

A study and a practice

Keeping found information found is an essential challenge of personal information management or PIM. More generally, PIM is about taking charge of the information in our lives. Are we managing our information, or is it managing us? Can we weave an informational fabric that has a strength, utility, and beauty that is far greater than a simple jumble of its component threads? Better PIM starts by asking the right questions. Better PIM means that each of us becomes a student of our practice of PIM.

Chapter *One*

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make sense for us in the lives we lead and want to lead? Information found does us little good if we misplace it or forget about it before we have a chance to use it. And just as we must maintain a house or a car, we need to maintain our information—backing it up, archiving or deleting old information, updating or correcting information that is no longer accurate.

Keeping found information found is an essential challenge of personal information management or PIM.

PIM is about finding, keeping, organizing, and maintaining information. PIM is also about managing privacy and the flow of information. We need to keep other people from getting at our information without our permission. We need to protect our time and attention against an onslaught of information from telephone calls, email messages, the television, radio, and the Web. PIM is also about measurement and evaluation: Is this new tool worth the trouble? Should we change a current strategy (e.g., a strategy for getting through the email inbox or for organizing web references)? And PIM also includes efforts to make sense of our information. What is it telling us about our world? About ourselves? In a larger sense, PIM is about the use of information to keep ourselves “found”—on track to fulfill our life’s goals and our life’s roles and responsibilities.

Here is a more formal definition for PIM:

Personal information management (PIM) refers to both the practice and the study of the activities a person performs in order to acquire or create, store, organize, maintain, retrieve, use and distribute the information needed to meet life’s many goals (everyday and long-term, work-related and not) and to fulfill life’s many roles and responsibilities (as parent, spouse, friend, employee, member of community, etc.). PIM places special emphasis on the organization and maintenance of personal information collections in which information items, such as paper documents, electronic documents, email messages, web references, handwritten notes, etc., are stored for later use and repeated re-use.¹

I notice, though, that when I describe PIM in these terms to people in casual conversation, their eyes glaze over. When I talk instead about “keeping found things found,” people invariably say something like “that’s my problem” or “let me know when you figure this one out.” Is this a problem for you too?

PIM is about finding answers to questions such as these:

- What should I do with all my digital photographs and videos? Will I still be able to see these in thirty or forty years or will they disappear like all the data on my first PC disappeared?
- Why do I seem to practically live in my email inbox? (—if you can call this living). I try to keep up with email but then I don’t seem to get anything else done.
- How should I organize my hard drive? I know what to do with paper documents but my computer files are a mess! Sometimes I think I’d be better off reformatting my hard drive and starting all over again.

¹ This definition for personal information management is a small variation on a definition provided by Jones (2006).

But PIM is also about finding answers to this question:

- How can I get smarter about the way I manage my information so that I have more time for my family, friends and the things I really care about in life?

By way of introducing PIM and the remainder of this book, discussion in this introductory chapter moves through the following sections:

- ✓ *An ideal and the reality.* One ideal of PIM is that we always have the right information (in the right place, in the right form, in the right quantity, etc.) to meet our current need. The reality, however, may well be that we spend significant amounts of time overcoming a pervasive problem of information fragmentation made worse by the very tools that are designed to help us.
- ✓ *A brief history of PIM.* PIM is a new field with ancient roots. The development of a community of people doing PIM-related research is in response to several observations: (1) Analogous to a personal problem of information fragmentation, research relating to PIM is scattered across a number of different disciplines ranging from cognitive psychology to database management. PIM as a field of study provides a productive meeting ground for researchers from these disciplines. (2) PIM concerns—such as the importance of understanding the life cycle of personal information—easily fall in the spaces between other disciplines. (3) PIM is an area of intense interest, both scholarly and popular.
- ✓ *Who benefits from better PIM and how?* We all do and in several ways. Better PIM also has the potential to provide broad societal benefits.
- ✓ *A study and a practice.* Better PIM starts by asking the right questions. We can all become better students of our own practices of PIM. The book, through its exploration of PIM foundations, research into PIM activities, and developments in PIM-related technologies, can help by providing concepts and a framework in which to express PIM problems and solutions.
- ✓ *Looking forward.* The concluding section to this chapter maps out the remainder of the book. The book begins with PIM foundations and then reviews PIM activities we all do (or avoid doing). PIM solutions follow (for email, from search, on PDAs, on the Web), before concluding with a look to the future and to the ways we can “bring the pieces together.”

Let's get started.

Information is a source of learning. But unless it is organized, processed, and available to the right people in a format for decision making, it is a burden, not a benefit.

William Pollard (1938–)

1.2 An ideal and the reality

We depend on information to understand our world, to get things done, to make good decisions, to learn and gain better mastery of the world, to understand what we can affect and what we must learn to live with.

One ideal of PIM is that we always have the right information in the right place, in the right form and of sufficient completeness and quality to meet our current need. Tools and technologies help so that we spend less time with time-consuming and error-prone actions of information management. We then have more time to make creative, intelligent use of the information at hand in order to get things done.

This ideal is far from reality for most of us.

