Innovating the Future: From Ideas to Adoption

By Peter J. Denning

Futurists and innovators can teach each other lessons to help their ideas succeed.

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Innovators and futurists ought to have a symbiotic relationship. Often, they do not.

The futurist aims to help us understand how trends and events will shape the future, so that we can chart our business and policy courses to bring us to a future that most appeals to us. The innovator, on the other hand, aims to realize a possible future by getting ideas (i.e., possibilities for the future) adopted as practice in our communities.

Many would-be innovators ask in frustration, Why do my own good ideas often go by the wayside and other people's bad ideas get adopted? Why do I invest enormous time and resources to systematically generate new ideas, only to see much of my effort go to waste? Leaders in all fields fret and fume over these questions. They want to improve their innovation success rates.

Increasing success and reducing wasted effort on the path to innovation are very important goals. Many people believe innovation is the key to economic development, technological progress, competitiveness, and business survival. Policies that enhance a nation's ability to be innovative are constantly in public discussion and are hot topics among politicians and business leaders. Futurists collaborating with innovators can contribute to these goals.

I have been investigating these questions for many years and have learned many things that I wish I knew when I was younger. Based on these investigations, my colleague, Robert Dunham, and I wrote a book, *The Innovator's Way* (MIT Press, 2010, innovators-way.com). I will share here some excerpts from the book as a guide for innovators—and futurists—who are trying to get their ideas adopted.

The Work of Futurists

Most futurists see their mission as investigating how social, economic, and technological developments will shape the future. Futurists help others understand and respond to the coming changes. They also help apply anticipatory thinking to issues facing education, business, and government. They do this by a variety of methods, of which these three are the most common:

1. Revelation of current realities. Sometimes the prevailing commonsense interpretation of what is happening and how it will shape the future is not well grounded. It is a belief, but is not supported by data and observation. Futurists examine the data and propose new, well-grounded interpretations. They then examine how policy and action might change to align with the reality.

Peter Drucker was a master at this. His book *The New Realities* (Harper-Business, 1989) is loaded with examples. My favorite was his chapter "When the Russian Empire Is Gone," in which he analyzed economic data, conversations of politicians and the media, and moods of Russian citizens to conclude that the Soviet Union would soon fall. The collapse occurred within a year of when the book was published, much sooner than he expected.

2. Extrapolation of trends. When a trend can be detected in some measure of performance, futurists can calculate future values of that measure and draw conclusions about the consequences. In 1965, Gordon Moore noticed a trend in computer chips: Every year, the transistor count doubled for about the same price ("Cramming More Components into Integrated Circuits," in *Electronics Magazine* 38, April 1965). Many people started using Moore's law to gauge whether the computing power available in a few years would support their new technology offerings. Though not a law of nature, it became a guiding principle that has sustained the computer chip industry for nearly 50 years.

In *The Age of Spiritual Machines* (Viking, 1999), Ray Kurzweil claimed that the same trend was evident in four previous generations of information technologies and would be present in technologies that supersede silicon. Based on that, he extrapolated 50 years into the future to predict a "singularity" around 2030, when he believes artificial brains will become intelligent.

In *A Vision for 2012* (Fulcrum, 2008), John L. Petersen noticed deep trends in economic data that would lead to crushing public debt, unsustainable government programs, rising food prices, rising fuel prices, and social unrest. Many of his predictions have borne out.

On the other side, in *The Social Life of Information* (Harvard Business, 2000), John Seely Brown and Paul Duguid warn against overconfidence in trend extrapolation because social systems often resist and redirect changes in technology. They exposed a series of major predictions that never happened and led to the dot-com bust in 2002.

3. Scenarios. A scenario is a story that lays out in some detail what the future might look like under certain assumptions about trends and other factors. Futurists usually offer several scenarios under different as-

sumptions. The method is useful to help people see how they might react to different futures, and then try to influence policies and trends so that the most attractive futures come to be. Futurists do not offer scenarios as predictions. They often evaluate the probabilities of the various futures they lay out.

