

Business white paper

Big Data and healthcare

How data analytics can improve patient care and reduce costs



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Technology is advancing healthcare in new and creative ways. From advances in treatment and disease prevention to tools that help physicians target diagnoses, technology is significantly improving quality of care and redefining the business of healthcare.

Businesses everywhere are confronting rising pressure to become more efficient. Healthcare organizations have the added challenge of needing to comply with unique regulatory guidelines designed to support public safety. Considering the essence of healthcare, one could argue that the stakes are higher than anywhere else. So how can healthcare organizations balance costs, regulatory requirements, and profitability concerns with the reality that patients' lives are in their hands?

The explosive growth in Big Data is fueling a new wave of innovation across industries. As companies learn how to harness and analyze increasing amounts of data with greater agility and efficiency, they are gaining new business insights allowing them to tackle some of their most stubborn business challenges like reducing costs and improving service levels. You can reap these rewards if you position your organization to embrace and leverage this data-rich environment and combine that with the necessary expertise and tools that are equipped to handle the volume, variety, and velocity associated with Big Data.

150 exabytes (150 billion GB) of healthcare data was recorded in 2011.

Source: Institute for Health Technology Transformation, *Transforming Healthcare Through Big Data*

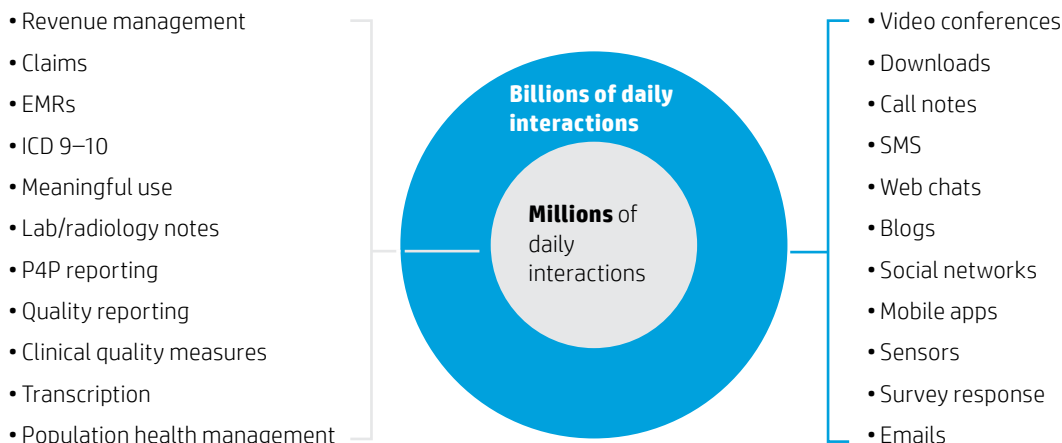
Big Data's impact on healthcare

Making decisions based on instinct alone has never been sufficient. This is certainly true in healthcare. Clinical practitioners require data to make their medical diagnosis, treatment recommendation, and prognosis. A richer set of near-real-time information can greatly help physicians determine the best course of action for their patients, discover new treatment options, and potentially save lives.

Imagine if we could collect, mine, and manage more population health data—and do so in an efficient manner. We could spend more time and resources on the projects that are directly linked to increasing life expectancy and quality of life. Managing population health, increasing speed and efficiency in collecting and analyzing data that pertains to infectious diseases, for instance, can reduce the likelihood or impact of an outbreak. On an individual patient-care level, an alert notification in a patient's file can inform a physician that a patient is an ideal candidate for a promising drug trial. The power of Big Data is that it can be realized immediately and its effects can be felt from both micro and macro levels.

Aside from its effects on overall patient care, Big Data also has the potential to significantly alter the business of healthcare delivery. Healthcare is heavily regulated. Healthcare providers are required to provide an extraordinary level of transparency and justification for their activities. If they can leverage Big Data technology not only to improve service levels, but also to more efficiently and effectively report on their activities, healthcare service providers can improve operational efficiency and increase profitability. In the U.S., for example, the Federal Government imposes penalties on organizations that exceed readmission limits. By analyzing Big Data, healthcare providers can reduce readmissions, and also effectively track and report them to government agencies.

