Spreading Joy Throughout the World, One Flower at a Time – Royal FloraHolland Uses Machine Learning on AWS to Evolve its Practices

"It's empowering to know that we can transform the business through data-driven initiatives – and we're just getting started."

- Remco Wilting, head of data and data science at Royal FloraHolland

A century-old company blooms into the digital space

Embraced around the world for their ability to speak volumes without saying a word, flowers can be found for sale nearly everywhere. The flower industry is expansive, and with its 145,000 transactions conducted a day and 400,000 varieties of flowers and plants available, one company stands apart in its legacy, volume, and sheer size: Netherlands-based Royal FloraHolland, a cooperative company where growers come together to sell their products in the same place.

Some visitors enjoying Royal FloraHolland's Aalsmeer auction

Royal FloraHolland connects buyers and sellers around the world through its online trading platform Floriday and its world-famous live floral auctions. The Aalsmeer auction near Amsterdam also serves as tourist destination where visitors can immerse themselves in the international flower trade.

"We're in the business of bringing together as much supply and demand as we can at one time," says Remco Wilting, head of data and data science at Royal FloraHolland. "We're a large company and over 100 years old, so we're very traditional in some respects, but we've recognized the importance of going digital to provide our growers and buyers with more opportunities." As Royal FloraHolland recognized that growers wanted to use other trading methodologies outside of the physical auction house to sell flowers, the company began exploring how it could improve current processes and provide growers and sellers with new opportunities to reach buyers.

About Royal FloraHolland

Royal FloraHolland is the world's largest flower auction company. For over 100 years, the company has organized the international marketplace for flowers and plants for growers and buyers. The company brings supply and demand together for an optimal price and low transaction costs and supplies the world with fresh flowers and plants every day.

The flower auction at Aalsmeer, a Royal FloraHolland location, is the world's largest trading center for plants and flowers.

"The world is getting smaller, and digitization is necessary for us if we want to stay competitive and differentiated in our industry," says Wilting. "Because if we don't do it, somebody else will."

The digital greenhouse: building data-driven applications on AWS

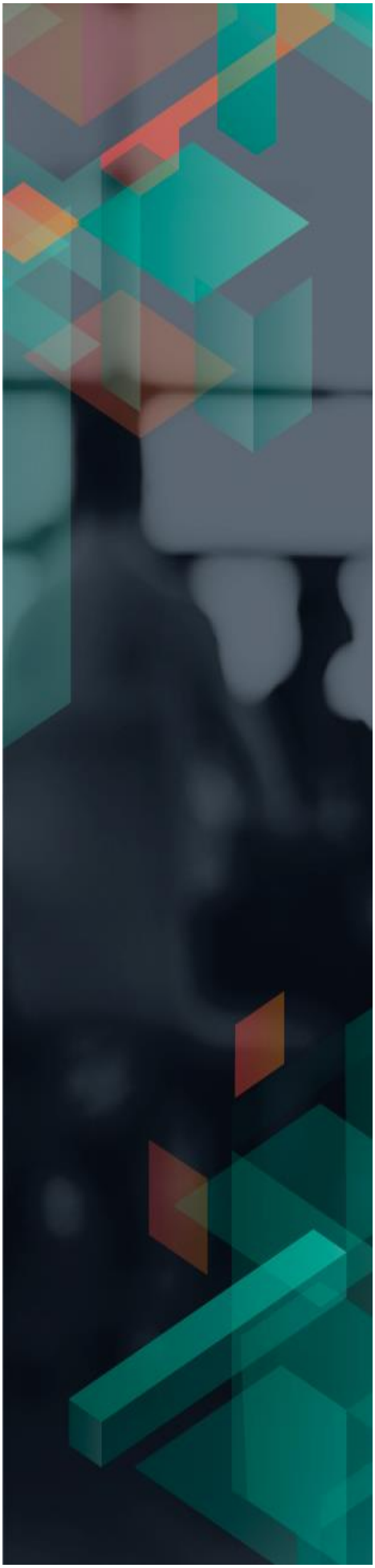
The company recognized its need to reorganize in order to go digital and become more data-driven. "After the decision to go down a more digital-focused path, the IT department evolved into the business technology organization (BTO), which is responsible for both IT and digitalization of the business," says Wilting. "During that evolution, we started what we call our digital greenhouse, where we're building new applications for our growers and our customers."