Let's take a look at the work of innovators for overlaps. Before we do that, we need to have a good definition of innovation.

In Search of the Meaning of Innovation

Innovation is one of the most studied subjects of all time, but there is considerable disagreement about what innovation is. The most common notions are that innovation is a mysterious talent, a disposition of some people's DNA, a process that can be controlled by savvy managers, or a flash of genius. Less common notions about innovation involve adoption, diffusion, and new behaviors. Thus, the recommendations of different authors about how to achieve innovation lead in conflicting directions.

There is agreement that success of an innovation means adoption. However, successes are few and precious. Business surveys reveal that only about 4% of innovation initiatives meet their financial objectives. Patent office statistics show that only about 0.2% of patents make a return on the inventor's investment. The National Research Council reported in 1986 that the U.S. government's track record of promoting innovation through university research is not as good as is commonly believed: Fewer than 25% of innovations can be connected to published research ideas.

It appears that we collectively share a misunderstanding of innovation and therefore experience great difficulty in achieving it. No wonder our methods are ineffective.

The low success rate of innovation initiatives is often explained as an inevitable consequence of the uncertainty of the marketplace. We are often asked to rejoice that the prevailing 4% success rate is so high. If low success is certain, a company's best strategy is to "take many shots on goal." However, this strategy is available to only a few companies that can afford to let 96% of their research and development go to waste. For the rest of us, achieving innovation looks like a crapshoot.

In *The Innovator's Way,* Bob Dunham and I concluded that the notions based on idea generation led to the fewest successes, whereas the notions based on adoption led to the most successes. Since we were interested in success and in the innovator skills that generate it, we used the second notion as our definition: Innovation is adoption of new practice in a community. There are three key words in this definition:

1. Community. The set of people who change. The community can be small, such as a family; medium, such as a business's customers; or large, such as a nation or the world.

2. Practice. Habits, routines, and processes that people embody. *Embody* means that people engage with the practice skillfully and without conscious thought. The ability to perform is not the same is applying a mental concept.

3. Adoption. The members of the community make a commitment to learn and embody a new practice. They will make such a commitment only if they see sufficient value in the new practice and are willing to sacrifice the previous practice to get it.

Notice that this definition covers many types of innovation. The Internet is a set of technologies that support new practices, including browsing, searching, online shopping, social networking, blogging, and texting. Mothers Against Drunk Driving (MADD) inspired new practices backed by laws to take drunk drivers off the roads. Sustainable architects have introduced new construction practices that produce buildings with no carbon footprint. Heads of families have adopted small business practices to help them balance income and expense and pay off debt. The key to success is adoption of practices, not the invention of ideas.

Unfortunately, the notion that innovation comes from clever ideas is enshrined in popular mythology. It is certainly true that ideas are necessary for innovation, but, as we will discuss, ideas are never sufficient. Company or public policies aimed at stimulating creativity, producing more ideas, or encouraging inventors do a disservice by getting everyone to focus too much on ideas at the expense of adoption. We call this imbalance the invention myth—the belief that invention of new ideas is the driver of innovation. The invention myth has led many people down the path to failure in their innovation initiatives.

Then what is a balanced and holistic view of innovation? The Eight Ways framework is our answer.

The Work of Innovators

The eight ways are practices that innovators use to produce the eight essential outcomes for innovation. Their names are listed on the wheel of the figure on page 43. Taken together, these practices define what it means to be a skillful innovator.

