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Lumina Decision Systems

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The annual listing of 10 companies that are at the forefront of providing Predictive Analytics solutions and transforming businesses

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Bridging from Predictive to Decision Analytics with Human Intelligence

According to Gartner, 85 percent of big data projects fail. Through 2022, only 20 percent of analytic insights will deliver business outcomes.

These staggering numbers inevitably raise the question—"Why?" A Harvard Business Review study reported the main reasons as "insufficient organizational alignment, lack of middle management understanding, and business resistance." Too often, executives just didn't find that the analytics results addressed issues important to them. Analytics professionals or "data scientists" tend to focus too much on crunching the data, and too little thinking about how it applies key business decisions and objectives. There are now many excellent tools for cleaning, analyzing, and visualizing data, but they don't really help in structuring the decision options, defining organizational objectives, or modeling an evolving and dynamic competitive landscape. You can't extract this information from data, which is inevitably only about the past. You need to consult with senior decision makers and subject matter experts. In short, you need to build a bridge between data analysis and human intelligence.

MAX HENRION, CEO

This is where Lumina Decision Systems comes to the rescue. Lumina designed its flagship software product, Analytica®, to help analysts structure decisions and objectives, and link them with quantitative models. Analytica helps users visualize problems with clarity and power, far beyond what is possible with conventional spreadsheets and BI tools, or statistical and ML applications. It is being used by clients from a wide range of industries, including finance, healthcare, energy, environment, aerospace, and telecommunications.

In an interview with the editorial team of CIO Applications, Max Henrion, CEO of Lumina, discusses how his company works closely with clients to develop effective decision models of the complex and uncertain environment faced by their organizations.

Could you provide a brief overview of Lumina Decision Systems?

Lumina specializes in providing software to help organizations bridge from data analytics to effective decision making. We provide processes and tools for analytics, modeling, and structuring decision problems, notably our Analytica suite of software. We also provide consulting and training to assist analytics teams in learning how to develop dynamic decision models.

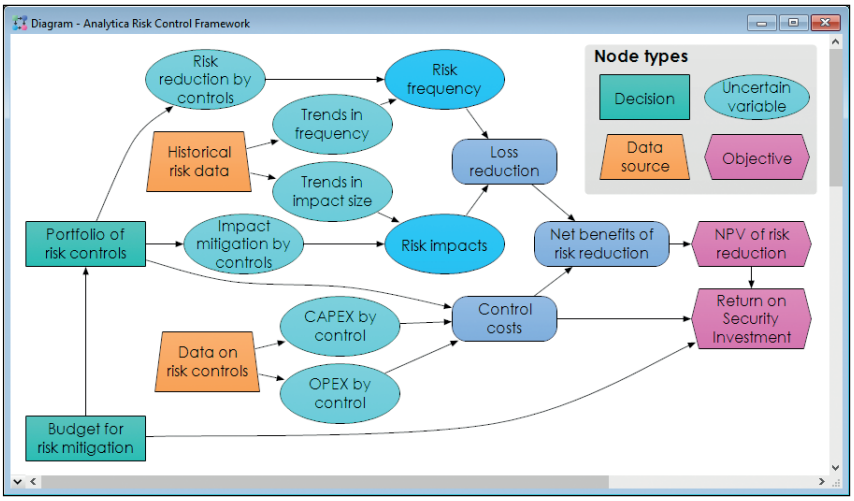
What are some of the major market challenges that your company addresses?

For instance, suppose an automobile maker wants to forecast sales over the next decade to help in planning R&D and manufacturing capacity including conventional fossil-fueled models and electric or hydrogen vehicles. The analytics team can fit statistical models to the last ten years' sales data. But, that data alone won't help you project the adoption curve for completely new products and technologies from the company and its competitors, or the effects of new government regulations on efficiency and emissions. But the company will have experts who understand a lot about the technology, the markets, and government policy and can help make useful predictions based on their judgments Our software tool, Analytica, helps analysts work with these experts to structure their knowledge and judgment to drive systems dynamic models in combination with results from the predictive analytics to help inform business decision making.

