

# Advancing Smart Farming Thanks to Geospatial Technologies



The Netherlands' agricultural exports are booming. In 2016, a record EUR85 billion worth of farming products were shipped around the globe, making the country (with an area of only 41,543 square kilometres!) the second-largest exporting nation in the world. Precision agriculture, also known as 'smart farming', is likely to

further boost these export activities significantly in the coming years, as geospatial technologies help farmers to continue to increase their production.

The use of *global navigation satellite systems* (GNSS) – in particular GPS – has already become mainstream in the agriculture sector. Various machinery guiding and positioning solutions are available for farmers which have increased production and improved the yield per field. Seeding, harvesting and fertilisation are carried out much more efficiently than in the pre-GNSS era. Over the next decade, GNSS is expected to also expand in developing countries to the benefit of local farmers.

However, there is more than GNSS alone. Another geospatial technology that will offer exponential opportunities to the agricultural industry is remote sensing. This sensor-based technology observes the Earth from above and can be done from [space](#) – using satellites – but also from aircraft or unmanned aerial vehicles ([UAVs or 'drones'](#)). Remote sensing using UAVs is within reach for many farmers, as these vehicles are flexible, small and relatively cheap. The most advanced remote sensing technology is [hyperspectral imaging](#), but this has remained costly so far. There are now a number of interesting initiatives to substantially reduce the costs, however, so things seem to be moving in the right direction. In the meantime, [multispectral imaging](#) is a cheaper alternative. Despite being less suitable for specific agricultural tasks, multispectral imaging can still help the farmer to create a prescription map which supports more efficient use of fertilisers or a reduction in pesticides. Multispectral imaging of vegetation also is a good tool to identify crop stress indicators or a shortage (or abundance) of nutrients or water.

An innovation with a very promising future in farming is [thermal imaging](#). This technology has enjoyed rapid growth and has already gained a foothold in various realms of agriculture, such as plant disease detection, nursery monitoring, irrigation scheduling and yield forecasting. Lightweight multispectral and thermal sensors on small UAVs are now reasonably priced and hence more accessible for farmers (see for example the article titled '[Multispectral and Thermal Sensors on UAVs](#)' on the *GIM International* website).

So what is the difference between hyperspectral imaging and multispectral imaging? Hyperspectral imaging divides light into thousands of small bands to capture detailed information, while multispectral imaging works with far fewer bands. Due to the spectral content in the pixels, hyperspectral solutions add a new dimension in the agriculture sector. The technology has a wide range of applications; it can even detect subtle colour changes on foliage. A UAV equipped with a hyperspectral sensor makes it possible to identify anomalies from 300-400 metres above the crops. This ability to allow farmers to see even the smallest defects in their crops makes hyperspectral imaging a potential game-changer once it becomes widely integrated by farmers.

But what about good, old-fashioned GPS – the global positioning satellite system that has become so vital for so many farmers nowadays? Well, that will remain one of the pillars of modern agriculture. In fact, precise positioning will be the driving force behind the next revolution that will advance smart farming: driverless tractors. No matter whether Google or Elon Musk are already working on them or not – tractor manufacturers such as Case, John Deere and New Holland are, albeit still in the phase of prototypes or autonomous concept vehicles but they will succeed at some point. Farming without driving a tractor...that's certainly something to digest for the diehard farmer. But GNSS will continue to make their mark in agriculture.

If you have any questions, comments, or feedback, please contact [Wim van Wegen](#). Wim is also on [Twitter](#) and [LinkedIn](#).

