BRAIN GAIN:
TECHNOLOGY AND THE QUEST FOR DIGITAL WISDOM

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Chapter 2: The Quest for Digital Wisdom
The Emerging Homo Sapiens Digital

Brain gain, certainly. But wisdom? That is a more complex question.

In mid-2008, a small article—actually a letter—appeared in *Nature,* the leading life-sciences journal. The letter's authors were seven scientists—neuroscientists and ethicists—all well-known, all highly regarded, all at the top of their profession.

The letter's purpose was to make a recommendation. The authors began by discussing a practice that had been going on for years, on college campuses and elsewhere, of people routinely taking drugs like Ritalin and Adderall to "increase executive functions" and "improve their abilities to focus their attention, manipulate information in working memory and flexibly control their responses." Because these drugs are widely prescribed as treatments for ADD and ADHD, they are often easily obtainable by students and by people in general.

But no one, up to the time of this letter, was advocating giving such medications to *everyone.*

The article's authors, however, were writing to support the practice of not just allowing but actually *encouraging* (their term) the "responsible use of cognitive enhancement tools—including the pharmacological," by "healthy" people (i.e., those not diagnosed with ADD or ADHD). Their reasoning, and their radical claim, was that these drugs "will be increasingly useful for improved quality of life and extended

work productivity, as well as to stave off normal and pathological age-related cognitive declines."

The letter's title: "Toward responsible use of cognitive-enhancing drugs by the healthy."[1]

None of the letter's writers recommends just "putting these substances in the water supply" (as the letter's lead author, Professor Hank Greely of Stanford Law School, put it to me),[2] and all support further study. But all of these noted scientists recognize and agree that there is cognitive enhancement—i.e., mind or brain gain—from the use of these technologies. And Greely, the legal ethicist in the group, does not see pharmacological mind enhancement as morally wrong in principal.

Do *you* think what these ethicists and scientists are saying is wise? Or not wise?

That is what this book is about: considering all the kinds of new technologies—a few pharmacological but most not—that are already enhancing and impacting our minds today, and considering the wisest uses of all these new technological capabilities. This is what I call the "quest for digital wisdom."[3]

It is critical for us to think about these questions now, before events overtake us. For example, in 2011, just three years after the publication of the letter in *Nature,* the *New York Times* reported on its front page that the United States was experiencing shortages in Ritalin and Adderall. These drugs and their generic equivalents, they explained, are in short supply, and often difficult to obtain. "Shortages, particularly of cheaper generics, have become so endemic that some patients say they worry almost constantly about availability," wrote the *Times.* The main reason for the shortages, according to the paper, is "healthy" students. "Since the drugs have been shown to improve concentration, and not just in people with ADHD, they have become popular among students who are seeking a study aid," wrote the *Times* reporter. (Of course, not all of what students use these drugs for is studying. The *Times* also cites as reasons for the shortage the drug manufacturers' manipulating the supply, and "people, many of them college students, who use the medications to get high or to stay up all night.")[4]

But with plenty of other alternatives available for getting high, why have so many non-ADD and non-ADHD students gravitated, in large numbers, toward these drugs? I agree with the scientists that it's because the students see them as technological

mind enhancers—that is, as brain gain. Using these technologies, the students believe, makes them wiser, giving them a leg up.

We can, and should, debate the merits of achieving enhancement in this particular way. But given the huge changes in our technology, our environment, and our world in general, there is little question, and can be little debate, that we, as humans, are in desperate need of additional wisdom—wisdom that now comes from incorporating technology into our minds.

What is "Wisdom"?

I want to begin by asking two questions that may seem obvious, but are probably not asked as much as they should be. First: "What is wisdom?" And second: "Why would we want it?" The answers to both of those questions will help us understand what digital wisdom is, and why we are—or should be—on a quest to find it.

Wisdom is a universal, but ill-defined, concept. It is often, although not always, associated with old age and experience, and yet we also talk about "the wisdom of babes,"—we often see wisdom in our children.

Definitions of wisdom fill entire volumes. The Oxford English Dictionary suggests that wisdom's main component is judgment, referring to the "capacity of judging rightly in matters relating to life and conduct, soundness of judgment in the choice of means and ends."[5]

Philosopher Robert Nozick suggests that wisdom lies in knowing what is important.[6]

In his *Nicomachean Ethics,* Aristotle speaks of "practical wisdom," the ability to discern the best thing to do, in every situation we face, to achieve our worthiest goals.[7] In their book *Practical Wisdom,* professors Barry Schwartz and Kenneth Sharpe update Aristotle's concept for the current world, arguing that we need to integrate it further into our justice, educational, and medical systems.[8]

Many see wisdom mainly as the ability to solve problems—some think it is just a more complex kind of problem solving. Others talk about wisdom as finding the healthy thing to do.

Stanford law professor and ethicist Hank Greely sees wisdom as the ability to "usefully integrate our experiences to come to an understanding or plan of action."[9] Some include as part of wisdom how those plans and decisions are implemented as well.

An interesting definition of wisdom comes from Howard Gardner, who suggests that wisdom may be seen in the breadth of issues considered in arriving at a judgment or decision.[10]

And many definitions—although not all—attribute to wisdom a moral component, locating wisdom in the ability to discern the "right" thing to do. This is, of course, problematic since agreement on moral issues is frequently difficult to come by. What it implies, though, is that wisdom cannot be conclusively defined without a consideration of context.

Combining these sources, let me define wisdom as *the ability to find practical, creative, contextually appropriate, and emotionally satisfying solutions to complicated human problems.*

I believe wisdom involves considering the largest possible number of factors, analyzing them appropriately and well, and reaching and implementing useful and beneficial conclusions.

Digital wisdom, I believe, involves doing this for both the technologies we use and the ways in which we use them.

Wisdom and Technology

Some might question why I put "digital" and "wisdom" in the same sentence, thinking "digital technology" is only—or mainly—for entertainment or pleasure. The truth is, though, that wisdom and *every* technology have always been closely linked.

Wise cave people, for example, used charcoal and paint to leave markings on trees or cave walls. Wise hunters used arrows, and spears. In the Bible, David exhibits technology-based wisdom in slaying Goliath, by knowing that a strongly propelled, well-aimed rock could be more powerful than large size and muscles. Leaders throughout history have understood that if they wanted to protect their people, or advance their cause, it was wise to develop advanced technology, which generally provided the best weapons. Even the fact that we often name our historical eras in terms of technologies (the Stone Age, the Bronze Age, etc.) may have some relationship to wisdom—some might say humans were wiser in each of the succeeding technology eras.[11]

And even that paradigm of wisdom, the biblical story of King Solomon and the baby, has a technology component. While Solomon knew that a real mother's instinct is to want her child to live, without a sharp sword (a highly advanced technology at the

time) to potentially cut the baby into "equal" parts, his offer would not have been possible.

All technology requires wisdom in its use. Many, such as Neil Postman *(Amusing Ourselves to Death)* have warned us against the dangers of excesses of pleasure that can come from ill-considered uses of technology.[12] If one puts electrodes into the "pleasure centers" in animals' brains, lacking wisdom, they will use that technology to literally self-stimulate themselves to death.[13]

Technology-based wisdom is something we teach to all our children, starting at a very young age. The almost universally known children's story (at least in western culture) of the three little pigs teaches that those who are wise use better technology. (The wise pig employs the more advanced technology of baking clay bricks, rather than the earlier construction technologies of wood and straw). Today, many teens learn about the relationship between technology and wisdom through computer games like Civilization and Rise of Nations, where, by investing in (or not investing in) various technologies they lead a civilization, either successfully or unsuccessfully, through the various stages of history.

Each new technology humans invent presents us with a new need to think about wisdom, because almost all technology can be used in positive and negative ways. In the past, people needed to successively develop "stone wisdom," bronze wisdom," and "steel wisdom." We are still struggling with "atomic wisdom" today. Digital wisdom involves integrating the technologies of *our* times into our thinking and decision making, doing it wisely, and sharing the results.

