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The Cellphone, Navigating Our Lives

By [JOHN MARKOFF](#)

The cellphone is the world's most ubiquitous computer. The four billion cellphones in use around the globe carry personal information, provide access to the Web and are being used more and more to navigate the real world. And as cellphones change how we live, computer scientists say, they are also changing how we think about information.

It has been 25 years since the desktop, with its files and folders, was introduced as a way to think about what went on inside a personal computer. The World Wide Web brought other ways of imagining the flow of data. With the dominance of the cellphone, a new metaphor is emerging for how we organize, find and use information. New in one sense, that is. It is also as ancient as humanity itself. That metaphor is the map.

"The map underlies man's ability to perceive," said Richard Saul Wurman, a graphic designer who was a pioneer in the use of maps as a generalized way to search for information of all kinds before the emergence of the online world.

As this metaphor takes over, it will change the way we behave, the way we think and the way we find our way around new neighborhoods. As researchers and businesses learn how to use all the information about a user's location that phones can provide, new privacy issues will emerge. You may use your phone to find friends and restaurants, but somebody else may be using your phone to find you and find out about you.

Digital map displays on hand-held phones can now show the nearest gas station or A.T.M., reviews of nearby restaurants posted online by diners, or the location of friends. In the latest and biggest example of the map's power and versatility, [Google](#) started a location-aware friend-finding system called Latitude in 27 countries early this month.

On its face, Google's new service — available on dozens of mobile systems — is simply a way for friends to keep track of one another and meet up, for families to stay in touch or for parents to find comfort in knowing where their children are.

But it will generate a gold mine of new information about where millions of people travel each day, and there is no doubt that Google and others are planning to dig in that mine. "Everyone is watching Google, and this will open a floodgate of location-oriented applications and services," said Greg Skibiski, the chief executive of Sense Networks, a New York City firm that mines the millions of digital trails left by cellphone users for marketing purposes.

It was the arrival of the so-called WIMP interface — for windows, icons, menus, pointer — in the 1980s on

both the [Apple](#) Macintosh and computers using [Microsoft](#) Windows that made personal computers personal and moved them beyond the world of hobbyists and business. Now many of the software designers who created those interfaces say they see a change of similar magnitude with phones and maps.

“We’re way early on, and we don’t know what the Macintosh of maps will be yet,” said Paul Mercer, a former [Apple Computer](#) software designer who more recently worked on the development of the [Palm Pre](#) smartphone. “But because of their relationship to the real world, maps will be a metaphor for a huge swath of mobile computing.”

Indeed, a new generation of smartphones like the G1, with Android software developed by Google, and a range of Japanese phones now “augment” reality by painting a map over a phone-screen image of the user’s surroundings produced by the phone’s camera.

With this sort of map it is possible to see a three-dimensional view of one’s surroundings, including the annotated distance to objects that may be obscured by buildings in the foreground. For starters, map-based cellphones simply translate paper maps into a digital medium, but future systems will probably begin to blur the boundaries between the display and the real world.

“I always said the next interface would be Quake,” said Steve Capps, one of the designers of the original Macintosh interface, referring to the popular video game. “How long will it be before you come out of the subway and you hold up your screen to get a better view of what you’re looking at in the physical world?”

Increasingly, phones will allow users to look at an image of what is around them. You could be surrounded by skyscrapers but have an immediate reference map showing your destination and features of the landscape, along with your progress in real time. Part of what drives the emergence of map-based services is the vast marketing potential of analyzing consumers’ travel patterns. For example, it is now possible for marketers to identify users who are shopping for cars because they have traveled to multiple car dealerships.

“When I go from point A to point B with my feet, there is something of real value there,” said Tony Jebara, a [Columbia University](#) computer scientist who is a co-founder of Sense Networks.

A full-blown map-based, location-aware mobile world would entail rethinking basic American notions of privacy. For a generation of older Americans, exposing their precise location around the clock to an army of little brothers for marketing and advertising purposes is a privacy invasion.

Today the vast majority of cellphone users in the United States still use the devices primarily for just one function: talking. About 10 percent of cellphone users take advantage of map features, according to the market research firm M:Metrics. But the number is growing, the company said. And a survey by another market research firm, LJS, showed that 24 percent of those interviewed wanted GPS mapping capabilities on their next phone, but only 19 percent wanted an Internet connection.

On the other hand, there is a generation of smartphone users in their 20s that has grown up sharing the most intimate details of their lives on [MySpace](#) and [Facebook](#). They may have a different point of view.

Recently, for example, Sam Altman, a 23-year-old [Stanford University](#) computer science graduate and the founder of Loopt, a pioneering friend-finding service, was having dinner in Palo Alto, Calif., when he noticed

from the screen on his phone that his freshman college roommate was having dinner just two restaurants away. The two met after dinner at a bar, where they were joined by another former Stanford student who noticed on his display that they were socializing together.

Mr. Altman said his willingness to display his location was just as valuable in his business dealings. At the [Consumer Electronics Show](#) in Las Vegas last month, he turned on a feature that broadcasts his location and his name. He had more than a dozen business contacts as he traveled around the vast trade show, and he said he was able to kick off four deals from his random contacts.

The map interface even seems to have a biological basis, as suggested by new brain studies showing how the world is represented in brain maps.

“Humans evolved with amazing navigational abilities in our brains from an evolutionary perspective,” said Eric Schmidt, Google’s chief executive. He argues that the correlation between the map on the phone and the internal map in your head is a natural way to navigate all kinds of information.

For example, neuroscientists have discovered that people who have occupations that require them to maintain complex mental maps of the world, like London taxi drivers, have an enlarged hippocampus. What happens when our hand-held computers become extensions of the way we think?

“I have wondered about the fact that we might as a culture lose the skill of mapping our environment, relying on the Web to tell us how to navigate,” said Hugo Spiers, a neurobiologist at University College London. “Thus, it might reduce the growth of cells in the hippocampus, which we think stores our internal maps.”

Among cellphone makers, the map metaphor has been adopted most aggressively by [Nokia](#), the world’s largest maker of mobile phones. The company has acquired digital maps of 69 countries and is now rushing to deliver to developers the tools to create software for Nokia phones oriented toward maps and navigation. In many ways this is similar to the tool kit that early computer designers gave programmers to develop Windows applications.

“This is a new metaphor upon which others can build,” said Michael Halbherr, Nokia’s vice president for social location services.

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