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Empowering insight-driven health care organizations with self-service analytics

What's at stake?

The health care industry is going through significant transformation and disruption. Legislative uncertainty, shrinking margins, outcomes-driven reimbursement, talent shortages, and consolidations are changing the industry's dynamics. To succeed in this environment, health care organizations must change the way they operate by creating a best-in-class experience. This requires an analytics infrastructure through which they can effectively share information, personalize patient care, and engage members to maximize the value to all parties.

Many health care organizations do not yet have the technology, processes, or expertise to realize the potential benefits of analytics. Decision-makers across the health care enterprise are looking for relevant, actionable information from a variety of sources to make timely strategic and operational decisions. However, limited IT resources, legacy systems, lengthy approval processes, and conflicting priorities can be barriers to meeting these needs. Overcoming these barriers requires a new approach that empowers users by giving them more timely access to the data they need. The goal of this paper is to describe how modern self-service analytics can deliver insightful information to analysts and decision-makers faster, with less hassle than traditional approaches. This whitepaper examines how self-service analytics transforms the user experience, defines a modern self-service analytics platform, and identifies important implementation guidelines.

Case Study 1: Optimizing business analyst and IT resources in health plan analytics

Issue

Disparate systems, legacy data warehouses, and business intelligence tools resulted in heavy dependency on IT staff and long lead times for analytics projects. Highly paid data scientists spent their time assisting the IT staff in preparing the data rather than analyzing it.

Solution

By implementing automated analytics tools and restructuring the analytics organization, IT refocused their efforts on data management allowing data scientists and functional business users to spend more time analyzing data and driving informed decision-making.

Impact

Business analysts were able to more efficiently connect supply chain, clinical, and financial data and analyze utilization, clinical outcomes, and supply costs. By automating data preparation and implementing machine learning-based predictive analytics, management was able to identify improvement opportunities in supplier performance and clinical variation.

Going beyond the limit of traditional approaches

A recent study ranks the United States 50th out of 55 developed countries in the effectiveness of our health care system[1]. Many regulatory agencies and independent health care organizations are recognizing the need for better ways to provide accessible, high quality, and affordable health care. To deliver the information decision-makers need, analysts must often overcome a variety of time-consuming challenges such as IT backlogs, rigid data architectures, unnecessary latency, and technological complexity (See Case Study 1 on optimizing business analyst and IT resources in health plan analytics). These challenges can limit the organization's ability to optimize the value of their investments in electronic health records, understand customer needs, and find innovative solutions to health care's toughest problems.

Self-service analytics is an alternative approach to traditional business intelligence (BI), helping enable non-IT professionals to be more independent in accessing and working with data even if they do not have a background in statistical analysis, business intelligence, or data mining. This approach uses agile methods and modern technology to automate data access, preparation, consumption, and analysis. Empowering business users with more timely, meaningful, and flexible analytical capabilities is an essential component of an effective and insight-driven health care organization and can be instrumental in enhancing diagnostic accuracy, improving patient outcomes, developing precision medicine, and supporting value-based care.

The modern self-service analytics technology platform

As illustrated in the supply chain example (see Case Study 2 on self-service analytics enabling supply chain analytics), after years of relying on busy, understaffed IT departments, many business users are experiencing first-hand access to the insights they need to make a significant contribution in their organizations. Slow turnaround times, rigid templates, and complicated tools no longer need to be barriers to analytics success. Self-service analytics offers an environment in which business users can create and access specific sets of data, queries, and reports on demand, without IT intervention. To enable this environment, a modern self-service analytics platform (See Figure 1) should support:

- Ingesting data across multiple sources, both structured and unstructured, in "right-time"
- Storing, preparing, and provisioning large volumes of disparate data to service analytical requirements
- Serving data to the business in an intuitive consumable format through a flexible and easy-to-use interface
- Managing the quality, integrity, and availability of the data through robust governance
- Empowering the user community through training, adoption, and analytics enablement

Case Study 2: Self-service analytics enabling supply chain analytics

Issue

Traditional processes for accessing and analyzing data were ineffective in meeting the business needs and did not provide sufficient visibility for buy-to-pay supply chain analysis. Dependency on IT and manual efforts resulted in delays in addressing business issues and increased risk of missed cost savings opportunities.