In the real world, we do not always find the right information in time to meet our current needs. The necessary information is never found, or it arrives too late to be useful. Or information enters our lives too soon and is misplaced or forgotten entirely before opportunities for its application arrive. We forget to use information even when (or sometimes because) we have taken pains to keep it somewhere in our lives. We fail to get the information we need even when it is directly in view.

This is not the way it was supposed to be. In an inspirational and aptly titled article, “As we may think,” Vannevar Bush (1945) expressed a vision that many of us probably share. Tools of information management should provide us with a perfect complement that extends our abilities, compensates for our limitations, supports us to work and think as we need to—only better:

Consider a future device for individual use, which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, “memex” will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory. (p. 6)

The vision endures. One review not so long ago included the following:

There’s a fundamental difference between searching a universe of documents created by strangers and searching your own personal library. When you’re freewheeling through ideas that you yourself have collated . . . there’s something about the experience that seems uncannily like freewheeling through the corridors of your own memory. It feels like thinking. (Johnson, 2005, p. 27)

Many of us probably share the experience described in this quote: namely, that the ways of accessing and interacting with our personal information are fundamentally different from the ways of accessing and interacting with publicly available information. Less common—much as we might yearn for it—is the experience that personal collections of email messages, web references, files, paper documents, handwritten notes, etc., are a natural extension to memory or that working with these collections of personal information feels like thinking.

More common may be a feeling of being perpetually out of synch with our information. The information is “ours” in the sense that we can move, copy or delete it. But in other ways, the information is not ours and is out of our control. Inboxes are overflowing. Hard drives are encrusted with files and folders that haven’t been looked at in years but that still manage to get in the way as we try to access newer information.

New tools, even as they help in some areas, often exacerbate an already pervasive problem of *information fragmentation*. The information we need may be on the wrong computer, PDA, smart phone, or other device. Information may be “here” but locked away in an application or a different format so that the hassles of extraction outweigh the benefits of its use. We may find ourselves maintaining several separate, roughly comparable but inevitably inconsistent, organizational schemes for electronic documents, paper documents, email messages, and web references. The number of organizational schemes can increase if we have several email accounts, use separate computers for home and work, use a PDA or a smart phone, or use any of a bewildering array of special-purpose PIM tools.

These are failures of PIM. Some failures of PIM are memorable. Many of us, for example, can remember the frustration of failing to find an item of information—a paper document, a digital document, an email message—that we know is “here somewhere.” In an already busy day, we may spend precious minutes, sometimes hours, looking for lost information.

Other failures of PIM may go unnoticed as part of what might be called an “information friction” associated with getting things done. In his highly influential article, “Man–computer symbiosis,” Licklider (1960) described his observations of his own workday:

About 85 per cent of my “thinking” time was spent getting into a position to think, to make a decision, to learn something I needed to know. . . . [M]y choices of what to attempt and what not to attempt were determined to an embarrassingly great extent by considerations of clerical feasibility, not intellectual capability. (p. 4)

Many of us might reach similar conclusions. For example, a seemingly simple email request can often cascade into a time-consuming, error-prone chore as we seek to bring together, in coherent, consistent form, information that often lies scattered in multiple versions contained in various collections of paper documents, electronic documents, email messages, web references, and the like. Can you give a presentation at a meeting next month? That depends. What did you say in previous email messages? When is your child’s soccer match? Better check the paper flyer with scheduled games. Does the meeting conflict with a conference coming up? Better check the conference web site to get dates and program information. What have you already scheduled in your calendar? And so on. In their observations of people processing email, Bellotti et al. (2005) describe instances in which a single email message initiates a task involving several different software applications and lasting an hour or more.

How do tools need to work so that their use feels more like thinking? How do we need to manipulate our information so that it is truly ours—and more like an extension of our own memories? These are long-standing questions of PIM, given new urgency with ongoing,

dramatic increases in the amount and variety of information that can be stored digitally for personal use.

1.2.1 What are we really managing?

Information is a means to an end. Not always, not for everyone, but mostly. Information is rarely even a very precious resource. We usually have far too much of it. Even a document we have spent days or weeks writing is typically available in multiple locations (and, sometimes confusingly, in multiple versions). We manage our information so that we can manage our lives.

We manage information for what it represents: our world, alternatives, and the means for effecting change in this world. Information represents alternatives—alternate hotels, alternate life journeys. Information represents the means for change—information to make the hotel reservation, information concerning how to practice Zen and where.

Even if information itself is rarely a precious asset, we manage information because information is the most visible, “tangible” way to manage other resources that *are* precious.

In 1971, Herbert Simon, Nobel laureate in economics, elegantly expressed this point with respect to the resource of attention:

What information consumes is rather obvious: it consumes the attention of its recipients. Hence, a wealth of information creates a poverty of attention and a need to allocate that attention efficiently among the overabundance of information sources that might consume it. (p. 40)

This quote still rings true if we replace “attention” with “time,” “energy,” or “well-being.” Certainly the nagging presence of papers representing unpaid bills, unanswered email or unfiled documents can distract, enervate and demoralize. We can’t see our well-being, our attention or our energy or even our time. But we can see—and manage—our paper documents, our e-documents, our email messages, our digital calendars and other forms of information. It is through the management of these personal information items that we seek to manage the precious resources of our lives.

