Recent Case Studies

TABLE OF CONTENTS

Case Study: Food and Beverage

A Snack-Food Giant Finds Hundreds of Thousands in Weekly Cost Savings with River Logic

Summary

This snack-food giant was meeting less than 90% of the demand for its most profitable product due to constrained capacities within its highly complex manufacturing process. Opting to make each product at each of its 20 North American manufacturing plants, the company had no visibility into their supply chain planning trade-offs across procurement, inventory, production allocation, logistics, and more. They were wrangling more than 25 spreadsheets to create their production allocation plans, and they knew they were missing out on major profit opportunities. Since adopting River Logic, hundreds of thousands in cost savings per week have been uncovered. Additionally, they have uncovered $2.5M in opportunity cost from freed up inventory.

Company Overview

The snack-food manufacturing company is a subsidiary of a multinational food, beverage, and snack manufacturing corporation. It has several thousand employees and annual revenues well above $10M USD. It runs more than 20 manufacturing plants, all spread across the United States, and has several hundred processing and packaging lines.

The Challenge

The customer was seeking a solution that could help address a major issue: they were meeting less than *90%* of demand for one of its most profitable product families. Due to confidentiality conditions, this product family will be referred to as Product Family A (PF-A). They were unable to meet demand for products in PF-A because its capacity was constrained.

In order to produce products within PF-A, two of the steps in their manufacturing process had limitations:

1. They could only ever get 35% of their raw material into the appropriate shape to produce the products in Family A
2. They also had to slow down one of the steps in their manufacturing process to further process Family A

With over 20 plants and several hundred processing and packaging lines, the company was doing what most other manufacturers do: using gut-feel and 20+ spreadsheets that contained data from sourcing, production, finance, sales, and transportation to determine where to produce which products. Further, they had absolutely no visibility into the forward-looking financial impacts of their decisions.

Their assumption was that transportation costs would outweigh producing only certain products at certain plants. Therefore, the company had decided to make every product at every plant in order to try and meet demand for PF-A.

In addition to spreadsheets, they used the following planning-related tools:

- A solution suite from a major ERP vendor
- A point optimization solution
- A well-known network design tool

Like more than 50% of companies today, the problem with this approach was that the customer had no ability to measure cross-functional trade-offs. Not only that, it had a complex supply chain with some very unique constraints and processes that other planning tools were unable to model.

They were unable to make data-backed, informed decisions in response to a highly dynamic market. **Prior to seeking River Logic, the company was driving up costs, unable to relieve its capacity constraints, and failing to meet demand; thus, it continued to miss out on major profit opportunities.**

The Solution

When it came to the everyday dynamics of their business, they were finding that spreadsheets were error-prone, difficult to validate, and inflexible in their ability to assist in agile responses.

In order to understand how and where to make which products, the snack-food company required two things:

1. They needed to understand, on a per product level, the impact of everything from raw material to distribution
2. They needed to see forward-looking financial impacts of their operational decisions, i.e., they needed an integrated financial and operational model of supply chain.

"A dedicated planning application that uses prescriptive analytics can give managers and executives the ability to assess trade-offs with greater insight and precision, especially if the analysis incorporates financial data."

After considering multiple vendors — in addition to considering an in-house built optimization solution — they selected River Logic's Production Allocation and Logistics solution. With a solution that enables cloud-based scenario analysis of around its end-to-end (supplier to distribution) value chain, the customer is now able to input data from all its existing systems in order to see the exact financial and operational impacts of trade-off decisions across its value chain.

The snack-food company is able to take into consideration the following complexities in order to make KPI-driven, data-backed decisions that are directly aligned with corporate objectives:

- Production capability complexity
- Demand complexity
- Cost of goods complexity
- Transportation variations
- Financial constraints and targets (per plant, per product, and company-wide)
- And more

The Impact

The value that River Logic has had on the quality of our snack-food companies plans, processes, and overall objectives was transformational. Model was designed to run on a seasonal basis. During the school years, product mix changes. During summer, it shifts again or in response to events like the Super Bowl. Run to do "what-if" and give them insight into production feasibility why they're looking at costs from various perspectives, like raw materials, transportation, labor,

With River Logic, the company is now able to allocate the right demand, to the right location, at fewer overall hours than before, meaning the solution was able to find a way to meet all existing demand at an overall lower cost than before.