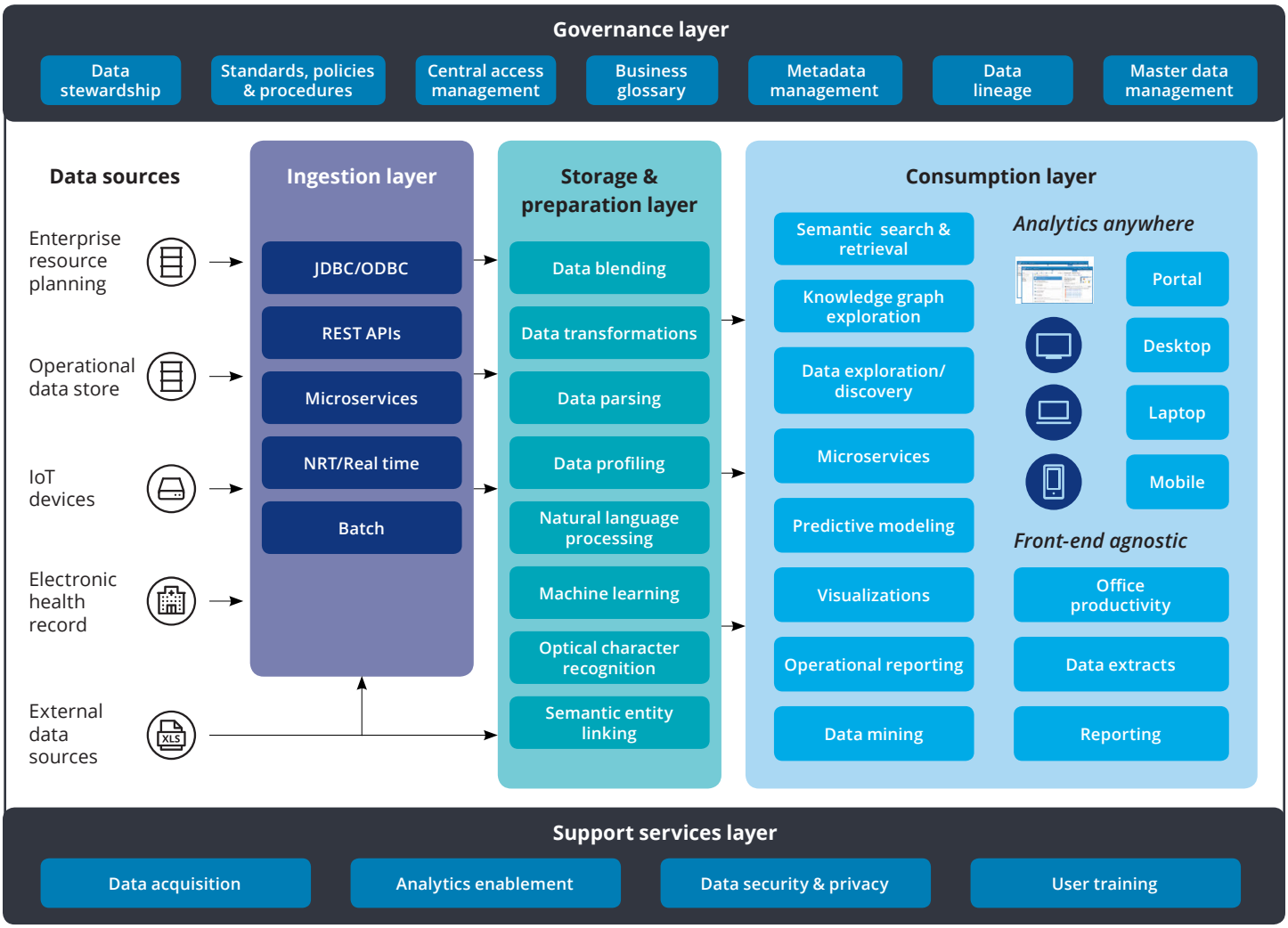
Solution

Using an agile approach, a collaborative team with representatives from various departments implemented a self-service analytics platform based on a combination of Big Data, automated data preparation, advanced analytics, data visualization and mobile technologies.

Impact

The organization realized significant improvements in analyst productivity such as reducing data preparation time from several days to a few hours, automating data access and profiling activities, and delivering analytics via multiple platforms including laptop, tablet, and mobile devices. As a result, business analysts could access, prepare and analyze data across multiple sources with minimal IT support.

Figure 1: Modern self-service analytics technology platform reference architecture



The five layers comprising this platform include:

Ingestion layer: ***Provisioning data for quick and flexible self-service analytics***

Richer insights are available from every customer interaction by combining structured and unstructured data from the expanding range of sources. Additional data sources inside and outside the organization, including streaming data and machine-generated data from connected devices (Internet of Things or IoT) further enhance these insights. Accessing, preparing, and analyzing disparate data on demand from across the enterprise is the essence of self-service analytics.