Fire Wisdom

Although there may not as yet be a single paradigm for digital wisdom—that is, a story that everyone is raised on like the *Three Little Pigs*—it may be helpful for our understanding to review the trajectory of one of man's oldest technologies: fire, a technology that humans didn't invent, of course—it came from lightning—but one that we did tame for our uses.

There's no doubt that fire was frightening at first—after thousands of millennia, it still is. When it strikes, fire can destroy our most precious possessions: libraries, crops, fortifications, and even whole cities. But fire also brings humans great benefits. The ancient Greeks saw it as a "gift" from the gods (it was actually stolen from them, according to Greek mythology, and given to man by Prometheus). Over the course of history humans have learned a great deal about fire's benefits and how to control it,

in our hearths, homes, and factories. Over time, we have found, if you will, "fire wisdom."

While one could conceivably make the argument that because it is an "external" enhancement fire makes humans "lesser," my guess is you wouldn't believe it. Despite its many dangers, fire vastly improves us. How "human" would we be without this technology, without "home fires" to warm us and bring our families together? Without all of fire's industrial benefits? Without fire and its successors to cook with and to sit and read by?

Still, while we appreciate fire, we continue to teach our children to be very careful with it. "Don't play with fire" is a universal lesson, and has even become a metaphor for safety. Most citizens are happy to pay their government to maintain highly trained fire fighters.

Despite its obvious danger, no one writes books about how "fire is destroying humanity." The story we tell, rather, is about how much this technology has improved our lives. We recognize the dangers of the technology and do our best to protect against them, but we accept that this powerful tool benefits us and strive to make better and better use of it. This is our fire wisdom.

Digital wisdom is similar. The difference is that humans are still at digital technology's very beginnings. And as with fire, the beginning is the scariest time. Just as with fire, the potential dangers of digital and other modern technologies, identity theft, cyber-attacks, worldwide electronic wipeout, for example, and even, at the extreme, nuclear annihilation, are real. Some dangers are still coming into focus.

But the benefits of these technologies are real, too. And just as with fire, the positives of digital and other modern technologies so far outweigh the negatives—and come in so many diverse ways—that we often ignore them. People often don't realize, for example, that their chief way to complain about technology is through the Internet and email!

This focus on the negatives, and taking for granted of the positives, is particularly true with respect to the ways digital technology is affecting the mind. Although it is not what we usually hear, the benefits of digital mind enhancement far outweigh the negatives, and many of our smartest people recognize this. I recently asked the former president of Harvard, treasury secretary, and presidential advisor Larry H. Summers, what he thought were the biggest benefits of the new technologies for education. He responded immediately that mind enhancement (through pharmacological technologies like future successors to Ritalin and Adderall) was the

most promising place to look.[14] Another smart observer is Hank Greely, the professor of law and bioethics at Stanford who helped write the letter I mentioned earlier, and whose whole career has been spent studying the question of biological mind enhancements. Greely dismisses almost out of hand many of the objections to such enhancements, although with some caveats. He admits there are serious concerns around safety, fairness, and coercion to be worked out. In many cases it is coercion of kids by parents pushing their kids toward enhancement. (I agree with Greeley that these are serious issues, and I discuss these and other legitimate concerns in some detail in Chapter 7.)

But even though Greely's personality, he says, leads him to an overall "middle position," he nevertheless views mind enhancement through pharmaceuticals as generally positive, and certainly not in any way "wrong." He points out in his writings and talks that mind enhancement is something people have always done and, in fact, strived toward; that it is something that brings many benefits, and that it is something we do today in many places. Today biologically based mind enhancement happens in our homes (vitamins), in our schools (Ritalin and Adderall), in our workplaces (caffeine), in our military (amphetamines for long flights), in our sports (energy drinks and steroids) and even in medicine (many doctors take drugs like modafinil to increase their alertness).[15]

Greely dismisses arguments about enhancements being bad just because they are physical (as in drugs) versus mental (as in teaching or coaching). All, he notes, affect our brain. He does not agree that mind enhancements obviate the need for effort—they just multiply, he says, that effort's effects. He does not accept what he calls the "integrity" arguments of "needing to play by the rules" and of not "cheating" because rules are arbitrary—we make them and change them.[16] And Greely doesn't agree at all with the "it's not right, it's not natural" arguments (what he calls the "yuck factor" arguments) against enhancements, even while noting that these arguments often have the most "political" resonance. "I frankly do not see much in [these arguments]" he writes, although, he adds, carefully, as the good professor and lawyer he is "I am somewhat open to being convinced."[17]

We all should remain open to being convinced by new evidence. But it is important to recognize that the sorts of mind enhancements that I am talking about in this book are very large in both their number and scope, and that biological mind enhancement is only one of over 50 kinds of enhancement I look at.

Gain versus Wisdom

There is, however, an important distinction to be made between brain gain and true digital wisdom. Gains due to technology can often be observed and recognized right away, such as when a technology extends our senses in some fashion. Technologies like telescopes, thermometers, microscopes, hearing aids, as well as email, search engines, and other digital technologies, provide clear gains.

Wisdom though, takes longer to recognize. It comes partially through our choice of technologies, but it also often comes in how those technologies are used by us. Even the most obviously beneficial technologies also have their downsides and can, if desired, be used in negative ways and for nefarious purposes. I have heard, for example, that more telescopes and binoculars are sold in New York City than anywhere else on earth. Do you imagine this is all for bird watching?

So just asking whether a technology—mind-enhancing or otherwise—is positive or negative, or good or bad, is generally an unhelpful question, since all technologies have the capacity to be both. We need to question whether the technology is being used wisely.

Yet the "good or bad" technology question gets asked a lot. Entire technologies get banned in schools or even countries, denying people obvious benefits (such as students' abilities to reach their parents in emergencies, or citizens' ability to find all the information on the Internet.) Some U.S. schools have banned students' use of calculators, cell phones, YouTube, Facebook, and other digital technologies. China and other countries have banned access to parts of the Internet.

My approach is therefore *not* to provide an answer to the unhelpful question of whether each of the individual mind-enhancing technologies I discuss is "good" or "bad." It is rather to offer instead an alternate overall perspective that provides, I believe, a better lens for viewing technology and our future.

Practically, I also offer a more helpful set of questions to be asking. For any technology, or group of technologies we encounter and want to evaluate, we should ask ourselves:

Is this use of technology wise?
Are there wiser uses of this technology?

The combined answers to these questions for all of our technologies is what constitutes our digital wisdom.

The Quest for Digital Wisdom

The struggle to acquire digital wisdom—that is, to find the ways that digital technology can make us wiser and better as human beings—is an important piece of humankind's twenty-first-century development. Humans *need* digital wisdom and I strongly believe we can develop it. I hope to show you why and how.

A key thing, in any evaluation, including of technology, is to overcome our personal instinctive affinity (or disaffinity) and look at both sides. This I will try to do. But that doesn't mean we can't, or shouldn't, make judgments. We must remember that as important as the risks of various technologies may be, that they are *only a piece* of our assessment of the digital wisdom of using those technologies. As humans, we use many risky technologies on a daily basis—from pharmaceuticals, to nuclear power, to air travel, to explosives. We employ these technologies—despite obvious risks—because our assessment tells us that their use, in particular cases, is okay. A big part of digital wisdom is knowing when our decisions to use those technologies are right.

