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# Beyond the Ninth Circle of Help

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improve the design of your internal software.

BY ELIZABETH ROSENZWEIG



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and productivity, improve the  
design of internal software.

*by Elizabeth Rosenzweig*

**Several years ago**, a brilliant engineer devised a new software tool for augmenting decision making. He was justifiably proud of it and immediately released it for use among a small group of colleagues in his company. He assumed that they would take it up, use it to transform their work, and develop innovative breakthroughs accordingly.

The program might have achieved all this, but it was too hard to figure out. Even its inventor struggled at times to remember how to make it work. Nonetheless, he did not empathize with his users. He blamed them. He actually told me he thought they weren't smart enough to use it. He didn't say this to be harsh; it was simply an observation, grounded in a common cognitive error. Most of us expect everyone to think and feel the same way we do. But people's reactions vary, especially in response to subtle cues like those in user interfaces.

One day, after much prodding, I got the engineer to visit my usability lab at Bentley University. For the first time, he stood behind a one-way window and watched people trying out his software. They had been told that their work would help improve the product for other users, so they were willing to invest their time. The engineer was sure, before coming in, that some people — the smarter ones — would jump right in and succeed with it. And he didn't care about the rest.

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But in our lab, he saw people he thought were smart struggling to learn his tool, asking for help, even pounding the desk in frustration. This time, he couldn't blame their intelligence. He recognized that he needed to rework his user interface design — that, like most other software designers, he had taken its effectiveness for granted. Until he saw their frustration firsthand, he hadn't realized that other smart people didn't process information the way he did, and that his design was hurting company sales, sucking up company resources, and wasting people's time, including his own.

This story demonstrates the strategic importance of good user experience and why so few companies realize its value, especially in systems for employees. Though the concept of user interface has long been an integral aspect of computer science, it did not gain its rightful prominence until 1995, when Donald Norman, director of the Design Lab at the University of California, San Diego, coined the abbreviation *UX* as a universal shorthand for “user experience.” As it happens, that was the same year Netscape, the first widely used consumer Web browser, went public. The transparency and interoperability of the Web have led to a steady advance in knowledge about user interface design since then.

Unfortunately, too little of that knowledge has trickled down to systems inside large enterprises. Many businesspeople are attuned to the importance of *UX* for their customers, but ignore it for their employees. Yet, user experience is arguably even more strategically important inside the enterprise than out. Consider the digital tools people use in your company every day to track time and expenses, check their email, manage travel, and conduct other routine tasks. These employees are trapped, forced to use your company's software

systems regardless of *UX* quality, and, if they don't understand them, relegated to spending hours on the phone seeking help. How much of their time do these systems squander? And what does that cost you in call center expense, potential turnover, and loss of commitment? (See “How to Tell if Your Internal Software Is Well Designed.”)

When a software interface is poorly designed, like that of the software many employees use at work, not only does it guarantee poor *UX*, but it diminishes capabilities in the company. A poor user interface sends a message to employees that their time and commitment have little value, and that — just as my engineer colleague believed — the problem is their own fault. Then leaders wonder why their people don't innovate or embrace change, and why it is so hard to execute the company's strategy. In this way, poor *UX* design can become a root cause of some of the most intractable, passive-aggressive cultural resistance in business today.

It doesn't have to be this way. Enough is known about how the human mind works, and about user interface design in general, to create better, more satisfying internal software experiences. When companies build such experiences into their basic way of operating, they can transform not only their employees' experience, but their own retention rates, employee satisfaction levels, and capabilities.

