

How Big is Big Data?



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A few years ago, **Alphabet's** CEO, Eric Schmidt, famously estimated that “every two days we produce as much information as it has been created from the dawn of civilization until 2003. However, Big Data is far more than just a matter of quantity. It is something that is dramatically impacting many aspects of our society.” Much of Big Data is produced in cities, through “sensing”, namely the ability to measure what happens around us and to respond dynamically.

In the urban context, data can help us understand the world around us in detail and so to better plan its transformation — especially from a circular economy perspective. Data is already a key component of many businesses. Today, it is starting to foster more intelligent strategies and action plans not only in the private sector, but also in the public sphere. The city of

Toronto, among many others, has been experimenting with the use of data for urban resilience: it has collected statistics about city issues and urban needs through decades of floods, ice storms and other natural disasters, and made them open. Furthermore, each time new relevant insights emerged; they were shared with the general public, encouraging feedbacks and collective participation. This, in turn, generated a sense of belonging in the local communities — and supposedly the ability to better respond to any new shock.

In general, the Internet of Things (IoT) technologies offer new ways to analyse and measure cities. Learning more about our cities puts us in a historically-unique position to make more informed decisions about the infrastructure which governs almost every aspect of our lives — such as energy, food distribution, civic

participation, health, traffic and waste. At the City Lab we developed Trash Track in which tags to several sensors then followed it as it moved through the city's sanitation system. From the things we learned from the project, we understood that the amount of information can produce change. People involved in the project were able to follow the data, hence rethinking the project. For instance, one of the participants said: “I used to drink water every day and throw away the bottle. Now I stop thinking about the project, I know that I don't want to stay there forever. As a result, I'm drinking water in place

Aligning the IoT with the circular economy principle:



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participation, healthcare, education, traffic and waste. At the MIT Senseable City Lab we developed a project called Trash Track in which we added digital tags to several samples of trash and then followed it as it moved through the city's sanitation system. Out of the many things we learned from this experiment, we understood that the simple sharing of information can promote behavioral change. People involved in the project were able to follow their own waste — hence rethinking their behavior. For instance, one of the participants told us: "I used to drink water in plastic bottles every day and throw them away and stop thinking about them. Now, after the project, I know that these bottles go a few miles from home to a landfill and will stay there forever. As a result, I stopped drinking water in plastic bottles."

Aligning the IoT with the circular economy principles can create vast

space for innovation. To harness the range of opportunities offered by the spread of "sensors", citizens must be closely involved in the main urban processes. IoT has the potential to empower us to better understand how our day-to-day activities can affect the shared urban space. In order for us to scale up such opportunities, it is critical that an increasing number of people — users as well as developers of IoT — are exposed to their own personal Big Data. The quantification of the personal self can lead to the change of behavior — and hence to urban transformation. In short, Big Data should become as much as possible Open Data (at least at the individual level) to have a true, profound impact on our city.

INFO

Carlo Ratti, an architect and engineer by training, practices in Italy and teaches at the MIT, where he directs the Senseable City Lab. Ratti has co-authored over 250 publications and holds several patents. His work has been exhibited in several venues worldwide, including the Venice Biennale, New York's MoMA, London's Science Museum, and Barcelona's Design Museum. Two of his projects — the Digital Water Pavilion and the Copenhagen Wheel — were hailed by Time Magazine as "Best Inventions of the Year". He has been included in Blueprint Magazine's "25 People who will Change the World of Design" and in Wired Magazine's "Smart List: 50 people who will change the world". He was curator for the "Future Food District" at Expo Milano 2015 and is currently serving as Chair of the World Economic Forum Global Agenda Council on Future Cities. He is the Founding Partner of Carlo Ratti Associati.

The Senseable City Laboratory's research focuses on studying and predicting how digital technology is changing the way we describe, design and occupy cities. Interconnected computational elements are increasingly saturating the built environment (whether small-scale mobile devices or larger-scale infrastructural microprocessors). This new condition allows us to design technology that could function as an interface between people and the city. Projects carried out at the lab are intended to help us learn how the cities are used and thus make better use of their resources and improve their design. The Lab's researchers come from various disciplines such as physics, architecture, urban planning, the arts, electrical engineering and computer science. This allows performing technological development with an emphasis on behaviour as well as functionality and form, and evaluating design in terms of both emotion and use.

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