KWS SAAT SE & Co. KGaA helps farmers optimize seed sowing with satellite imagery and yield prediction

The success of crop farming depends on factors like soil quality, humus content, moisture and shade. To give crops the best chance of thriving, farmers used to manually run seed drills so they could target seed distribution according to those factors. It was effective, but it was also time-consuming and required years of experience.

Today, satellite data helps farmers across Europe optimize seed drill programs by aiding in potential yield predictions; with corn, for example, more seeds can be planted in promising areas, and fewer seeds in spots less likely to produce. To achieve reliable predictions,

observation over time is needed — this means terabytes of data must be managed and analyzed simultaneously, which requires intelligent process controls and more.

To help their customers, farmers around the globe, KWS SAAT SE & Co. KGaA, the world's fourth largest seed producer, is creating a new smart farming procedure to automate and improve yield analysis, satellite imagery processing and data accessibility — ultimately maximizing crop yields.
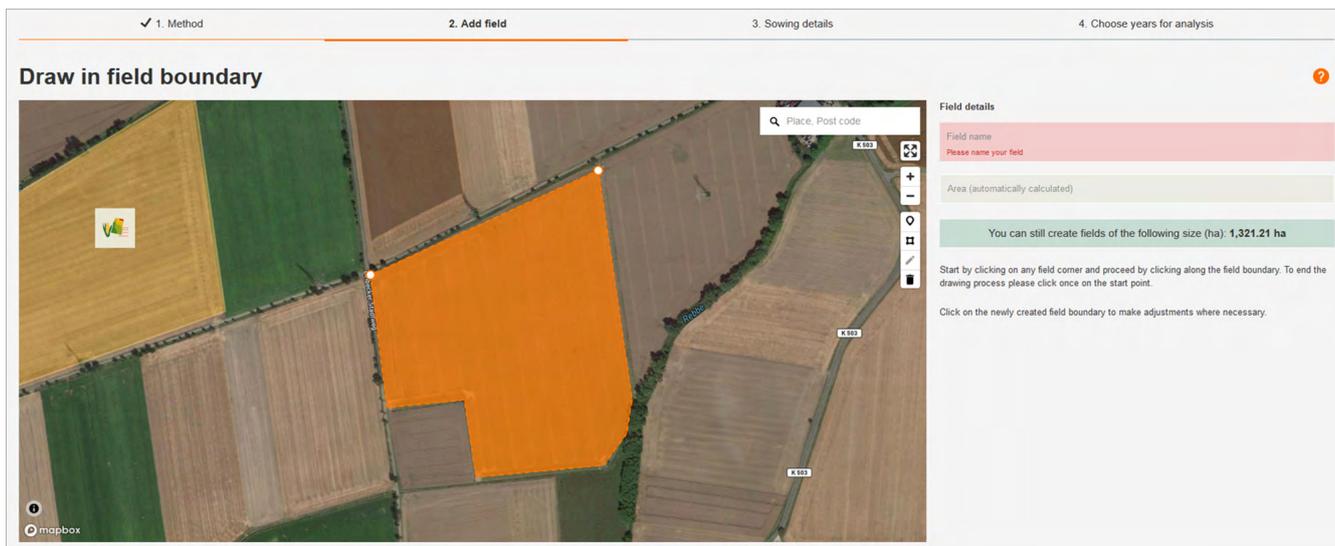
In myKWS, the digital service platform, the farmer draws or selects the requested field. (Image source: KWS SAAT SE & Co. KGaA)

Calculating potential yield zones

The old manual approach of sowing seeds can now be replaced or supplemented with digital analysis, which is commonly used in remote sensing applications. KWS SAAT's custom solution, built as part of a partnership between GEOSYSTEMS GmbH and Hexagon, involves a high degree of automation and a reproducible analysis rule.

This allows farmers to plant the optimum number of seeds by using the solution to calculate potential yield zones anywhere in the world, regardless of the crop types, as long as they have enough data.

A farmer can simply open the web service portal myKWS and upload his field boundary on a map, and the system returns a depiction of yield potential zones for his field. Since the calculation is limited to a contained, specifically requested zone, it happens quickly enough that the farmer can simply wait for the results.

The calculation of the yield potential zones is done with a spatial model that integrates algorithms based on the expertise of KWS SAAT, which invested more than 200 million euros last fiscal year into plant breeding research and development. It also includes recommended sow rates for specific crop types for each zone.

Clean, up-to-date imagery

KWS SAAT's operations include the automatic classification of agricultural yield zones from Sentinel-2 data — free and open imagery that's frequently updated. GEOSYSTEMS' Sentinel Made Simple framework allows for the automated, continuous download and processing of high-quality Sentinel-2 data, which updates every five to 10 days.

The data processing is done in advance rather than in real time because it involves a huge amount of images — years of history covering the entire countries of Germany, UK, France, Italy, Hungary, Croatia, Serbia, Romania and Bulgaria. That's about 5,000 tiles and terabytes' worth of data to handle.

IMAGINE NoClouds and ATCOR Workflow for IMAGINE, both developed by GEOSYSTEMS as add-on modules to Hexagon's ERDAS IMAGINE, enable a pre-processing workflow with atmospheric correction and haze and cloud removal. This function was crucial for the calculation of yield potential zones because it requires high-quality image data without obstructions or atmospheric effects.

Hexagon's ERDAS IMAGINE Spatial Modeler makes workflows flexible and reproducible; ERDAS APOLLO powers the overall satellite imagery and data management. Once all these processes have run — when the images are downloaded and ready — the solution creates a mosaic of the finished tiles.

Yield potential zone map of the requested field in myKWS, indicating the recommended sowing density for each zone. (Image source: KWS SAAT SE & Co. KGaA)

Data where it's needed, when it's needed

The custom solution takes what was previously guesswork based on years of personal experience and turns it into objective, reliable, data-based analysis. KWS SAAT's knowledge of remote sensing, vegetation and farming offloads the work of prediction, and parallel computing allows for up to 10 jobs to be run simultaneously.

While the solution is implemented in the AWS environment of KWS SAAT, the farmer uses it through myKWS, the KWS SAAT digital service platform. KWS SAAT maintains access to the spatial model and can therefore adapt the algorithms whenever needed. This means it can grow and change over time, making it not a one-time fix, but a flexible, open solution.

And while complex imagery processing and analysis run behind the scenes, all the farmer sees are the results shortly after his request. Best of all, a farmer receives the zone map and his site-specific sowing instructions right where he needs them — in the cab of his seed drill. The seeder automatically applies the right amount of seeds per square meter without any interaction by the farmer.

"KWS SAAT SE & Co. KGaA can provide its farmers with a valuable service to use seeds effectively and to generate higher yields," said Julita Emersleben, an IT and customer service expert at KWS SAAT. "In developing this solution, GEOSYSTEMS is a strong partner who not only understood our requirements, but also fully met them. We look forward to further developing this new solution together."

Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications. Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

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