kell Damsgaard was my friend and study buddy, without whose guidance and competition I would probably not have done nearly as well academically as I did.

Cigna Corporation (then INA) provided me with a full-tuition scholarship to Yale. Working there as a management intern for two summers, I first learned about the applied economics of risk.

Yale College changed me completely. My two years of pre-medical training gave me a solid ground in the hard sciences, which I have used continually, if mostly by way of analogy. I studied social psychology with R.P. Abelson (Hawthorne effect, Milgram experiments), philosophy with Kenley Dove (Plato's cave), cultural anthropology with Sidney Mintz, and Biology 20 (competition among species, which I later took as a metaphor for competition among organizations).

At Yale, you learn as much from your peers as from your teachers. Kevin McKean was my first good friend there, whom I am still lucky to call a friend today. Dr. Jim Rothman was my early roommate and is now a Nobel Prize laureate, with whom I have shared many deep and fruitful conversations about science over the years. Dr. Perry Meisel was my roommate, friend, rock band

mate, and an eminent English literature scholar – from whom I came to observe and admire the discipline and craft of scholarship. My dear friends Dr. Dan Friedlander, Dana Smith, Neil Shropshire, Dr. Ira Lowenthal, Doug Laney, Harry Levitt, Rick Cech, and Bill Bierce each made a major contribution. Finally, Yale's distributional requirements forced me, a confirmed "science guy," to take a history course. I naturally selected the history of science – "and that has made all the difference."

There are others too numerous to mention, especially in the YC classes of 1970, 1971 (my class), 1972, and 1973. In particular, Barbara Miller has provided lots of "tea and sympathy" over the years. Julia Preston has always been an inspiring conversationalist, writer, and friend. Yale provided my first exposure to people who saw boundaries as arbitrary, rules as guidelines, and limitations as temporary. People who decided what they wanted to do, planned and prepared to do it, and (to my astonishment) actually did it – most often, quite successfully – became first my role models, and then my friends. Rising to the high marks they set has remained a lifelong pursuit of mine.

I worked under psychologist Dr. George Witt during four of my six years between college and management school. "Jerry" hired me to do fascinating fieldwork on social dynamics within low-income New Haven families, which he called "family action systems," and which resulted in my first co-authored, though regrettably unpublished, book. He taught me a lot about independence, entrepreneurship, and how to write winning grant proposals.

The Yale School of Management (SOM) played a major role in forging me into what I am today. Without the founding dean Bill Donaldson, it's likely there would have been no SOM. I studied, among others, with Dr. Art Swersey (operations research), Dr. Sidney Winter (microeconomics), Dr. Ron Wippern (finance), Dr. Larry Isaacson (marketing), Marya Holcombe (writing), Dr. Garry Brewer (game theory and behavioral economics), Dr. Allen Flores (computing as a management resource), Dr. Aaron Wildavsky ("Information for Decision"), Dr. John Bassler (data analytics, which enabled me to earn a living for the first five years of my journey), and Dr. Bob Fetter (production management). More recently, Dean Ted Snyder has provided insights and support for my work.

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Don Welsch, a prominent business econometrician, took me under his wing at Peat, Marwick, Mitchell (now KPMG) and got me measuring the value of, among other things, sales taxes in New York State – which resulted in our co-authoring an academic paper, my first professional publication. Tom Welch,

a partner there, was the first to draw for me the clear connection between public writing and practice development.

Hope Picker, market analyst extraordinaire with whom I worked closely at PwC, has been a source of ideas and inspiration for many years.

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The Society of Competitive Intelligence Professionals (SCIP, now Strategic and Competitive Intelligence Professionals) became my professional network. I served as its founding NYC chapter chair, as a director on its global board, and was eventually elected a Fellow. SCIP sponsored the earliest versions of this work, which led me to visits with Chinese government officials in Beijing and U.S. intelligence officials in Langley, Virginia. I am especially indebted to the Fellows (many of whom recently organized independently as the Council of Competitive Intelligence Fellows), especially: Cyndi Allgaier, Jan Herring, Dr. Ben Gilad, Cliff Kalb, Dr. Mark Little, Dr. Dick Klavans, Dr. Martha Matteo, Ruth Stanat, Ellen Naylor, Arik Johnson, Bonnie Hohhoff, Kirk Tyson, Dr. Pat Bryant, Dr. Brad Ashton, Cynthia Cheng-Correia, Eric Garland, Dr. John Prescott, John McGonagle, Dr. Jonathan Caloff, Seena Sharp and Dr. Jay Paap. Dr. Walter Barndt was a wise and kind mentor, and his book *User-Directed Competitive Intelligence* was influential in my thinking about knowledge clients and users. My buddies Les Joynes, Roberta Piccoli, and Robert Bugai were always supportive and helpful.

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Several talented artists have helped us immensely. Joan Wong of Arising Group designed much of The Knowledge Agency's current website. John Fantini designed (among other things) the Knowledge Value Chain and Competitive Ecosystem graphics that appear herein. Tyler Gore designed our blog site KnowledgeValueChain.com. Leslie Hassler provided the author photograph.

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I must echo Sir Isaac Newton's comment that, "If I have seen further than others, it is by standing upon the shoulders of giants." I have gained enormously by the excellent work in the economics of knowledge that precedes me, some (but not all) of which is reviewed herein. The economist Fritz Machlup was arguably the first writer to focus extensively on the economics of knowledge. His work is not widely known today and remained unknown to me until relatively far into my journey of discovery. His writing style – an erudite, scholarly tone tempered by a playful earthiness – has served as inspiration for my own.

Peter Drucker's work continues to pervade and inspire my own, as evidenced by the work I present herein, which cites him throughout. His 1974 book *Management* convinced me, a pre-medical degree holder then working as a business analyst, that management is a field worthy of study and mastery. In so doing, he changed the course of my life – though I acknowledge that Herb Simon's *Administrative Behavior* had an even larger impact on me.

Amos Tversky and Daniel Kahneman's 1974 paper "Judgment Under Uncertainty: Heuristics and Biases" (included in Kahneman 2011) was easily the most revelatory piece I read in management school – and remains an eye-opener nearly a half-century later.

Paul Strassman's 1990 book *The Business Value of Computers*, though not cited herein, was (to my knowledge) the first in-depth treatment of information technology's economic impact.

My thinking on value dynamics was influenced by Jay Forrester's system dynamics – introduced me to me by Art Swersey at Yale – as well as by consultant Adrian Slywotsky's profoundly insightful book *Value Migration*.

There are moments when in writing a book – as in creating any large work, I suppose – when you feel alone, under-appreciated, and over-taxed. I offer my deepest gratitude to Guy St. Clair and T.J. Elliot, who helped me socialize the journey by sharing their insights and reactions to drafts at various stages.

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I save mention of my biggest debts for last. I have during my four-decade consulting career been fortunate to serve more than one hundred organizations in a range of industries worldwide. They have consistently pushed me to the boundaries of my understanding, creativity, and resourcefulness. I have had some vivid experiences and met some unforgettable characters. Solving the problems for which they sought my help has provided me both the motivation and the economic foundation that enabled me to develop the work I offer herein.

So, most importantly, I profoundly and humbly thank my clients. For without practice, there would be no need for theory to describe it.

Lastly, all of this support notwithstanding, any remaining errors and/or omissions, either in this work or in my work in general, remain solely my responsibility.

Intellectual Property Notices

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