

A network diagram consisting of nodes and edges. The nodes are colored in shades of blue, orange, and black. The edges are thin lines connecting the nodes. The diagram is partially obscured by a black horizontal bar.

AYASDI

**Advanced Analytics in
Life Sciences**

Introducing Ayasdi's Advanced Analytics Software

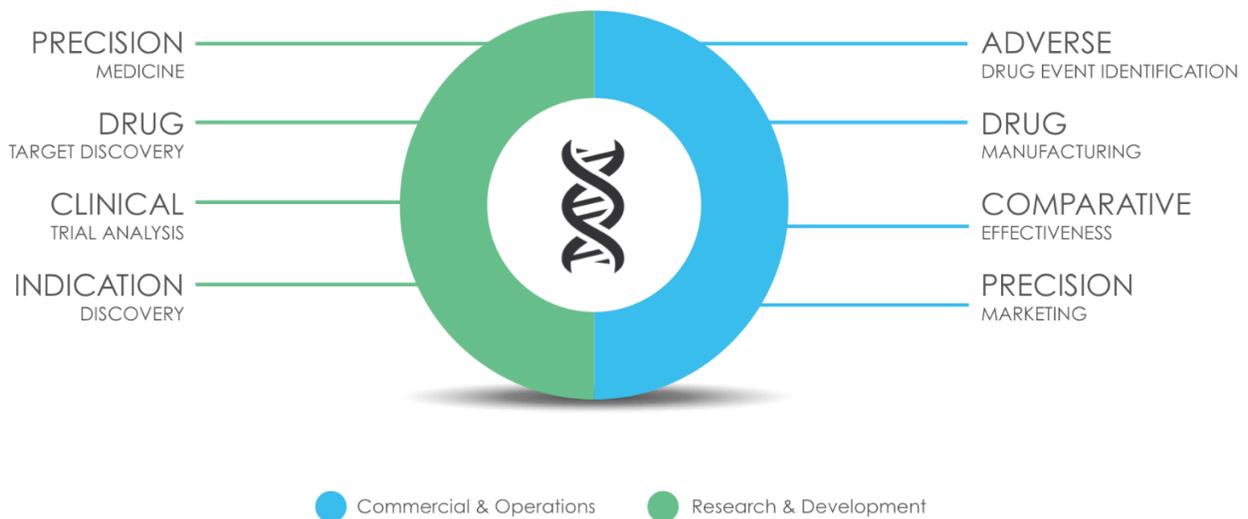
Regulators and empowered consumers are placing tremendous pressure on pharmaceutical companies to meet increasingly stringent drug quality and safety requirements while demonstrating the superiority of their therapies over a growing number of generic alternatives.

Your firms have a wealth of knowledge locked in the massive amounts of data gathered throughout the discovery-to-commercialization process that can help meet these demands. The challenge, however, lies in extracting meaningful, actionable information from data to develop and commercialize drugs faster and at lower costs.

Ayasdi Cure™ fundamentally accelerates the discovery of critical intelligence from pharmaceutical datasets. It uses Topological Data Analysis (TDA) that combines machine learning, statistics and geometric algorithms to quickly discover and visualize intelligence previously hidden or overlooked by conventional analytics.

“We conduct pioneering research to identify the genetic susceptibilities – or predispositions – of many diseases, including cancer. Ayasdi has helped us glean new insights that will lead to breakthrough drug discoveries.”

- Eric Schadt, Director, Icahn Institute for Genomics and Multiscale Biology, Mount Sinai