Figure 1. Big Data for healthcare



Enterprise Information that comes from line of business systems providing structured database information that helps to run the business



Global Information that comes from internal and external unstructured sources that provides insight on the business drivers

Optimize costs

The McKinsey Global Institute estimates that the potential value from Big Data in healthcare could reach more than \$300 billion USD a year.¹

Specific cost savings will vary, but the means for lowering costs and increasing value include:

- **Reducing preventable readmissions:** It enables you to comply with a U.S. Affordable Care Act provision that reduces payouts to Medicare Prospective Payment Systems (PPS) hospitals with excess readmissions. According to PricewaterhouseCoopers’ Health Research Institute, simply implementing proper discharge planning and instructions for cardiac patients could save a 350-bed hospital \$486,000 USD every year.²
- **Improving physician and worker performance:** Big Data analytics can help improve physician performance by giving them the tools to create treatment plans based on information that validates what has worked—not only with an individual patient, but also in similar patient populations. This supports more targeted treatments that can translate into bottom line savings.
- **Drive greater operational efficiencies:** Applying proven data analytics in every area of the organization leads to better decisions being made in real time that will result in more efficiently run facilities.

¹“The big-data revolution in US healthcare: Accelerating value and innovation,” McKinsey, April 2013.

²“The price of excess: Identifying waste in healthcare spending,” 2010.

Improve patient care

Two-thirds of executives working in federal healthcare agencies believe that Big Data will improve population health management and preventive care, InformationWeek recently reported.³

Analyzing data sources like individual health records with external sources like a patient's social networks could help determine whether he or she has the level of support from friends and family needed to follow a prescribed treatment.

By having more information to work with, healthcare organizations can improve patient care in a few general ways:

- **Know your patients better:** Healthcare providers can achieve a total view of a patient by combining multiple data sources, such as medical device data, public health data, and socioeconomic data. By understanding a patient's life outside of his or her medical visits, providers can work toward more personalized treatments.
- **Track your patients better:** Big Data extends beyond any individual organization, which is what makes it so valuable. By tracking things like patient populations, current events, weather patterns, and other third-party data sources, healthcare providers can achieve greater visibility into the impact of the care they are providing and monitor patients beyond the four walls of the hospital.

Improve the entire organization

Big Data analytics have the potential to help you make sweeping improvements in your organization—even beyond those already discussed. Regulatory compliance is a top priority, but data analytics allow you to go beyond compliance and begin to fully understand the organization as a whole, including where to focus new investments without taking the emphasis off patient care quality.

In addition to the immediate benefits, Big Data could pave the way to future competitiveness. To stay competitive, healthcare providers will need to respond to patient needs as quickly, creatively, and flexibly as retailers do while maintaining the rigor and steadfast discipline necessary in delivering healthcare.

80 percent of electronic health data is unstructured.

Source: Institute for Health Technology Transformation, [Analytics in Healthcare Infographic](#)

Know your data challenges

Big Data adds to and presents new challenges in identifying, collecting, managing, and analyzing relevant information.

The Big Data challenges healthcare providers face include:

- **Legacy IT:** Many organizations are trying to manage healthcare and operational data using stagnant, closed, archaic clinical systems.
- **Data volume:** Organizations must gather and make sense of all sorts of structured, unstructured, internal, and external data from a myriad amount of sources from clinical systems to machine data (e.g., heart monitors).
- **Siloes:** Data residing in a variety of systems that support different operational processes result in error prone, largely inefficient, and lost data.
- **Lack of integration:** Disconnected systems like EMRs and clinical systems fail to provide the holistic view needed to identify gaps and opportunities.
- **Skills and tools:** Keeping up with fast-changing and advancing Big Data technologies is a daunting task when time and resources are already constrained and competition for industry and technical talent remains fierce.

³ ["Agencies See Big Data As Cure For Healthcare Ills,"](#) March 26, 2014.