Digital Wisdom

Digital wisdom is a dual concept, referring both to wisdom arising *from* the use of digital technology, and to wisdom *in* the prudent use of such technology. Digital wisdom is similar to, but different from, Aristotle's concept of "practical wisdom"—what he calls *phronesis.*18 It is similar in that, like practical wisdom, digital wisdom can only be assessed in terms of our aims and goals, which differ in individual situations. That a use of a technology might be wise (or digitally wise) in some situations, and unwise in others, is obvious from the way nuclear technology can be applied to generating energy or weapons. (And, as recent events in Japan have showed us, there is even need for digital wisdom in a peaceful context.) Digital wisdom is also similar to practical wisdom in that they are both "moral" skills rather than just technical or artistic skills; that is, they involve decisions about what is "right." Both involve good judgment.

But digital wisdom differs from practical wisdom in at least one very important respect. According to Barry Schwartz and Kenneth Sharpe, practical wisdom is learned primarily though trial and error. I believe we can be much more deliberate and proactive in creating and extending digital wisdom.

Schwartz and Sharpe point out that trying to induce wisdom though incentives, or rules, often produces unfavorable results, citing, for example, doctors who order fewer tests because that is what they are incentivized (i.e., rewarded) for doing, when the wise thing is for the doctors to order the *right* amount of tests, based not on the incentives but on their judgment. Wisdom, they say, lies in doing things *not* because we are incentivized to, but because we judge them to be the right things to do. "Incentives—even smart ones," they write, "may move the goal further away." A technology-related analogy would be when business or school system administrators keep their technology tightly "locked down" (that is, when they severely restrict what users can access) because they fear they will be blamed if something goes wrong. The goal of keeping their job leads them to make decisions that are personally protective but are digitally unwise for their organizations. (Doing this is known, in the vernacular, as "CYA"[19])

On the other hand, setting up hard and fast rules, such as "always do what the businessperson wants," is often, also, an invitation to disaster—Schwartz and Sharpe call such rules "pale substitutes for wisdom." "Rules without wisdom," they write, "are blind—and at best guarantee mediocrity, forcing wise practitioners to become outlaws, rule-breakers pursuing a kind of guerilla war to achieve excellence."[20] We can easily find examples in the technology world of this rule-based lack of digital wisdom, such as "blanket" bans on the use of pharmaceuticals, or smart phones, or any mind-enhancing technologies during exams.

Yet it is a measure of how far we have, in fact, advanced toward digital wisdom that many students are now allowed to use calculators on some exams and to use computers to take tests and write essays. The military also tends to be forward thinking on these matters, as do the many businesses that provide employees with personal technology tools. But we are still learning in these areas.

The valuable gains in wisdom that we get from technology do not come from enhanced convenience—although technology often does make things easier. Digital wisdom is rather about using technology—particularly the new digital technologies of our age—to improve our minds. Technology helps us most when it makes us *better thinkers* who make *wiser decisions and choices.*

Although there is certainly no guarantee about anything, I believe people are likely to become "wiser" human beings when they can do things like:

- concentrate harder,

- combine the intellects of hundreds of experts from around the globe to work on a single problem,
- apply the power of all the world's computers to their own individual issues and questions,
- communicate across the globe without barriers,
- take into account every relevant fact and precedent before making a decision,
- recall all of their past experiences,
- tap into the power of their unconscious mind,
- not just find information, but automatically rearrange, combine, and analyze it,
- understand what is going wrong in their own body and how to fix it,
- prevent crimes, wars, and other negative events from happening,
- see old and/or familiar things in totally new ways,
- and debate issues and ideas more fully.

This is, of course, a partial list of what technology can enable. We will see that these capabilities, and many others, are currently possible, and are available to many people today. Many more technologies that go even further toward making us digitally wise are very close and will become available in only a few years. This is why I speak of *Homo Sapiens Digital*—the Digitally Wise Person. I believe that our species, *homo sapiens,* is, because of technology, getting wiser.

Not that every *homo sapiens* is there. But that is what we all should be striving to become: digitally wise people. We are not born with digital wisdom, but we can acquire it. Hence the book's subtitle: *The Quest for Digital Wisdom.*

The concept of the "quest" i.e., a difficult journey to achieve a worthwhile goal, goes way back into ancient history, but it has taken on new meaning and relevance for many of today's young people though the medium of video games. In a great many of those games, the hero must complete increasingly difficult, risky, and dangerous quests in order to gain desired rewards. So, many of today's kids are used to "questing". (There is even a game-based school in New York City called Quest to Learn.)

I believe a quest for digital wisdom is one that twenty-first-century humans desperately need to undertake. I have certainly felt myself on such a quest. As digital technology enters more and more phases of my life, from communication, to

education, to medicine, to entertainment, I have often felt myself struggling to find the right thing to do, and the wisest path to take. Do I buy my six-year-old son an iPad? Do I push for more computers in his classroom? Do I demand that my family's medical records be digitized? Do I share my personal information on Facebook? Do I support stronger privacy legislation? These are questions to which there are no easy answers, but that we must all address in our search for digital wisdom.

The Value of the Past (in a Technology-driven World)

I believe strongly in extracting all the wisdom we possibly can from the past, using it in our own lives, and passing it to our children. But whatever else you take away from this book, there is one thing I hope you will learn and remember:

The changes coming because of technology are far greater than you—or anyone—imagine. And because of the changing context, the wisdom of the past, in a great many cases, will no longer apply.

This is true for a number of very important human areas. An enormous number of our fundamental assumptions are currently undergoing re-examination and change. They certainly include, at a minimum, privacy, physical and intellectual property, what is important, what is valuable, and even what constitutes and characterizes good and deep relationships.

Much of what has traditionally been considered totally private information is now going online, where it can be found more and more easily. Do we value privacy, or transparency? And if both, how do we prioritize them?

New kinds of value are emerging from unexpected directions, such as from the ephemeral online relationships created by links and sign-ups to virtual communities. To whom does this value belong?

Relationships can be carried on via more and more channels, and in more and more ways. Which are wise, and when? Minds can be accessed and influenced as never before. Who should have responsibility? Virtual goods are being created and sold. Who owns them? Many new behaviors are possible. Which are acceptable, and under what conditions?

Because so many of these beliefs are central to our lives—who we are, who we are with and how we interact with them, how we earn our living, what we own—we have

to find "new" wisdom in these areas. A large component of digital wisdom is figuring out which of our beliefs need to change, and which we should keep.

How do we judge what is digitally wise and what is not? The answer is not yet crystal clear, and perhaps will never be. But there are already some guidelines emerging.

For one thing, "top-down" authority is no longer the best way to make decisions. Because of technology, the voices of those at the bottom have been liberated and empowered, and wise decision makers need to listen their opinions and take them into account. This is true in politics (the blogosphere), in business (where anyone can send an email to anyone, and doing so is often encouraged), in the military (where individual solders have started their own blogs to complain about conditions or equipment, and officers have created their own web sites to assist everyone at their rank), and in a great many other fields. "Bottom-up" has now entered our decision-making vocabulary. So one criterion for a digitally wise decision is whether it has taken into account the opinions of all the stakeholders from bottom too top.

Another clear direction is that people are becoming more fully informed, as information becomes more available. It used to be that one side—say the government—could easily withhold things that could be valuable to the other side's argument—something that we don't permit in our legal system, for example. Today we have WikiLeaks and digital hacking. The issues of what information should be kept secret is a tricky one, particularly in cases of national security, but the digitally wise direction is, I believe, moving toward openness. For example, information on the H5N1 bird flu virus was made public so that scientists could share access, even though there were concerns that terrorists might misuse the information.[21]

A third guideline is to learn to talk about these changes in neutral language that allows dispassionate discussion. If teachers shout "plagiarism" or "theft" or if people scream "less human" every time students do something new and different with technology, it will certainly not help. Our behaviors and expectations in many of these areas ought to be reframed not as absolute rules but rather as societal expectations, some of which may be changing.

We also see people's expectations changing regarding online availability and speed of response. We will need to decide, despite our resistance, when it is in our best interests to adapt.

