Like many techies, I've been wondering what changes we'll see in the Internet in the coming years. In doing so, I look at the Internet in the broad sense, at the level of applications and uses, but without abandoning a technical perspective. What new kinds of applications will we see, and what will programmers have to do differently to take advantage of new technologies and implement new applications?

Made-to-Fit Interfaces
From the perspective of applications and systems programming, the most appropriate conceptualization of the Internet is based on the interactions—between people and between people and computers—that it supports. And despite all its clever features, today's Internet is still quite unimpressive in the kinds of interactions it enables. I believe the main requirement for the Internet's further success is the development of better user interfaces. Interfaces will drive—or limit—the Internet's expansion into our daily lives.

Going Mobile
Currently, our interactions with the Internet occur mostly in controlled settings, using a desktop or a laptop computer. But users are increasingly moving to smaller, more portable devices such as cellular phones and PDAs, which many people find more convenient and less threatening. Portable devices offer new challenges and opportunities. On the one hand, portability severely constrains the interaction modalities, because of smaller displays, more difficult data entry, lower bandwidth, and so on. On the other hand, a portable device is physically present where the user needs it. This means the device can conceptually be part of whatever the user is doing, anywhere and anytime. Today's approaches mainly address the obvious challenges of portability, but they fail to exploit the opportunity that portability offers.

Linking the Internet to Our Lives
Portability offers an opportunity for computing to participate intelligently in users' activities. But how, exactly? To incorporate the Internet into your activities, you not only have to be connected to it (so that it "knows"—in a broad sense—who and where you are), you must also make it aware of what you are doing so that it can determine how best to help you. In other words, to become even more useful, the Internet must move from knowing just your name and e-mail address in the wired version to also knowing your location in the wireless version and then to knowing your history, current situation, and needs. These would include what you have been doing, where you are, and what you wish to do.

The only way to understand and engineer this helpful, personalized Internet is to advance the knowledge representations (roughly, data structures) on both the connecting devices and the servers that maintain appropriate information about users. Such information will be inherently sensitive, and to protect privacy its distribution will have to be under the user's control. You want the Internet to know what you are doing, but you don't want others to know any more about you than you wish to reveal.
These requirements constitute a classic case for the application of agents to provide the Internet with intelligence and a repository of knowledge, assist users in their daily work, and represent them in their interactions with other users and services. The Internet may know a lot about you, but only through your agents; others on the Internet will know very little. Because they are active and persistent, the agents can gather information about you and apply it to seek out opportunities and synergies on your behalf.

When agents residing on devices and servers can act adaptively on the basis of familiarity with users’ everyday lives, the Internet will move to a new level of convenience. Rather than an isolated information source accessed from an office, it will be a meaningful presence in daily activities, right in the thick of things.