The company learned that it is in fact *more* profitable to reduce material and transportation costs while increasing the number of changeovers across their nationwide network. With River Logic, they have uncovered hundreds of thousands in cost savings *per week*, in addition to huge opportunity costs due to freed up inventory.

The hard savings are unmatched by any other tool they had used:

- **Reduced transportation costs:** By making certain products closer to the point of sale, transportation costs were reduced.
- **Increased throughput:** River Logic revealed that by increasing the number of changeovers across the entire network, the company is actually *more* profitable and is able to meet 100% demand. Certain plants had an increase in the number of changeovers while other plants had a decrease in the number of changeovers. However, the *overall* number across the entire network increased.
- **Reduced labor costs:** Because throughput rates increased, overall production hours and (thus) labor costs decreased significantly.
- **Product to demand:** The company is now able to produce to demand and respond more quickly to unexpected market events. Additionally, with all of the freed-up inventory, they leverage River Logic to determine how to best utilize the inventory.
- **Reduced in raw material purchase and variable costs:** Because River Logic's solution is able to account for the variation of raw material purchases and variable costs on a per plant basis by producing a full financial ledger per plant, the snack-food giant is able to optimize for lowest possible cost.

Case Study

An Integrated Mining and Chemicals Company Sees $45- $80M in NPV Improvements from River Logic

Summary

This multi-billion dollar, globally Integrated Mining and Chemicals Company leverages River Logic for its mid-term and long-term planning. The monthly planning solution looks across a 24-month horizon and helps the company determine which products are most profitable on a per product and/or per customer basis. The long-term planning solution supports the company's yearly strategic planning and looks across a 30+ year time horizon to help the customer understand, on a yearly basis, the best way to get their starting products out of the ground, given the existing mine plans that its geologists have compiled and the future market predictions. The initial implementation is valued at $45-$80M Net Present Value (NPV)improvement, realized within the first 6 months of deploying River Logic.

Company Overview

The company operates globally with almost two dozen mining sites and processing facilities and thousands of employees. It mines for three naturally occurring minerals that are processed to produce their primary product. The primary product has around 20 code variations that are determined by purity, size, weight, and other chemical characteristics. In addition to primary product, the company also sells secondary products.

Trade-offs Between Upstream and Downstream Processes

There are multiple attributes of the mined ore that have variability (concentration, chemical form, impurities present, etc.). The way mined ore gets processed depends on those attributes. There can be variations in blending, additional steps added, recycling, removal of precious minerals, etc. The minerals are either used as feedstock in their natural form or in an upgraded form — the latter which is produced through secondary processing. The minerals are then put onto large barges and shipped to chemical processing plants in order to make end products. The company also has decisions to make with respect to further purifying and selling bi-products that needed to be taken into account in their decision-making process.

Depending on what comes from the mines and the processing options at the mine, cost and efficiency of final production and potential end products are impacted. The company needed to have the ability to take into account upstream decisions (processing at the mine sites) and downstream decisions (what end products are produced) in addition to shipping variables in order to optimize their entire value chain. They needed the ability to see when it was better to de-optimize the process upstream in order to realize net improvements across the entire value chain.

The Challenge

The Mining and Chemicals company's decision-making process is multifaceted. Since the company mines its own feedstock, it has the option to sell the feedstock or move it along in the

manufacturing process. The company must appropriately handle variations in purities of starting products (i.e., feedstock) in addition to considering logistical and financial impacts of selling and further purifying bi-products whether to buy, sell, or continue certain quantities of feedstock in the manufacturing cycle. As previously mentioned, some of the mined product gets processed near the mine in order to offset transportation costs and increase the purity of the shipped product. Thus, there are trade-offs to consider when determining what product and quantities get processed, where they get processed, and how products are transported to the next manufacturing plant or end customer.

All of these factors contributed to an incredibly complex planning process, one packed with significant trade-offs, variables, and constraints that need to be evaluated holistically. The company found that using Excel for planning purposes was far too cumbersome. Plus, it had no understanding of the impact of these decisions on product and customer profitability. Furthermore, the company was unable to take into account the impact of fluctuating exchange rates and numerous currencies on their decisions. It was clear that the business needed an overhaul in their planning and analytics approach.

The Solution

With River Logic, the customer now has a solution that allows all of its mining and manufacturing processes to be represented in a single Intelligent Model — a model that not only shows how its business works from mine to customer, but one that describes the financial components of the cycle every step of the way.