Another step in Royal FloraHolland's reorganization process was identifying partners to take care of IT needs and infrastructure. "Because of its global reach, pace of technological innovation, and flexibility, we chose to migrate to Amazon Web Services (AWS), and use it to deploy all future applications built in our digital greenhouse," says Wilting.

Wilting then began to build a team to support the company's digital transformation. "As we began to build Floriday, we digitized our global trading platform for buyers and sellers and we came to realize just how big of a role data was going to play in the future of Royal FloraHolland," says Wilting. He decided to bring in Xebia, a partner with data science and AWS expertise, to help him educate his growing data science team and identify use cases in which well-trained deep learning models could drive better business decisions.

Becoming data-driven and embracing deep learning models with the help of the experts at Xebia

Xebia, an Advanced AWS Partner Network (APN) Consulting Partner and Machine Learning Competency Partner, believes that it must be able to provide specialized experts who can work together to truly help customers transform.

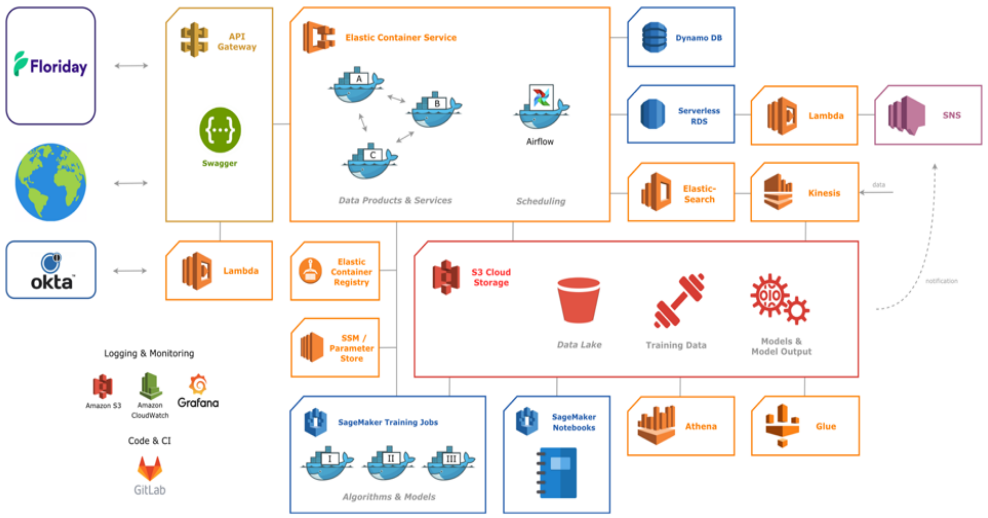


"Xebia is passionate about bringing experts across different domains together to empower customers to transform and drive new business outcomes through technology," says Martijn van Dongen, chief of AWS technology at Xebia. "Every unit within Xebia can operate independently but is also very comfortable working together. We each strive to be an authority in our respective fields, such as data science, cloud, and digital strategy."

"We knew Xebia was a leading player in data science and cloud in the Netherlands, and we decided to partner with them as we began building our own data science practice," says Wilting. Throughout its first year of engagement, Xebia embedded with Royal FloraHolland's team and worked with the team on a day-to-day basis as it scaled and began developing pilots on AWS. "Initially, we functioned as Royal FloraHolland's data science team and we helped them build up their practice and hire new people," says Vincent Warmerdam, data scientist at Xebia. "We helped them identify and prioritize the use cases they wanted to address by taking advantage of their data in new ways on AWS."

Using microservices and Amazon SageMaker to build models and drive new insights

To deploy data-driven applications, Xebia helped Royal FloraHolland build a sophisticated container architecture on AWS. "We helped Royal FloraHolland create an Amazon Elastic Container Service (Amazon ECS) platform using Docker microservices; this is the platform running its digital greenhouse applications and Docker machine learning technology," says van Dongen. "All workloads on AWS are deployed using automated deployment pipelines and AWS CloudFormation. The development teams have the autonomy to continuously deploy to production."