1.2.2 More than organizing; more than just getting things done

PIM is about the use of information to manage precious resources such as our time and attention. PIM is also about the use of information to make good decisions and to get things done. But to equate PIM with decision making or time and task management is to understate its scope. We live in a world of information. Our understanding for and feelings about the world around us are increasingly a product not of direct experience but rather of the information we receive in the form of newspapers, magazines, television programs, selected slices of the Web, and so on. To manage our information is to manage our reality.

An important distinction must also be made between organizing and managing information. Many of us know people who have very disorganized collections of information and yet they

manage. Some of these people may even be exceptional in their ability to manage not only themselves and their personal projects, but also the work of others. On the other hand, many of us may have had the experience that sometimes the hours we spent to “get organized” never really paid off. People who are very organized can fail in their practice of PIM; people who are very disorganized can succeed. Personal information collections can appear to be a disorganized mess. But is this mess part of a larger strategy of PIM, or not?

Bob and Ted each have email inboxes with more than two thousand email messages. To outward appearances, both inboxes are equally disorganized. When asked about his inbox, Bob expresses a guilty, fearful exasperation. “I know! It’s a mess! I just don’t know what to do about it!” When asked about his, Ted says, “I like having ready access to all email I’ve received over the past year. If an email message is really important, I’ll drag a copy of it to my calendar or to the file system. But it’s not worth my time to sift through and file away or delete inbox messages one by one.”

Ted is managing his incoming email; Bob is not. For Ted, the disordered inbox fits into a larger strategy of PIM. For Bob, the disordered inbox is a repeated reminder of his failure to gain control of his information (and perhaps the inbox stands for a larger lack of control in his life).

1.3 A brief history of PIM

PIM is a new field with ancient roots. When the oral rather than the written word dominated, human memory was the primary means for information preservation. Various mnemonics² were essentially information management as applied to human memory.

As information was increasingly rendered in documents and these increased in number, so too did the challenges of managing these documents. To support the management of paper-based information, tools were developed over time. J. Yates (1989) notes, for example, that the vertical filing cabinet, now such a standard feature of home and workplace offices, was first commercially available in 1893.

The modern dialog on PIM is generally thought to have begun at the close of World War II with the publication of Vannevar Bush’s “As we may think” article. Bush recognized the difficulty brought on by the sheer quantity of information being produced and by the compartmentalization of information by an increasing specialization of scientific disciplines: “The investigator is staggered by the findings and conclusions of thousands of other workers—conclusions which he cannot find time to grasp, much less to remember, as they appear.” Bush expressed a hope that technology might be used to extend our collective ability to handle information and to break down barriers impeding the productive exchange of information.

The 1940s also saw the development by Shannon and Weaver (Shannon, 1948; Shannon & Weaver, 1949) of a theory of communication that lay the groundwork for a quantitative assessment of information value. Key to this theory is the notion that the information content

² See F. A. Yates (1966) for an excellent review of mnemonic techniques.

of a message can be measured for its capacity to reduce uncertainty. Although the precise definition of information with respect to uncertainty will come to be seen as overly restrictive, a larger point in the work of Shannon and Weaver remains: the value of information is not absolute but relative to a context that includes the intentions of the sender, the method of delivery, and the current state of a recipient's knowledge.

With the increasing availability of computers in the 1950s came an interest in the computer as a source of metaphors and a test bed for efforts to understand the human ability to process information and to solve problems. Newell and Simon pioneered the computer's use as a tool to model human thought (Newell, Shaw, & Simon, 1958; Simon & Newell, 1958). They produced "The Logic Theorist," generally thought to be the first running artificial intelligence (AI) program. The computer of the 1950s also inspired Donald Broadbent's development of an *information processing approach* to human behavior and performance (1958). By analogy to standard stages of information processing on a computer, people input information via their eyes, ears, and other sensory organs; they store and process this information internally; and they output the results of this processing via their motor organs, including hands and mouth.

After the 1950s research showed that the computer, as a symbol processor, could "think" (to varying degrees of fidelity) like people do, the 1960s saw an increasing interest in the use of computers to help people think better and to process information more effectively. Working with Andries van Dam and others, Ted Nelson, who coined the word "hypertext" (Nelson, 1965), developed one of the first hypertext systems, the Hypertext Editing System, in 1968 (Carmody et al., 1969). That same year, Douglas Engelbart also completed work on a hypertext system called NLS (Engelbart & English, 1994—video in 1968). Engelbart (1961, 1963) advanced the notion that the computer could be used to augment the human intellect. As heralded by the publication of Ulric Neisser's book *Cognitive Psychology* (1967), the 1960s also saw the emergence of cognitive psychology as a discipline in its own right—one focused primarily on a better understanding of the human ability to think, learn, and remember.