How Life Sciences Firms Benefit from Ayasdi Cure

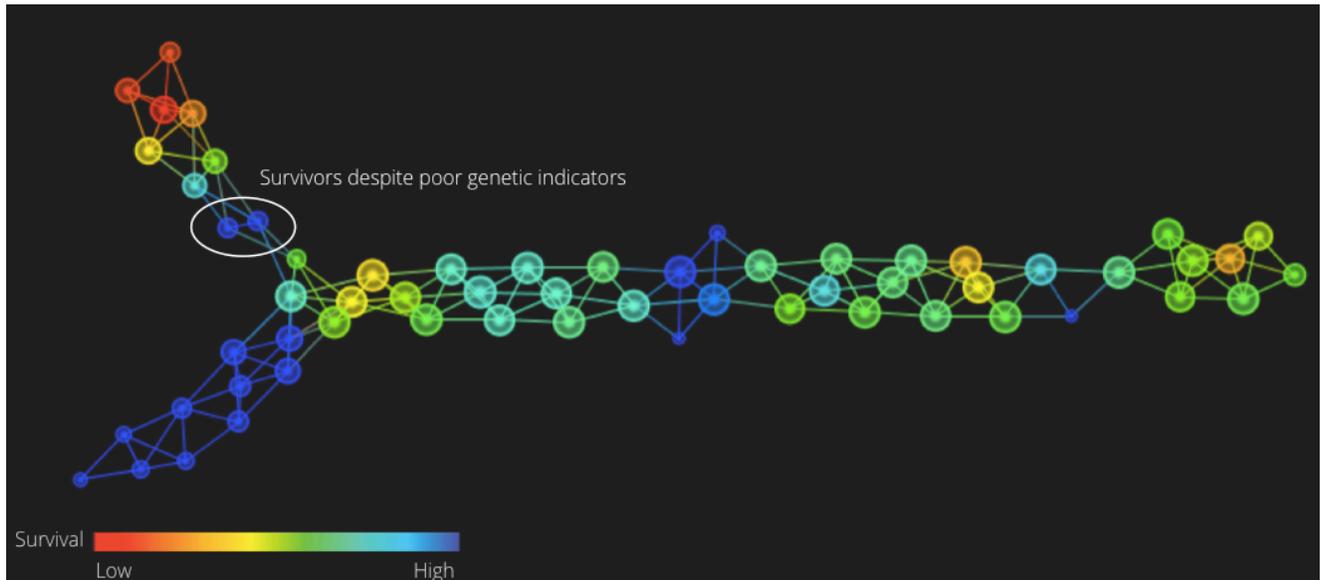
The Benefits

The uncovered insights can help your firms expedite biomarker discovery, prevent costly late-stage failures, detect adverse events early, and enable precision medicine.

PRECISION MEDICINE

Next generation patient stratification is the future of precision medicine and represents a fundamental shift in diagnosing and treating diseases. Affordable genomic testing is allowing pharmaceutical companies to combine a patient's genomic profile with other data to help understand the disease at molecular, genomic and clinical levels simultaneously. Ayasdi Cure offers your R&D departments a new level of analytical precision. It lets them explore millions of features per patient and automates time-consuming analytical work. Your researchers can now associate and analyze complex datasets that have never been analyzed together to discover and validate biomarkers.

For example, in clinical testing, small patient samples make it challenging to distinguish between disease resistance and unresponsiveness. Knowing upfront which patients are likely to develop resistance can allow your researchers to segment patients by genomic profiles and predicted responses to a treatment. They can then adjust their trial criteria, potentially saving hundreds of millions of dollars in failed clinical trials while reducing the likelihood of harm to patients.



Identifying populations of survivors despite poor genetic indicators

With Ayasdi Cure, your researchers can analyze a wide variety of complex data sets including patient genotypes and gene expressions, phenotypic data, tumor characteristics, lifestyle factors, and somatic mutations. The solution takes in all your data, from electronic health records to sequencing machine outputs, and allows your researchers to advance effective compounds within a fraction of the time compared with classical drug development approaches. This new level of precision can reduce time to approval, increase clinical trial success rates and efficacy, and reduce complications from poorly targeted drugs.

DRUG TARGET DISCOVERY

Drug discovery often requires the analysis of tens of thousands of compounds of interest to arrive at one or two drug target candidates. Determining which targets to prioritize can be a challenge.

Using Ayasdi Cure, your researchers can analyze biological pathways to identify mechanisms of action. The solution automatically uncovers the relationships between compounds and patient profiles, thereby narrowing the list of drug candidates.

