Business challenge

BioSCO SAS wanted to develop a decision support solution to optimize the agricultural supply chain. It needed core technology to provide mathematical modeling capabilities and powerful solver engines.

Transformation

BioSCO, a software-as-a-service (SaaS) company, was developing RonGO, a decision support solution to help optimize and digitize the cereals supply chain. The company wanted to embed third-party technology to provide mathematical modeling functionality. It chose the IBM® ILOG® CPLEX® Optimization Studio solution due to its robust capabilities, flexibility and straightforward deployment.

Results

Reduces transportation costs by 10 - 15%
using decision support capabilities

Lessens carbon footprint
by lowering CO2 emissions through shorter transport distances

Generates simulations in 10 - 20 minutes
to provide optimized supply chain planning guidelines

BioSCO SAS

Seeds of change—cereals supply chain optimization cuts costs and carbon footprint

Founded in 2016, BioSCO creates and develops SaaS solutions for companies in the bioresources field. Its decision support tools apply operational research and AI to optimize logistics performance across the supply chain, providing customers significant cost savings, as well as environmental and organizational benefits. The company is based in Venette, France, which is near Paris.

"Technically, CPLEX is very easy to deploy and to implement into the techniques we were developing in our framework. So that was key in our decision."

—Birome Holo Ba, PhD, Cofounder and CSO, BioSCO SAS

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A quest to optimize agricultural storage

The size of the global cereals supply chain is, in a word, enormous. Annually, France alone produces approximately 70 million tons of grain and transports it over routes covering one billion kilometers—more than the distance of three round trips between Earth and the sun.

Storage agencies play a critical role in managing that supply chain. They are the cooperatives or traders responsible for collecting the crop during harvest time, transporting it to a storage facility and selling and distributing it to customers throughout the year.

Until recently, storage agencies decided how to transport crops and where to store them based on previous experience. But harvests differ from year to year due to unpredictable factors, such as weather and variations in local and outside markets.

According to Birome Holo Ba, Cofounder and Chief Scientist of BioSCO: "Storage agents have to manage hundreds of different products and hundreds of collection and storage sites. And they've got a lot of customers. So the number of combinations is very high. On top of this complexity, they also have to deal with a lot of uncertainty. Basically, they only know at the last minute what they're going to collect, as well as the quality and quantity. And then they set the storage and commercialization strategy."

This uncertainty extends into cost estimates. "If you asked an agent how much it would cost for them to collect 200,000 tons of grain," says Thibaut de Saint-Denis, Cofounder and Chief Executive Officer (CEO) of BioSCO, "they wouldn't have any way of knowing. They'd collect it and determine the cost afterward."

With a background in agriculture, consulting and entrepreneurship, de Saint-Denis is well versed in this dilemma. So when he read Holo Ba's dissertation, which explored mathematical modeling and logistical optimization of the agricultural supply chain, he recognized an opportunity for radical transformation in the industry.

In 2016, the two joined forces to form BioSCO, which stands for "Bioresources Supply Chain Optimizer," a reference to the title of Holo Ba's dissertation. The partnership united their engineering backgrounds with Holo Ba's science and technology acumen and de Saint-Denis's business and consulting experience.

Initially they focused on manifesting Holo Ba's vision of a decision support system to optimize the collection, transport and storage of agricultural products—primarily cereals and grains. In putting together their solution, they needed mathematical modeling technology to provide the engine for doing so.

Decision-making through mathematical modeling

After investigating several potential core technologies, BioSCO chose to embed the ILOG CPLEX Optimization Studio solution into its new RonGO offering. RonGO, named after a Maori deity of cultivated crops, is a SaaS solution that applies powerful algorithms using supply chain data—such as collections forecasts, stock quantities, site locations, crop types and equipment—to generate optimized logistics scenarios.

The choice of IBM's technology over that of competitors was based on multiple factors. As a member of a national decision support user group, Holo Ba had become acquainted with several IBM employees who worked with the CPLEX solution, and he had used the solution in some of his previous ventures. The solution's robust functionality, cost-effectiveness and SaaS capabilities, as well as strong technical support from IBM, were key factors in the decision.

The CPLEX solution provides advanced mathematical optimizers and techniques, such as modeling mathematical programming, linear programming and constraint programming algorithms, to help solve large, complex problems. The BioSCO R&D team has created algorithms within RonGO to specifically address the challenges storage agents face. "The volume and variety of crops, the need to store them at harvest season and to distribute them throughout the year, the many routes of transportation—such as roads, trains and rivers—we take all of that into account in resolving the optimization problem," says de Saint-Denis.

RonGO is truly revolutionary in its speed and agility and the strategic planning information it provides. Following a 3-week initial implementation during which BioSCO helps customers integrate their data into RonGO, those customers are able to run their own simulations in 10 - 20 minutes, depending on query size.

As a SaaS solution hosted on IBM Cloud™, RonGO also gives customers the flexibility they need in an industry marked by the peaks and valleys of seasonal demand. Based on relevant data—such as collections forecasts, product stock quantities, site locations, type of product and equipment—storage agencies and other users can use RonGO to generate on-the-spot scenarios to help them determine optimal storage options, flow, production tool needs, costs and impacts.

A harvest of cost and environmental savings

RonGO is a first-of-its-kind solution—the closest competitors are consultants who analyze what has happened in the past and help organizations plan accordingly. And it is clearly spurring digital transformation within the bioresources field.

But being first also presents challenges in customer adoption, especially when it comes to altering existing work processes. In an industry that already faces multiple issues in terms of cost, value and global shifts in people's expectations around food, a major process change can be daunting.

For those customers who have embraced RonGO, the economic, environmental and organizational benefits are evident. According to de Saint-Denis: "With our solution, customers are experiencing logistics savings of 10 - 15%. In looking at the distances the agricultural supply chain currently covers annually in France, that could equate to 100 million kilometers—or about 2,500

times around the Earth. Translated into financial savings, it's about EUR 3.8 billion, which is the cost of 38 Airbus A320 airplanes."

Fewer miles traveled results in a significantly smaller carbon footprint. BioSCO estimates that unilateral use of RonGO across France could result in a reduction of 120,000 tons in CO_2 equivalent—approximately the quantity absorbed annually by 24,000 trees.

The future looks bright for BioSCO. The company is investigating further development of RonGO to incorporate machine learning capabilities. It is also considering potential partnerships to integrate data from companies that produce, for example, harvest forecasts. And it's actively pursuing expansion into other parts of Europe and other industries.

"Our customers deal with cereals, seeds and grains," says de Saint-Denis. "But we are not limited to that. Our platform can tackle many other products and variables. If you need to collect, store and commercialize products—whether it's sugar cane in Brazil or wood in Canada—the business problem is exactly the same, and our solution would answer the problem the same way, resulting in similar gains."

Solution components

- IBM® Cloud™
- IBM ILOG® CPLEX® Optimization Studio

Take the next step

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