The term "personal information management" was itself apparently first used in the 1980s (Lansdale, 1988) in the midst of general excitement over the potential of the personal computer to greatly enhance the human ability to process and manage information. The 1980s also saw the advent of so-called PIM tools which provided limited support for the management of such things as appointments and scheduling, to-do lists, phone numbers, and addresses. And a community dedicated to the study and improvement of human-computer interaction emerged in the 1980s as well (Card, Moran, & Newell, 1983; Norman, 1988).

PIM as an area of study with its own community of practitioners has emerged more recently. This book's preface lists some of the key events of the past decade leading to the establishment of a community of people doing PIM-related research and to the publication of this book. Efforts to form a community for the exchange of PIM research have several motivations:

1. *PIM-related research is scattered across existing disciplines.* Just as the information we need to answer a question or complete a task in our lives is often scattered (by location,

application, computer, etc.), PIM-related research is scattered across a diverse set of disciplines that includes cognitive psychology, human–computer interaction, database management, artificial intelligence, information and knowledge management, information retrieval, and information science.

2. *PIM concerns often fall through the cracks between these disciplines.* PIM requires the study of and support for people as they do the work of their lives in their own informational environments over extended periods of time, as opposed to short-term, experimenter-provided tasks in a controlled laboratory setting. PIM means considering the life cycle of personal information—from the acquisition of information to its initial use, its organization for repeated use, its ongoing maintenance, and its eventual archiving or deletion.
3. *PIM continues to increase in importance and relevance.* Not only academic publications but also articles in the popular press reflect a growing interest in and concern with matters of PIM. Pick up a magazine or newspaper and you have a good chance of seeing articles on one or more PIM-related topics such as (1) information overload, (2) our kids' ability to get things (like homework) done with TV on, iPod plugged in, and several different instant messaging (IM) conversations going at the same time, (3) how to protect our digital information—especially photographs and videos, (4) how to protect our privacy, when companies keep so much information (and misinformation) about us, (5) new, cool smartphones and PDAs, and (6) meeting, dating, and doing virtually everything else on the Web.

The growing interest in PIM also has two sides. On one side, the pace of improvements in various PIM-relevant technologies suggests that earlier ideals of PIM may actually be realized in the near future. Digital storage is cheap and plentiful. Why not keep a record of everything we have encountered?³ Digital storage can hold not only conventional kinds of information, but also pictures, photographs, music, and even films and full-motion video. In this vision, better search support can make it easy to pinpoint information. The ubiquity of computing and the miniaturization of computing devices can make it possible for us to take our information with us wherever we go and stay connected to a much larger world of information. Improvements in technologies of information input and output (e.g., better voice recognition, voice synthesis, integrated displays of information) can free us from the mouse, keyboard, and monitor of a conventional computer.

This is all very exciting. But the current, growing interest in PIM is also spurred by the awareness that technology and tool development, for all their promise, invariably create new problems and sometimes exacerbate old problems. Information that was once only in paper form is now scattered around in multiple paper and digital versions. Digital information further scatters into “information islands” when each is supported by a separate application or device. This other side of current interest in PIM recognizes that new tools and new applications—for all the targeted help they provide—can still end up further complicating a person’s overall information management challenge.

³ See Czerwinski et al. (2006) for a recent review of digital memory initiatives.

1.4 Who benefits from better PIM and how?

PIM may involve the “personal,” but better PIM promises to bring broad societal benefit:

- Within organizations, better PIM can mean *better employee productivity*. Better PIM can mean that employees have a clearer understanding of their information and their needs. Such an understanding can also facilitate better teamwork and better group information management.⁴ Longer-term, PIM is key to the management and leveraging of employee expertise. (See Chapter 3’s discussion of knowledge management.)
- Progress in PIM is evidenced not only by better tools but also by new teachable strategies of information management of direct relevance to education programs of information literacy.⁵
- As people age, their working memory (the number of things they can keep in mind at one time) generally decreases. Better PIM can translate to compensating tools and strategies of support.
- The challenges of PIM are especially felt by people who are battling a life-threatening illness such as cancer as they try to maintain their jobs and profession-related activities while living their lives and fulfilling their various roles (as parent, spouse, friend, member of a community, etc.). Better PIM can help patients better manage their treatments and their lives overall.⁶

But certainly better PIM benefits you, regardless of your special circumstances. There is little chance you could be reading these lines were information and external forms of information (email messages, web pages, newspapers, this book) not of great importance to your worldview and the way you lead your life.

Consider two kinds of people, *information warriors* and *information worriers*. Information warriors see their information and their information tools as strategic assets. Information warriors are willing to invest time and money to keep up with the latest in PDAs, smartphones, operating systems and application software, and anything new on the Web. For an information warrior, information technology is, so to speak, a profit center.

By contrast, information technology for information worriers is a cost center. New offerings in PDAs and smartphones, new releases of operating system and application software, new developments in the alphabet soup of Web-based initiatives—these and other developments in information technology represent more time and money that need to be spent just to keep up with everyone else. Information worriers may have a nagging feeling they could do better in their choice of supporting tools and strategies. But they don’t know where to begin.