**The Dynamics of Bad UX**

Interest in user experience is much higher than it used to be, especially among business leaders. This was one finding, for example, in PwC's 2015 Digital IQ study. Nearly 2,000 senior executives, representing 10 industries and 21 countries, were asked about their com-

## How to Tell if Your Internal Software Is Well Designed

### Answer *yes* or *no* to each question.

- 1.** Do you have a large and well-staffed internal call center that answers the same questions again and again?
- 2.** On the most-visited screens, is it obvious where to look first?
- 3.** Are there several ways to conduct a single activity, such as “Search” or “Import,” each with its own idiosyncrasies?
- 4.** When people try out the software, do they smile and look relaxed?
- 5.** Do people keep notes at their workstations so they can remember the steps to follow?
- 6.** Is the command syntax and design consistent from one screen to the next?
- 7.** Does the same screen include multiple types of interface cues — pull-down menus, radio buttons, rollover commands, and keystroke commands — with no apparent logic behind which is used when?
- 8.** Is it evident what each command will do?
- 9.** Does the software make people choose between technical options (such as file formats) that are not otherwise relevant to their job?
- 10.** Is there a universally recognized and consistently designed “Undo” command for all your in-house applications?
- 11.** Do menu commands require definitions before they can be understood by a novice — for example, “Find replica,” “Parent preview,” or “Open mail file copy of contacts”?
- 12.** Is there an easy way to return to previous screens?
- 13.** Are menu elements that have little to do with one another placed together — for example, “Insert WordArt,” “Equation,” and “File”?
- 14.** Is there a clear match to the physical world that makes a command feel natural? (“The swipe moves you left, just like you were sweeping the picture to the side.”)
- 15.** Do users spend a lot of time looking for onscreen cues before they can take an action?
- 16.** Can people see the full document and all essential commands without having to scroll or search?
- 17.** Do employees post complaints about the internal systems in online forums?
- 18.** Does every important screen include a call to action so people know what to do next?

*If you answered yes to the even-numbered questions, and no to the others, your interface probably makes people feel smart. If you answered yes to the odd-numbered questions, your software is probably making people feel frustrated. The next steps are to confirm your findings by watching people use the interface, and then to translate your observations into a new and better design.*

pany’s acumen with incorporating digital technologies. Seventy-four percent of the respondents said user experience and human-centered design skills were important to their business. Almost as many, 72 percent, said they had all the user experience and human-centered design skills they needed to deliver on their digital enterprise vision. And customer-facing software is indeed improving.

Why, then, does the quality and user experience of internal enterprise software remain a problem? The answer has a lot to do with expedience. Good UX requires iterative, intensive attention. It is thus often neglected by enterprise software developers, whether in-house or

external, as they scramble to meet internal deadlines or remain within budget.

Sometimes the problem is exacerbated when technical designers chase the next new thing in their field. Because they have a captive audience of employees, the developers see this as an opportunity to experiment with something new. Another cause can be the agile or lean techniques that software companies turn to for development. These may well speed up the release, but they do not, in themselves, promote good interface design. Good design is complicated. Faster development offers no guarantees of better interfaces.

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# Radical Intimacy and the Smartphone

by Dan Bricklin

Humanity has arrived at a technological turning point created by mobile devices, especially smartphones. For the first time, people routinely carry around pocket-sized devices with great computing power. The mobile phone is also one of the most ubiquitous devices in human history — far more popular than the personal computer. As of 2015, about 7 billion people had cell phones (whereas only 4.5 billion had access to indoor plumbing). Of those phones, about 2 billion are smartphones: portable devices with voice and Internet access, touch interfaces, cameras, sensors, and animatable screens. The phones can be customized with downloadable applications that allow owners to evolve how they make use of it.

Smartphones change interactions between people and organizations, making the connections radically intimate. Because the smartphone is integrated with a person's physical movement, held in the hand, and (when carried in a jacket pocket) kept next to the heart, it supplants all the other tools people have traditionally used to communicate, gather information, and express themselves. It's the device through which they get innumerable things done. The more people choose and use their applications, the more the devices become an extension of their owners. Every smartphone is potentially a wormhole between the persona of its owner and the world

at large, a visceral connection point, binding people together.

