

Managing Black Swans



Unlocking value through ML/AI with
challenge-based learning

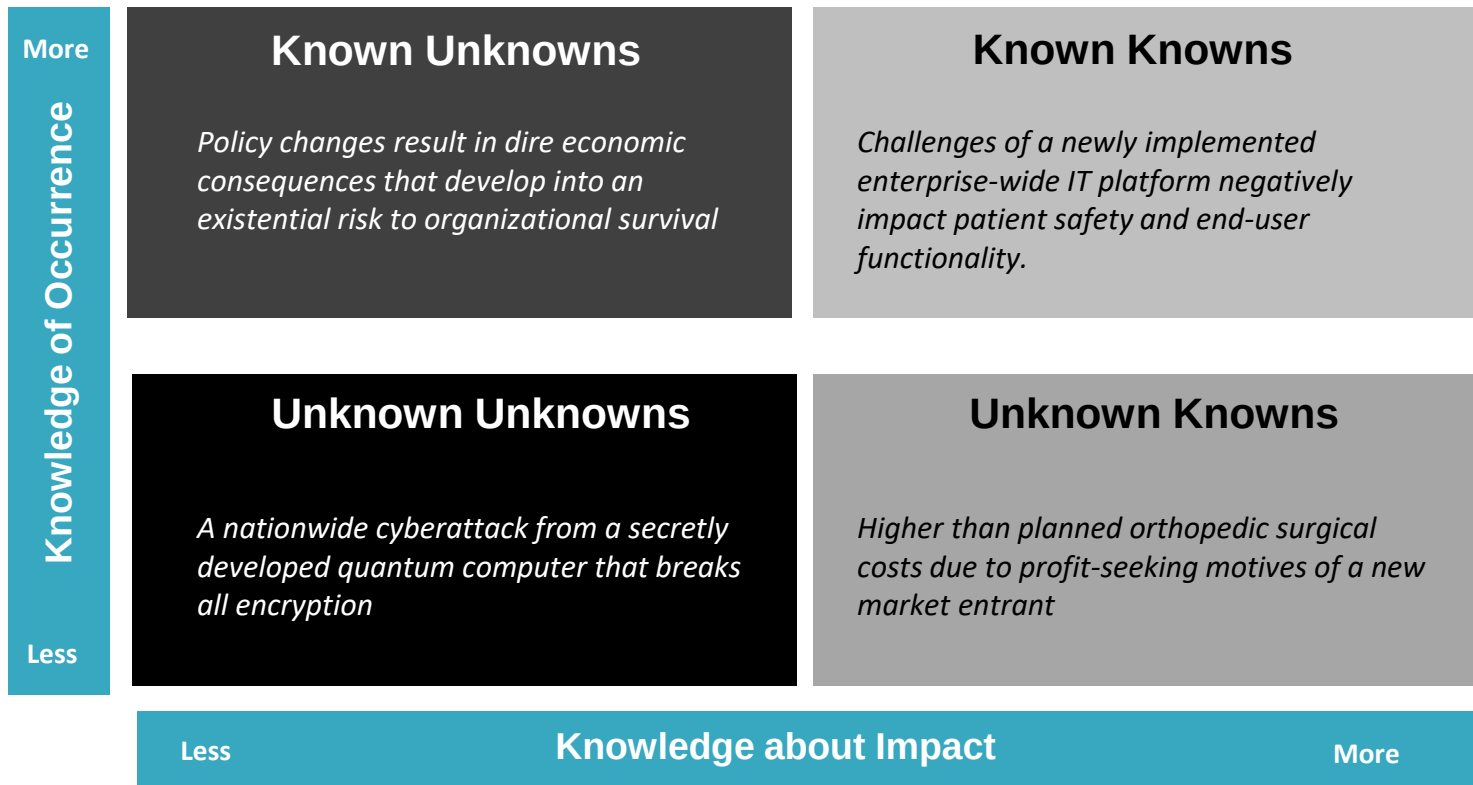
May 2024

The challenge - exponential rise of unknowns

Healthcare organizations now face never-before-seen operating challenges due to the complex interactions of access, availability, labor shortages, contracting complexity, transportation challenges, social media, rapid communication, policy changes with unintended consequences, and the global financial markets' desire for rapid, high returns.

