THE FUTURE IS ALREADY HERE

SAMPO SAVOLAINEN AND ANITA LANKINEN LOOK AT SOME OF THE LATEST TECHNOLOGICAL ADVANCES AND ANALYSE HOW THEY USE SPATIAL DATA INFRASTRUCTURES, WHAT ELSE CAN AND SHOULD BE DONE, AND EXPLORE WHAT ROLE THEY WILL PLAY IN OUR FUTURE

Transport agencies, cities and municipalities, environmental agencies, mapping and cadaster authorities – all of these public organisations have been collecting and storing spatial data for many years. However, often companies end up developing their own spatial data infrastructures (SDIs) and creating their core data by themselves instead of leveraging this publicly collected data.

Look at self-driving cars. Instead of relying on available information on road infrastructure, car manufacturer Tesla has mostly relied on sensors to guide its Autopilot system. The sensors are placed all around the car to help the car understand its environment, so that it can safely steer itself in most situations.

Every Tesla car, with or without Autopilot, is connected to the cloud. The company is constantly monitoring and collecting data from each car to create and update its maps. In short, the company acquires all its data through drivers of its cars. As a result, Tesla will have its very own map of the world, built from data collected from the hundreds of sensors embedded in each of its cars. Founder Elon Musk calls this a 'fleet learning network', where every car learns from the other. Musk referred to an example of a Californian highway, where the lines are badly marked, which, however, doesn't affect Autopilot data, as the system uses information from Tesla drivers who have used this section of road. This means that the data Tesla is collecting goes far beyond two-dimensional road maps.

Why not use existing maps?

So why do Tesla and other private companies prefer building SDIs from scratch instead of using data governments were collecting for years? We have come across the following typical arguments for this choice.

Firstly, governmental data is often missing some particular information that is crucial for the private organisation. For instance, TomTom could not rely on base maps to contain information about allowed turns at intersections, so had to collect this crucial information by driving through every intersection in every country in which this information was missing.

Secondly, the update cycle of suitable public data might not match the needs of private enterprises. For example, it might be dangerous for autonomous cars to rely on old data.

Lastly, spatial data is often recorded differently across countries or administrative areas. This is one of major issues the European Inspire directive is aiming to address by developing easily accessible, harmonised data and interoperable infrastructure for spatial information that supports environmental policy-making. Similar goals are pursued by

the member of the Arctic SDI – a collaboration between eight national mapping agencies (Canada, Finland, Iceland, Norway, Russia, Sweden, USA and Denmark) to provide politicians, governments, policy makers, scientists, private enterprises and citizens in the Arctic with access to harmonised data, digital maps and tools to assist in monitoring and decision-making in the region.

Moreover, in our experience, it looks like private companies often simply assume that the collaboration with public authorities would end up being too difficult.

But what if there was less friction, greater collaboration and data sharing between authorities and companies could work two ways? What if, say, Tesla shared some of the data it collected with public authorities? The data would be integrated into a common reliable data set and could be shared with more partners. One clear benefit of this would be for autonomous cars: cars from different manufacturers would be able to better coordinate and exchange information that would lead to even safer journeys.

This is just one example of how new technologies would evolve better and faster by sharing more data. It would not be the first time Tesla shared some of its innovations and hard work for the common good, either – back in 2014, it opened its patents for electric vehicle technology to advance the development of sustainable transport. This was not an act of charity either – having more electric cars and charging stations on the market was in their commercial interests.

This makes it even clearer that the quality of public spatial data should be constantly monitored, improved and recorded, and that it should be accessible using common standards across boundaries. Having reliable, good quality data readily available, our cities and countries will become smarter and more interconnected faster, while collaboration between governments and the private sector to build better services would become a natural step to help create more efficiencies. Data is the foundation of smart cities and our improved tomorrow, so we need to make sure it is available when it is required.

Artificial intelligence

In the past few years, artificial intelligence (AI) technology has been commoditized, and is now being used in applications as varied as autonomous cars, Google search and evaluating and categorising produce. This is largely due to advances in AI research such as recurrent neural networks, as well as large software companies opening the source code of the technology platforms necessary for massive data analysis.

Soon, we will reach the point where every building collects and analyses the data about its inhabitants to better serve their needs, every traffic light constantly analyses traffic and reacts accordingly, and waste management is monitored to allow for optimisation, just as well as any other system in a city. The amount of data collected will be so massive, its analysis so complex, the only way to truly process and make sense of all this data will be through AI. This will allow both lower costs due to automatisation of previously work-intensive tasks and new truly innovative products and services.

The cities would need to run several digital applications simultaneously, with SDIs serving as the base on top of which to merge all this data, as location is one of the most intuitive way to connect different characteristics of a specific place. It is interesting to see how companies are already enriching their maps with data from the Internet of Things (IoT). Smartphones are one of the most used sensors, collecting a wide palette of signals and data, and acting as an enormous distributed sensor network.

Google has used the location data of smartphone users to find out what are the most crowded areas in cities. Take a closer look at your city in Google Maps and you will notice that some areas are highlighted with darker shades of brown. This signifies which areas and buildings are hot spots – a tremendous resource for real estate agents and buyers, as well as for tourists who want to visit areas of interest.

Humankind has a great track record in innovation and disruption but historically we have not been able to fully understand the repercussions of our new inventions beforehand. During the early days of the commercial internet, most companies were unable to see the benefits it could offer them and reputable papers were publishing articles proclaiming that e-commerce will never happen.

In 1995, Newsweek said: 'The truth is no online database will replace your daily newspaper.' Looking at this quote today highlights not only the power of our inventions but also our nearsightedness in understanding their true value. Just as AI already has been, IoT is now being commoditised quickly; the combination of the two will bring unforeseen advancements and implementations. This is the right time for fearless innovators to take action and seize the moment.

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