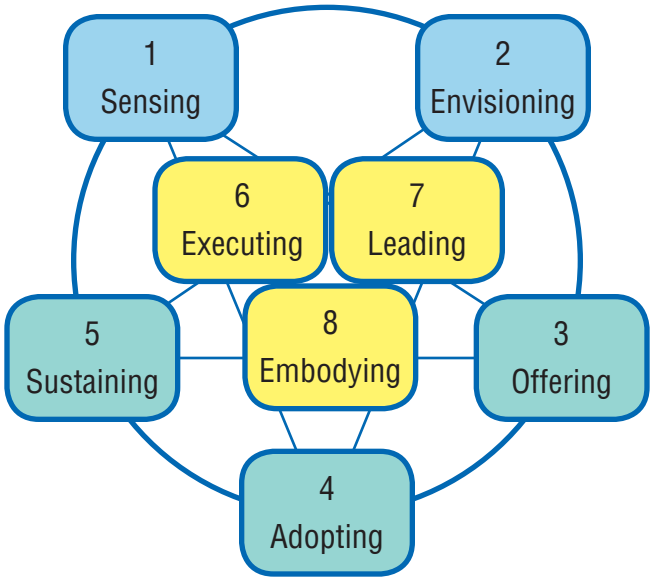
The wheel diagram suggests that the practices are not performed sequentially in numerical order. Instead, the innovator moves constantly among them, refining the results of earlier actions after seeing their consequences. It is better to think of the practices being done in parallel. That is why they must be learned as skills. The innovator must be able to do them well without thinking about them.

The "Structure of the Innovative Practices" table gives more detail. The first two practices are the main work of invention, and the next three are the main work of adoption. Although these five tend to be done

sequentially, they are not strictly sequential. Each of the final three practices creates an environment for effective conduct of all the other practices. The environment is important: The innovator has to execute the innovation commitments, proactively promote the innovation, and be sensitive to how other people listen and react.

The specification of each practice has two parts. The *anatomy* describes the structure of the practice when it goes well and produces its outcome. The *characteristic breakdowns* are the most common obstacles that arise in trying to complete the practice. The innovator moves toward the desired outcome and copes with breakdowns as they arise. The breakdowns are not mere annoyances. Coping with them is a normal part of the process.

The Eight Ways of Innovation



Example: The World Wide Web

Tim Berners-Lee is widely known for creating the World Wide Web, considered one of the great innovations of the twentieth century. His parents were both part of the Ferranti Atlas Project at the University of Manchester in England in the 1950s. After earning a graduate degree in physics in 1976 from Queen's College, Oxford, he worked as a software engineer at Plessey Systems, a telecommunications company, and then at D. G. Nash Ltd., were he wrote text-processing software for intelligent printers and a multitasking operating system. He was fascinated by a question, first raised by his father, of whether computers could be used to link information rather than simply compute numbers. In 1980, he went to CERN, the European high energy physics research laboratory, with this question on his mind.

Berners-Lee saw a huge disharmony between the actual direction of the Internet and the information-sharing visions of its pioneers in the 1960s. He felt a burning desire to do something about it. Given his dream about information sharing through linking, the esoteric world of hypertext was an obvious place to look for a key to an information-sharing Internet.

In his spare time, he worked on a program called Enquire that could link information on any computer with any other. He began to envision CERN not as a network of separate

Structure of the Innovation Practices

The main work of invention	1	Sensing	Locate and articulate a new possibility, often in disharmonies or incongruous events.
	2	Envisioning	Tell a compelling story about the world when the possibility is realized.
The main work of adoption	3	Offering	Offer to produce the outcome; gain a commitment to consider it.
	4	Adopting	Gain commitment to try it for the first time, and overcome resistance to the change.
	5	Sustaining	Gain commitment to stick with the new practice over time, integrating it into the environment.
The environment for the other practices	6	Executing	Create environment for effectively managing all commitments to completion.
	7	Leading	Proactively mobilize people to generate the outcomes of the other practices.
	8	Embodying	Instill the new practice into the practices of the community.

computers, but as a single information space consolidated across many computers. In 1989, he wrote "Information Management: A Proposal" to create a hypertext system at CERN linking all its computers and documents into a single web from which information could be quickly retrieved from anywhere in CERN. At first his proposal was ignored, but with help from prominent computer engineer Robert Cailliau, he got the attention of CERN's leadership. In 1990, they gave him the go-ahead to make a prototype, which he built on a NeXT computer.