These unknown (unexpected or unforeseeable conditions) pose a potentially greater risk simply because they cannot be anticipated based on experience or investigation. Known unknowns result from recognized but poorly understood phenomena.

Illustrative cases



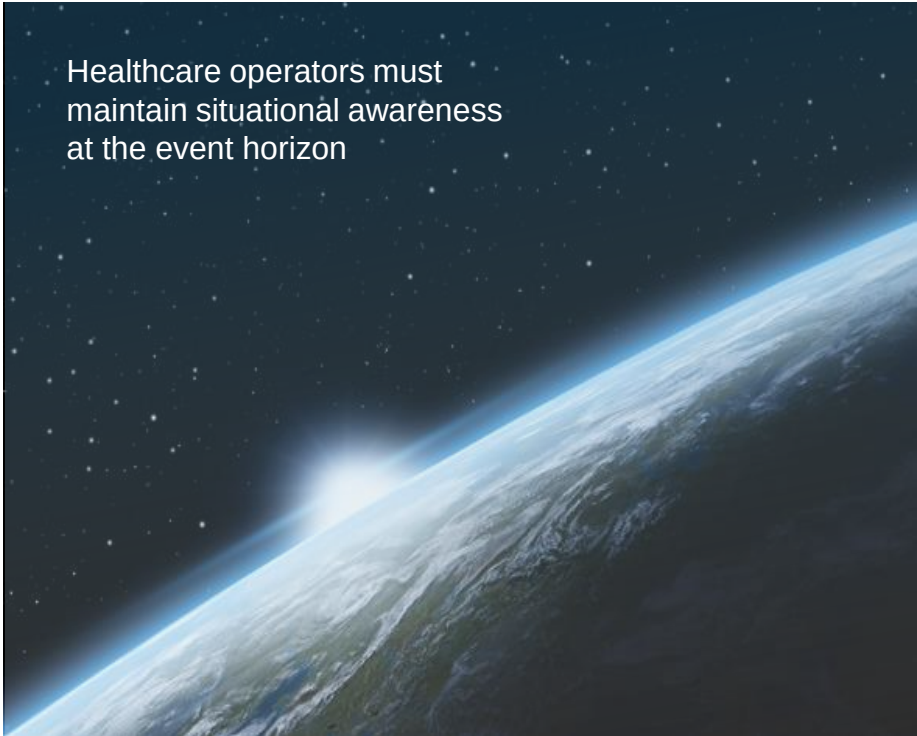
Exponential rise of unknowns - can't be solved by existing tools

Legacy tools, while sufficient for understanding known knowns in contained, low externalities environments, are not suited to addressing the challenges faced by 21st-century healthcare operators.

By contrast, more advanced tools offer the potential to significantly enhance our health systems. With their superior granularity, fidelity, and speed, they can better improve population and individual health status, optimize clinical resources, and ensure equitable access for all.

Consider the benefits of advanced analytic capabilities. Today's situational awareness, diagnostic intelligence, and advanced decision-making can be revolutionized. These capabilities empower healthcare organizations to gain profound insights, enhance patient outcomes, and optimize operational efficiency. They can ingest and synthesize large data sets from process logs, EHRs, Remote Patient Monitoring, claims systems, and demographic-social-environmental attributes from structured and unstructured data.

To stay operationally viable, 21st-century healthcare organizations must leverage these large data sets, employ advanced data science engineering, such as natural language processing and temporal anomaly detection, and generative AI simulation techniques.



Healthcare operators must
maintain situational awareness
at the event horizon

The Big Idea

Today, amidst one of the most disruptive periods in healthcare history, Cogitativo stands as a beacon of guidance, created to help clients effectively navigate the complexities of the marketplace.

Cogitativo's revolutionary approach is a grand vision—that the intricate challenges of the healthcare system can be unraveled through the fusion of advanced applied data science, the utilization of one of the country's most extensive healthcare data sets, and the expertise of nationally recognized operators that deliver unbiased, actionable insights. Our science-based perspectives are not just quick, but they are unique and precise, setting us apart in the industry.

Since 2015, Cogitativo has developed essential insights for clients and the larger stakeholder community. This unique approach has allowed us to deliver actionable insights that have significantly impacted our clients' operations and strategies.