The integrated Mining and Chemicals company utilizes two planning and decision support solutions for its mid-term and long-term planning:

1. One planning and decision-making solution supports a monthly planning process that looks across a 24-month horizon. This model helps the company determine which products are most profitable on a per product and/or per customer basis. The model helps them answer questions like:
    a. Should we sell, process, or buy what is mined? What about chemicals that are co-produced during processing?
    b. What gets upgraded and what gets sent to the chemical processing plants?
    c. What quality Slag/SR should be produced?
    d. Should we process certain products near the mine or transport the lower quality?
    e. Which feedstock goes to which chemical processing plant?
    f. Which lines, at which plants should make which quality/grade of product?

2. The second planning and decision-making solution supports strategic planning that looks across a 30+ year time horizon and supports a yearly planning process. This solution helps the customer understand, on a yearly basis, the best way to get their starting products over the next 30 years, given the existing mine plans that its geologists have compiled and the future market predictions. They're able to answer questions such as:
    a. Do we have enough mines? What if we were to opt for more? Where and when should it open?
    b. What are the benefits of upgrades versus new structures?
    c. Where should we spend our capital?

d. How will these decisions impact timing and yields?
e. Which mine should feed which plant/s?
f. Should we automate? If so, where, and what is the impact on KPIs?

Modeling complexities that exist for this company require advanced analytics (optimization), as well as the ability to consider validated financial data — both of these requirements are supported by the River Logic platform that modeled and validated the business in a pilot phase before scaling across the enterprise.

The Impact

Using River Logic, the company is able to validate the best courses of action, resulting in a 3-5% improvement in Net Present Value (NPV) within the first 6 months of deploying River Logic. Insights from River Logic continue to help them better understand their business and their planning process by pointing to several previously hidden insights/surprises in their current planning process, such as:

- Forecast sales prices that cause swings in production that do not make sense
- Sales price forecasts that seem unrealistic
- And More...

Case Study

Leading Ethanol Marketer and Producer Gains $12M in Added Profits from River Logic

Summary

A leading ethanol marketer and producer uses River Logic to optimize its commercial and operational planning decisions. Faced with an extremely complex logistics and inventory management challenge — something very common in the downstream oil and gas sector — and the desire to increase collaboration among operations and trading teams, the company now has a fully integrated planning solution. The commodity trading and logistics optimization solution allows logistics planners to easily optimize transportation schedules and inventory management strategies for a given set of contracted demand and to re-optimize in light of strategic what-if scenarios. Similarly, traders are able to proactively identify market opportunities that go beyond traditional price arbitrage strategies and improve return on the firm's existing transportation and inventory assets. Immediate results yielded $12 million in profitability improvement opportunities related to current contract fulfillment, and the firm estimates total net-back gains of $.01 to $.02 per gallon, annually.

Company Overview

The company, a Fortune 500 international manufacturer and marketer of transportation fuels and other petrochemical products, produces and distributes large volumes of ethanol throughout the United States. The company operates multiple high-velocity production facilities, and its traders buy and sell future share contracts, which are typically fulfilled out of regional third-party terminals.

The Challenge

Traders and logistics planners alike were under continual pressure to satisfy several complex inter-related supply and demand constraints intrinsic to their commodity-based business model, as illustrated in Figure 1 below, while executive management kept a careful eye on the

Supply	Demand
• Production Planners push volume into the supply chain	• Energy Traders buy and sell future shares at a given price
• Primary objective to maximize production output	• Primary objective to maximize profitability of their desk
• Temporarily stored at local holding tanks with limited capacity	• Contracts fulfilled via inventory at regional terminal tanks

Complex Logistics & Inventory Value Chain Network

Figure 1: Supply and Demand dynamics driving complexity in the company's logistics and inventory value chain

firm's strategic objectives, which included overall portfolio profitability and total return on assets:

Despite the extreme complexity of the combined logistics scheduling, inventory management, and market trading problem, traders and logistics planners had no cross-functional view of customer demand, product sourcing, storage, or transportation. This caused the following challenges:

- The use of spreadsheets to model the value chain failed to properly represent the impact of constraints and decisions accurately
- Spreadsheets made it impossible to analyze all possible decisions simultaneously, leading to suboptimal outcomes and money left on the table
- Spreadsheet manipulation and maintenance required significant time from planners and traders, thus limiting productivity and reducing collaborative analysis
- There was little to no collaboration in the ongoing planning processes; each trader developed his or her own insights via traditional arbitrage approaches that routinely failed to fully leverage the firm's transportation and inventory asset positions
- Responses to unplanned events were inefficient and ineffective

