Products that are smart, connected, and worth a premium price—they're every manufacturer's dream. But to what end, and toward what kind of user experience?

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This Changes Everything

by Michelle Berryman

In January 2007, the late Steve Jobs addressed the crowd at MacWorld by saying, "Every once in a while a revolutionary product comes along that changes everything. You are very fortunate if you get to work on just one of these in your career. Apple has been very fortunate that it's been able to introduce a few of these into the world. In 1984, we introduced the Macintosh. It didn't just change Apple—it changed the whole industry. In 2001, we introduced the first iPod, and it didn't just change the way we listened to music—it changed the entire music industry."

He was right, of course. The Macintosh user interface and mouse pointing device forever changed personal computing and, in fact, paved the way for tremendous changes in products that combined physical controls with graphical interfaces and, eventually, led to integrated online experiences.

The iPod built on the Macintosh legacy while simultaneously changing the music industry and creating a new concept for product-based experiences, one that combined a physical device with online shopping, storage, and syncing capabilities. The iPod did not exist in isolation, however. It was a single component in a completely integrated ecosystem that involved a computer, an application (iTunes), content (music), a device, and a user. The symbiotic relationships among these components made it fast, easy, inexpensive, and most important, fun to build a robust, personal music collection. Even more significant than the ecosystem was the emotional connection users developed with their iPods and their music.

However, the real excitement and anticipation at MacWorld 2007 was the curiosity around what Apple would do next. The world (or at least Mac-ophiles) waited breathlessly as Jobs continued his presentation.

"Well, today we're introducing three revolutionary new products. The first one is a widescreen iPod with touch controls. The second is a revolutionary new mobile phone, and the third is a breakthrough Internet communications device. . . . These are not three separate devices!"

Jobs went on to say that Apple had reinvented the phone. It was a bold claim, and he knew it. He also knew he was right. But, at the time, it's doubtful anyone, including Jobs, realized just how significant this announcement really was. After all, this wasn't the first time the phone experience had been reinvented. Henry Dreyfuss and his design team profoundly changed the phone experience in 1937 with the Model 302 telephone. They did it again in 1959 with the Princess phone, and again in 1965 with the Trimline.

A little history

The Model 302 was the first widely accessible telephone to come into homes and connect people virtually. The technological breakthrough involved was the integrated ringer and circuitry in the subscriber's unit; before, these had existed as separate, connected components. Seventy-four years later, the Model 302 is still the iconic, globally recognized visual symbol for the telephone.

The Princess Phone comes in green, beige, blue, turquoise, pink, yellow, and white.

The Princess phone broke the Model 302 standard by changing the form factor and coming in a variety of colors. It was sleek and modern-looking, but functionally identical to the Model 302. However, the updated aesthetics turned the Princess phone into something novel—a fashion accessory for the home. After the Princess phone, the telephone continued to evolve incrementally, both aesthetically and functionally. Then, in 1965, the introduction of the Trimline phone caused another paradigm shift in telephony. Unlike previous telephones, in which dialer was separate from handset, the Trimline integrated the two, creating a sleeker, more usable handset. This re-mapping led the way for the integrated handset design that dominates the mobile phone market today.

Another landmark in telephony occurred in 1973, when Motorola's Martin Cooper made the world's first mobile phone call, paving the way for the future and for true telephone mobility. In 1984, Motorola launched the DynaTAC 8000x—the first commercially viable cellular telephone. It weighed two pounds, sold for nearly $4,000, and offered less than an hour of talk time per battery charge. Even with these limitations, consumer demand for mobile telephony was high—and it has not waned. In fact, in July 2011, there were 5.3 billion mobile subscribers worldwide (77 percent of the world's population), although it's doubtful any of today's mobile subscribers still use a DynaTAC 8000x!

Throughout the 1980s and '90s, there were many functional changes in telephony. In addition to the birth of truly mobile cellular telephones, there was widespread adoption of services like caller ID, call-waiting, call-blocking, and last-call return. In parallel, answering machines became

commonplace and, eventually, began to be incorporated into phones. Even with all of these new functions, at their heart, whether corded, cordless, or cellular, telephones still did only one basic thing: They allowed people to talk to one another across town or across the world.

Then, in 1997, Ericsson introduced the GS88, the world's first smartphone. The GS88 gave a glimpse of what the world might be like if the phone were mobile, extensible, and did more than make and receive calls, accept voicemail, and manage a contact list.