Even if these descriptions are stereotyped, many of us can probably think of people we know who come close to fitting each description. Perhaps you are an information warrior or an information worrier. Or perhaps, like me, you are a little of both.

The simple fact is that even if we embrace new developments in information technology, we must recognize that we don’t always have the time to learn about all the latest developments.

⁴ See Lutters, Ackerman, and Zhou (2007) for a discussion of connections between PIM and group information management.

⁵ For more on recent initiatives in information literacy, see Eisenberg, Lowe, and Spitzer (2004).

⁶ For more on special considerations of PIM that apply to patients, see Moen (in press) and Pratt et al. (2006).

We need a basis for deciding whether a new tool or a new way of doing things is likely to work for us. We'd like to avoid investing money and, more important, time to learn to use a new tool or strategy only to conclude belatedly that it won't work for us.

Better PIM starts by asking the right questions. Better PIM means that each of us becomes a student of our practice of PIM.

Just because it's common sense, doesn't mean it's common practice.

U.S. actor, lecturer, and humorist Will Rogers (1879–1935)

1.5 A study and a practice

Occasionally I teach half- and whole-day seminars on PIM. After one such course a few years ago, an attendee approached me with the comment: “The course made me realize that I know more than I thought I knew.” Was the course too basic for him? No, he explained, the course helped him a great deal and especially by giving credence to and words to express vaguely felt intuitions he had already.

Let this be a purpose of this book too. We each know a great deal already concerning our ways of managing our information. We know what seems to work and what doesn't. Although this book reviews research that relates to PIM, research alone can't tell you how to practice PIM. Use the concepts, framework, and examples of this book to become a better student of your own PIM practice. There is little about PIM that can be studied in a laboratory. PIM needs to be studied in situations of actual information management and used over extended periods. Who better to study your own practice of PIM than you?

In the other direction, your experiences and the insights you have gained from your practice of PIM can inform the overall study of PIM. Our practices of PIM are each uniquely tailored to our own unique circumstances—our education, our familiarity with computers, our jobs, our tolerance for risk, and many other factors. But our circumstances also overlap. We can learn from each other. Toward this end, a Web-based “Tales of PIM” discussion forum has been established as a means for researchers and practitioners (that's all of us) alike to share our experiences with PIM. What problems have we encountered? What solutions have we developed? Please share your experiences too.⁷

To become an able and successful man in any profession, three things are necessary, nature, study and practice.

U.S. clergyman and abolitionist Henry Ward Beecher (1813–1887)

⁷ For more, you can read the experiences of others at <http://talesofpim.org/> without registering. Registration takes only two minutes, and then you can share your experiences as well.

1.6 Looking forward: A map for this book

The book moves through the following sections:

- ✓ Foundations of PIM are established in this chapter and the next two (Chapters 1 through 3).
- ✓ Activities of PIM are described in Chapters 4 through 9. How do we practice PIM? What essential challenges must be faced? What problems arise? And what does this say for the supporting tools we need?
- ✓ Solutions of PIM are described in Chapters 10 through 13. Email, search, PDAs and other portable devices, and the Web are all assessed for their impact, current and potential, on our practices of PIM.
- ✓ Conclusions about PIM are discussed in Chapters 14 and 15. How should the pieces of a PIM practice fit together? How can our tools help? What does the future hold?

Think of this book as a journey—a shared exploration of matters relating to PIM, ranging from academic research, to technical development, to everyday practicalities. Topics in each of the remaining chapters are introduced in a “Starting out” section. Each chapter concludes with a “Looking back, looking forward” section, with a summary of the chapter’s main points and a brief preview of the chapter to follow. And now a little more about each section and its chapters.

1.6.1 Foundations

This part sets the stage with an introductory chapter and two others.

Chapter 1. *A study and a practice.*

Chapter 2. *A personal space of information.* What is information to us, and what does “personal” mean in this context? Personal information and informational tools combine to form a personal space of information that is just as real—sometimes more real—than the physical space we occupy.

Chapter 3. *A framework for personal information management.* PIM activities are an effort to establish, use, and maintain a mapping between information and need. Kinds of PIM activities are situated with respect to this mapping. Explanations for what PIM is and is not are developed through a comparison with related areas of study.

1.6.2 Activities

This part explores key kinds of PIM activities in greater detail.

Chapter 4. *Finding and re-finding: From need to information.* Finding is a multistep process, each step of which may entail some stumbling around. Various small acts of finding happen throughout a day and can easily consume much of the time in a day. Different finding activities have in common an essential movement from a current need toward information that will meet this need.

Chapter 5. *Keeping and organizing: From information to need.* The essential challenge of keeping stems from the multifaceted nature of the decisions concerning anticipated need. Is the information useful? Do special actions need to be taken to keep it for later use?

Where? When? In what form? On which device? With no crystal ball to see into the future, answering these questions is difficult and error-prone. Like finding, small acts of keeping occur throughout a day and can likewise consume much of a day's time. With keeping, the focus is on individual information items such as a web page, an email message, or a proffered business card. With organizing, the focus is on a collection of such items. With both keeping and organizing, the movement is from information at hand to anticipated need.