Not all the wisdom of the past, of course, is or will become outdated or useless, and not everything will change. But much will become meaningfully different—and

already is. I believe those who are quickest to understand this, to think about its implications and adapt, will be those who thrive in the twenty-first century. Those who hang on the longest to outmoded ideas and beliefs will almost certainly suffer.

Today we see this nowhere more than in our schools, many of which cling to pre-digital ideas, rules, and behaviors. That is why I devote an entire chapter (Chapter 6) to incorporating digital wisdom into the education system.

Despite the many Cassandras and other naysayers predicting our doom, what is happening to our minds because of technology is not, in the main, bad. As we will see in the many examples in the next chapter, the great majority of what technology is doing to us in this area is, rather, very *good*—good for each us, and good for humanity. It is crucial to always keep this thought in mind as you listen to the critics.

A Few Examples

One good example of our new digital wisdom is the late Steve Jobs's remaking of the music industry. (He did not do this totally on his own, of course, but many of the key ideas and insights were his, or championed by him.)

In the early 2000s, new Internet sites, enabled by new digital technologies such as file-sharing protocols and fast download technologies such as BitTorrent, allowed music—mainly popular songs—to be shared and downloaded for free. Young people in particular started rushing in droves to use these technologies, and music became, for these people, essentially free. On the other side were the record companies (sometimes joined by the artists), who thought music should continue to cost as much as it had up until then—in order to support, in many cases, their high salaries and lavish lifestyles and the investors in their companies. The record companies' most powerful weapon was lawsuits. They began to sue people, often poor, extracting some harsh judgments. A huge battle loomed.

With his unusual digital wisdom, Jobs saw a solution. He did not choose between those who wanted all music to cost a lot and those who wanted all music to be free. Rather he used technology to create a virtual store (iTunes) where people could purchase individual songs at the compromise price of just 99 cents each. While neither side was completely satisfied, both sides saw his solution as fair and wise. Although some music sharing still goes on (and some high-priced albums are still sold), the battle essentially ended.

What makes Jobs's solution digitally wise is that it was made possible only because of digital technology—the newly created abilities of technology to set up secure accounts, complete sales, and have customers download the music online. What is also worth remarking on is just how quickly technology can respond to a need or demand and create a solution.

Steve Jobs was also digitally wise in many of his other decisions. His purchase of Pixar (and early investment in digital filmmaking), his creation of the preferred music playing device (iPod), his remaking of the phone into an app playing computer (the iPhone), and the integration of magazines and movies into a device you could hold in your lap (the iPad) all paid off big for Apple. Perhaps Jobs's most digitally wise decision of all was to link all those devices directly to his iTunes store.

Other examples of digital wisdom abound—I will discuss 50 of them in the next chapter. They include using technology to overcome our brain's deficiencies, to improve our communication, to augment our physical well being, to improve our relations with other people, to make our world a better place, to deepen our analyses, to derive new and useful insights, to increase our executive thinking (i.e., decision-making) ability, to increase our creativity, and to do new, wiser things and achieve better outcomes in almost all fields of human endeavor—including artistic fields—as a result of the emerging symbiosis of human mind and technology.

Mind, Brain, Belief, and "Being Human": Dangerous Myths, Fears, Fallacies, and Beliefs That Keep Us From Reaching Digital Wisdom

There are, however, a number of myths, fears, fallacies and beliefs that keep us from reaching digital wisdom. I now discuss several of them.

The Fallacy of "Human" as Being Special and Always Better

"Preserving our humanity" is a phrase, and a goal, that comes up frequently in discussions about digital technology. But what "our humanity" means, exactly, is often left to the imagination. This is because people hold very different opinions and beliefs about what makes us human, just as they do about our minds, our brains, and our technology.

There are some who believe that humans are not just a species, but are differentiated from the rest of the universe by something special, something not "natural," (in the

sense of having evolved in nature). For some this difference is a God-given "soul" or "essence." For others, who may refer to themselves as "humanists," it is a belief that human beings possess some special kind of spark that technology can never replicate. Jaron Lanier calls this the "specialness of personhood."[22] "Being a person is not pat formula," he writes, "but a quest, a mystery, a leap of faith." Lanier differentiates his own "new digital humanism" from "computationalism," and "cybernetic totalism," preferring the former because he believes it is "a more colorful, heroic and seductive" approach to technology (which I'm sure it is). But Lanier also sees which view of people one adopts as being situational and practical: "There are some situations in which it is beneficial to think of people as 'special' and others where it isn't," he writes in *You Are Not a Gadget.*

To me, seeing people as special in this sense is a dangerous way to look at things.

I have no trouble with the idea that humans have something that other creatures don't, such as our abilities to talk, and to make tools—look at the great music and works of art we, alone on earth, have created. And we have not yet found any beings or intelligences outside our planet that are even there— let alone that surpass us.

But to assume this will always be true—that nothing on earth or in the universe will ever surpass humans, because it is the way of nature, or God, or anything else, is to diminish rather than extol humans. Humankind's greatest capacity is that we are capable of continually surpassing ourselves. Right now we have a symbiosis between man and machine that is more productive than either alone. Unless you are a clothing-less monk on a hilltop, it is hard to make a believable argument that the unaided human is better. But why get upset either way? Things evolve—almost nothing stays on tip forever. If, as some speculate, technology surpasses the human brain and takes off on its own trajectory—see Chapter 8—so be it. Digital wisdom will only come if we accept things as they are, not as how we might wish they were. (This doesn't mean, though, that we can't try to influence things.)

The Fallacy of "Genuine"

"People are afraid," my editor told me, "that technology will cause them to miss out on the 'genuine' experience." Closely linked, perhaps, to the "man is special" fallacy above is the belief that certain things are more "genuine" than others. In particular, the belief that face-to-face interactions are more genuine than virtual (i.e., technology-mediated) ones.

I believe the problems with this thinking should be obvious to anyone who has ever watched any sport on TV and then later attended a live game. Unless you are fortunate enough to have obtained the very best seats, as close as possible to the action, what you see on the television is often far better, and more of a "genuine" game experience: often these days you can even watch the game unfold from a participant's point of view. Some, of course, prefer to experience the smells and sounds and "feel" of being in an arena, which you do not get on television. But we should differentiate between the "being-a-spectator-in-a-crowd experience," (which you can, at least for now, only get in person) and the "watching-the-game" experience. For the latter, in-person is not the more "genuine" experience unless you are close. It has little to do with the genuine game if you are 100 rows back, where the players are specks (as I have been for example watching tennis matches. I once scored the last available seats to a Pete-Sampras-Andre Agassi match at the National Tennis Center at Flushing Meadows Park in New York City, where I spent the entire match freezing and wishing I was home watching a "genuine" tennis experience on TV.) Similarly, I'd consider an encounter with a famous person online in which I actually got to ask that person a question a far more "genuine" encounter than just being in the same room listening to that expert from the back row of a lecture hall.[23]

To think that *any* technology-mediated experience, whether it be visual (e.g., video, audio (e.g., music), or an online conversation (e.g., text, audio, or on Skype) is *always* less genuine is a fallacy. Perhaps more importantly, avoiding such technology as "not genuine" means missing out on much of what life affords us today. We can now virtually attend a huge variety of concerts, plays, and operas around the world—even of performers who are no longer with us.

Another element of this particular fallacy is conflating "genuine" with "better". Is a poorly recorded live performance of a song, say, more "genuine" than a beautifully- and highly-produced studio version? Some might argue this. But is it better? Absolutely not! I have both the studio and live versions of Garth Brooks's "The River" on my iPhone, and I only ever want to hear the— far better—studio version.

The truth is that technology does not make us miss important or genuine experiences—it actually does the opposite. Technology *opens up* a great many kinds of interactions and experiences that that are either impossible, or that most of us would never have, in person. So to equate non-technology-based with genuine is something that is, I believe, digitally unwise.