The rise of the smartphone thus raises a fundamental issue involving user experience — an issue that is not just technological, but that concerns the nature of human relationships. Businesses (and other organizations) that can figure out how to adapt to this type of user experience will thrive. Those that cannot will become irrelevant. Tens of thousands of computer applications and the business processes they embody, including thousands used by businesses to connect with their customers and employees, may need to be reengineered for smartphones and tablets, or created for them.

Business has gone through such a change before, when, in the 1970s, 1980s, and 1990s, it reengineered its paper-based information systems for mainframes and then personal computers. That seemed like a major shift at the time. But in retrospect, it was smaller than the change introduced by smartphones. The graphical user interfaces of Macintosh and Windows computers, with their text-heavy look and feel and typewriter-like keyboard input, were designed to evoke paper. People shuffled windows on those computers as they had once shuffled paper documents. The computer system was simply a way to maximize the output of people working at desks.

The smartphone and tablet, by contrast, are creating a new way of interacting with and through machines. These devices are, as everyone knows, essentially computers. But they are no longer relegated to a desk or an office. Interacting with the old devices is like playing a piano; each key is a discrete input normally

pressed separately. Interacting with a smartphone or tablet involves a much wider range of continuous motion. Like molding clay with your hands, it gives you a more physical, free-form connection to what you're doing.

For years, businesses have tried to use digital technology for strategic advantage. They automate just about everything they do, but they find themselves unable to gain the productivity they should. The reason is right in front of them — or, rather, right in front of the people who are forced to use their internal systems. Most businesses invest very little in appropriately addressing their software user experiences, and all but a few of their systems provide a terrible user experience.

The smartphone will, at long last, force businesses to change. Most businesses have let smartphones and tablets become gateways to their systems. They do this because workers who are comfortable with, and proficient at, their tools make fewer mistakes and are more productive. Employees, for their part, naturally expect to use smartphones at work, because the devices are so closely connected to the rest of their lives. It seems silly not to do things at work the same way they do things elsewhere.

But when businesses let people use their mobile devices, these extensions of the self, a new orientation is required. The institution has decidedly less control over its information, or the time and place of using it, because of the personal nature of the connection. The workforce also has a new, richer form of expression, in both providing information and collecting it, and business applications need to adapt.

## Freedom from the Form

To realize the depth of this change, consider something that most people take for granted. The form, a document in which people record data from the field, is at least as old as the Old Testament. In Chapter 13 of the book of Numbers, Moses sends 12 spies to scout ahead and gather information about the land of Canaan, and he gives them the equivalent of fields to fill in and boxes to check, telling them to report on “the land, what it is like; and the population that is settled in it: are they strong or weak, are they few or many; and what the land is like, where are they settled: is it good or ill; and what the towns are like, where they are settled therein: are they encampments or fortified places; and what the land is like: is it fat or lean, are there in it trees, or not?” (This passage is from *The Schocken Bible, Vol. 1: The Five Books of Moses*, transl. Everett Fox; cited on [www.bricklin.com/tabletforms.htm](http://www.bricklin.com/tabletforms.htm).)

Companies make similar requests today of the field representatives they send to take inventory of store shelves. To be sure, instead of parchment or paper, the form is now on an electronic tablet, a device that can take photographs, record and play audio and video, and manage many other forms of media. Yet in gathering information, most people still use the form on a tablet as though it were paper on a clipboard. The doctor seeking data during surgery or the building inspector looking at a boiler must turn away from the task at hand and look down at the screen, to check for information or enter data, just as on paper. This is not only an inconvenience, but also a possible danger, because people are prone to errors. Interrupting the flow

of what they are doing, and requiring them to fill in data as they would on paper, or with a keyboard, increases their chances of making a mistake, especially over time.

The smartphone is qualitatively different from a tablet. It provides freedom from the form. It enables a new approach to human–device interaction: an approach that doesn’t mimic an individual sitting at a desk with a piece of paper, doing a task.