To accomplish this objective, organizations typically need technology that can successfully accept data from many existing sources and provide the flexibility to accommodate new future sources. The Hadoop ecosystem has an array of tools designed to efficiently ingest and store large sets of structured and unstructured data in batch and real-time modes. Complementary technologies can integrate data from traditional data sources and other applications. REST APIs interface with web-based applications and other third party data resources, while microservices create modular applications that can integrate efficiently with external platforms and seamlessly ingest data.

Storage and preparation layer: ***Organizing and transforming data in a format suitable for analysis***

With the introduction of Big Data, cloud, and other technologies,

data storage has evolved significantly. Large volumes of data can be stored in their native format on a distributed platform with a minimal footprint. From this point, automated data preparation tools, often referred to as data wrangling technologies, can be used to manipulate data from structured and unstructured data sources to derive analytical insights. Before analysis can begin, these technologies can enable business analysts and data scientists to quickly understand the data by exploring a variety of factors such as the number of rows and columns, the range of values, the format of various fields in the data set, and whether the data contains plausible values. Visualization tools can highlight other characteristics (e.g., data distribution, positive/negative values, etc.) before conducting deeper analyses. This can save time, improve analytical results, and allow scarce data scientists to focus on projects that are more valuable.

By using data preparation tools, an organization can also leverage advanced machine learning, pattern recognition, natural language processing, and other techniques to accelerate the process of profiling, blending, transforming, organizing, and provisioning data for end-user analysis. These tools can scan and blend multiple datasets to generate comprehensive metadata supporting data governance and stewardship. Through this process, stakeholders are often able to overcome traditional limitations in current processes (e.g., IT service requests, change requests, etc.) and generate important insights that previously required days or weeks to produce.

Data consumption layer: ***Meeting diverse stakeholders' analytical needs on-demand***

Creating a powerful user experience that is intuitive and easy-to-use facilitates adoption and value realization. Many organizations use more than one BI platform where users have different needs at different points in time. The modern self-service analytics technology platform addresses these differences with a front-end agnostic layer that accommodates a variety of user needs.

One of the most important capabilities of this layer is a common semantic layer containing a non-technical representation of enterprise data helping stakeholders locate and access data using common business terms. By mapping complex data into familiar business terms, the semantic layer can insulate stakeholders from the complexity of the underlying data environment. Semantic search/retrieval and knowledge graph exploration are techniques to guide the activities of parsing and profiling. This layer encompasses a variety of analytical tools for data discovery, reporting, visualizations, and other functions including delivery through a variety of channels (e.g., desktops, tablets, and mobile devices).

Governance layer: ***Managing integrity and quality of services and data***

As the health care data ecosystem expands to include external data such as machine-generated data, sensor data from connected devices, and benchmarks from third party vendors, governance processes must exist to manage the integrity, availability, usability, and security of enterprise data. Self-service analytics programs involve a variety of questions such as what is the authoritative source, what training is required before an analyst obtains self-service capabilities, and how analytics data may be used. To establish a strong data governance program, many health care organizations begin by cataloguing and defining their data assets across all source systems, establishing a governing body, defining a set of governance processes, and creating a plan to execute those processes.

The governance processes should include details on how data is ingested, transformed, prepared, stored, presented, archived, shared, and protected. Standards and procedures should be developed to manage data access by authorized personnel and ensure ongoing compliance with government regulations. The platform should support Master Data Management (MDM) by allowing IT and stakeholders to access a centrally managed business glossary, data dictionary, metadata, and reference data. Finally, data governance workflows with clear accountabilities should support how stakeholders exchange information and manage data assets.

Support services layer: ***Ensuring secure, reliable service meets service level commitments and stakeholder expectations***

Effective self-service programs place a heavy emphasis on the "service" aspect to create an environment which can enable and empower business users to access and work with data to obtain on-demand insights. Achieving this objective typically requires attention to a wide range of details including the technical environment, data management, end-user education, and support. During implementation, realistic user expectations should be defined and underlying support services established to build momentum and empower self-service analytics users.

Once an organization deploys a self-service analytics program, IT should provide the underlying capabilities and infrastructure components to promote adoption and end-user satisfaction. First, data acquisition involves provisioning new data sources and managing the technical environment. Second, IT enables self-service analytics by investigating, acquiring, and deploying the various toolsets and methods for use at scale. Third, the self-service analytics environment should provide a reliable, safe environment where authorized access to, and use of, sensitive data resources complies with appropriate regulations and standards. Finally, the program should include on-demand training on topics such as data access, use, tool selection, and technical support.