The prototype included HTML, a new markup language for documents containing hyperlinks; HTTP, a new protocol for downloading an object designated by a hyperlink; URL, an Internet-compatible scheme for global names; and a graphical user interface. He drew on well-known ideas and practices, including Gopher (University of Minnesota's file-fetching system), FRESS and ZOG (hypertext document management systems), SGML (the digital publishing markup language), TCP/IP and FTP (standard Internet protocols), operating systems (the global identifier concept of capability systems, which had been on the Plessey computers), and Usenet news and discussion groups.

He put up the first Web page at CERN in November 1990. He released and tested browser prototypes at CERN in 1991. He gave his first external demonstration at the Hypertext 1991 research conference, a natural audience for this idea. It was an immediate success and inspired others to build Web sites. The first non-CERN Web site went up at SLAC (Stanford Linear Accelerator Center) in December 1991. Web sites began to proliferate; there were 200 in 1993. With the universal free browser, Mosaic, released by Marc Andreesen at the University of Illinois in 1993, the World Wide Web took off exponentially. During the 1990s, many new industries formed including e-commerce (selling by online stores via Web interface), publishing, digital libraries, eBay, Google, Amazon.com, Yahoo, and the Internet business boom (and bust).

Berners-Lee had no master plan, business plan, or any other formal document outlining a strategy for the Web. Instead, he insisted that all programmers working on Web software adhere to a small set of simple core principles: openness to everyone, no single controlling authority, universal identifiers, a markup language HTML, and a protocol HTTP. He steadfastly maintained that these principles were the essence of the World Wide Web; all else would be a distraction. He analyzed all new proposals to make sure they were true to these principles.

Building political support for the Web while advancing the Web technology became his central passion. Cailliau helped him build support within CERN. In 1994, he worried that commercial companies might get into a competition over who owned the Web, in violation of his core principle of openness. Michael Dertouzos at MIT helped establish the World Wide Web Consortium, W3C, modeled after the successful MIT X Windows consortium. This consortium eventually attracted over 400 companies, who collaborated on development of Web standards and tools; it became an engine of innovation for the Web. The W3C was an open-software, consensus-based organization that issued nonbinding recommendations, which become de facto standards once consortium members adopted them.

Berners-Lee himself refused to set up a private company so that he could benefit financially from his technology. It belongs to the world, he said.

Here is a summary of how Berners-Lee engaged the eight innovation practices.

• **Sensing:** In the 1980s, he saw a disharmony between the actual direction of the Internet (e-mail and file transfer) and its promise (semantic web of all human knowledge). This bothered him. It moved him to do something about it.

• **Envisioning:** He envisioned a system of hypertext-linked documents; any one could link to any other. Mouse-clicking a link would cause the system to retrieve the target document. The system architecture would consist of HTTP, HTML, URLs, and a browser. Common tasks such as scheduling meetings, looking up citations, and getting mail and news would be easy in this system.

• **Offering:** In 1989, he offered to build such a system at CERN. At first his offer was spurned, but with advice from colleagues he reformulated his offer around CERN document retrieval needs and got permission to build a prototype on a NeXT machine. He demonstrated the prototype at the 1991 Hypertext research conference, got strong positive responses, and solicited implementations of Web servers.

• **Adopting:** He visited many sites and attended many conferences to tell people about his system, always soliciting new servers, software, and browsers. Mark Andreesen, a student at University of Illinois, in 1993 made Mosaic, the first universal, easy-install graphical browser. After that, users adopted the Web like wildfire.

• **Sustaining.** In 1994, he founded the World Wide Web Consortium, hosted by MIT and CERN, to preserve the Web in the public domain by creating open software and standards for the Web. Over 400 organizations eventually joined W3C; it became an engine of innovation for the Web.