The Fallacy of Longer Always Being Better

Although many people praise and prefer long books like *War and Peace, The Brothers Karamazov,* or *Les Misérables,* and often seek out longer articles, or musical works, it is important to understand that longer—by itself—*does not* equal better. It is, in fact, dangerous to confuse and conflate the two. A novel, although it may be easier for a publisher to publish and distribute, is no better because of its length than a novella or a short story, Any book with 500 pages, whether fiction or nonfiction, is no better—just because of its length—than a book of 50 pages, or even an article of 10. A long newspaper article is no better than one that is shorter and better written. A three-minute NPR report is doesn't have to be better than a 30-second network news piece, even though the longer works, in each case, may contain more details.

It is not clear to me where the bias that many have in favor of length comes from. Possibly it comes from a time when information was harder to come by, when details were less easily available, and when people had more time to spend. Putting a great many details into a work made sense under those conditions. But today, those conditions have turned around 180 degrees. Information is far too easy to come by (think about the Internet), there is far too much detail available (think about high-definition TV that suddenly shows heretofore concealed facial flaws of many actors and reporters), and time is at an all-time premium (think about your life.)

Today it is even more important than ever that people to be able to value things not by length but by the quality of their content. And in our era of too much to do, the more high-quality content that can be put into shorter forms, with details available as backup, the better it is.

There has always been a countervailing trend favoring conciseness over excess length. We have aphorisms, morals, quotations, commandments, and haikus that express deep thoughts in short, memorable, ways. Nobody calls these brain loss. These need to be reinforced and used more widely. Despite protestations of many to the contrary, technology is a great boon to us in this respect, because it allows us to more easily highlight what is important and to easily relegate the rest to back up. But digital wisdom is required to do this in a way that enhances, rather than diminishes our understanding.

The Fallacy of Privacy Always Being Better

Privacy is something that many people value and wish to preserve. But it is a fallacy to think that privacy is always better—this is just not so. When you call 911, it is better that the operator can see your address. When the police have probable cause to think someone dangerous may be hiding in your house, it is better that the house can be searched. When one individual can blow up a plane, it is better that all passengers be scanned. From the perspective of population protection and epidemiological control, if you have a communicable disease, it is better that the world know about it than not know.

But if the information that you reveal about your disease is used to deny you insurance, or a job, that's a bad thing. There are valid concerns about "undue" invasions of privacy, that is, intrusions where there is no countervailing argument of good. Yet what is "undue" is generally based more on social norms and contracts than anything else, and those change with time and technology. The U.S. Bill of Rights specifies certain aspects of privacy that we have all agreed, by consensus, to guarantee in this country, such as the privacy of beliefs (1st Amendment), privacy of the home against demands that it be used to house soldiers (3rd Amendment), privacy of the person and possessions as against unreasonable searches (4th Amendment), and the 5th Amendment's privilege against self-incrimination, which provides protection for the privacy of personal information.

But there is no *requirement* that you keep your information private. If you don't feel you are incriminating or endangering yourself, personal information can be freely shared by individuals, companies and even our government.

(Remember the Freedom of Information Act?)

There are areas of legitimate privacy concern—information about minors, for example—and some things that people prefer—and in some cases have the legal right—to keep to themselves. It is digitally wise to be concerned about what happens to the information that we do share (e.g., health information with our insurance provider, or financial transactions we enter into with banks and credit card lenders), and about its being re-shared (whether sold or unsold) without our knowledge.

But as a social norm and a legal matter, rather than a natural right, the concept of what information should or shouldn't be private is subject to change. And with the advent of digital technology norms about privacy are shifting rapidly. To cite only one obvious example, Facebook and other social networking sites and activities have led

to a generation that is (rightly or wrongly, for better or for worse) much less concerned about sharing and privacy, in many of its forms.

I believe our children will grow up in a world with very different ideas about what should and shouldn't be private. To a great extent, this is because once something has been put online digitally it is very difficult—and often impossible—to remove it, or even to hide it from anyone determined to find it. We are all struggling with this—it is reported that there are 200,000–250,000 attacks *per hour* on the combined U.S. defense sites.[24]

Less (or no) privacy in the realm of information will clearly mean changes in peoples' lives and expectations. But will they all be bad? Here I think too many observers jump to unwarranted conclusions. Different does not necessarily mean worse.

Does it matter if our pictures, our incomes, and our digital details are easily available? Of course it will matter to some—today many lives, businesses, and governments are built on lies and illusions—but overall, and in the long run I'm not sure it does matter. It will certainly require some serious readjustments in how we do certain things. We will still need to prevent things such as theft or discrimination, and we will have to find, in many cases, new ways of doing this. Today there are people—including all politicians and celebrities— who already live in a world of far less privacy. They survive, for the most part, quite well. Some of them may yearn to go back to a more "private" life, but they have made trade-offs they thought were beneficial. As will our children. If they accept less privacy in some areas than we had, so be it. Will they come to regret that we didn't protect them? I doubt it.

Science fiction writer David Brin has an interesting perspective on privacy, particularly privacy from the surveillance that is becoming more and more prevalent. The only thing privacy laws accomplish, he quotes Robert Heinlein as saying, is to make the bugs (i.e., the cameras and the microphones) smaller. "In a decade" says Brin," you'll never know the cameras are there. Those with access to them will have devastating advantages."[25] A better solution than laws, Brin thinks, is to make everything transparent, that is, to give everyone access to everything. That way nobody gets any advantage. "The only alternative is to give the birdlike power of sight to everybody. Make the inevitable cameras accessible so anyone can check traffic at First and Main, look for a lost kid, or supervise Officer McGillicudy walking his beat. Only this way will the powerful have just as much—or little—privacy as the rest of us" says Brin.[26]

Is it better to keep things private, or to make everything public and prevent and punish information misuse? Determining how much privacy is the right amount for each person and group in the digital age is a matter of digital wisdom.

The Fallacy of Depth and of Its Always Being Better

The term "depth" is often used when describing relationships, and for writing as well. That "technology is preventing us from having 'deep' relationships with people—or books—as we did in the past," is an oft-heard contemporary complaint.

Like wisdom, "depth" is a concept that is hard to pin down. It is a metaphor, often referring to the amount, and / or the quality, of the "content" in something. But it is impossible to measure depth, in this sense, with any degree of precision.

People sometimes try to get around this difficulty by using the "I know it when I see it" argument. "We all know what depth is, though it's hard to pin down precisely in words" writes William Powers in *Hamlet's Blackberry.*27 Even though Powers goes on to say "it's the quality of awareness, feeling or understanding that comes when we truly engage with some aspect of our life experience," that still begs the meaning of "engage."

Unfortunately, the "I know it when I see it" argument provides no more clarity for depth than it did when Justice Potter used it for pornography. If we are going to use the word "depth" at all—and especially if we are going to use it as a yardstick for what is good—we need a better definition.

Some maintain, for example, that there is, *prima face,* more depth in things that do not contain digital technology—writings for example, or face-to-face relationships—than in things that do. I see this view as a dangerous fallacy. There are things online that are clearly of more depth than most faceto-face conversations (I'd cite David Brooks's *New York Times* blog as an example). People maintain intimate long-distance relationships using technology. Although it may not be the norm for some people, one can have a deep relationship, or a deep moment, or even a deep reading experience, online as well as in person, and many of these have much *more* depth than in-person, nontechnology-facilitated moments. (And by the way, let's note that this question is only asked in relation to newer technologies: no one disputes the potential for depth in the technology of writing letters.) Sometimes people will share much more about themselves in an email, for example, than when face to face. And if you haven't noticed, the bulk of face-to-face conversations in the world are about nothing more than the weather!

Digital wisdom requires that each interaction be judged on its own merits and not be stigmatized as less deep because it uses a technological medium.