For example, a real estate app called MagicPlan uses the motion-detection and photographic capabilities of the smartphone to capture the dimensions and features of its environment. You can point a phone or tablet toward the corners, doors, windows, furnishings, and other features of the room and it will draw a floor plan for you. There are apps for physicians that display customized images of the human body, making it easier to talk to patients about their situation, and other apps that measure patient indicators such as heart and respiratory rates, without requiring the medical professional to look away. There are apps for fixing boilers, which allow building inspectors and engineers to more easily recognize problems without having to look up the technical specs. And, of course, there are a wide range of GPS-based navigation apps, which must be simple enough for drivers to use safely.

## The Business Response

All these apps, and many more like them, are beginning to change the way businesses connect with their employees. The apps transcend the limitations of the paper form. They gather information automatically, or through gestures, voices, and

photographs, and then they translate it into data that is easy to manipulate and retrieve.

Smartphone apps depend on having a user experience that people find natural and comfortable. (That may not, by the way, mean easy to learn, if learning the app is part of learning the job.) As a result, the rise of smartphones has brought much-needed attention to the question of user experience.

As a software developer, I know that information technology professionals often think they are making work better simply because they’re computerizing it. When we think that, we are wrong. We rarely even try to track the fatigue, friction, and loss of commitment that stems from poorly designed technology. And poorly designed technology is everywhere.

“When the inventor of the USB stick dies,” wrote the Twitter comedian Cluedont, “they’ll gently lower the coffin, then pull it back up, turn it the other way, then lower it again.” The time spent figuring out the right way to insert a USB stick may not seem like much, but the distraction is real. If someone has to call customer service because the buttons on the computer interface all look the same, that’s more lost time. If a doctor won’t use a patient records system because it’s too hard to figure out or too cumbersome and error-prone to use, that’s even worse. All these things add up. You can’t measure the productivity and quality that you *would* have gained if things were better. So every company loses the time, trust, and benefits of the skills of its employees, while assuming that it is winning.

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As smartphones become the primary computer in employees' lives, companies will have to apply design thinking — a focus on people, how they work, and how they use tools — to their interfaces. The process of creating internal systems will change, incorporating great amounts of feedback from customers, potential customers, workers, and potential workers. Businesses will gain radical intimacy, a close connection with the people who buy from them and work for them.

Certainly, radical intimacy presents certain problems for business. Most people, as a rule, don't want to be intimate with companies, espe-

cially those they work for. A purely transactional relationship has many benefits for the individual, including the expectation that he or she could negotiate a better deal, and leave if it falls through. The senior decision makers in most companies don't want radical intimacy either. They have thousands of employees, and they believe that close relationships will require an untenable amount of time and attention. Blindly emulating the social world is inappropriate.

But mobile devices will force businesses to overcome these obstacles. They can start by improving their user interfaces. User interface is the touch point for human relation-

ships and behavior, the connection point between the person and the organization. At first glance, it may seem like a minor thing to focus on, even inconsequential — but it is actually profound.

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The designers often know that the software is counterintuitive and frustrating, but they assume that the employees will figure it out. In other words, they expect that people will come up with “work-arounds”: unofficial procedures that make the best of a bad situation. Work-arounds might include avoiding a particular browser because it freezes up in combination with the given software; keeping a command sequence written on a note next to the computer; or clicking on an empty part of the screen, because a button is supposed to be there, even though it never shows up.

A work-around may seem innocuous in itself. But, rather than fixing the problem, it reinforces it. With enough work-arounds in place, bad interface design becomes part of the culture, ingrained in ways of doing things, perhaps even celebrated for the ingenious work-arounds it inspired. Companies that depend on work-arounds lose countless hours in productivity. People spend time in training, or on support lines, when they could be doing something more valuable.

Meanwhile, like my engineer colleague, many user interface designers dismiss those who can't figure out the technology. It is a time-honored tradition in some IT circles to blame users, especially seniors or hurried people, for not understanding an interface. This tradition surfaces in jokes about “stupid user tricks,” in the slow response times for fixing user interface problems, and in the lack of interest in watching people try to use the software in the first place.

