

# 14.

## carlo ratti

### *Using virtual mapping of data flows to create a powerful new understanding of urban dynamics*

Based in Turin, Italy, and the Massachusetts Institute of Technology (MIT) in Boston, architect and information designer Carlo Ratti asks a basic question: 'How can our built environment adapt to our changing needs?' Put another way, how can we develop a mode of urban planning and architecture that evolves over time with the city? While there is much information to be gathered on human consumption, transportation and energy needs, Ratti and his SENSEable City Laboratory at MIT take a distinctive approach using the data flows generated by the proliferation of sensors and hand-held, always-on mobile devices. The visualizations that Ratti creates from this information are powerful tools for understanding our urban dynamics and connections, on both a local and global scale. Ultimately, Ratti's research is compelling because it proposes new ways of harnessing technology to change the built environment, and gives rise to the notion that data is vital and has a life of its own. Ratti's interpretation of this abstract information leads to surprising points of departure for contemporary space-makers.

One recent example is NYTE (New York Talk Exchange). On the basis that 'telecommunications such as the internet and the telephone bind people across space by

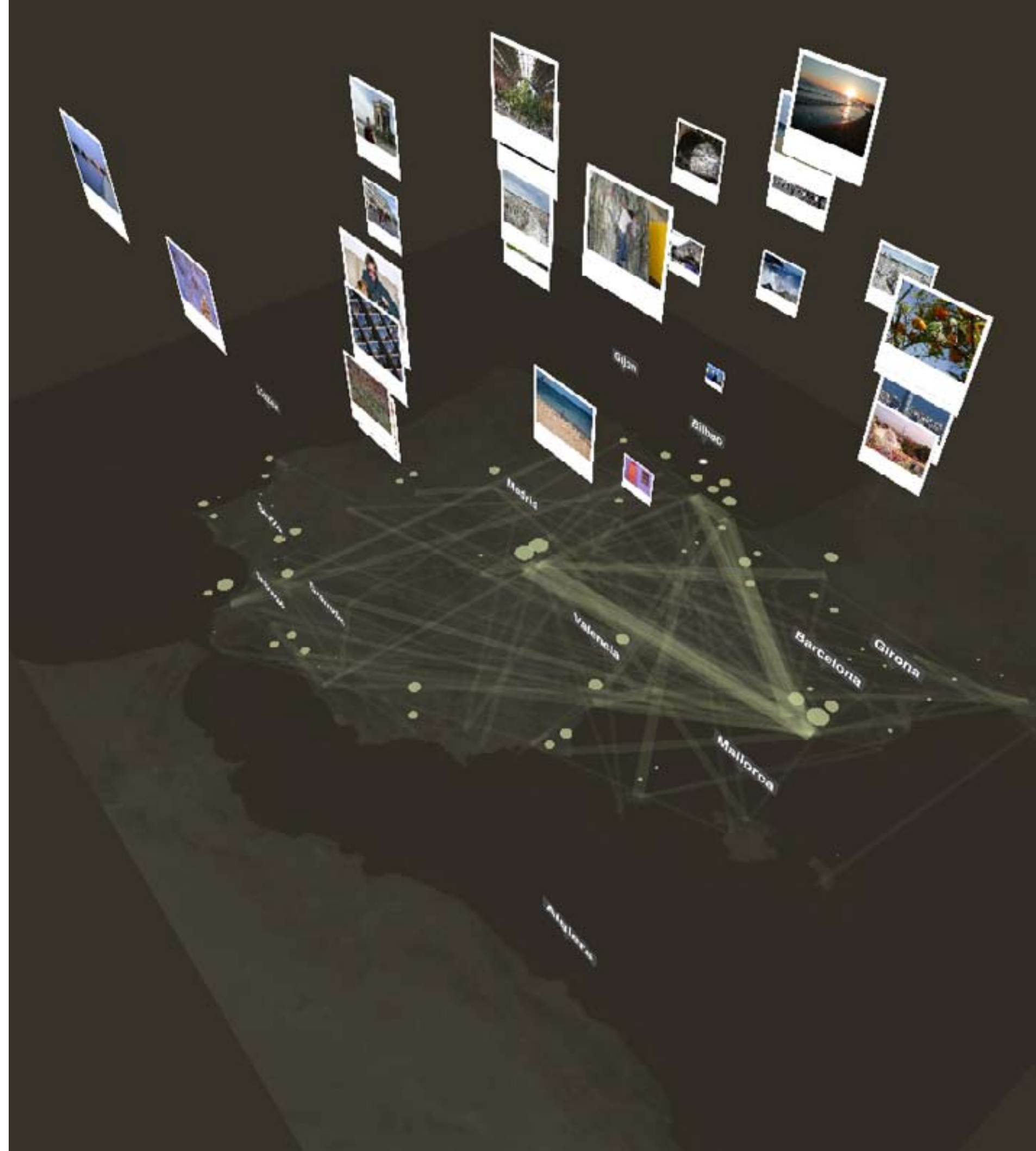
eviscerating the constraints of distance', Ratti and his team map volumes of long-distance calls and internet-protocol data between New York and other cities around the world. By looking at the real-time data and analysing activities by time of day and even neighbourhood, Ratti's visualizations of these digital communications begin to suggest new, dynamic forms of 'buildings' across space.