The Fallacy of Slower Being Better

There is also a feeling, expressed by many that it is somehow better to go or think or do things more slowly (and, they might add, deliberately). But it is a fallacy to think slower is *always* better, and that the speeds enabled by technology cannot add value to what humans do. When a person goes into shock, or when a missile is on the way, there is only so much time one can spend thinking and deciding.

Certainly there are cases for humans where "slow thinking," as Daniel Kahneman, calls it, is beneficial. But even he posits that humans have two separate thinking circuits and that each has its own strengths and weaknesses. Teachers everywhere have always praised and encouraged slow, deliberate thinking.[28] Others, such as Malcolm Gladwell in *Blink,* have praised fast, intuitive thinking as often good and useful. (Note that Kahneman and Gladwell speak behaviorally, not anatomically—we cannot currently observe these two types of thinking in brain circuits.)

But while there may be discussions about the varying speeds at which humans think, there is no question of the speed at which machines work— they are designed to go ever faster. Is that ever an advantage? Of course. There are clearly situations in which the time to reflect and weigh options is quite limited, say before another player's buzzer sounds, or before a bullet arrives. Slowly weighing all the factors (and perhaps "sleeping on it," which has also been shown to aid decision making) is not, in many situations, a possibility. The ability of machines to think fast then becomes a powerful asset. So much so that in many cases we program machines to make decisions on their own, such as when to close floodgates, or shut down nuclear reactors. Interestingly, Kahneman even defines expertise as the shifting of decision making from slow thinking to fast thinking based on accumulated experience. And no individual can store more accumulated experience than a computer.

Slower thinking is also supposed to allow us to more easily separate out emotional components from our thinking and decisions, which play a big part in the fast, or "blink," type thinking. In this way we can sometimes avoid or overcome the many biases that cloud or thinking.[29] Machines do not have these biases, and are also particularly good at not getting emotional, even when under pressure. So the interaction of human and machine is almost certainly likely to produce a more emotionally unbiased decision, at faster speeds.

Digital wisdom requires not just looking at the speed at which decisions are made, or even just at the human system that makes them, but at the wise interaction of minds and machines in the process.

The Fallacy of "One Thing at a Time" Being Better

Although my mother is long gone, I can still hear in my head her voice shouting, "Marc, concentrate on one thing at a time." It was common wisdom in her generation that doing this was always better. Some things clearly are better. It is certainly better (at least in the sense of statistically safer) not to talk on a cell phone while driving.

But there is no reason to believe that this is true in every situation, and, in fact, it is—just as clearly—not. It is certainly not how most people, particularly successful people, operate most of the time. There are tasks that demand our highly focused concentration, and many others that do not. Even when we try to focus on a single task, other thoughts, whether they be conscious ideas, emotions such as anxiety, or physical needs such as hunger or going to the bathroom, typically intervene. Often those "extraneous" thoughts are useful: Suddenly something important that you'd forgotten pops into your head, and you can go off on a tangent and take care of it.

Research has uncovered situations in which people get no more out of giving something their full attention than they do out of giving it their partial attention. In studies done for the television show *Sesame Street,* researchers found that young children who watched a program in a room full of toys (and were distracted by those toys a great deal of the time) got the same information out of the program as similar kids without toys.[30] Linda Stone, now a researcher at Microsoft, coined the term "continuous partial attention" to describe—negatively, I believe—what many of today's people do. I do not, however, think this is anything new, and it isn't necessarily negative. In fact, it is terribly misleading to say that concentration on only one thing is always important.

One reason, as noted, is that many things do not require our full attention. But additionally, researchers are now finding that there are people who *can* multitask successfully when doing two or more highly demanding tasks.

A recent article in the journal *Scientific American* labeled these people "exceptional multi-taskers."[31] It is not clear, as yet, what causes this, and whether it can be transferred to others. Certainly most people are capable in certain situations—often with training and practice—of concentrating intently and blocking out distractions. Our bodies have evolved mechanisms to help us completely focus on the task at hand

in emergencies, such as the rapid production of adrenaline. But most people, most of the time, do not have a single focus—and there is nothing wrong with that.

The much more important issue—on which far less focus is placed, unfortunately—is understanding in which situations concentration and focus are important, necessary, or even crucial, and in which they are not. Because the appropriate mix varies considerably by individual, digital wisdom requires adding this type of understanding to both our self-knowledge and, additionally, to our school curriculum.

Digital wisdom also requires knowing in what situations we need to interact frequently with our technology, and when we can let it operate independently. For example, I can give my computer certain tasks, like searching or calculating, hit "enter," and let it go off on its own. But if I don't watch from time to time, it may get stuck (for example, on a dialog box) and just sit there awaiting my response. There are other technologies, like some cooking technologies for example, that need to be closely and continuously monitored—miss the precise moment to intervene and something spins out of control.

Andy Clark adopts this as his criterion for considering whether a technology is a cognitive enhancement—the less we have to pay conscious attention to it, he believes, the more it became part of what he calls our "core consciousness." Today there are, typically, many technology enhancements working with our minds at once, and there is no need for us to pay attention closely to all of them. In fact, in many cases we can set the technologies to signal (or warn) us when an event occurs that we need to pay attention to, as pilots—and cooks— often do.

To sum up, digital wisdom includes knowing, as individuals, when it is okay to multitask, and when it isn't.

The Fallacy of "Brain Science" Providing All, or Even Enough, Answers

As I discussed earlier, neuroscience, and our understanding of how the physical brain works, is making great strides. I am optimistic that someday we will understand almost everything about how the brain functions. But that day is not today, nor will it likely be in my lifetime (and probably not in the lifetime of my son, although that is more open to question). Today we are still at the stage of uncovering particular mechanisms, and finding, as one neuroscientist says, the scientific rules by which our brain operates.[32] We are just at the beginning of learning many of those rules, are still totally ignorant about others, and are even earlier in the process finding new actionable steps we can take based on the knowledge we have. (This has happened in

a few places. The neuroscience-based company Scientific Learning, for example, has helped many kids read based on a neurological understanding of their issues. But our current process of treating depression, for example, is still a crude hit-or-miss, trial-and-error affair.[33])

Big problems occur when people apply the label "brain-based" where they really shouldn't. That is, when they extend the link between what we actually know and the actions we should take farther out than our knowledge justifies, as John Bruer warned in his 1997 article "Education and the Brain: A Bridge Too Far."[34] Because having the term "brain-based" in the title appears to sell books, too many recent volumes titled brain-based this or that (particularly brain-based learning) are either just reformulations of old ideas in new "brain-based" language, or, in far too many cases, based on false understanding of the neuroscience research. (This last is something that a conversation with almost any reputable neuroscientist will confirm.[35])

The key point is that while it is important to keep abreast of developments in neuroscience, it is even more important not to over-rely on them. Many conclusions presented by writers, reporters, and even some less-responsible scientists are based on single experiments and exceeded the bounds that the experimental data truly allows. Most scientific papers contain a section at the end labeled "discussion," where the authors speculate on some of the implications of their work. When examining research, the information from these sections—while useful for understanding the scientists' thinking—is dangerous to take as fact or truth, as some appear to do.

It takes a great many experiments and verification before the findings from individual research studies become generally accepted science. Digital wisdom involves understanding scientific methodology and processes well enough to know what information to rely on and what to be critical of and skeptical about, and where to keep an open mind. Nowhere is this digital wisdom needed more than in interpreting neuroscience.

The Fallacy of Relying on "Tried and True" Solutions in New Contexts

Some people object to technology—and to technological mind enhancement—on the grounds that our old "tried and true" approaches and solutions work just fine. Why use calculators for subtraction and multiplication, for example, when we have "always" done these things in our heads?

I include this as a fallacy because the people who champion the tried and true typically ignore two important factors. The first is our changing context. The second is the mental cost of doing it the old way, which includes the cost of checking and re-checking for human error.

