

Use Case: Vandersat

Remote sensing company VanderSat partners with IT engineering consultancy Bi4 Group.

“ Using multi-sensor satellite data, VanderSat developed an innovative new technology to derive water and temperature data products with an unparalleled resolution. ”



VanderSat

Creating Scalable, Innovative Satellite Data Solutions

Together with Bi4 Group, a scalable software infrastructure was developed, that lets users visualize and analyze this complex data more intuitively.

VanderSat is a Dutch remote sensing company that delivers innovative satellite data products. The company has strong scientific roots and now uses earth observation data for commercial purposes. VanderSat offers a unique database,

acquired with a patented technology that contains refined information of the moisture content of both soil and vegetation at field scale (100 x 100 meters). “This is lot more detailed than the current standard of 25 x 25 km footprints,” says VanderSat COO Thijs van Leeuwen: “the current standard is very relevant for global climate research purposes, but insufficient for local commercial applications. This is where VanderSat data comes in”.

Pioneering work

Soil moisture is an essential climate variable and key input parameter for crop yield prediction, drought monitoring, and hydrological modeling. Whereas normally this variable is estimated through premises, VanderSat can directly calculate the moisture content using their in-house technology, which is the result of years of scientific research, combined with cloud processing and scalable software architecture.

The company uses open source (raw level 1) satellite data derived from sensors that measure the natural emission from everything on earth through passive microwaves. One major advantage of using microwave

measurements is that they are not interfered by cloud cover. But that’s not the most interesting thing about it, explains Van Leeuwen: “By collecting daily information on soil moisture via different satellites and over a longer period, we have built up a historical archive which goes back 16 years. By using this data archive, we can put observations of today into perspective”. This is very important for insurance companies that want to predict draught or saturated conditions, which affects crop yield through moisture content of the soil.

By collecting this historical archive, VanderSat has been doing pioneering work. After generating an interest in the products derived from these data,



a string of long-term partner contracts were signed recently with several business partners. One of them is Swiss Re, the world's second-largest reinsurer. They use VanderSat data products to create new parametric insurance products that give a payout to farmers in the case of predefined levels of drought.

Another client are the Dutch Water Authorities. By connecting to VanderSat's web API, they receive their satellite data products that will help them improve water management on a local level and lower costs for flooding detection and damage assessment.

Strategic partnership

Next, VanderSat decided to take their new satellite data technology even further and develop customized client applications. Lacking the expertise to develop a scalable software architecture to serve all data to their clients, they partnered with Bi4 Group, an IT engineering consultancy specialized in innovation and data-driven solutions.

This decision was prompted by two things, says Van Leeuwen: "first, working with large global satellite datasets in near real-time means demanding performance requirements. Second, we aim for client applications that offers decision making tools instead of data analytics. At the end of the day, our clients

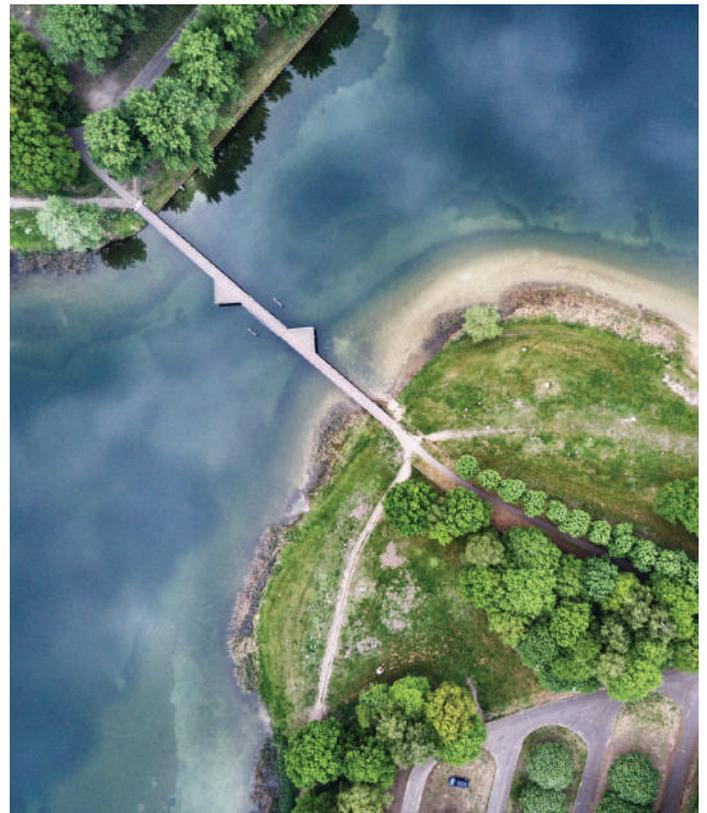
are not interested in intelligence, models and algorithms - they want an application that tells them if they should irrigate or not".

Bi4 Group built the web infrastructure to connect to VanderSat's satellite database and presented a user interface through a web application. First, an API layer was developed to be able to deliver the raw satellite data. Next, they created a Web Mapping Service (WMS) that projects the data on a map through web application. The user can login to the application and select an area of interest, together with VanderSat data of interest, such as temperature or moisture. These are projected next on a map, using a color scale to discern spatial variation.

Visualizing time series

Thanks to Bi4 Group's modular software approach, the company was able to deliver a concept user interface product very fast. All data computations happen inside a black box, that is combined with a back- and frontend that need to be aligned for an optimal service to the client. Right now, a solution is being developed to structure the data in such a way that the user not only sees the data displayed on a map, but can also easily visualize time series for any specific area on the fly.

This is not an easy task. The first challenge is to find a way to store both map tile image and time series without duplicating many gigabytes of data. Second, to make the map usable, the performance of data retrieval has to be improved. Third, the map tiles have to be pre-calculated and stored in a temporal cache. Finally, a streaming service is being implemented to update the time series charts in real-time. These go ten years back in time, so that's a lot of data.



The cooperation with Bi4 Group also enabled flexibility, so that customization can be applied when necessary. For example, a generic user interface was developed with different dashboards for different clients: "This process requires adjustments on a weekly basis.

There's a quest for the right user interface because our clients have not worked with these data before. All in all this is a very complicated process, but one that in reality runs quite smoothly", says Van Leeuwen.

Evaluating the partnership

With their new satellite data technology, VanderSat aims to make a difference in several sectors, integrating satellite data in decision-making frameworks. Currently, the company is active in four different markets: agri-food, reinsurance, water management and NGO's.

Van Leeuwen sees a lot of opportunities for VanderSat's new technology and data products: "we really want to create a whole new market and make a difference as a remote sensing company. Remote sensing companies have been promising for a long time that everything can be done with satellite

imagery, but now the time has come to fulfill that promise".

The partnership with Bi4 Group is only a logical step in this process, adds Van Leeuwen: "in order to create scalable solutions, the software architecture needs to be top-notch. Bi4 Group has a lot of expertise in areas such as data visualization and smart solutions to meet the high performance requirements of very large datasets. Our strategic partnership enabled us to deliver VanderSat's unique satellite data to our clients in the right way, adding flexibility where necessary".