Due to a lack of logistics and inventory constraints and variables knowledge when making trading decisions, the business was convinced it was leaving significant net-back dollars on the table. This led them to seek out a solution that allowed them to:

- More easily identify and understand the complex trade-offs in their value chain
- Empower planners and traders with the knowledge needed to plan, execute, and track integrated commercial operations strategies aligned to corporate objectives
- Enable greater agility and collaboration within their commercial operations processes

They sought an agile, forward-looking planning solution that would enable them to see the millions of variables and constraints across their end-to-end business, while capturing data from existing resources, including their ERP, TMS, and Energy Trading & Risk Management system. They selected River Logic because it was the only Prescriptive Analytics platform capable of meeting these needs while also enabling the type of cross-functional collaboration needed to finally put to rest the piles of spreadsheets by which they'd so long been completely reliant.

The Solution

The River Logic solution is based on an Intelligent Model, as shown in Figure 2 below:
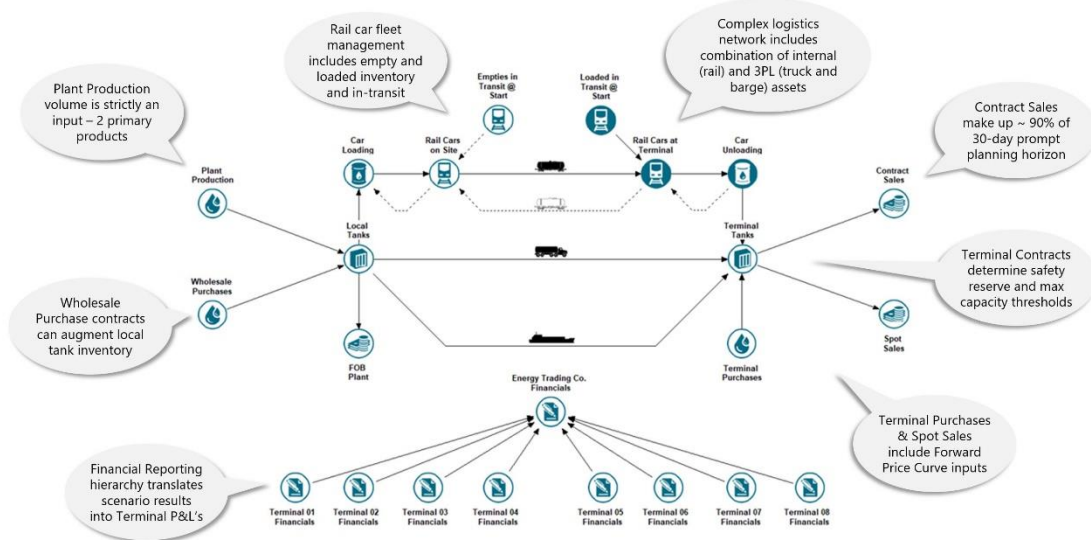

Figure 2: River Logic Intelligent Model establishes realistic, digital representation of how the business works.

The River Logic Intelligent Model establishes a realistic, digital representation of how the business works, including how it incurs revenue and cost – and then it applies prescriptive analytics to find ways of meeting all key objectives while respecting important cross-functional limitations, such as customer SLAs and inventory holding capacity thresholds.

Logistics planners, traders, and executive managers create and analyze unlimited what-if scenarios via River Logic's cloud workspace, containing a series of editable master data input forms and embedded Microsoft Power BI reports, as shown in Figures 3 and 4 below:

Figure 3: Optimized Logistics Schedule

Figure 4: Spot Sales Opportunity Report

With River Logic, the firm has acquired:

1. An Intelligent Model that can easily be expanded or modified to meet the business needs
2. Ability to not only manage – but optimize – the complex inter-related constraints of the business, including contractual, physical, and financial
3. Ability to proactively identify and quantify marginal opportunities that go beyond traditional price arbitrage

4. Complete performance management with the ability to create optimized logistics schedules, inventory management strategies, and trade execution playbooks; track progress against plan; and manage planning process with easy to use workflows

All plans now reflect reality. Scenarios can be quickly modified to represent market changes or new internal constraints, helping the company see immediate value by answering questions like:

1. If we have a plant outage or capacity reduction, how should we re-optimize the logistics plans? What are the costs? Which if any risk mitigation strategies should we pursue?
2. Which products, customers, contracts are making us the most money? What is the best way to expand our positions in these markets?
3. When and where do we have excess transportation capacity and what does that mean to our potential return on assets relative to the current forward price markets?
4. When commodity prices fluctuate, where are the opportunities to trade based on profit and our current positions?

