

The new Maps Platform

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All right, and thanks, Mike. So, let me tell you a bit more concretely what exactly this new map is, and how it better solves the core challenges that our customers are having. I'm Laurens, I joined TomTom with Mike about a year ago. And I lead product for our new Maps Platform, Directions and Autonomous mapmaking. Now, as a product manager, one of my big jobs is to understand: "Hey, what are those industry challenges, and how can maps help?" Now, there are four major ways that the expectations for maps have been rising in the last couple of years. One is, we need richer map features. Gone are the days where a road network and points of interest are sufficient. Now, we need 3D buildings with clear entrances, and pedestrian paths and routing toward those buildings. It's not just sufficient to understand: "Hey, what are the turn restrictions for vehicles?" But you need lane-specific restrictions by vehicle type. Right, richer map features is one. Two, global coverage. As Harold mentioned, our customers are increasingly global, their revenue is increasingly global. So, the map that we provide needs to be of the same quality globally. Three, higher accuracy and quality levels. My background is in autonomous driving. I was at Google, Waymo, for a few years leading, amongst other things, the mapping platform. And when you think about autonomous robots, right, they need not just to know where the road is, but they need high-level lane geometry to understand how to safely navigate those roads. When we talk to some partners that are thinking about the metaverse, you need to protect that Metaverse onto three-dimensional buildings, you need to know where the human is that is wearing the metaverse devices, and you need to know exactly where those buildings are. So, higher accuracy and quality levels. Then, provided in minutely updates. Now, that's not true for all features. It tends to be that buildings don't move around on a day-to-day basis. However, there's other features like hazards, roadworks, speeds, that do change. And when they change, we need to be able to update them on a monthly basis. As well as if a customer tells us about an error in a map, we should be able to propagate that error to their production map within minutes.

Now, let's go a little deeper. A map can only be as good as your sources are. Now, we've talked about OpenStreetMap as a very important source. This is a human-curated source that is good at certain types of features. For instance, visual features. Their roadmap and the community is worldwide, meaning that this quality, they're able to provide on a worldwide basis. Now, we as TomTom intend to be a very good corporate member of this community, also giving back. But it's just one of many sources that we use. For instance, we have probe data. There are 600 million devices, vehicles, phones, that give us GPS traces and help us understand: "Where are new roads opening up? Which directions are they going, at what speed are they going?" More recently, with more and more cars coming online, and having access to cameras, we get information from their observations of where the speed signs are, where the lanes are. Then we combine that with our sensor ground truth, survey vehicles, satellites, and aerial imagery, to provide the ground truth to understand from multiple sides: "Hey, what is actually there in the world?" Then, data acquisition. We've been around for 30 years. In those 30 years, we have acquired many local sources from local governments, understanding where are the administrative boundaries, where are the postal codes. It takes a lot of time to establish those relationships and understand where those sources are. So, there is a great advantage of being a mapping company that has been around. Then finally, automated feedback loops. Customer data contributions are increasingly important, and we will talk about that a bit more in a little bit.

Now, let's dive a little bit deeper into some of the sources. Our new map data, improvements on visualization. As Harold mentioned, here, on top, we see Monza, Italy, near Milan, in our current map. And below, you see the new map with much more detail in greenery, parks, more detail in the building footprints. It's a much more pleasant map to look at, but it's also more functional.

Then, when you have better road data across the world, it doesn't just help the visual appearance. Here, you see the difference with more roads and more accurate roads. How it helps Teresina, which is a mid to large city in Brazil, how it helps our current products like traffic. With more accurate roads, we're able to better map-match our traffic product to those roads, making our existing products, that were already world-leading, much better globally.

Then, the automated observations, right? As I mentioned, we are getting these observations of daily 650 million signs, 70 million kilometers of road, in 60 countries. Now, these observations contain, where the vehicle is, the lanes are, the signs are, and what the signs are that I'm seeing. Now, these observations can be noisy. So, a single observation tells you something, but you can't trust it yet, which is why these vehicles need a map. But if you aggregate the observations together, you get a much better picture of: "Hey, where are the lane boundaries?" What is the lane divider type? Where exactly are the signs? And what are the signs saying? So, this is an incredibly important source for us to update our maps. And we are getting these in partnerships with OEMs. And the data volume of this important source has doubled in the past eight months.

Now with this source, these are the types of things that we're building. Right, on the top left you see the lane network that we're creating with this source. On the bottom is how we would use that lane network for a human driver, visualizing exactly where the lanes are, what the merge-in merge-out lanes are – helping you as a driver to not miss that critical exit. But, as importantly, these are important for the robots. Here on the top right, you see the intersection with exactly the lane boundaries, and the lane trajectory, indicating how an autonomous vehicle should traverse a complex intersection safely. So, this is what we're doing, combining the different sources.

Now, it's not just our sources that are important. Our new Maps Platform is built from the ground up to provide a base map that is shared, quality-controlled and standardized, which makes it a lot easier for other companies, who may not be mapping companies, to add their own data to it. Because when we have conversations about this new mapping platform, pretty much every company that we talked to tells us: "Hey, we have a lot of data that we want to add to the map. But adding data to the map is not an easy task." That is why we start with this base map that is quality-controlled and standardized, making it easier from the start to add custom data to this. Now, we as TomTom have our own value-added layers, based on these other sources that are needed to provide the use cases that our customers need. For these, the feedback loops from our customers are incredibly important to keep improving the layers that we as TomTom feel: "Hey, this is where we are experts at." Then, finally, all of these layers, the base map, the TomTom value added layers, and the custom layers work natively, whether you want to take the data directly, or whether you take our navigation or search software.

So these are the new maps. At the core there, we accelerate current businesses, and we enable collaboration. For instance, our new maps for ride-hailing companies accelerate their ability to launch in new markets with the richness that we can provide them on turn restrictions, on routing, while at the same time enabling a collaboration on those turn restrictions, on those roadworks, with the company that critically depends on those features for their bottom line. Similarly, our new map enables food delivery companies to understand better where the apartment complexes are, and improves the time it takes for one of their delivery people to get to the front door, while at the same time collaborating with them on finding the building entrances with a company that critically depends on knowing where the entrances are. And, as a final example, we accelerate the ability for automotive companies and Tier-1s to launch higher levels of autonomy in urban settings with this new map, while at the same time collaborating with them on using vehicle observations for our maps – to understand and improve the accuracy of the features that self-driving vehicles critically depend on for safe operations. So, that is our new map. And now, I will hand it over to Antoine and Mike, who'll tell you a bit more about the business implications of this.