Royal FloraHolland's data architecture on AWS

"All of our APIs are put behind Amazon API Gateway," says Dirk Guijt, data scientist at Royal FloraHolland. "We're using Amazon Kinesis to collect and process streaming data. We use Amazon Kinesis Data Firehose to load this data into a data lake on Amazon Simple Storage Service (Amazon S3) and AWS Glue to catalog the data in the data lake. The data can then be used by algorithms in Amazon SageMaker to train ML models. Using Apache Airflow, an open-source tool for orchestrating complex computational workflows and data processing pipelines, we trigger a SageMaker job to train models and we then write the models back to Amazon S3, where we ingest it into our production services."

The team quickly identified three areas to prioritize using deep learning applications to drive efficiencies and better customer experiences: trolley logistics, flower photo recognition, and a recommendation engine for buyers.

Saving costs and driving efficiencies by improving trolley predictions

The trolleys that come and go each day to deliver flowers are the crux of the Royal FloraHolland supply chain. “Accurate trolley prediction is a very old problem for us,” says Wilting. “The number of trolleys that come in determine how many people are needed to handle all of the flowers and plants, so the workload of our logistics team is very much dependent on how many trolleys come in each day. It’s important information for them to be able to plan in both the short- and long-term, and it’s not a prediction we’ve been able to improve substantially in the past.”

Gaining accurate trolley predictions can lead to efficiencies, better customer outcomes, and Euros saved

Royal FloraHolland and Xebia saw in the trolley prediction problem a classic use case for data science to address. “Regardless of if you have too many or too few people walking around because of inaccurate trolley predictions, neither is good for our business. Either we spend too much money on labor or we have too much of a workload for the people there, meaning we won’t meet the deadlines of delivering goods to customers,” says Wilting. “If we can build and train models that help us drive better predictions, then we can quickly translate the improvements that follow into money saved.”

Providing buyers with a complete picture

Flower buyers want to know what they’re buying but often only see a picture before purchase. “When a picture isn’t representative of the product, a buyer is very unhappy. The pictures are traditionally inconsistent in quality. They’re taken by the individual growers and can vary greatly from grower to grower,” says Wilting. “We want to see if we can use a deep learning model to check image quality and provide feedback to help growers improve the quality of the images that are presented at the auction.” The business value is clear: the better an image, the more likely a grower can sell flowers at a higher price. “The value is related to the overall revenue going through our platform,” says Wilting. The company continues to train its models and gather feedback from internal teams to drive further improvements to the application.

Good flower photos are becoming more and more of a differentiator for sellers in the digital age

Giving buyers a new way to see current supply and recommending alternatives in real time

Providing buyers attractive alternatives that suit their needs when what they request isn't available can drive additional business revenue and improve customer satisfaction. Using deep learning on AWS, Royal FloraHolland is currently exploring how it can automatically present buyers with stock availability and alternative options tailored to their preferences. "We want to make it possible for buyers who aren't close to our physical locations to see the current supply and what they can buy now," says Guijt. "We believe we can use this data to build and train models for a recommendation engine that'll assist them in finding what they need and providing alternative options to them. For instance, if they always buy from a particular supplier a flower that's not available anymore, we want to help them intelligently identify alternatives they may be interested in."

Giving suppliers and buyers more options and improving operational efficiency

Becoming data-driven impacts the entire company, and Royal FloraHolland's Data & Data Science team learned to involve internal stakeholders early on in projects. "We've had a lot of eagerness to help out and provide feedback for us as we build these applications," says Guijt. "Through our demonstrations and explanations of the business goals driving these technological changes, we find that internal stakeholders begin to see how much easier their lives may become. They see the benefit and they want more. And by providing us with feedback as we develop and train the models, they hold a stake in what we're doing, and they help shape the models."

For Royal FloraHolland, the dream to use data to improve business outcomes and keep the company on the cutting edge of the flower industry is being realized through each project it undertakes on AWS with the help of Xebia. "It's empowering to know that we can transform the business through data-driven initiatives," says Wilting. "And we're only just beginning. There will be much more to come."

Xebia

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