For instance, an emerging drug developer used Ayasdi Cure to discover multiple biomarkers for an early-stage drug. The firm was then able to differentiate between responsive and unresponsive patients. After their pharmaceutical team had assembled the clinical trial data, they used the Ayasdi solution to validate the identified biomarkers' response to the drug within hours. More importantly, the Ayasdi solution helped the researchers discover additional significant biomarkers associated with survival.

Ayasdi Cure uses topological data analysis techniques on complex, multi-modal and multi-tiered data to identify chemical fingerprints that characterize compounds with similar potency and selectivity. The solution can further characterize compound descriptors related to activity or inhibitory capabilities to speed the discovery of hypotheses for potential drug candidates.

CLINICAL TRIAL ANALYSIS

When analyzing clinical trials, pharmaceutical firms wrestle with small patient samples and an inability to distinguish between resistance and unresponsiveness. For instance, in clinical trials for cancer, a patient can relapse by becoming resistant to the drug or because the tumor, due to its unique molecular profile, does not respond well to treatment. If clinicians knew which patients are likely to be unresponsive, they can adjust the trial criteria to target patients that will benefit the most.

With Ayasdi Cure, your researchers can automatically segment patients by their tumor genomic profiles as well as their predisposition to respond favorably or adversely to treatment. It helps them quickly identify cancer sub-types that are likely to respond well to treatment and tailor clinical trials targeting patients with that particular profile.

INDICATION DISCOVERY

One strategy to grow revenue at lower costs is to identify additional indications for approved drugs. Ayasdi has worked with leading companies that have been successful in this mission.

For example, research scientists at a pharmaceutical firm were preparing to discontinue a drug. Before doing so, they decided to use Ayasdi Cure to study the drug's impact on new biological pathways. Ayasdi Cure quickly led them to understand the fundamental biology underlying the drug's mechanism of action and its effect on a never-before-studied molecular pathway. As a result, Ayasdi helped the researchers associate dosages with patient responses and demonstrate the drug's significant differentiation over the standard of care. A ten-fold productivity improvement, intuitive analytics, and analytically supported results helped the scientists file for drug approval in record time.

This strategy opens up the possibility for new revenue streams and saves hundreds of millions of dollars in avoided Phase 1-3 clinical testing, enabling a single drug to achieve blockbuster revenues.

ADVERSE DRUG EVENTS

Nearly a million people are injured or die every year from adverse drug events (ADEs), which costs hospitals millions of dollars and harms pharmaceutical companies' reputations¹. In addition, hospitals lose millions of dollars each year as a result of unnecessary admissions, readmissions, malpractice and litigations linked to ADEs. Few consumers report these incidents, and when they do, the data is often sparse. This makes it challenging for pharmaceutical companies to differentiate benign from lethal effects and sufficiently link a particular drug to a patient's outcome.

With data now available from credit cards, electronic medical records, mobile phones and social media, however, there are new ways to predict and monitor for adverse drug events. For example, a global pharmaceutical firm used Ayasdi's solution to analyze social media data to understand consumer sentiment around the company's marketed drugs. The advanced, intuitive analytics helped detect subtle signals in the data that other methods would have missed. In another situation, Ayasdi's solution helped a firm automatically uncover a link between a drug and adverse effects in a subgroup of patients. It would have taken months or been impossible to accomplish with other approaches. Ayasdi's solution can help your firms reduce the chances of adverse events that can potentially cost billions of dollars in litigation and erode shareholder value.

DRUG MANUFACTURING AND SUPPLY CHAIN OPTIMIZATION

Drug manufacturing is faced with an increasing number of significant challenges ranging from growing drug shortages, rising complexity of therapies, counterfeit growth and new serialization, tracking and tracing legislation. These trends are pressuring your firms to create flexible supply chains while finding new ways to ensure product integrity, safety, and availability.

There are significant opportunities to uncover and remedy inefficiencies and reduce variances in pharmaceutical supply chains. However, the complexity of the data makes it difficult for current analytical solutions to produce an integrated picture of the supply chain and identify opportunities for optimization.