Implementation guidelines for successful self-service analytics

Self-service analytics represents a fundamental shift in the way IT and business users collaborate to get insights from their information sources. Historical approaches for supporting end users included creating spreadsheet-driven models, shadow systems, and custom SQL queries. These fragmented approaches often fall short in meeting stakeholder expectations. With the introduction of modern technologies, organizations can now implement effective self-service analytics programs drastically reducing development time, cost, and data quality issues by considering five important guidelines.

Guideline 1: Paint the future with a compelling vision focused on the business impact

Health care organizations are a collection of complex, interconnected processes, data, and people networks. Each network includes individuals with different backgrounds, priorities, business issues, and technical capabilities. To be effective, self-service analytics should include the flexibility to address the diverse needs of these various stakeholders and provide a clear path to meet their emerging analytics needs. A compelling vision can provide stakeholders a clear understanding of how self-service analytics can help them meet their business objectives.

The vision should answer several questions such as what business functions and systems are impacted, which stakeholders are involved, what capabilities are needed, and what benefits will be achieved. An effective vision establishes a clear picture in the minds of senior executives, analysts, and IT on how empowering functional business users with analytics capabilities will transform the organization's ability to meet the needs of its customers.

Self-service represents an important step in the journey from retrospective reporting to emerging analytics capabilities (e.g., predictive analytics, machine learning, natural language processing, and artificial intelligence). Just as a self-service model moves analytics closer to the point of action, these emerging technologies begin to establish a cognitive fabric that enables health care organizations to be more effective.

Guideline 2: Eliminate unnecessary barriers to analytics agility and decision making

Health plans and providers have complex technology environments that often limit the success of their analytics efforts. An estimated 60% to 80% of an analyst's time is often required in overcoming data-related challenges such as data scattered across multiple sources, poor data quality issues, and repackaging insights for delivery to decision-makers. For example, in the first case study, analysts depended on IT staff to combine data from clinical, claims, and supply chain systems to address business questions related to vendor performance and total cost of care. Such dependency can delay the analytics process, particularly when IT already faces a backlog of requests.

Self-service analytics can dramatically transform the relationship between business and IT staff by automating data preparation tasks and shifting the analysts' focus to understanding, discovering, and delivering valuable insights. IT staff can focus on more technically complex activities such as infrastructure management, technology optimization, and data provisioning. Restructuring processes to deliver seamless service is an important consideration that typically requires teamwork between business and IT. By automating and streamlining traditional analytics and data management activities (i.e., data provisioning, data distribution, and service delivery), self-service analytics can improve follow-through and responsiveness to drive business-driven outcomes.

Some information departments (e.g., finance, quality, actuarial services) may also be more mature in their use of analytics, while other groups do not yet have the technical skills or the incentives to perform complex data blending and algorithms design. Modern self-service analytics can automate many of these tasks, allowing business users to focus on applying their domain expertise, problem solving and decision-making skills. In such instances, a self-service analytics program includes a center of excellence where a shared pool of resources can collaborate on complex problems and knowledge sharing.

Guideline 3: Stimulate analytics discovery and data-driven decision making with a modern analytics architecture

Many health care organizations undergoing EHR and other systems implementations traditionally rely on application reporting features that come with inherent limitations in data breadth and access. As a result, many business users are unable to access and work with the data to address complex functions such as population health management, value-based care, end-to-end supply chain management, and research. Modern business analysts and data scientists need flexible capabilities to connect to data from multiple sources, in multiple formats, and then work with the combined data sets using their preferred analytic tools.

Fortunately, emerging data preparation technologies can simplify tasks that traditionally consumed analyst time or required programmer intervention to get basic reports and dashboards. These technologies can streamline access to relevant data, automatically generate technical metadata, facilitate data preparation with machine learning capabilities, and deliver consumable insights through a variety of front-end platforms. Advanced capabilities such as predictive modeling, data discovery, natural language processing, and data visualization are included in an integrated platform that supports the diverse analytics needs and enhances the performance of analysts and other information consumers.

These technologies move analytics closer to end users with the domain expertise to impact patient care and business outcomes. According to IDC, self-service analytics tools are one of the hottest areas of growth in the Big Data and analytics sector.[3] Perhaps most exciting is that the modern analytics architecture is not a destination. Rather it is the next step in a journey that positions the organization to take advantage of the convergence of other capabilities such as machine learning, digital assistants, streaming data, and Internet of Things.