The rise of mobile and the app culture

The change brought about by the iPhone was different from all other advancements in telephony, however. As Jobs indicated, this wasn't just one product. It was three products (or more) rolled into one device, and it sparked a love affair for consumers. It was technologically sophisticated, responsive, and fast. It was physically elegant. The screen was large, with rich colors, a high resolution, and a compelling user interface. The user experience was enjoyable and unlike that of any other product on the market. It employed gestural controls that were intuitive, simple, and fun. It included stand-alone applications (apps) that increased functionality, novelty, and usefulness. It was more than a phone; it was, as Jobs described it, "an Internet communications device." And it was truly remarkable.

The iPhone experience elicited desire from users—an almost insatiable desire for more. More of everything.

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More pinching and zooming. More panning, petting, and flicking. More browsing. More texting. More photos. More music. More apps. Just—more.

Apple responded by launching the App Store in July 2008 with more than 500 applications in a variety of categories. Consumers went wild. By July 2011, more than 465,000 applications had generated 15 billion downloads—nearly 14 million downloads per day—from the App Store. There's no end in sight, and Apple now has more cash on hand than the US government.

Like other innovations, this one has already spawned a movement. By the time this article is printed, Google's Android will have reached parity with the Apple product in terms of the number of apps available for download, and Windows Marketplace for Mobile is coming on strong too, with more than 30,000 apps and continued growth projected on the Windows Phone 7 platform.

Apps are one of the key differentiators that have propelled the smartphone from quintessential "phone-dom" into a transformative device functionally capable of doing so much more than making and receiving calls and managing voicemail and a contact list. With apps, users can control, manage, and/or monitor many aspects of their lives, including their calendars and investment portfolios, as well as local weather, traffic, sports scores, breaking news, health and fitness, coupons and deals, online shopping, travel (reservations, maps, guidebooks, departure schedules, and so on), games, expenses, insurance, home automation, and of course, social media. The list is almost limitless, and the marriage of the smartphone and apps puts it all at the user's fingertips.

Interestingly, the iPhone was just the tip of the proverbial iceberg. Since it was introduced in 2007, everything about "mobile," including smartphones, tablets, apps, social media,

and even user expectations has taken off. The iPod may have changed the music industry, but the iPhone and its assorted smart siblings are changing everything else. From breaking news in 140 characters on Twitter to contributing to the overthrow of governments, connected mobile devices and apps provide users with unparalleled access to people, content, information, and power. It's anticipated that by 2015, 2.8 billion people will be using smartphones around the world and the US will have more than 82 million tablet users. Growth will continue at unprecedented rates for the foreseeable future—and so will the associated possibilities.

Beyond the phone

The idea of smart, connected devices is no longer limited to phones and tablets, however. TVs are now connected and have apps. Cars are connected; they have apps of their own and pair with other mobile devices to stream music and real-time traffic, provide GPS services, read e-mail, and compose voice-driven texts, e-mails, and status updates. Homes are increasingly connected. Home appliances are becoming smarter too, driven by a need for greater energy efficiency, but also by a desire for products to deliver more functionality to users. Even our shoes are connected and able to record distance and time traveled so users can monitor their health, set fitness goals, track performance, monitor calories burned, and record related personal statistics. Our pets and luggage are connected through RFID chips that facilitate their return to us when they get lost. Gas pumps and fuel tanks are connected and able to monitor inventory and environmental compliance. Forklifts are connected to warehouse management systems. Office equipment schedule maintenance and repair automatically, without human intervention. The list goes on and on—from banking to medical, people and information are connected. Products and services are increasingly intertwined. Everything is getting smarter. Users want more functionality, more personalization, and more control over the products, services, and environments they interact with on even intermittent occasions.

The idea of smart, connected devices is no longer limited to phones and tablets, however. TVs are now connected and have apps.

Growing pains

There are some drawbacks. The rise in these products is creating a crisis for both product manufacturers and users, as both groups grapple with what it means for a device to be smart and connected. As Apple proved with the iPhone, to the victor go the spoils—so the stakes are high for manufacturers to get it right. But that is much harder to do than it seems. Manufacturers want their products to be smart and sexy. They want users to believe their products are technically sophisticated and worth a premium price. They want a little of the Apple joie de vivre, and this is where the mismatch in user needs and expectations starts. It's also where the opportunity for convergence needs to be explored in greater detail.

For around $300, consumers can buy a great smartphone from Apple, Samsung, Motorola, RIM, HTC, or any number of other manufacturers. In all likelihood, the user's smartphone of choice will be fairly comparable to most other smartphones on the market. It will be technically sophisticated and capable. The form factor will be beautiful and well detailed. The screen will be crisp,

clear, and have a high resolution with rich color and great graphics. If the smartphone is running Apple's iOS, Windows Phone 7, or the Android operating system, the user interface on the device will also be comparable in many ways and will share similar interaction modalities for panning, zooming, pinching, flicking, petting, and scrolling. In addition, the device will sync with the user's computer for data storage and it will be able to access an app store with tens, if not hundreds, of thousands of apps that will completely customize the functionality and capabilities of the phone for the user at an incremental cost of around $0.99 (or less) per app. It's a complete win for consumers, handset manufacturers, carriers, app developers, and others within this eco-system.