Ayasdi's solution is designed to fuse highly complex and disparate datasets to automatically extract critical intelligence that can help optimize demand and inventory management. It can analyze data sets from inventory management systems of distributors and pharmacies, RFID and bar code data, and more, to uncover opportunities to improve supply chain efficiencies, drive down costs, and reduce risk.

Whereas other methods deal poorly with the modern, high-dimensional drug manufacturing process, Ayasdi's advanced analytics can detect subtle connections between non-intuitive factors that can lead to improved outcomes. As a result, pharmaceutical firms can make greater strides towards creating life-saving drugs.

COMPARATIVE EFFECTIVENESS

As the costs of premium drugs continue to increase, pharmaceutical firms are challenged with justifying their prices and value to clinicians, payers and regulators. Not only do they have to prove drug efficacy with increasing detail, but they also have to demonstrate how the drug is superior to the existing standard of care and other available therapies. Current methods for analyzing data from drug superiority studies are time-consuming, highly manual and increase the burden on analytics departments.

Ayasdi Cure represents a new approach to ingesting, associating, and analyzing clinical trial results, patient profile information, and survey responses to determine comparative effectiveness. It automatically pinpoints patient segments with clinical outcomes that support the efficacy of a drug.

It can analyze merged data from disparate sources, and discover information about groups of patients that might not have been connected before. With best-in-class comparative effectiveness strategies, your firms can reduce waste in healthcare (which costs the U.S. nearly \$7 billion), improve outcomes, and increase patient satisfaction.

PRECISION MARKETING

Experts estimate that roughly 25% of pharmaceutical marketing to doctors, insurance companies and patients is now delivered over a digital platform – with 87% of respondents reporting the need for analytics to target spending and drive improved returns on investment².

Ayasdi Cure can help your firms launch more targeted and personalized marketing campaigns while monitoring drug performance across physicians with enhanced precision. It can drill down into the performance of marketing campaigns for new or expiring drugs by merging data from prescription sales, call center activity, physician profiles, social media, and patient demographics. It can detect subtle, non-intuitive patterns in the data that other methods miss. It provides an intuitive experience that saves days or weeks of manual analysis. As a result, pharmaceutical companies using Ayasdi can target patients and physicians more accurately, while improving physician and patient satisfaction. Since pharmaceutical companies spend nearly 30% of their revenues on sales and marketing budgets, reduced inefficiencies can lead to hundreds of millions of dollars in savings.

Summary

Pharmaceutical firms continue to amass unprecedented amounts of complex data throughout the discovery-to-commercialization process. Ayasdi Cure enables firms to quickly discover critical insights from this data to help produce high quality and effective therapies faster and at lower costs. Ayasdi Cure utilizes topological data analysis that combines machine learning, statistics and geometry to surface deep insights from data that can help expedite biomarker discovery, prevent costly late-stage failures, detect adverse events early, and enable precision medicine.

Ayadi's advanced analytics solution can help. It uses a new technique of topological data analysis combined with machine learning algorithms to help your firm tackle and simplify the toughest data analysis problems. By correlating and analyzing complex datasets - patient profiles, MD profiles, locations,

efficacy, safety, unit sales, patient satisfaction and social data – Ayasdi’s solution uncovers insights hidden or previously overlooked by other analytics tools.

With Ayasdi’s software, you can effectively segment your customer base, precisely target customers with the right products and services, predict and prevent customer churn, and optimize your commercial operations.

AYASDI

ABOUT AYASDI

Ayasdi is on a mission to make the world's complex data useful by automating and accelerating insight discovery. Our breakthrough approach, Topological Data Analysis (TDA), simplifies the extraction of intelligence from even the most complex data sets confronting organizations today. Developed by Stanford computational mathematicians over the last decade, our approach combines advanced learning algorithms, abundant compute power and topological summaries to revolutionize the process for converting data into business impact. Funded by Khosla Ventures, Institutional Venture Partners, GE Ventures, Citi Ventures, and FLOODGATE, Ayasdi's customers include General Electric, Citigroup, Anadarko, Boehringer Ingelheim, the University of California San Francisco (UCSF), Mercy, and Mount Sinai Hospital.

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