It also shows up in the experience of incoming staff. In many companies, new employees encounter what amounts to an involuntary hazing when they are introduced to the company's technology. They are told, “We all went through it.” A few employees leave, if they have opportunities elsewhere. Others chafe and groan. Many blame themselves. Ultimately, everyone who stays surrenders and gets used to it. Eventually, they forget how it felt at first, and they inflict the same hazing on others. After all, they endured this rite of passage, so why shouldn't everyone else?

All of these experiences reinforce the perception

# Good design is transparent; people feel as if they already know how to control the technology. They don't have to be taught how to use it.

that the company doesn't value its employees. Subpar UX also makes the company more vulnerable to potentially serious events through human error. When medical employees make mistakes, for instance, it can be life-threatening to patients; when database managers use a work-around, it can inadvertently open doors to cyber-attack; and when errors are made in data entry, it can lead to misguided decisions.

Even companies known for their excellent user interface sometimes have breakdowns in design thinking. As a shopper, I love Amazon for its interface. The recommendation engine, for example, allows me to sort and scan an enormously complex body of user-generated reviews and comments in a way that makes it easy to choose a purchase. Furthermore, Amazon continuously improves its onscreen product and checkout pages. This in itself reinforces my interest in coming back to the store as a shopper.

But I'm also a book author — which, in effect, makes me a supplier to Amazon. And the user experience makes me feel like a second-class citizen. The author profile pages on its system are difficult to set up, so much so that I have yet to create one for myself, despite the fact that my own expertise in software should allow me to do so fairly easily. I — and presumably a fair number of other authors — haven't been able to get past my perception that the company does not value my time and interest.

## A UX Ethic for Internal Systems

When interfaces are done well, it's magic. Good design is transparent; people feel as if they already know how to control the technology. They don't have to be taught how to use it. I learned this in the 1990s as a research

scientist and designer at Kodak. Kodak thrived for a century because it took something hard and made it simple. When cameras first emerged in the 1860s, they were big and complicated. A photographer needed a wet plate measuring 11 by 14 inches to produce an image, not to mention a portable darkroom and the cart and donkey to pull it around.

George Eastman, who was a skillful inventor, applied his talent to creating a camera with a good user experience. He figured out how to break all this technology into small, user-friendly pieces. He created a dry form of photographic film, a flexible roll to let the dry film unspool, and a carrying case. His slogan was "You press the button, we do the rest." His first hand-held camera was expensive. But in 1900 he came out with the Brownie, an affordable box camera that was simple to use.

The Brownie's simplicity was possible because of Eastman's user-centered approach to design. That simplicity, in turn, made the camera extraordinarily popular. Eventually the everyday photographs that this camera enabled changed the way people perceived events, including the horrors of war (soldiers took it to the front) and the milestones of family life (it was energetically marketed to children). I like to say it was the first mobile device.

Now imagine if your own company's internal software and devices were just as intuitively obvious to use. Instead of making employees feel inadequate, your company's user interfaces could make them feel smart. And that would be the start of a self-fulfilling prophecy.

In 2005, I founded World Usability Day because I was concerned about the problems of poor interface design and its role in blocking people from taking