To rely on humans to do certain things is to invite error. Have you ever found a repeated word in a printed book? I have, in my own work, despite several readers and proofreaders. Despite all that we have learned about checking and re-checking our work, and "putting more eyes" on it, we still often wind up with mistakes. But there are many things that we can rely on machines to do *completely without error,* once the inputs are right, and digital wisdom demands that we identify these places and delegate them to machines. Spellcheckers can flag every repeated word in a huge manuscript, something that human proofreaders often miss. Of course we can't rely on spell-check alone, because some things, like spelling and grammar, are more contextual and still rely on people. But it is a much better use of human time to decide about the situations that are equivocal than it is to actually look for them. (A computer, for example, can find, in the Gettysburg address, the repeated word "that that nation shall live." A human needs to decide—at least for the moment—that it belongs there.)

Complex calculations are similar, and we typically get math completely backwards in this respect.[36] Human time is best spent getting the inputs and methodology right in mathematical situations, and in verifying that the answers make sense. Manipulation and calculation are tasks best done by machines. Doing calculations in your head is certainly still a valid way to solve problems assuming you are accurate in your mental math and it provides the right answer. But does it really make sense to spend large amounts of time learning and practicing mental (and even paper) calculations—particularly of complex math—in a twenty-first-century context, when almost everybody has access to a machine that does it for them? Shouldn't this, rather, be something that is more like looking at your watch to tell time? Today, chips with four-function calculators cost a tiny fraction of a cent each, and can easily be built into everything. Is it worth spending years teaching kids types of calculation (beyond, that is, the most simple examples) that they will never do? Or is this a waste of our limited twenty-first century educational time, particularly given that we often have only limited success? I go into this more deeply in Chapter 6.

It is not that tried and true methods like memorizing the multiplication tables are not useful—they can be. It is rather that the trade-off of the time and effort needed to memorize versus the time and effort it takes to calculate the answer may no longer

be worth it in today's context. I am sure that at one time many memorized the multiplication tables up to 20 x 20. But today, who would know the answer to 19x17 by heart? We would almost all see memorizing that as a poor use of our time. Our context has changed.

Similarly, note-taking is a tried and true way to remember what a professor or speaker said. But does it really make sense when your pen can also function as a recording device?

Flying by the seat of your pants (that is, without instruments) is generally considered a useful skill for pilots to have. But does it make sense to teach this to pilots who will likely, in the future, only fly planes that cannot stay in the air without computer control?

I know many would answer "yes, it does" to the above questions, and in some situations they may be right. My goal here is not to judge the specifics but to emphasize that digital wisdom means that we should continually be asking these questions and reassessing our decisions.

As we enhance our minds with technology, a big part of digital wisdom is learning how and when to abandon old beliefs, habits, and skills, or to put them into backup for retrieval when needed. The "backup and retrieval" is part of technology's job, but the determination of what skills humans need to actively retain is a decision for humans.

The Fallacy of "Reflection" Being Slow

People often cite "reflection" as a skill that humans can do and machines cannot. Although this may once have been the case, it is no longer entirely true. Many of today's computers, like IBM's Watson, are capable of reviewing their own actions and making corrections in future attempts. Reflection— and continuous improvement based on reflection—is enormously important for making progress, and reflection is an ideal place for human and machine to work together symbiotically. Andy Clark believes it may even be possible, eventually, to develop a technology-based "prosthetic" to help with reflection.

The problem, I believe, comes in thinking that such reflection needs to take a great deal of time. Educators have often made reflection into a long, drawn-out process of "thinking hard" and articulating one's ideas, out loud or on paper. But although this may be one way to produce reflection, it is certainly not the only way, and it is not clear at all to me that this is the normal way human reflection actually happens.

My experience in watching people reflect is that our reflections often happen very quickly. We instantaneously put together information into patterns and observations. For example, a videogame player who just lost a life might quickly flash through all the things to do differently in the next life.

Lengthy reflection may be, in some cases, nothing but a series of these almost instantaneous events. It may even be analogous to the way IBM's Watson parallel processes by putting the same data into a series of different analysis packages or algorithms, going through hundreds of them at once and comparing the answers.

This may be why reflection is best done not in a single session, but over time, with insights coming "in flashes" whenever they do. Or, as Kahneman suggests for thinking, there might be more than one type of refection that need to be combined for the best results.

The digital wisdom, I believe, is not that we need more time for slow reflection, as many suggest, but rather we need *more cycles* of reflection, at whatever speed, by both humans and machines. Reflection now certainly consists of a new and better symbiosis of a variety of types of human and computer "thinking."

The Fallacy of "Expertise" Meaning "Knowledge and Analysis of Data" and of Expertise Coming Only from Professionals

One of the things that technology has already changed greatly is the meaning of "expertise." An "expert" used to be someone who possessed a great deal of knowledge—much of which was gained through experience—and who was able to do analyses in order to answer new problems.

In today's digital age, much of the knowledge that experts formerly uniquely possessed in their heads and books (and far more) can be found online by machines. And much of the analysis that experts would previously have done can be outsourced to machines, which can do the same analyses, and more, in a fraction of the time. An example is the web-based Wolfram Alpha analysis engine and database, (wolframalpha.com), developed by mathematician Stephen Wolfram. Its goal is to "analyze any data in the same way that an expert would"—but in only seconds.[37]

In terms of expertise, digital wisdom calls for a new division of tasks between human and machine, and a new definition of what it means to be a human expert. Human expertise will clearly consist more in understanding context and what to look for, than knowing specific information or being able to do specific types of analysis. And

human experts will always turn to, and always rely on, machines as helpers (as we saw earlier with the APACHE example) in order to make the wisest decisions.

Another important and positive trend for expertise in the digital world is that it is expanding from only a concentrated group of professionals, where it has formerly resided, to many amateur experts out on the margins. In many fields technology tools are allowing interested and knowledgeable individuals, who make their primary living in other jobs, to make important contributions. One example is astronomy, where amateurs scanning and analyzing available pictures and data with new tools have already made important new discoveries.[38]Another is protein folding, a skill requiring human manipulation of large molecules on a computer screen (important for pharmaceutical development) where amateur users of the publically available Fold-it program have produced new and important solutions.[39] A third field, surprisingly, is neuroscience, where new understanding of the brain's electrical micro-fields, combined with inexpensive new tools to measure them, is now opening up brain research, as one neuroscientist put it "to guys [and, hopefully, girls] in garages."[40] Digital wisdom requires that we encourage these directions.

The Fallacy of Short Attention Spans

Do young people have short attention spans? Do people today have shorter attention spans than in the past? It certainly seems so to many people, particularly parents and teachers, and many people say this about themselves. It might even be true in some cases, but to generalize it to all today's people, or even to all today's young people, is a fallacy.

One could probably be forgiven for such thinking, as this is almost all one hears on the subject. But the truth is that *anyone's* attention span depends— and has always depended—very much on what they are doing and how they feel about it. As a college professor once put it to me, "Yes today's kids have short attention spans—for the old ways of doing things."[41]

Many of the individuals who think that all today's people have short (or shorter) attention spans can generally themselves concentrate for long periods when there is something they really want to do, such as a hobby, a sport or, in some instances, their work. Most healthy young people can as well. Many young people accused of having short attention spans spend long periods playing video games, listening to music, or watching movies in a focused way.

One reason we may feel that concentration spans are shorter is that we now so often multitask. But the reason we do this may not be because we *can't* concentrate, but rather because we choose (often wisely) not to. In the world of today, it is often highly inefficient to focus only on one thing. Movies (and lectures) for example, typically have slow parts (during which it may make sense to text friends). Kahneman posits that our system for focused thinking is, by nature, "lazy," and that without strong motivation it often slows or shuts down. Intense concentration on something we are not passionate about may therefore *require* breaks. We also tend to forget, I believe, the extent we were all distracted in our youth. We idealize our own ability (or former ability) to concentrate.