And it's an impending disaster for manufacturers of technically sophisticated, smart products in other categories.

To be sure, users want smarter products across a broad range of categories, from other consumer electronics and home appliances to gas pumps, automated teller machines, office products, medical devices, and industrial equipment. They also want great experiences with these products—experiences that are exemplified by the $300 smartphone and bevy of $0.99 apps in their pocket. Like it or not, smartphones, tablets, and their associated apps are defining user expectations for appearance, functionality, extensibility, interaction, and price for smart products. Users may not expect to play games or check the weather report on their $2,000 refrigerator or their $1,400 copier, but they do expect the experience to be at least as good as the experience on their smartphone. Not only do they want the experience to be comparable—they expect it to be comparable.

Like it or not, smartphones, tablets, and their associated apps are defining user expectations for appearance, functionality, extensibility, interaction, and price for smart products.

This evolving attitude for users has led many products to a crossroads as manufacturers attempt to add functionality and value through enhanced interfaces. Analog controls have given way to digital, screen-based product interfaces, but to what end and, more important, to what user experience? Looking at home appliances for a moment, does the user benefit greatly from a digital interface on an espresso machine, oven, refrigerator, or washing machine? How will the interfaces on these products age over the 5- to 15-year lifespan of the product? How will the screen graphics and user interactions stand up to the test of time? What happens when the screen dies before the lifespan of the product? Can it be replaced cost-effectively or comparably? Can apps be added to products like these to extend functionality or customize the experience? What do users really want to do with these devices, above and beyond the things they do with the analog versions of the products? Should these products communicate with one another or with a home management/home automation system? Where do users want to interact with these products? Similar questions can be asked about most product categories, although the relative lifespan and price point for home appliances compared with other consumer products makes this category a particularly interesting study. Professional office equipment and tools, medical devices, industrial

equipment, and commercial infrastructure are similarly affected. These products often have high price points, long lives, and heavy user interaction. Yet they all have to stand up to the consumer litmus test of: "Is [the experience] as good as the smartphone in my pocket?" Sadly, at this point in time, the answer to that question is probably "No."

Convergence

One of the reasons for the disparity in user experiences from smartphones to other products is the ecosystem within which the products reside. Smartphones have an ecosystem of connected devices and services, while most other products have yet to make the leap to a connected, shared ecosystem. Using home appliances as an example once more, as long as the refrigerator is a standalone product, the user experience will be limited and will not extend far beyond the traditional refrigerator experience. Further, users will have to go to the refrigerator to interact with it. If the refrigerator connects to a home automation system, the user has an additional touch-point within the home to monitor and control the refrigerator. The user experience changes accordingly and shifts away from the refrigerator to some degree. If a computer, smartphone, or tablet controls the home automation system, the refrigerator experience changes once again because the user can interact with it (even if only on a limited basis) from a remote location, possibly even external to the home. If apps are brought into the mix, the user could potentially receive guidance and control temperature zones (crisper, main cavity, freezer compartment, and so on) based on the type of food stored within, frequency of usage (vacation home versus primary residence), energy consumption, or other factors. Suddenly, the refrigerator is a fully connected, convergent device and the user experience is extensible beyond the physical product itself. In fact, the refrigerator is now delivering new value to the user by providing guidance based on usage patterns, food types, and energy consumption. It's an enormous value-add for the consumer and the manufacturer, but the experience described requires an ecosystem, not just a digital interface on the refrigerator door. This type of user experience takes much of the interface burden off of the product and places it on the other devices the user is already interacting with on a regular basis—the computer, smartphone, tablet, or some combination thereof. Now, the interaction with the $2,000 refrigerator is as good as the interaction with the $300 smartphone—because it's largely on the smartphone. The screen on the refrigerator augments the experience, but doesn't dominate it.

Until smart products become conjoined with connected infrastructures, user experience will suffer. Until manufacturers realize that products like refrigerators should harmonize with existing and emerging technologies, interaction modalities, and user behaviors, they will continue to languish in their historical context without an avenue to escape their essential "refrigerator-dom." Going forward, integrated product experiences will begin to look more like the refrigerator example, as manufacturers come to realize that consumers don't want another device or control. They want more control through the devices they are already using quite fluidly and comfortably from their pockets, from the comforts of their homes, offices, cars, and couches. Apple may be right again when it tells us, "There's an app for that." ■

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