4IR: WHAT DOES IT MEAN FOR GEO?

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Chris Harris takes stock of developments as the 4th Industrial Revolution (4IR) unfolds and reckons we're in for a wild ride

As this is my final column for 2018 I thought I'd end the year with a few thoughts about the future and where 2019 might be taking us. Right now, there is a lot of talk about the 4th Industrial Revolution (4IR) building on the digital revolution that moved analogue (devices/ workflows/ communications etc.) into digital technology.

The 4th industrial revolution introduces AI, robotics, virtual/ augmented reality (VR/AR), The Internet of Things (IOT), autonomous vehicles, nanotechnology plus more besides and we're certainly in for a wild ride in the next few years!

Over this past year we have seen an increasing number of geospatial concepts from varied organisations thinking outside the box to fully embrace this new dawn of technology. These are thought - provoking applications that underline the importance of geospatial information to a wider community and, of course, provide an interesting glimpse of a future that will affect us all.

• **Self-driving vehicles.** These rely heavily on accurate geospatial data. Firstly, the mapping with which such vehicles interface needs to be high resolution – survey and mapping professionals are required to produce everything from localised surveys to data-rich countrywide maps. Mobile mapping will almost certainly be utilised to capture the huge datasets required to bolster general surveys and update mapping. Then there is the onboard technology, the positional accuracy of the vehicle is key to a safe and smooth passenger experience. Famously General Motor's 'Super Cruise' hands-free driving system raised the bar because it incorporated Trimble RTX GNSS. Trimble's RTX technology uses signals captured by more than 100 GNSS reference stations around the globe. RTX corrects the signals for atmospheric conditions, satellite orbit and time errors before sending the data directly to a Super Cruise vehicle. Vehicles are also assisted by a network of LiDAR, camera and radar sensors as well as a state-of-the-art driver attention system.

• **Artificial Intelligence.** Today we can fly over a field with a drone and take some photos. We can then feed all those photographs into a piece of software. The software will look at each individual picture to see how much corn is in the field (we have already taught it what corn looks like). From there we can see which areas of the field have a poor yield and may need more attention. This data can be loaded into the cab of a guided intelligent tractor to disperse the correct amount of fertilizer in the right place.

• **The support of robotics.** The possibilities are endless for this and, again, positional accuracy is very important. Robotic tractors (the next step up from the above application), robotic weed killers, robotic white line painters, robotic bulldozers - these are all technologies that exist or are currently being tested.

• **VR/AR.** This is growing in popularity on construction sites. Managers would like to arrive on site not only with a plan drawing but with a proper idea of what the building will look like *in-situ*. Or perhaps they don't want to arrive on site at all but would like to walk around it from the comfort of their own office. Devices such as Microsoft's HoloLens are being used to take designers and engineers into the field, allowing them to be fully immersed into the project. Imagine walking upstairs or through a door in a digital building, or making adjustments to a steel beam so that this can dynamically adjust all data associated with the model – a dream for BIM. Geospatial professionals are being asked more for 3D data, sometimes specifically to satisfy these areas of interest.

The geospatial professional has never been in such high demand and the timing of what we can do as well as the technology we can use make it an extremely exciting time. The technology that can be deployed to do these tasks needs to be understood – and physically used. We may be on the cusp of robotics and AI but we are a long way from making the human redundant.

Robotics offer endless possibilities in the agricultural sector. Photo supplied by Trimble Catalyst user, the Small Robot Company