



Identify Relationships – Answer Causal “Why” Questions

Understanding “why” specific outcomes occur remains frustratingly hard to gauge. Results based on correlation alone lack the right actionable insights and the models to explain the actual predictions and the quality of behaviors that are predictive in nature. Cognizant Causality provides a vital new capability with its breakthrough AI to determine causative factors, predict specific outcomes and better inform business decision-making.

Understanding Influences

Why do customers make certain choices? What’s causing clients to make buy decisions? What’s influencing your bounce rate? Conversely, what is influencing loyalty decisions?

By understanding why manufacturing problems are occurring on one particular production line, or why medical treatments affect people differently or why employees are leaving the company, changes can be made to improve outcomes.

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Overcoming Limitations—of Man and Machine

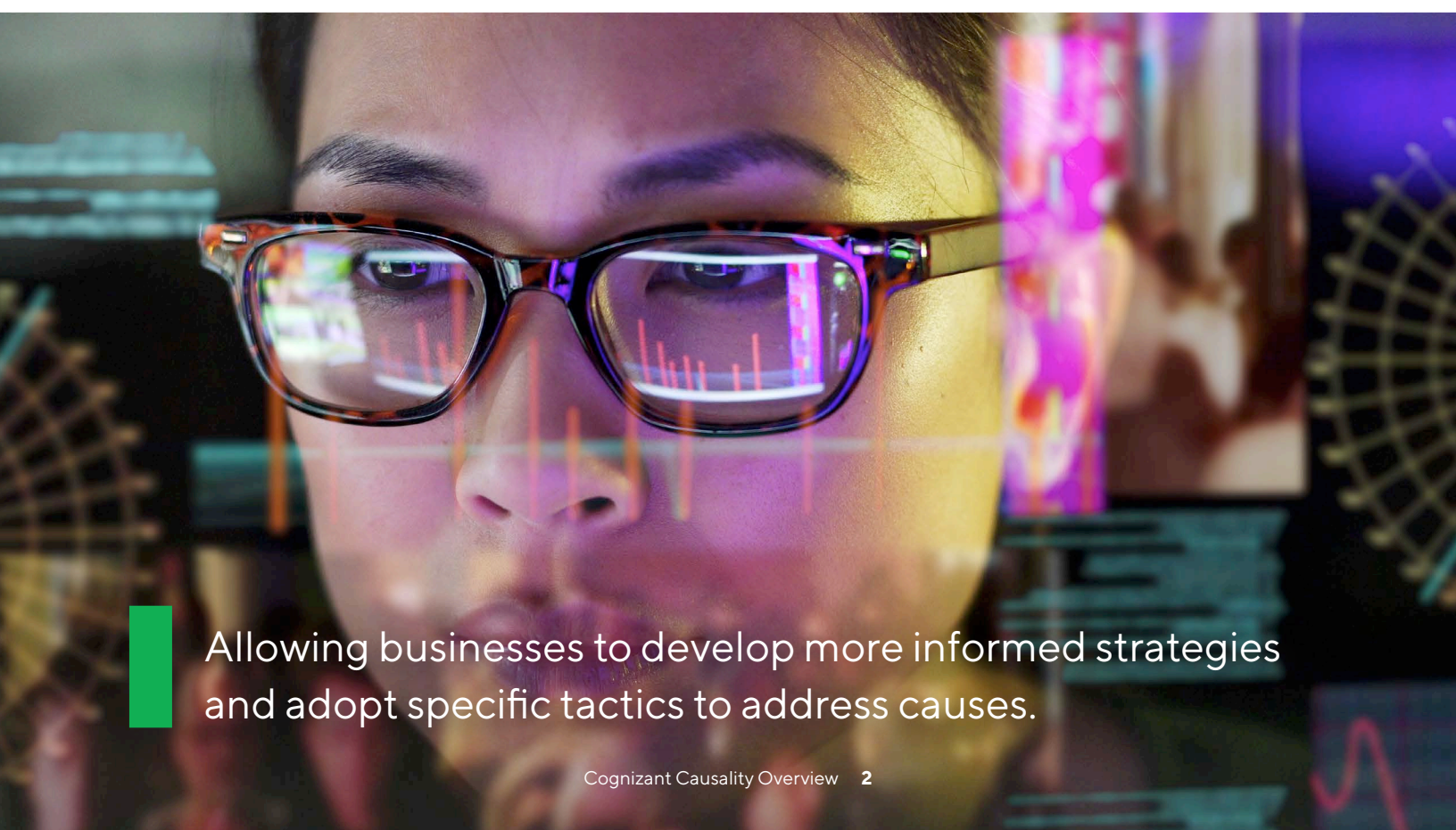
Businesses today have unprecedented amounts of data available that could offer answers, but the number of variables that affect outcomes has grown as well and added new levels of complexity. Traditional research is laborious, costly and slow and it only finds answers to the questions it is asking.

Cognizant Causality, derived from information theory, is an AI breakthrough. It identifies contributory causes of outcomes without relying on a hypothetical model being constructed in advance, providing a vital capability for business decision-making.

Most machine learning AI platforms base their analytics on known models, developed in multiple iterations by engineers. Such iterative model

development to refine the AI engine to produce desired outcomes is laborious and costly. It takes time. The machine must be taught how to recognize patterns in data. Moreover, human beings are fallible and have varying ranges of expertise in statistical analysis, data science or particular types of subject matter that are necessary to develop the right types of algorithms to make predictive models work.

Our AI causality solution builds a unique model for the data it is operating on. The model then refines, trains and corrects itself, yielding factors related more strongly to outcomes, and discovering which variables are the best predictive drivers for the objective.



Allowing businesses to develop more informed strategies and adopt specific tactics to address causes.