Guideline 4: Engage users with a meaningful analytics experience

Many analysts and decision-makers constantly work together to address increasingly complex issues involving a variety of expertise, data sets, functional processes, and regulations. To promote effective teamwork and adoption, self-service analytics deployments include a focus on the customer experience. Without this focus, adoption can be slower, inefficient workarounds can proliferate, and IT's credibility can suffer. However, when adoption is achieved, interactions between IT and business users can be radically transformed for the benefit of all parties.

Change management, training, and continuous improvement are essential components for adoption and collaboration. Business users are trained on the new platform to perform analytic functions with minimal IT support. IT staff must learn new skills and processes to support the new technology. When training is effective, end users will engage IT staff as an exception when they need access to additional data sources, specialized skills, or analytic capabilities. When used in conjunction with self-service capabilities, centers of excellence can expedite knowledge exchange and discovery, helping enable the organization to benefit from improved communication and coordination.

According to TDWI, improving access to data, speed, and flexibility are among the top priorities for information intensive organizations.[4] When these capabilities exist, the result is a scalable platform that can easily extend to other parts of the organization, helping enable business users to address issues at their convenience using their preferred analytic tool. Similar to the transformation that has occurred with mobile devices, self-service analytics can significantly enhance human capabilities, helping enable employees to deliver incremental value to the organization in ways that have been too difficult or costly to do with traditional business intelligence tools.

Guideline 5: Define enterprise strategy through governed analytics and data-driven decisions

Self-service analytics presents a unique opportunity for health care enterprises to enhance their strategic decision making from the ground-up by empowering executives with on-demand insights about the organization across operations, finance, customer service, and sales. These capabilities can give them the ability to make more timely decisions and course-corrections, often resulting in significant performance improvements and cost savings.

To promote consistency, self-service analytics programs include controls, standards, and decision rights that are coordinated with enterprise data governance. While governance appears similar to managing traditional BI, there are unique considerations for self-service analytics. Provisioned data sets should be certified and located in a secure workspace where analysts can work without having a negative impact on their peers. Object libraries with dimensions and measures should be curated and provisioned to meet users' analytics needs.

Many data governance programs span from the original data source to the point data is accessible by analysts. Beyond this point, analysts are often on their own to figure out which data sources are most appropriate for their specific use case. Self-service analytics users can benefit from capabilities such as automated data catalogs, common business rules, vetted algorithms, and business metadata that guide them to trusted analytics insights. When aligned with an enterprise priorities and comprehensive data governance program, the organization can gain a repeatable, scalable framework that increases the agility and effectiveness of future analytics projects. Following these guidelines can expedite the implementation of a self-service analytics program and help avoid many of the pitfalls that impede value realization.

Conclusion

By 2020, Gartner predicts self-service analytics will make up 80% of all enterprise reporting[5]. This prediction is a reflection of how many organizations are restructuring their analytics functions to become more agile and successful. Those organizations who make the transition early can quickly reap the benefits while those who delay are likely to experience competitive disadvantages with a negative impact on their business and their customers.

Self-service analytics helps insight-driven organizations transcend from traditional reporting and business intelligence tools to automated data preparation and advanced analytics capabilities. Many organizations that have begun this journey have discovered that by focusing on specific use cases, engaging business users from the outset, and leveraging a modern analytics architecture, they establish a platform for self-service analytics that can be scaled across the enterprise.

Harnessing the full potential of health care data can have a profound impact on the quality and affordability of care, can break new grounds in medical research, as well as improve overall member/patient outcomes and population health. Converting this data into actionable insights that are available on-demand to decision-makers across the organization can be the key to unleashing an insight-driven health care organization. By democratizing data across an organization, new insights and opportunities open up that may not be possible with traditional approaches.

Let's talk

Are you ready to learn more about how your organization can use self-service analytics to increase the effectiveness of their analytics programs? Contact any of the authors listed below to learn more.

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References

[1] Wu, Lisa (2016 September 26). U.S. Health-Care System Ranks as One of the Least-Efficient. Retrieved from: https://www.bloomberg.com/news/articles/2016-09-29/u-s-health-care-system-ranks-as-one-of-the-least-efficient

[2] Cleaning Big Data: Most time-consuming, least enjoyable data science task Survey Says, Forbes May 23, 2016.

[3] IDC FutureScape: World-wide Big Data and Analytics 2016 Predictions, IDC, November 2015.

[4] The Data Warehousing Institute: Self-Service Business Intelligence, 2011.

[5] Gartner Makes it Official: The Age of Self-Service Is Upon Us, Feb 2016.

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