• **Executing:** He put together programming teams and solicited others to do the same, so that good Web software was developed and made available for anyone to use. He set clear principles for design and implementation of all Web software.

• **Leading:** At every opportunity, he recruited ever-larger numbers of followers and Web supporters. He

articulated a small set of guiding principles for Web development and stuck with them. He refused to let the Web "go private" or to become wealthy from his own invention. He said the cause was too important and too big for his personal considerations to influence.

• **Embodying:** He embodied his set of core principles for the Web and practiced them everywhere he went. Through well-designed software and later through tutorials in the W3C, he helped Web users embody the new practices of linking, clicking, and browsing.

Extension to Teams, Networks, And Organizations

The Eight Ways of Innovation have been presented as personal skills. They are the skills of serial innovators, who are good at all eight.

But what happens if you are strong at several but not all? For example, you could be a good inventor and storyteller, but you dislike anything having to do with offering or adopting. The obvious thing to do is team up with others who are good at the practices you are not good at. With good coordination, the team as a whole can do all eight practices and be positioned for success at its innovations.

The same is true at a larger scale for organizations. A well-designed organization can, through good internal coordination, take individuals skilled in some of the practices and produce teams good at all of them. Those organizations can become very successful at innovation.

Networks can also be very good at innovation, if they have people who are good at each of the practices and use the network as a means to find each other and coordinate. Open source software communities, such as the W3C, illustrate this.

In all cases, the eight practices are embodied in the innovative individual, team, organization, or network. The eight practices must always be present in order for individuals or collectives to be successful at innovation.

Collaborations with Futurists

The work of futurists and innovators most closely aligns in the Sensing and Envisioning practices. Futurists are good at turning up new possibilities and formulating stories about what the world would be like if the possibility were made real. Innovators can use their help.

The standard futurist scenario is not necessarily a compelling vision story. A visioning story is not the same as a vision, which is a committed declaration about a future. A visioning story is a compelling narrative that connects a vision to the concerns of the people and provokes their care and commitment. A good vision story inspires your audience to:

• Believe that there is a better future, well worth sacrificing what they now do to gain it.

• See that a blind spot has kept them from seeing this future sooner.

• Trust in your ability and commitment to make it happen.

• Ask for more conversation about this future.

Futurists collaborating with innovators can convert scenarios into vision stories.

There are two other places in the innovation process where futurists can help innovators. One is in the Offering practice. Even if listeners are attracted by an innovator's vision of an attractive future, they are often reluctant to sign on because the innovator has not shown them a credible, risk-managing path from the present to the future. Many futurists have well-honed skills at finding paths from the present to the desired future.

Futurists can also help innovators in the Adopting and Sustaining practices. In both cases, innovators are quite likely to encounter resistance from some subset of the community that feels threatened by the change. Resistance is a major impediment to adoption. Many futurists are skilled at examining communities as social systems and noticing where support for and resistance to change are most likely to come from.

Achieving Adoption

Innovation is the adoption of new practice in a community. It is not a mysterious talent, a product of good DNA, a management process, or a flash of genius. It is the outcome of an innovator—individual or team—skillfully performing the eight practices. The eight practices share four main features:

1. They are fundamentally conversations. Innovators perform them by engaging in the right conversations.

2. They are universal. Every innovator, and every innovative organization, engages in all of them in some way.

3. They are essential. If any practice fails to produce its outcome, the entire process of innovation fails.

4. They are embodied. They manifest in bodily habits and performance patterns that require no thought or reflection to perform.

These practices are consistent with the notion that the future is malleable. We are innovators when we shape it and influence how it evolves. The eight practices tell us how to go about doing that successfully. We as futurists can collaborate with innovators to help them improve success, especially in the Sensing, Envisioning, Offering, Adopting, and Sustaining practices. ❑

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