Chapter 6. *Maintaining information for now and for later.* Do you know where your information is? Is it safeguarded against hard-drive failure? Fire? Theft? What about those digital photos you took that can never ever be replaced if lost? Information needs to be backed up. Support for older digital formats—especially for media items such as photographs and videos—may disappear as newer formats emerge. Old information needs to be deleted, archived, or otherwise moved out of the way so that we don't keep tripping over it as we try to access current, working information. Document duplicates and near-duplicates may create havoc later if they are not removed or reconciled with one another. Information needs to be corrected or updated (perhaps in several different places). These and other maintenance activities are discussed here.

Chapter 7. *Managing privacy and the flow of information.* A discussion of privacy and security brings us to a consideration not only of "our" information but also information "about us" and the large overlap between these two kinds of personal information. If our first reaction is to say that "personal information is personal and no one else can see it," we are likely to realize later that some distribution of our personal information can be very useful. We want the travel agent to know about our seating preferences. We want colleagues and friends to know about our schedule. We may want close friends and family to know about our current condition if we are battling a serious illness. The proliferation in the ways to project our personal information onto the Web naturally brings out a desire for technology that can support a personal privacy policy with finer distinctions concerning who can access what under which circumstances. Similarly, we want to control the flow of incoming information so that, for example, our dinner hour is not interrupted by telephone calls that can wait or our inboxes do not fill up with spam. Activities to manage the flow of information (to us, about us) are discussed here.

Chapter 8. *Measuring and evaluating.* We should periodically ask ourselves: Is it working? Are our schemes for organizing information maintainable? Are the strategies we try to follow sustainable? Is this tool really helping, or is it more trouble than it's worth? For paper documents, the evidence that things aren't working is sometimes all too clear. For example, if paper documents continue to pile up in a to-be-filed stack and we never have time to actually file these documents away, this may be a sign that our great new organizational scheme, for all its promise, is simply not sustainable. As we look for efficient, accurate, objective ways to evaluate our own practice of PIM, we run into many of the same problems, at an individual level, that are also in evidence for the field of PIM. Activities to measure and evaluate are discussed here.

Chapter 9. *Making sense of things.* We try to understand our information and its implications for our lives. What does the information mean? How should it inform our decisions? Efforts to make sense of information are often facilitated by piling, sorting, and otherwise manipulating information items so that key patterns and relationships are more apparent and, literally, more visible.

Each chapter in the PIM activities part of the book includes the following three sidebars meant to make more explicit some of the implications for a chapter's discussion:

- *What now for IT?* PIM issues are organizational as well as personal. Good PIM can improve employee productivity and job satisfaction in ways that directly impact the bottom line of a company or other organization. Managers of information technology departments know this. But they also know that letting in the wrong tools and promoting the wrong practices of information management can have the opposite effect.
- *What next in tool development?* How can software developers apply the lessons of a chapter in their development of tools? PIM-relevant technologies are numerous, quickly advancing, and still greatly underutilized. Many opportunities to improve PIM tool support are missed for the simple reason that people with an understanding of PIM problems and opportunities don't talk with the people best able to make better tools to address problems and exploit opportunities.
- *What now for you and me?* We should not hold ourselves and our practices of PIM captive to future tools that may or may not fulfill their marketing brochure promises. What can we do now with what we have in available tools and techniques? With a particular kind of PIM activity in mind, what considerations apply no matter what the available tools?

1.6.3 Solutions

This part includes chapters on four distinct solution areas, each of which has had and will continue to have a profound impact on our practices of PIM:

Chapter 10. *Email disappears?* The title provocatively suggests that email, as we know it, may need to change profoundly and in ways that mean we no longer recognize it as email. Two necessary improvements in email will require its radical transformation: (1) Email, as one mode of communication, will need to integrate with other modes of communication such as the telephone and instant messaging. This process of integration is already underway. (2) Email conversations need to be situated within the collaborative informational contexts in which we work. Support for wikis, for example, though basic now, points to the possibility that people working together might communicate more directly through a shared representation that greatly reduces the need for email exchange and that also improves the efficiency of such exchanges when they do occur. This chapter reviews email challenges with respect to each of the seven kinds of PIM activity.

Chapter 11. *Search gets personal.* Each of the six ways that information can be personal (see Chapter 2) also points to a way that search can get more personal. This chapter considers new opportunities to personalize search both as interaction and as technology. Making search-as-interaction more personal means using personal information to improve both the initial processing of a search request and the quality of results returned. Making search-as-technology more personal means leveraging a process of content analysis, done in any case to create an index, in order to support PIM activities in new ways that have little, visibly, to do with search-as-interaction.

Chapter 12. *PIM on the go.* A near future is described in which a single gadget—call it a PDA—that we carry in a pocket or a purse can store nearly all the information most of us are likely to need and can also come equipped with sufficient processing power—exceeding that

of current laptops—for its management and use. We consider it a devil’s irony that all our information could be “there” in a single gadget and yet still be deeply fragmented in informational space by information tool and form. Features of a PDA can, and should, be analyzed with respect to their support for each of the seven kinds of PIM activities. A consideration of PIM activities suggests ways to better leverage and integrate the features of a PDA.

