

Dr. Ken Gilleo

The World in Your Hand

Cell phones are the latest product caught up in the convergence craze.

Although product convergence is as old as the hatchet, it seems to be reaching a new peak in today's compressed world. Combining multiple functions into the same box is one of the simplest strategies for new product development. Let's look at modern convergence to see how it might change our lives.

In the Beginning...

When did it start? Some say that the clock radio was the first important example. The idea of adding a clock to a radio is valid but somewhat obvious. Others think the calculator watch started convergence. The watch industry kept busy by adding timers, pulse sensors and even wireless messaging. You can now buy a personal digital assistant (PDA) watch.

Convergence is Calling

Where is the real action in convergence today? We have seen some in personal computers, entertainment centers and certainly the automobile. But the focal point for conversion fits in your palm: the cellular phone. The nearly ubiquitous cell phone is a prime marketing target and technology challenge. The phone remains the most important driver for packaging and circuitry innovation.

Just about everyone either has or wants a cell phone, so the enormous market is back on a healthy growth curve. However, adding more functions while making the phone even smaller is a substantial task. Cell phones operate in harsh environments that include hot, humid vehicle interiors, salt-sprayed ocean beaches, down-pours, blizzards and much worse. How many drop tests have you inadvertently run this week?

The challenge is magnified by complex electronics that include at least one computer chip, ever-expanding memory, constantly improving displays, sophisticated multi-band two-way digital radio systems (transceivers) and quality audio. The cell phone requires high volumetric efficiency and robustness, but at a reasonable cost.

If you recall, the phone was one of the early adopters of flip chip and then chip-scale packaging. But chip size was not dense enough, so a strong demand for 3-D stacked packaging was created.

Fun and Functionality

Can we really pack any more into this tiny form factor? Taking a line from the late great communicator, U.S. President Ronald Reagan, "You ain't seen nothing yet!"

Add a camera to the list of standard cell phone features. Snapshot pictures are going the way of silent movies, so make sure your new phone has live video. Phones already have video recording and even video calling—the logical evolution of a product with a camera, monitor and wireless. And do not forget music, since we can already get an M3P player, compose our own sounds and play 100 annoying rings.

We also added critical Internet connectivity and instant messaging to phones some time ago. Now available are Bluetooth for device connectivity and short-range phone-to-phone linking for those who seek adventure.

What Else Can We Add?

What's left? How about television, since we already have a receiver and display? Several companies are launching phones that will receive digital TV. What else do you want in the palm of your hand? How about this magazine viewed on a rollout screen like e-ink?

If you are getting lost in this maze of convergence, just ask the phone to show you where you are. New phones can provide directions with a map and locations of stores, restaurants and banks. But you may not need to stop at the bank if the phone can dispense electronic credit. Adding Wi-Fi or direct Internet connections to your PDA or laptop is not necessary; let your phone do the linking through Bluetooth or infrared.

Will it Ever End?

You can bet that anything remotely reasonable, or even cute and unreasonable, is either on the CAD drawing boards or being promoted on the Internet. Do we already have enough convergence? Some experts say that the average user just wants to be able to talk—and talk well. Will one more feature push it over the top?

Your new gee-whiz phone may start buying products or making dates—without you. So while you may want the world in your hand, make sure it does not get out of hand. ■

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