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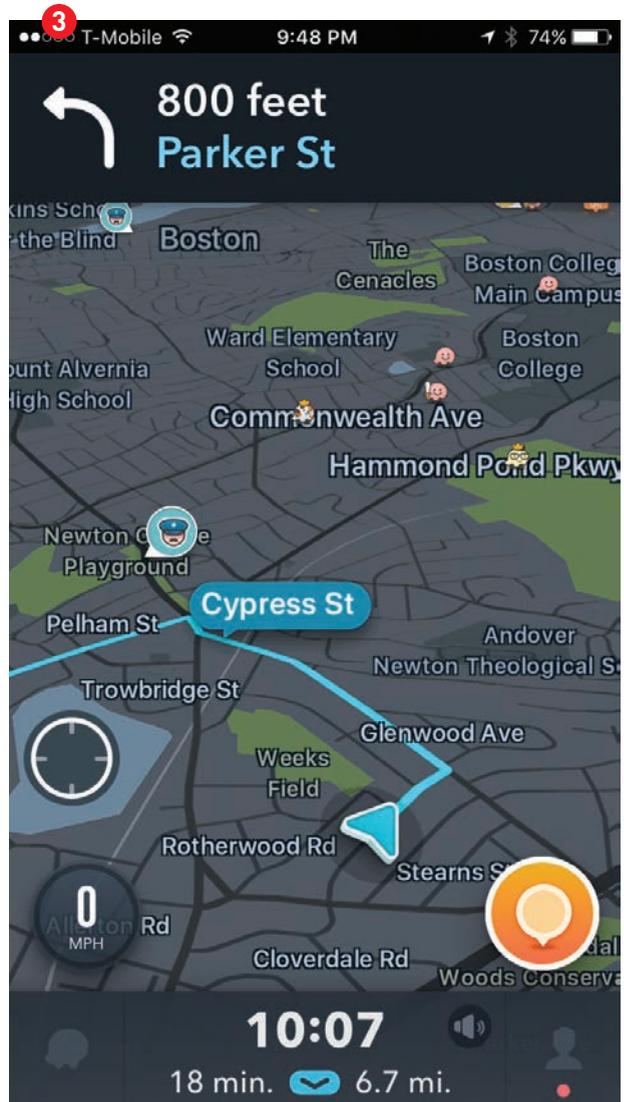
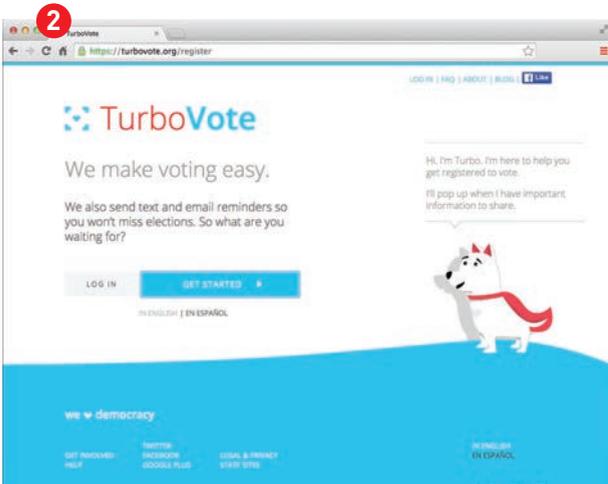
**Why Good UX Works**

These examples, drawn from historical research and from our work at the Bentley University User Experience Center, show how user experience overcomes complexity. They are from customer-facing systems, but the principles apply to internal systems as well. Indeed, bringing employee systems up to par with the systems facing consumers should be seen as a priority for engaging and retaining talent.

**1** **Brownie, the Original One-Button Camera**  
 Introduced in 1900, this camera was the first modern handheld communications device, with only one button needed to capture an image on film.

**2** **TurboVote Home Page**  
 This voter registration and reminder site created by Democracy Works was instigated by a graduate student in public policy who kept missing elections. It puts the most-needed essentials at the center, including a call to action ("What are you waiting for?" and a prominent "Get started" button). Lower-priority options and information are placed around the periphery.