Chapter 13. *PIM on the Web*. A near future is described in which nearly all of life’s activities—schooling, shopping, job search, working at a job, dating—are mediated by the Web. We use the Web as an extension of ourselves, projecting our preferences, interests, opinions, availability, abilities, and services. Between our PDA as one focus and the Web as another, many of us may decide to dispense with our traditional personal computer (desktop or laptop) altogether. Just as with features of a PDA, we can analyze a confusion of Web services and initiatives with respect to their support for each of the seven kinds of PIM activity.

1.6.4 Conclusions

This part has just two chapters:

Chapter 14. *Bringing the pieces together*. There is a large difference between simple convergence of information and its integration into a larger whole in which pieces are mutually supporting. How can we achieve better levels of integration for the information in our lives, and how can our tools help?

Chapter 15. *Finding our way in (to) the future*. The book concludes with a return to PIM as a study and practice we each do now and can do better. We’re doing our best to find our way with respect to the management of information in our lives. What about the future? Finding our way into the future can be approached from two perspectives. How do we find our way to the future? Which future? What must we be certain to plan for? Second, how do we find our way *in* the future? How do we keep our life’s purpose and values foremost when we’re sure to be pulled in many directions by new tools and new forms of information?

1.6.5 Other PIM topics covered throughout this book

In a book that is already long, many other topics of PIM are perhaps deserving of their own chapters, but will be discussed instead, throughout the book, as the opportunity arises. Topics covered in this distributed fashion include:

- *Individual and group differences in PIM*. Each practice of PIM is unique. People also differ in their approach to PIM and their needs for PIM by age group (e.g., teens vs. college students vs. elderly people) and special circumstance (e.g. patients fighting a life-threatening illness such as cancer). Implications of individual and group differences for PIM practice and the design of supporting tools are discussed at various points in the book, albeit all too briefly.⁸
- *Techniques of PIM*, which might be incorporated into program of PIM training or a larger program of information literacy, are also discussed in Chapters 4 through 9 (see, especially, the “What now for you and me?” sections).

⁸ But for a much more complete discussion of individual differences in PIM, see Gwizdka and Chignell (2007); and for a discussion of patient needs for PIM, see Moen (2007).

- *Considerations of PIM* vary for different forms of information, such as paper documents, email messages, digital music, photographs, and videos. Paper printouts, for example, can be easily taken wherever we go, marked up, and then discarded when “used up” (with the assurance that the digital original remains). Email messages carry an expectation of response. Digital photographs and videos representing events in our lives are irreplaceable. Variations in PIM for different forms of information will be covered—especially in Chapter 6’s discussion of maintenance. Just as important, however, are the common considerations of PIM that apply regardless of information form.
- *Digital memories* and the possibility to record all of a life’s experiences (to some level of fidelity) are discussed as part of Chapter 12’s discussion of “PIM on the go.”⁹
- *Good and bad futures enabled by PIM technologies*. So many visions of a future made better by technology tend to be picture perfect. But for every picture there is a negative. Across chapters, there is an attempt to explore PIM potentials both good and bad as enabled by the technologies covered. Armed with an understanding of the ways that technology can go right and wrong, there is the hope that we—collectively and in the small daily decisions we make in our individual lives—can take a more active hand in determining how technologies are used in the management of our information and our lives.

1.6.6 Themes and metaphors

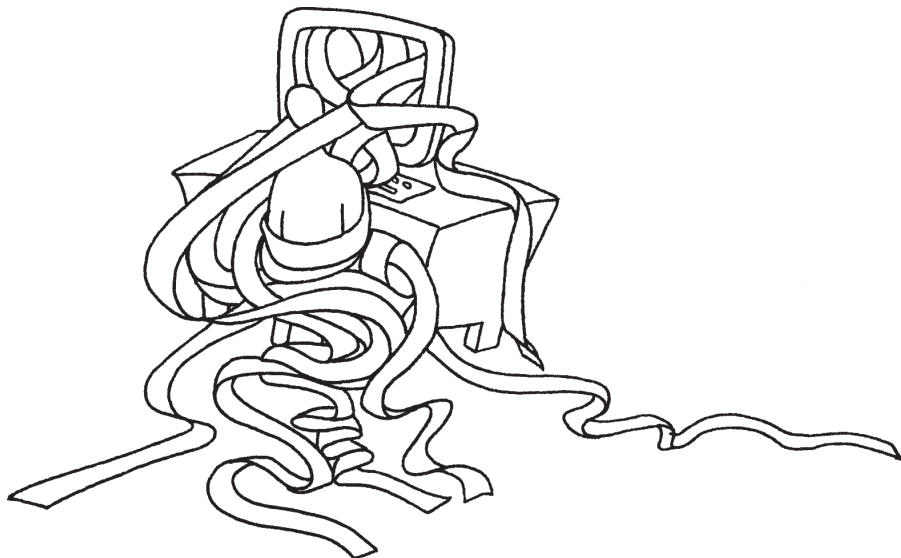
One of the book’s themes is explicit in its title: PIM is a study and practice that each of us does and can do better. Two other themes help to weave together the book’s content: (1) information use and information management are inextricably interwoven; and (2) we need tools to help us situate our interactions with our information.