The Impact

The company is now able to optimize logistics plans given the demand that's under contract, and then quickly identify opportunities to better monetize transportation and inventory. This information is then sent to traders in near real-time, so they can make more informed market decisions considering the unique opportunities afforded by the company's optimized supply chain, resulting in significant competitive advantage in the ethanol market.

From a financial perspective, immediate results include $12 million in profitability improvement opportunities on current contract fulfillment, and the firm estimates total net-back gains of $.01 to $.02 per gallon, annually.

Current What-ifs

- Contract Profitability Analysis
- Optimized Contract Fulfillment
- Plant Closure / Temporary Shutdown

Future What-ifs

- Delivery Day: Understand the cost of delivering on a specific day vs. a delivery window
- Unplanned Outage: Understand the cost of unplanned plant outages and quickly re-optimize to adapt to changes; identify if outage should be addressed with ST or OT labor
- Fleet Size: Understand the optimal fleet size to serve current and potential demand
- Asset Utilization: Identify under-utilized assets to evaluate future strategies
- Contracts: Understand the impact of new contracts (purchase / trans / sales / etc.)

Case Study

Unilever Reveals Radical Savings with the Power of River Logic's Prescriptive Analytics, Brought to Life through Microsoft PowerBI

Anyone in Manufacturing is almost certainly familiar with the daily struggle of simulating the real world using a hypothesis (e.g. rules)-based technology to evaluate the impact of decisions before they are made. In the case of capacity planning and production allocation, this entails manually defining rules that determine capacity and requirements while allocating production to different lines while ensuring the plans remain feasible. This is a very complex problem with more than a million possible answers, causing talented employees (that would otherwise bring more value to the company) to spend countless and frustrating hours manipulating complex trade-offs around assets, throughput, finished or near-finished goods inventory, investments, etc.

Unilever's Challenge

This was exactly the case at Unilever, a top ranked consumer goods company that manages hundreds of brands, thousands of SKUs globally and brings in over €50B in annual revenue. Last year, Unilever was ranked the #1 Supply Chain company by Gartner. Despite their achievements, their use of the full SAP suite (APO/SNP/SCM) and many other Supply Chain tools, they still were unable to answer the question that plagues so many manufacturing companies:

"Given latest demand and considering all my capacity, throughput, labor and inventory pre-build constraints, as well as their impact on fixed and variable costs, what is the optimal production line for a given SKU per month?"

They needed a technology and a process that balanced factory capabilities, capacity, and costs for a dynamic volume allocation at the lowest total network cost.

Unilever's Technology Solution

Enter: River Logic, offering a Gartner-ranked prescriptive analytics solution. Prescriptive analytics is a category of advanced analytics solutions that provide the best solution possible answer to a range of business decision-making problems, simultaneously taking into consideration an unlimited number of business constraints in order to best meet the objectives specified. River Logic simplified the problem by shining light on the most relevant inputs and outputs through a revolutionary scenario management user experience that leverages PowerBI for highly detailed scenario analysis and visualization. By conducting rapid what-if scenarios *in seconds*, analysts who previously took *weeks* to find a solution were able to do so in only a few hours. Not only that, they finally had the best possible insights to make optimized decisions that drove unmatched value for the organization.

Using River Logic's code-free Visual Modeler, an optimization model was created for the Spreads Division of Unilever BCS that included the following:

- Procurement (raw materials and packaging costs)

- Inbound logistics (costs, parameters, bills of material conversions, scrap factor)
- Manufacturing (labor costs, labor switch as fixed vs variable, resource calendar, product routing, run rates and efficiencies, production costs, fixed and variable costs, and MOQ)
- Outbound logistics (transport networks and transport costs)
- MSOs (demand in tons by SKU, by customer, and by market)
- Full financial information from each of the factories and each sales entity.