Challenge questions range from the rise of consumerism, resource optimization, payer-provider operations, and delivery system equilibrium.

Cogitativo answers these challenge questions by:

- Applying proven techniques that include world-class PhD data scientists and nationally recognized healthcare operators that detect anomalous behaviors or process gaps using structured and highly dimensional, unstructured data
- At Cogitativo, we process mine our proprietary healthcare data set, a comprehensive representation of over 200 million Americans, ensuring the breadth and depth of our analysis

By harnessing our broad suite of machine learning solutions and providing actionable, operational insights, Cogitativo empowers our clients. We enable them to make informed decisions and drive positive change in their healthcare operations, inspiring a new era of efficiency and effectiveness.

Components of a challenge question

By design, Cogitativo's challenge question methodology allows for the generation of various challenge questions.

1. **A challenge question is a succinct, focused query structured to enable advanced computational techniques to uncover new insights and provide** actionable recommendations.
2. Once a challenge question and its attributes are framed, Cogitativo **mines its proprietary healthcare data sets** and data sets from the client.
3. Cogitativo, with its unique data science capabilities, conducts a comprehensive investigation of sourced-featured engineered data. It employs supervised learning methods to deeply understand past data events. Additionally, Cogitativo deploys unsupervised learning methods for in-depth pattern matching, anomaly detection, and causal analysis. The meticulous application of ensemble machine learning techniques, combined with extensive domain expertise, ensures a thorough exploration of a challenge question's known and unknown attributes.
4. Measured in weeks, Cogitativo provides insights and recommendations about the client's challenge question through its proprietary Workbench. The Workbench is an interactive visualization custom-built for the challenge question, focusing on providing highly interactive, exacting—granular views into response attributes (answers) to the challenge question.



The process of tackling a challenge question

Responding to a challenge question flows from a workflow that mirrors the a high performance 21st-century learning environment. Cogitativo's cognitive learning teams are given free rein to design and create solutions while supported by data scientists with boundaries and checkpoints. The following process is provided as a starting point but is not meant to be prescriptive.

1. Introduction of challenge question: Once the challenge question is selected, the first step is to develop an overview of it and its related essential attributes. This sets the broader context and foundation for the work that will follow.
2. Assessment: Our data scientists, SME teams, and client stakeholders collaborate to determine the metrics for success. They adopt, adapt, or develop machine learning rubrics to gauge the success of their models and solution output. This collaborative approach ensures a comprehensive and unified understanding of success criteria.
3. Guiding activities & resources: The team begins identifying an extensive list of features to guide their analysis of the challenge question topic. These question features outline what the teams need to know to formulate a viable solution. Questions will be answered and reframed, or new question features will be formulated as information is gathered and concepts explored. This phase is critical as it creates the map for learning and sets the foundation for developing a solid solution. The team seeks to solve the challenge by participating in various learning activities, conducting research and experimentation, interviewing client-SMEs, and exploring multiple avenues to assist in crafting the best solution. This stage aims to gain a solid foundation for developing the solution.
4. Model-Iterate-Model-Iterate-Model: The team engages in an iterative ensemble ML/AI model development process. Once they have identified possible solution attributes, they build various computational models and present them to fellow data scientists. This iterative approach allows the team to continuously refine and improve their solution, reflecting the dynamic nature of the project.
5. Communication: The next step is developing a workbench and other communication materials to solve the challenge question and then communicating that solution material to the client. The scope of this phase varies greatly depending on the project's complexity.



Select examples



1

Challenge Question: Following the implementation of a new claims system, a large national healthcare payor engaged Cogitativo to detect process gaps and logic conflicts in the claims administration

Solution: We deployed machine learning models to evaluate the end-to-end processes for over one billion monthly adjudicated claims. We identified hundreds of process failures resulting in inappropriately paid claims and member service failures.

2

Challenge Question: A national Payor wanted to know how to identify providers with the best outcomes based on member conditions to make informed choices regarding benefit design and network selection.

Solution: We deployed their proprietary Vision machine learning platform and Disease Progression Index to rate providers on their ability to manage disease progression for their patients



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Making the unseen, seen

For additional information, contact insights@cogitativo.com

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