One model of PIM has it that information management is what we do before and after information use. Many actions taken with paper-based information seem to be consistent with this model. When we visit our doctor, for example, she is still likely to talk to us with reference to a paper chart documenting our medical history. She may ask questions. “Are you still experiencing pain in your lower back?” Certainly this is information use. And the actions to retrieve our file from a filing cabinet and to place it back again when our visit is over are actions of information management.

But look closer and we might notice that our doctor underlines or circles some information. She may make notes in the margin. Are these actions information use or information management? Later, the chart may go into a stack of other charts to be processed for insurance reimbursement. Is this use or management?

The boundaries between use and management blur further for digital information. Information use and information management are inextricably interwoven. To separate the two is to risk missing important opportunities for a synergy between and integration of different activities. Certainly management should facilitate use. But, conversely, the impressions made by our use of information should facilitate its management and subsequent use.

⁹ But see Tan et al. (2007) for a much more complete discussion of digital memories in the context of PIM.



Many of us, for example, follow a kind of hub-and-spoke approach when browsing the Web. From one page as a starting point, we click first on one hyperlink to go to another page; then we go back, and then click through to another page. This action is greatly facilitated when the web browser changes the appearance (through font or color) of hyperlinks we've already clicked. The change in hyperlink appearance is a kind of automated management of information based on use, which facilitates subsequent use.

Information is used to complete tasks such as “book a hotel” or “make airplane reservations” and to complete larger projects such as “plan a trip to Stockholm.” Therefore, the position that information use and information management are interwoven might be alternately stated as information management and task/project management are interwoven—two sides of the same coin.

Throughout this book, considerations of task and project management are often used as lenses for assessing PIM activities. How does information management help us to manage and complete tasks and projects in our lives—the things we want to get done? Conversely, how can activities of task and project management that we must do be leveraged in support of better PIM?

But information use is about more than tasks and projects or is equated with these only if they are given very broad definitions. We sometimes need to manage information—digital photographs or videos or even life-affirming anecdotes, for example—with no clearly defined end in mind. We may manage information for the possibility of a use at some unspecified point in the future—to share with our future selves when we need an emotional lift or to share with future grandchildren who haven't yet been born.

A second theme of this book—essentially a restatement of the first—is that better PIM depends on and follows from tool support that situates our information and the use of informational tools with respect to both the physical and informational contexts of their use. A basic example of support for situating information would be Vannevar Bush’s description of a memex able to associate, on command and by current use, two pieces of information that happen to co-occur in time or space so that, thereafter, with retrieval of one piece, the other piece can follow.

A larger point is that access to an item of information or the use of a tool does not occur in isolation. Access and use occur at a place and a time—possibly as part of an event involving other people. Access and use also occur in an informational context that includes other items currently in view or recently accessed. Access and use occur in the context of tasks or projects we need to complete.

Many of our tools do not make provision for this larger context but instead seem to be designed as worlds unto themselves, with an assumption that their use is our primary purpose. The consequences for our workflow are often disruptive. For example, as we’re working in one context—to complete a document, research information on the Web or review a budget—we may experience a need that can be met by an email exchange (e.g., “Does this number include equipment rental?”). But if doing so means going to an email application, with its inbox in view by default, we pay double for the resulting disruption in context. We must leave the context that prompted us to send the email and may pay a price later to reconnect with the earlier context. Worse, we are drawn into a new context defined by the email application, not by us. Who can see email messages newly arrived and not be tempted to look and perhaps send a quick response?

We may say things like “this shouldn’t take long” or “I’m just gonna . . .” An hour or more may pass before we manage to return to our original context.

We move continuously through a day from need to information and from information to need. Tools built with an awareness of this basic “warp and weft”¹⁰ of informational interactions can help us to weave an informational fabric with a strength, utility, and beauty far greater than a simple jumble of its component threads. Keeping our information found means situating this information in our lives—in the contexts of daily use and also in the contexts of our goals, our roles and responsibilities, our hopes and our dreams.

Metaphors help to facilitate our exploration of PIM. As an alternative to the metaphor of PIM as a weaving of a fabric, activities and supporting tools of PIM can be viewed as the structural elements of a bridge or a building. If these are mutually supporting, then the resulting structure is much stronger even as the costs of construction and the final weight of the structure are greatly reduced.

But first, in Chapter 2, we explore another metaphor. Our information and our informational tools combine to form a vast sea. We do not have good control of this sea—not even in the home waters of our office or the hard drive of our computer. Farther out are pirates intent on stealing our information and robbing us of our time and money. And farther out . . . thar be dragons.

¹⁰ From the online version of the *Oxford English Dictionary*, warp means “the threads which are extended lengthwise in the loom, usually twisted harder than the weft or woof, with which these threads are crossed.” Warp and weft together weave a fabric. Interestingly, this end result is sometimes referred to as the “web.”