Real-Time Maps Could Help Make Cities More Livable

MIT's Carlo Ratti uses location data from cell phones and laptops to create maps of human activity in cities.

By Katherine Bourzac

When people wander around the MIT campus with a Wi-Fi-enabled cell phone or laptop, they're also participating in a real-time mapping project. Carlo Ratti, a practicing architect with a firm in Torino, Italy, runs the SENSEable City Laboratory (http://senseable.mit.edu/) in the university's department of urban studies and planning. He can reveal patterns of activity on the MIT wireless network, which blankets almost the entire campus, by measuring activity on wireless access points.

Similarly, in collaboration with European telecom companies that allowed him access to information about traffic on cell-phone towers, Ratti has monitored cell-phone users in Milan and Graz, Austria, mapping how people move through cities over the course of a day.

Ratti's research, which uses location data to make real-time maps (http://ispots.mit.edu/) of how people move through space, gives insight into where people like to work and how traffic flows through the city -- information that could help architects and city administration design better digital spaces.

As huge corporations such as Microsoft and Google move into real-time mapping and municipal Wi-Fi projects (see "Microsoft's Plan to Map the World in Real Time (http://www.technologyreview.com/read_article.aspx?id=16781)." and "Killer Maps (http://www.technologyreview.com/read_article.aspx?id=14825&ch=infotech)."), though, Ratti is also worried about issues of privacy. He says city planners, telecoms, and private companies need to work together to design digital infrastructures that will protect individuals' privacy rights, by giving them control over the data. For example, someone might want to know that a friend is in a particular café, using a real-time map, so they can head there -- but he or she might not want the boss to know where they are.

Ratti spoke with Technology Review about his Wi-Fi and cell-phone monitoring projects and about collaborating with telecoms and city administrators.
Technology Review: How can people use real-time location data?

Carlo Ratti: This information becomes very interesting because it can create a feedback loop. When you give this information to the community, the community can change its behavior.

Imagine you have a real-time situation of movement of traffic in the city. If everybody knew about that they could optimize their movement through the city based on overall conditions. For example, we've been invited to do a project for the Venice Biennale, probably the largest exhibition on architecture and urban studies in the world. It happens every other year in Venice, and this year it will be about cities. Our project is called Rome in Real-Time. We will be trying to overlay on the city map all the real-time information we can get today, starting from cell-phone information, but also including the position of buses and taxis, and overlay all of them on the map. This will be displayed at the Biennale in September and on an urban-size projection screen in Rome.

TR: The idea behind it is to see where, for example, your bus is and to monitor traffic?

CR: That's the basics, but what is more interesting, when you see all the dynamics of the city in real time, is not only to optimize your trip but also to really get the pulse of the city -- you can see where people are, where you can go and get a drink. Maybe you can also see tourists and the concentration of different nationalities in the city. You might imagine Italians aiming to go to the parts of town with the highest concentration of Scandinavian tourists. This project is a partnership with Italy's main telephone operator, Telecom Italia.

TR: How can architects and planners use this real-time data?

CR: There are a number of possible applications. The most immediate is, if you're able to monitor all the flows in the city, you can understand better the use of space. You can understand better new types of space use that are emerging because of technology. For instance, on the MIT campus, you see an increasing mobility of people thanks to Wi-Fi and laptops. If you're able to understand this, you can design spaces that are better suited to the new needs of movement, to the dynamics of the space. This information can inform and help design.

I just came back from Zaragoza, Spain, where I'm involved in a project called the Digital Mile. The key question was: How can you design new kinds of spaces taking advantage of digital technology? There was a lot of thinking about "open source" -- programmable public spaces that allow people to do new things when they're there. In some of the spaces we created some "digital" water curtains that will be totally interactive and allow people to play with them. The overall idea is how to create a...
Interactive and allow people to play with them. The overall idea is how to create a responsive public space.

**TR:** Playful water fountains sound perfectly harmless, but what about more sinister uses of location data?

**CR:** Is it a dream scenario or a nightmare scenario, being able to monitor all this activity? For a traffic engineer this is a dream scenario. If you are somebody interested in architecture, this is a dream scenario. If you are somebody interested in emergency relief, this is a dream scenario. Something like [the] Katrina [relief disaster] would never have happened if you had such a system as we had in Austria [cell-phone monitoring], where you could identify where people were after a disaster and actually go and help them.

If you think about privacy this would be a nightmare.

**TR:** How do you deal with privacy issues?

**CR:** A general approach that could solve most of the privacy issues is really to give the data back to the people who own it, the people who produce the data. They will be able to decide with whom to share it and when to share it.

On the MIT campus [when the wireless project is fully developed], it will be you deciding on a peer-to-peer basis when you want to share your location with your friends, everybody, or nobody. You will be able to change these all the time to control in a dynamic way when to share this information with whom. You could imagine something similar with cell phones, but you would need to design it -- the system is a bit more complicated. We want to test it on the MIT campus and then expand it.

Big communication companies want to get ahold of the data because they think they could sell them in the future. This is the model that Google is using in San Francisco. They are giving a free Wi-Fi infrastructure to San Francisco, but they want to be able to develop new business models based on data about how people use the infrastructure.

On the one hand, you've got big corporations trying to do this. What we want to do is give back to the people the power of the data. Our work is about engaging the public in data management and the discussion about who should control the location data. Should they be available? How should they be managed? This is a new type of information we have about cities, and there should be a critical discussion about how we cope with it.

**TR:** How are you engaging with industry in this discussion?
CR: We are building a SENSEable City Consortium that will bring together the four main actors in this urban, real-time revolution: telecommunications companies, hardware producers, physical infrastructure producers -- people who build urban furniture, which is very crucial in the city if you are putting Wi-Fi in street lamps -- and public administration.

The consortium, which is about to be launched, will be a unique venue for these types of partners to do research together. If you think about how a city worked 20 years ago, the people involved were very well defined. Now it's as important to have a real-estate developer as it is to have an infrastructure developer. The city of the future is not something dealing only with concrete. The theme is marrying concrete and silicon. Because it's not yet official I can't disclose the partners. Big cities and companies have expressed interest, but we are still discussing with their lawyers.

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