Concentration is a complex area, where discussions generally contain more heat than light. Digital wisdom demands we get more understanding here. This understanding includes, I believe, each of us knowing our own varying attention spans as a function of the different things we do and the different contexts in which we do them.

The Fallacy of "Limited Capacity" and the Need for In-Person/Online Trade-offs

How much capacity does a human mind have? We don't really know.

We do know pretty definitively that most of us have a very small "buffer" for storing facts that we don't intend to remember, such as telephone numbers. (Research suggests we can generally retain seven digits, plus or minus two.) But what about the human capacity for carrying on multiple simultaneous projects? Or for reading and putting together ideas from multiple books? Some call this "working memory" and equate its size with a person's intelligence. Many business and other consultants thrive on working on multiple projects simultaneously. (At the Boston Consulting Group, where I spent six years, this was required—not just because more work got done, but because *better* work got done through the cross-fertilization of ideas.) Bill Clinton has said he typically has seven or so books he is reading and thinking about, among his many other endeavors.[42]

So while capacity may vary from person to person, we have little idea of its upper limits.

The fallacy, though, is in thinking that humans lack the capacity to do multiple things in their heads, and that to do one thing (or do it well), we have to do less of others. A particularly egregious example of this fallacy, I believe, is the idea advanced

by some that we can't have strong in-person relationships and strong online ones simultaneously—that this is a necessary tradeoff. Some even cite studies to back this up, but I have looked at these and they do not, in my opinion, justify jumping to this conclusion (although like all hypotheses, this one could be further tested.)[43]

It is, of course, the case that we get better at things we do frequently (especially with good feedback) and that skills we use less frequently can get rusty and disappear. Some brain research even shows new dendrites and synapses being created as animals learn better skills, and dendrites being pruned as some tasks are abandoned. There may, in fact, be trade-offs among tasks competing for the same resources. But exactly what trades off against what is largely unknown.

Here the digital wisdom consists, I think, of not jumping to premature conclusions about limitations of *either* people or machines. And we should certainly not do this about their combination, because the human-machine combination is something whose power we have hardly begun to tap.

The Fallacy of the "Cultural Now"

We all have a tendency to believe that what goes on in our own lives and times has a great deal of importance. And much of it does, at least for us. But the bulk of what happens in our lives, in our times, and in the culture we create and experience is, with any distance and perspective at all, much less important than we think.

Purveyors of popular culture try hard to make people think that anything recent or and new is more important than it actually is, and their efforts are often abetted by technology. But technology is also increasingly, freeing us from "the recent's" grip. Technology now allows us to interact with practically any music, any book, or any movie, no matter when it was created or where it physically is. There is a reason that so many narrowly specialized TV and radio stations exist, and that people gravitate toward personalized services like Pandora, You Tube, and Pinterest—we are all, in the details of our personal preferences, different and individual.

A recent article, titled "In Praise of Not Knowing," suggested that life was more fun when information was harder to find, and knowledge more "secret."[44] I couldn't disagree more with this point of view. To me, the ability for each person to more easily know, find, and experience a wider variety of things is a clear example of brain gain. Digital wisdom lies in finding among all that's available the things that are meaningful to you.

Another way that technology now allows us to happily escape the "tyranny of the now" is by allowing us to circumvent simultaneous scheduling, that is, situations where seeing or doing one thing precludes our doing another thing of equal interest. In the past, TV stations tried to schedule all their most interesting programs in the same time period—head to head. You could watch Carson or Letterman, but not both. I still attend many "multi-track" conferences where I must choose between two simultaneous sessions both of which I want to attend. But in more and more places and ways, technology is overcoming these limitations with time-shifting (i.e., recording for consumption when desired) allowing us to experience one of the events later. Marketers are realizing that is digitally wiser to put things online for people to watch when they prefer, than it is to prevent people from seeing them.

Technology allows all human events—lectures, TV coverage, concerts, plays and many other things to be recorded and stored for future reference. This will continue to radically change how people behave—think of how much iPods, movie downloads, and digital recorders have already changed people's listening and viewing habits. We are just beginning to feel the impact of these kinds of changes, which also have huge implication for education (see Chapter 6). Digital wisdom, I believe, includes making our cultural (and other

experiential) choices not in terms not of immediacy, or what is the latest, or what is available, or even what the most people prefer, but in terms of quality and personal connection.

The Fallacy of "Wisdom" as Coming Only from Humans

Despite the "wise old owl" of folklore, wisdom was regarded up until recently as a purely human attribute. But that is changing. However we regard wisdom, technology now must be considered a component of the wisdom equation.

Among the earliest to foresee this were science fiction writers. Isaac Asimov, for example, gave much thought to the future human-machine relationship. In 1950, in his story collection *iRobot,* Asimov proposed three "Laws of Robotics" : (1) A robot may not injure a human being or, through inaction, allow a human being to come to harm; (2) A robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law;[45] (3) A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws. (Asimov later added a fourth [or "zeroth"]: A robot may not harm humanity or, by inaction,

allow humanity to come to harm.[46]) It remains to be seen whether Asimov's laws will actually apply to all human-robotic interactions, but the idea of technology and machines working together symbiotically is now firmly with us. A science fiction concept I have always found intriguing is George Lucas's creation (in the Star Wars films) of two separate categories of robots: working robots (such as R2D2) who speak only their own machine language, and communications robots, (such as C3PO) whose function is to translate between those machines and humans.

Digital Wisdom: The Wise Symbiosis of Mind and Technology

Who in the twenty-first century wants or needs a weatherman without radar? A scholar without the Internet? A doctor without diagnostic technologies? A lawyer without automated research capabilities? An auto mechanic without a computer? (A Dalai Lama without Twitter might still be desired by some, but even that is no longer possible.) Today wisdom—as I hope you are now at least starting to believe—is a joint property of humans and technology together. Anyone who continues to think of wisdom as the sole province of human minds is missing, I believe, humanity's greatest opportunity—perhaps ever—to get wiser.

It is already very clear that, because the human brain is highly plastic and continually adapts to the input it receives, the brains of those who interact frequently with technology will be restructured by that interaction. With the possibility of inherited, epigenetic changes, the brains of wisdom seekers of the future are likely to differ, in both organization and in structure, from our brains today, in ways we cannot now completely understand or foresee. Neuroscientist Dr. Michael Merzenich observes that "We can say unequivocally that the brain that is massively exposed to all our modern stimuli is going to be substantially different."[47] Bearing in mind that different does not necessarily mean worse—or better—we can ask "What might this mean in terms of people's achieving wisdom, and digital wisdom in particular?"

My belief is this: While future wisdom seekers will likely still be able to achieve *today's* level of wisdom without the cognitive enhancements offered by our increasingly sophisticated digital technology, that level of wisdom will not be sufficient, either in quality or in nature, to navigate the complex, technologically advanced world of our future (and even of our very near future). For that we require the cognitive enhancements and extensions of technology, and the digital wisdom to use them well.

Are *you* already becoming a wiser person because of technology? Has *your* brain been extended? Almost certainly. But the extent of our digital wisdom also depends, to a great extent, as I said at the beginning of this book, on our *attitude,* on how we choose to see technology and the world, and on the enhancements we decide to accept and let in.

Most people dislike and resist change—even a detour on our route home from work can cause a great stir. Ask someone to change their behavior in almost any way, and they will almost certainly say no, or at least resist.

But there is one type of change that people have much less resistance to. It is a type of change that humans do all the time and, for the most part, do very well.

It's called adapting. As humans, we have evolved to be excellent at scoping out our environment and adapting our behavior to maximize our benefits in that environment. We do this every time we move, for example, or change jobs.

Our new, rapidly expanding technology means a changing environment, and our success as humans means adapting, as quickly and completely as possible, to that environment. Whether we are comfortable with or discomfited by this new technology, all of us, if we are going to succeed, need to learn to use it wisely.

We all need digital wisdom.

Now, let us look at some examples.