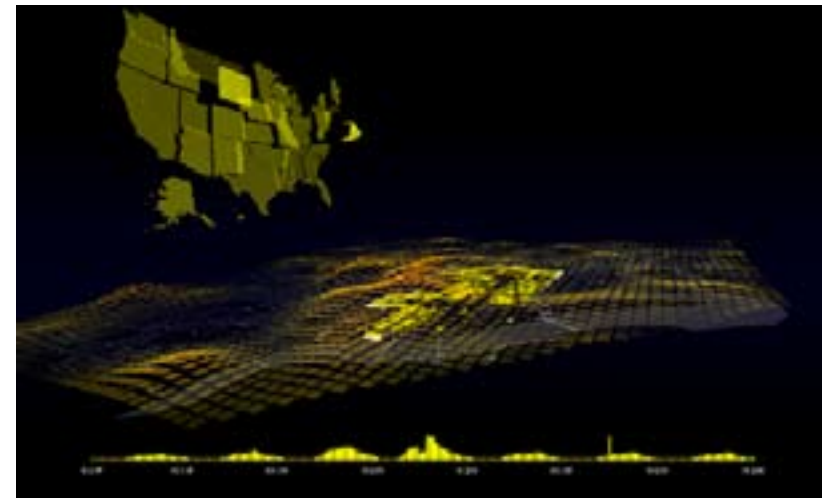
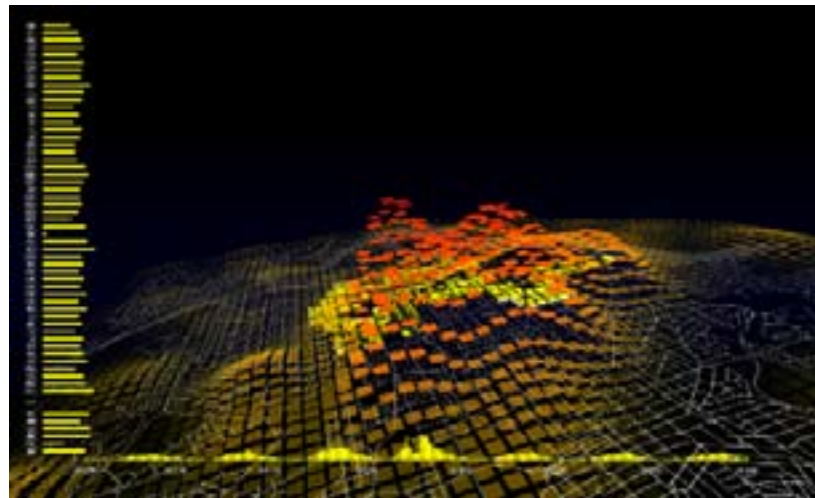
How might this affect a sense of 3-D space when making plans? Globalization can be seen in trade figures, but visual maps of actual data flow are more concrete and comprehensible. Tracked information can offer live insights into social patterns, revealing a new kind of geography with its own demographics and 'power' patterns that are linked to trade and the extensions of personal domains. A virtual map of 'land mass' can take form. The maps generated by Ratti and his team of researchers provide us with a sense of ourselves in a dynamic, interconnected planet and can establish the groundwork for a better understanding of urban patterns and needs.

Even Ratti's more 'conventional' architecture projects are conceived at the interface of the digital and the concrete. A built metaphor for his data research is the Digital Water Pavilion for the 2008 Expo in Zaragoza,

Spain – an interactive structure made of digitally controlled liquid curtains, it is a world of fractal water that disappears and reappears within a tectonic. The mechanics of 12 hydraulic pistons, 120 metres (394 feet) of water walls and 3,000 electromagnetic valves lie behind a structure in which spaces are flexible, changing and responsive, just as our cities – and their flows of people, information and communication – must be in the future.

*Los Ojos del Mundo* (The World's Eyes), 2008  
Spain is one of the most visited countries in the world. But what do the millions of tourists see? Where do they travel to? And where do they come from? The SENSEable City project *Los Ojos del Mundo* uses data-mining techniques to analyse digital photos posted on the internet by tourists, allowing an insight into the intensity of tourist flows and quantifying the attractiveness of locations throughout the country.





**Digital Water Pavilion, Zaragoza, Spain, 2008**  
 The 3,000 electromagnetic valves that control the water walls can be opened and closed to form a curtain of falling water with gaps at specified points. The result is an architecture that is fluid both literally and figuratively – a place where spaces are flexible, changing and responsive, and walls and doors can disappear and reappear.



Above

**Obama, One People: the World, 2009**  
 The World reveals the international nature of Inauguration Day, depicting the variations in call activity between Washington, DC. and other US states and foreign cities – 138 different nations in total, over half of all the countries in the world. The main international callers were from Canada, Great Britain, France and Puerto Rico, which registered a five-fold increase in call activity.



Top left and right

**Obama, One People: the City and the Country, 2009**  
 Through an analysis of AT&T's call volumes, Ratti is able to illustrate the emotional flow of the Presidential Inauguration in Washington, DC. Each pixel in the City visualization rises and turns red as call activity increases. The Country includes a map of the US, where states with strong increases in call activity light up and move forward. Timelines at the bottom show overall calls in the Washington area.