How Causality Works

Cognizant Causality uses a mutual information theory to uncover high-dimensional relationships within data. This approach reveals group effects that otherwise would remain hidden, such as where multiple variables interact and correspond to outcomes in suggestive ways. And, it uncovers important patterns typically overlooked with traditional data science methods.

Our causality service simplifies the process, reduces bias and provides strategic and tactical actions that can be taken in response to change. It evaluates the thousands of possible variables in data – from sales and marketing to human resources, from innovative research and development to learning more from digital twins – and finds relationships. It operates on extremely large datasets to derive valuable knowledge about the combinations of factors that correlate most strongly to specific outcomes.

This “clear-box” approach operates without preconceptions or prewritten models by separating

relevant and contributory factors from non-relevant correlative ones to quickly give users insights into which factors predict outcomes. A causality model adopts the outcome as the precondition for analysis. It then can parse massive amounts of data to identify which variables relate more frequently than others to that outcome.

During this process, it discovers combination effects where factors that are weak predictors individually can be seen as strongly predictive in combination. The system automatically provides multiple recommendations to achieve the targeted goal – a powerful tool for decision-making. Such analysis allows businesses to develop more informed strategies and adopt specific tactics to address causes. Users need only provide their data and their domain-specific goals. Our AI causality engine autonomously examines relationships and reports on them, reducing dependence on in-house subject matter experts.

Causality in Action

Getting the Payoff: Financial Institution Focuses Collections



Collecting from credit card customers in default costs millions. Collections agents spend hours making calls and sending texts, emails and letters to people who never pay. Results are negligible, agent job satisfaction is low and turnover is high. How to know when to stop trying and why some people pay while others never will?

Our causality service helped a large US-based issuer of branded credit cards identify which factors fit the profiles of customers who will eventually pay outstanding debt, those who won't pay under any circumstances and a middle group where collections efforts could pay off – literally. It demonstrated that the bank could save more than \$10+ million annually, simply by focusing collections efforts on customers whose profile fit that third group.

The Business Case for Causality

IT departments are constantly being asked to do more with less: to increase efficiency as they provide insights back to the business while spending less and demanding fewer resources. At the same time, advances in digital information-gathering are yielding ever-larger datasets from a range of sources along with new expectations from businesses and customers are leaving many internal IT architectures struggling to keep up.

Cognizant Causality allows IT executives to make a categorical step forward in how they serve the operating business, even without internal data science talent and AI subject-matter experts on staff. Overcoming the challenges and costs presented by performing root cause analysis accelerates information analysis.

Key features include:

- **It's autonomous** – Developing its own models automatically without the need for human intervention. The engine needs only data, an objective and subject-matter expertise.
- **It's assumption-free** – Reducing biases, both human and data-driven, resulting in findings based solely on the evidence that arises in the data.
- **It's universal** – Encompassing all types of data and all computational functions, yielding results that are reliable and easily interpreted.
- **It's self-aware** – Rapidly adjusting to new data and evolving data-sets, analyzing, self-critiquing and modifying its operation.
- **It's adaptive** – Automatically improving models and its own operation using feedback.

Causality in Action

Passing the Test: Aiding Research to Find a Cure



The complexity of the human genome presents tremendous hurdles to researchers seeking effective treatment regimens for different cancers in a range of patients. Huge volumes of data are available, but effectively analyzing that data is grueling and time-consuming. Patients can't wait.

We helped a medical diagnostics company improve testing to identify the most effective treatment regimen, by analyzing genetic information and historical data. Our causality engine analyzed sequences in the records of thousands of individual genes to narrow potentially causal ones from more than 70 to only three-to-five. This increased predictive accuracy from 62% to 81% and allowed doctors to optimize cancer treatments.

Our causality engine provides a visual representation of the interaction between key variables or clusters of variables, depicting their individual or aggregate impact on specific outcomes. A tool within the platform gives suggestions on the easiest way to influence key variables that in turn can alter the target outcome.

It operates on our clients' data in a secure environment on a private cloud in AWS. Our process includes raw data intake, anonymizing data and pre-processing it, performing proof-of-value exercises based on input and expectations from our client and then reviewing results. The cloud-based platform completely erases treated data at project completion.

Finding the Answers That Matter

No matter the industry – whether it be manufacturing, retail, finance, insurance, healthcare or life sciences research, Cognizant Causality is helping businesses answer the most important questions. What drives a customer to make a purchase? What keeps existing customers loyal? What can our data tell us about our business, industry and where it's headed? Where are the points of failure in the company and how can they best be fixed?

Causality automatically identifies key drivers, generates a unique model for every different set of data, predicts correlated variables with confidence and helps businesses make informed decisions based on predictive indicators in their data from their highly dynamic environments.

For more information, visit www.cognizant.com/causality.



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About Cognizant Artificial Intelligence Practice

As part of Cognizant Digital Business, Cognizant's Artificial Intelligence Practice provides advanced data collection and management expertise, as well as artificial intelligence and analytics capabilities that help clients create highly-personalized digital experiences, products and services at every touchpoint of the customer journey. Our AI solutions glean insights from data to inform decision-making, improve operations efficiencies and reduce costs. We apply Evolutionary AI, Conversational AI and decision support solutions built on machine learning, deep learning and advanced analytics techniques to help our clients optimize their business/IT strategy, identify new growth areas and outperform the competition. To learn more, visit us at cognizant.com/ai.

About Cognizant

Cognizant (Nasdaq-100: CTSH) is one of the world's leading professional services companies, transforming clients' business, operating and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 193 on the Fortune 500 and is consistently listed among the most admired companies in the world. Learn how Cognizant helps clients lead with digital at www.cognizant.com or follow us [@Cognizant](https://twitter.com/Cognizant).

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