Could you shed light on the services you offer?

Analytica helps subject matter experts structure their predictions and judgments in an organized way. It provides influence diagrams as an intuitive, visual way to capture expert knowledge. Influence diagrams depict the decisions, uncertainties, and objectives as nodes with standard shapes. It shows causal and probabilistic influences among the variables as arrows. (See the example influence diagram.) After drawing influence diagrams as a qualitative representation of the key factors, users add formulas to each variable to quantify the influences. These may be simple accounting relationships, such as "Earnings = Revenues – Costs," empirical relationships based on statistical or ML models, or causal relationships expressing expert judgments.

Analytica uses a flow architecture, which enables users to define an influence diagram model as a set of declarative relationships, without having to write procedural programs. In this way, analysts can build powerful models without needing to be—or to hire— programmers. Some people use Analytica to



supplement or replace spreadsheets due to its transparency, power, and flexibility. Others use it to replace programming in languages like R or Python. Experienced users find that they can build models in Analytica five to ten times faster than equivalent spreadsheets or programs in R or Python.

Many estimates and assumptions are inevitably uncertain. Analytica enables users to represent and analyze the uncertainties explicitly. Rather than massive, highly detailed, deterministic models, it's usually more useful to build a relatively simple model that is explicit about the uncertainty and allows for exploring a variety of possible future scenarios. The software uses fast Monte Carlo simulation to propagate uncertainties through the model and intelligent sensitivity analysis to discover which uncertainties really matter and why. Analytica is highly effective for creating and managing multidimensional tables with Intelligent Arrays™.

Could you cite a customer success story?

In 2018, the state of California was considering a new climate bill, SB100, with an ambitious target to reduce greenhouse gas emissions by 50 percent by 2030. In preparation, state agencies including the California Air Resources Board (CARB) wanted to make sure these policies were practical and economically sound. To this end, Energy + Environmental Economics (E3), a consulting firm in San Francisco, developed the PATHWAYS model. E3 found that the initial version of PATHWAYS in Excel was impractical for analyzing the huge volumes of multidimensional data. So, they rebuilt and expanded the model in Analytica. The E3 team found the influence diagrams were helpful to visualize connections between variables and flows through the model. They also found Analytica's Intelligent Arrays™ convenient in the way it handles arrays with multiple dimensions. Their clients at CARB found it much more accessible than other tools that required them to set up special software environments. Using PATHWAYS to explore the effects and costs of alternative decarbonization scenarios, they found that the net costs to be relatively small, even negative, in part due to the rapid reduction in costs of renewables and electric vehicles. The analysis greatly increased confidence in the practicality of these policies, enabling then-Governor Jerry Brown to sign the bill in 2018.

In a rapidly changing World, predictive analytics can't simply extrapolate trends from historical data. Tools for effective decision making must combine data analytics with dynamic models based on human expertise

What does the future hold for your company?

We are pleased to see that our customers are finding Analytica an effective tool to help them combine traditional analytics with human intelligence and judgment for long-range forecasts and decision making. Many other organizations are starting to recognize the need for these kinds of tools. So, we see a bright future for our services and products.

In addition to providing Analytica as a general tool for predictive and decision analytics, we see great interest in pre-built Analytica-based tools for selected applications. ANDES (Analytica for Distributed Energy Systems) helps utilities and other organizations evaluate and plan for the impact of low-carbon generation and distributed energy systems on electricity demand and grid capacity. It lets them prepare for rapid electrification of the energy system, including adoption of electric vehicles and changing from gas heating to electric heat pumps. ANDES uses location-specific adoption projections based on a combination statistical models and expert judgment to visualize a range of futures that cannot be simply extrapolated from past trends. ARC (Analytica Risk Control) is a second application that helps organizations quantify and manage cyber threats and information risks. It helps risk managers select cost-efficient portfolios of controls to mitigate those risks. CA