One way to think of the scale of this problem is that it is equivalent to 1 million equations with approximately 1 million variables in each equation, including detailed information for every factory, dozens of production lines, thousands of raw material items, dozens of markets, thousands of BOM combinations, fixed/variable costs and more.

Value Realization

Once the model was built, BCS business users were able to leverage River Logic's Microsoft Azure-based scenario analysis solution to create and analyze unlimited scenarios, import bulk data, and adjust/review input parameters on an ongoing basis.

BCS was able to move from once-a-year business planning to a rolling 12-month business planning process — meaning they went from planning only once per year to 12 times per year. Before River Logic, their planning time was a few months. **After River Logic, it went down to 1-2 days.** This drastic improvement in efficiency in turn helped improve the reaction time and quality of decisions when the organization was faced with demand and cost volatility for that period. They were able to improve tactical decision making when unplanned events occurred, such as shortages of raw & pack materials or unpredictable swings in foreign exchange rates. Furthermore, **their strategic planning also improved by being able to guide contract negotiations on procurement, labor, co-pack, transport, Brexit etc. In addition to the drastic improvements in the quality of decisions, efficiency and decision-making agility,** *BCS* **saw a radical initial savings in cost of goods***.*

River Logic & PowerBI Embedded: A Winning Pair

Power BI played a major role in both the success of the sale and the success of the application itself. Compared to Tableau, Qlik etc., — which are just BI tools — River Logic chose Power BI because of its much broader footprint including data blending, predictive analytics (R integration), and query generation (Power Query).

From a business perspective, embedding Power BI within the River Logic application means that business users — the people creating and analyzing scenarios — don't have to jump back and forth between multiple applications (PowerBI and River Logic) in order to get those **detailed drill-downs required to understand the "why" and the "how" behind optimization-based scenario runs.**

PowerBI also allowed a few hundred analysts to the do the work of a *few thousand* analysts, enabling Unilever to save *weeks* of analyst work and reinvest that energy elsewhere. Users are able to seamlessly execute their workflows within a single application, and take advantage of the many innovative features that PowerBI has to offer.

Beyond PowerBI, the fact that River Logic decided to build its solution on Microsoft Azure has furthered River Logic's competitive differentiation and revenue growth. Unilever BCS is just one example of dozens of solutions that have and can be developed using River Logic in combination with Microsoft Azure. Azure and PowerBI have enabled River Logic to create optimization-based prescriptive analytics solutions that address a near-unlimited number of planning and decision support challenges. These solutions span dozens of industries, like Mining, Oil & Gas, Utilities, Consumer Goods, Healthcare, Government, Chemicals and more.

The Power of Microsoft Azure

By basing its product roadmap on a cloud platform, River Logic is able to utilize Azure's platform as service (Service Fabric) and infrastructure as a service (IaaS) to meet our goals of bringing together new, cloud-based application experiences within existing products. Azure offers the 'base building blocks' that allow its engineers to rapidly compose our application experience, together with the tooling and environments to be highly productive.

Microsoft Azure provided the 'base building blocks', tools, and environments River Logic's engineering team needed, while also providing background infrastructure management and crucial connections to dev-ops. This removed much of the ancillary work from River Logic's team and allowed them to focus on the key application aspects.

Further, to meet and exceed customer experience goals, River logic took advantage of the integrated environment (SDK) for developing, testing, and deploying cloud applications. SDK reduced the cost for code integration. **Using the continuous delivery and deployment approach supported by Azure meant that River Logic's monthly release of new features and functions could be 100% focused on the customer experience.** In addition to Azure's Security Development Lifecycle (SDL) that allowed River Logic to meet Unilever BCS's stringent security requirements, Azure provided the ability for River Logic to scale quickly and reliably from a few (10) to thousands of users. This scaling is an essential piece when enabling the ability to run rapid and unlimited what-if analyses in very little time.

In today's highly competitive global environment, firms such as Unilever need not only to extract the most value from their resources, but also to provide their oftentimes scarce talent with the necessary technologies to maximize impact while minimizing manual work. By leveraging dozens of features and services available in Microsoft Azure's Platform-as-as-Service, River Logic has brought to life the ability for companies like Unilever to do just that.

Companies are able to empower employees with optimization-based prescriptive analytics, thus ensuring that every decision made is not only data-backed, but also directly aligned with company objectives. With the simplicity of PowerBI reporting at their fingertips, even top-level executives who might not even be familiar with prescriptive analytics can have visibility into the process of ensuring the best path forward.