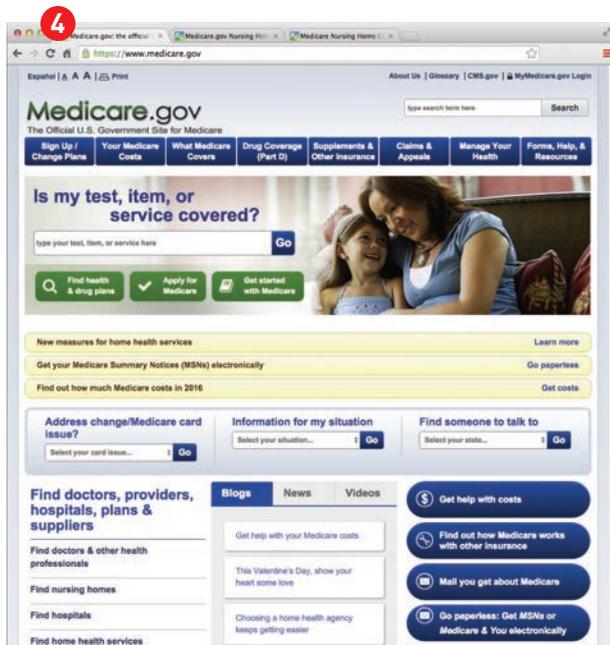
**3** **Waze Navigation Screen**  
 The Waze navigation interface, for all the complexity of its terrain, makes it easy to spot where you are now (the blue arrow), where you're going (the blue line), and what you'll find along the way.



4

### Medicare Home Page

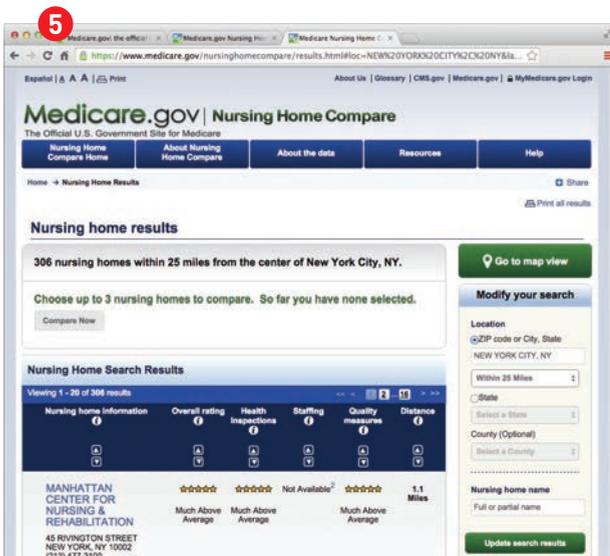
The U.S. Medicare system home page has been iterated upon and improved over the years through in-depth research into the needs of users, many of whom are aging or highly stressed. The home page simplifies their search by grouping similar options through visual cues — green for those starting out, yellow for data, and blue for particular types of help. The system responds to clicks quickly, which reassures visitors.



5

### Medicare Nursing Home Comparison Screen

The Medicare website has a five-star rating system that, like the ratings in *Consumer Reports*, makes it easy to compare options. The commands and user experience are common on all of the site's pages.



6

### Medicare Nursing Home Search Page

The images of happy people benefiting from the services described here provide an emotional boost, and direct the visitor's gaze left to the most critical element for a nursing home search: location.



advantage of the products and services important to life, especially in the developing world. Indeed, better user interface design, a seemingly narrow solution, could be the key to helping humanity deal with a broad array of challenges. And the user experience of internal enterprise software is a good place to start.

Companies that want to take their internal UX seriously need an ethic to guide development. It should be based on a single, simple premise: Every technological system that people interact with should present an obvious interface. There should be no manual. There should be no need to look up a command on Google, build a cheat sheet, or consult an online forum, chat line, or help desk. Sound impossible? Like the Brownie of yore, the iPhone is built upon a remarkably complex system, but people nonetheless find it remarkably easy to use. Take it as a model.

The first step is to look at your existing user interfaces. How many of them reinforce what you want your employees and customers to experience? Consider each one in terms of what's good for the people using them. Not what's good for accounting. Not what's good for engineering. Not what's good for people who love figuring out technology. Make the interfaces inviting and clear for people who want to get their job done without having to become an expert in your tool. Redesign may seem expensive, but consider how much you'll save on internal guidance and support, and potentially on turnover.

Interfaces that feel right, even for people with different styles of processing information, aren't as hard to develop as you might think. In software, a good interface incorporates artificial intelligence and an awareness of what constitutes a positive user experience. When I

was at Kodak, MIT researcher Henry Lieberman and I designed an electronic shoebox that automatically sorted images. If you took photos at a wedding in San Francisco, it would link those images to the date on your calendar (through the time stamp), and it was smart enough to recognize an entry about a wedding there. It would use the metadata to connect the dots and automatically organize your wedding photos, separating them from other photos. If you typed an email to someone about the wedding, it automatically put those photos at the top of your images folder, so they'd be the first you saw when you clicked to attach a photo. The more you used it, the better organized it became. The effectiveness of that user experience was not just a matter of the screen design. It had to do with the way the screen design, the functionality, and the information architecture all fit together, evoking a form (the shoebox full of pictures) that people already felt comfortable with.

One of the best current examples of an organization thinking through good user experiences comes from the U.S. Centers for Medicare & Medicaid Services (CMS) and its website [www.medicare.gov](http://www.medicare.gov). This group deployed extensive usability testing and focus group research to understand how its users, including care providers and patients, would use the site. CMS was particularly interested in how people under stress experienced the site, because most visitors to the site are probably concerned about their health or that of a loved one.

Consider just one part of the site, the section on nursing homes and other living situations covered by Medicare. Usability studies conducted between 2011 and 2014 helped the Medicare designers learn how to make the task of comparing facilities less stress-

# Better user interface design, a seemingly narrow solution, could help humanity deal with a broad array of challenges.

ful. They learned, for example, that the information about nursing homes wasn't detailed enough; among other things, it didn't tell users whether a facility offered short-term or long-term care. It also was not easy to find out how recent the data on nursing homes was. Although the site included a five-point rating system that consumers liked, the nursing home administrators felt it was unclear why facilities earned the ratings they did. CMS took these lessons to heart and revised the site accordingly. Then it again tested the site with users. The organization continues to test to see how it can improve user experience for the broadest possible audience.

Another good example is the mobile mapping and navigation app Waze, which is linked to its users' calendars. If a user has an appointment, Waze will automatically send that person an alert when it's time to leave and suggest directions for how to get there. It makes life easier. Because it incorporates and amalgamates user information (about real-time traffic patterns), it also has to combine a huge amount of complex data into a few indicators, generated instantaneously. Waze's user interface was apparently one of the main factors in Google's decision to buy the company, and its features are being incorporated into Google Maps (see pages 72–73 for images).

The key question for your product or app or system: What is it meant to help users do? Consider what will make them feel rewarded, and what will make them feel hurt. Then watch people use the system, and see how many (or how few) of your assumptions are borne out by actual experience.

Many of your IT design professionals probably already know how to make things better. But they need

permission, support, and encouragement — not just from you, but from the culture around them — to keep iterating and testing until they get it right. Paying attention to user experience may mean that it takes longer to release a product or internal system. But when it's right, the result is far fewer headaches down the road, happier customers, and happier employees. That should mean a happier bottom line. ✚

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Christopher A.H. Vollmer, Matt Egol, and Naseem Sayani, "Reimagine Your Enterprise," *s+b*, Apr. 14, 2014: How to make human-centered design the heart of your company's digital agenda.

Nielsen Norman Group website, [www.nngroup.com](http://www.nngroup.com): Source of articles on usability by two leaders in the field, Jakob Nielsen and Don Norman, and their colleagues.

PwC Digital IQ study, 2015, [pwc.to/YourDIQ](http://pwc.to/YourDIQ): Developing your UX (and other digital) capabilities.

World Usability Day website, [www.worldusability.org](http://www.worldusability.org): Point of contact for design efforts aiming at simplicity and accessibility (Nov. 10 in 2016).

More thought leadership on this topic: [strategy-business.com/technology](http://strategy-business.com/technology)

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