The journey to data analytics

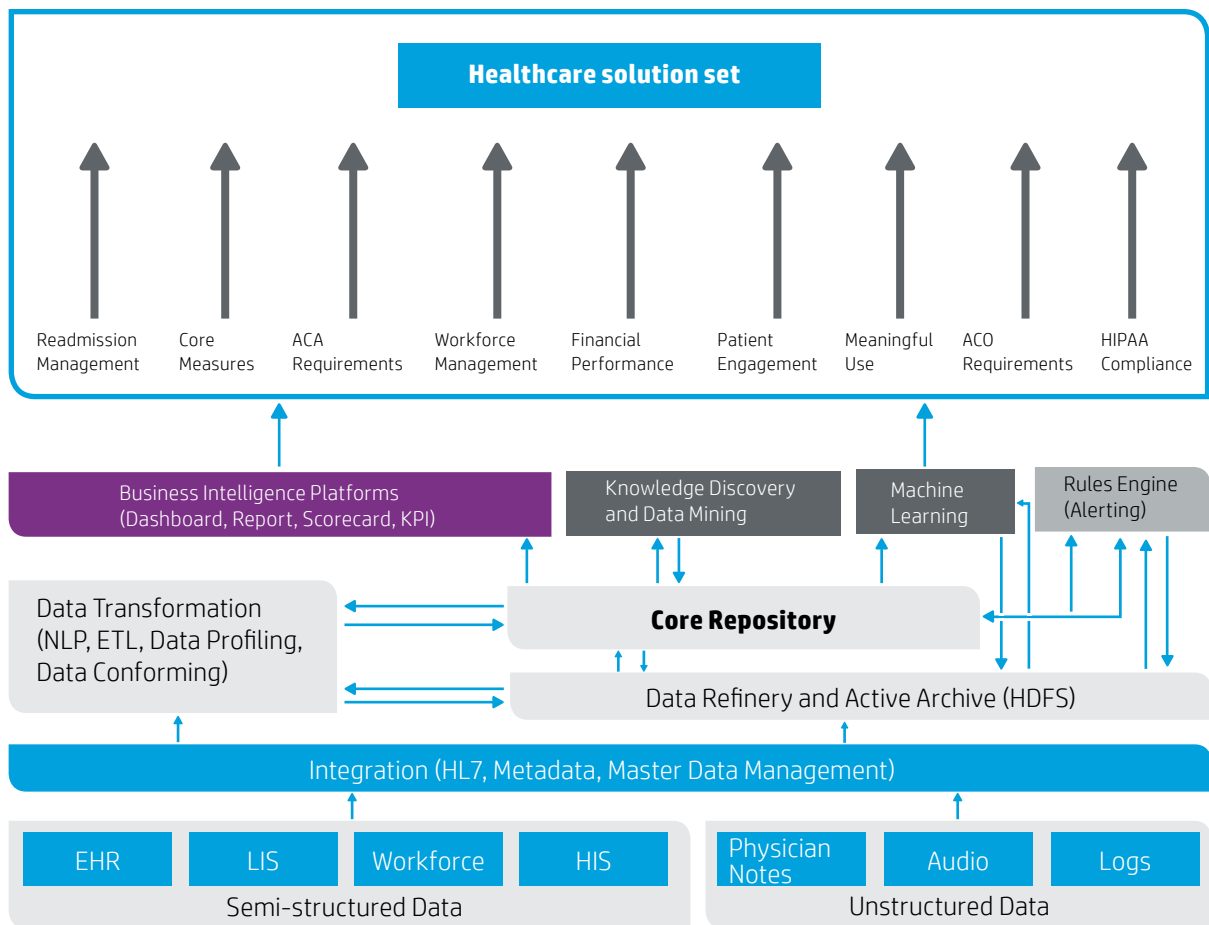
The challenges around mastering Big Data are significant but surmountable. Organizations can work toward tackling these challenges through a combination of technology and change management initiatives. Harnessing the ever-growing volume of patient, clinical, financial, and operational data in your organization is a journey. Understanding the evolution toward a data-centric organization, and where to find the right tools and services to do so, is a crucial first step.

The critical areas around data management and analytics include:

- **Data mining:** Organizations must examine large, relational databases from multiple perspectives and angles to identify correlations or patterns.
- **Descriptive analytics:** Then, they have to analyze that data in order to obtain a clearer, more detailed picture.
- **Predictive analytics:** Analyzing current and historical data to make predictions about future, or otherwise unknown, events becomes all the more crucial.
- **Prescriptive analytics:** Finally, putting all the analysis practices together to determine the best decision or course of action among many possibilities.

To support each of these valuable generative activities, you need a powerful, flexible Big Data platform and the right applications to perform the analytics that can help you achieve the strategic objectives outlined above.

Figure 2. Information flow architecture in healthcare



The Avnet HealthPath Analytics Platform

Avnet’s HealthPath Analytics Platform, powered by HP HAVEn, provides you with a cohesive view of a patient, regardless of where the data is stored within your infrastructure. The combination of the Avnet HealthPath Analytics Platform and HP HAVEn allows you to rapidly integrate systems across multiple operational and clinical areas.

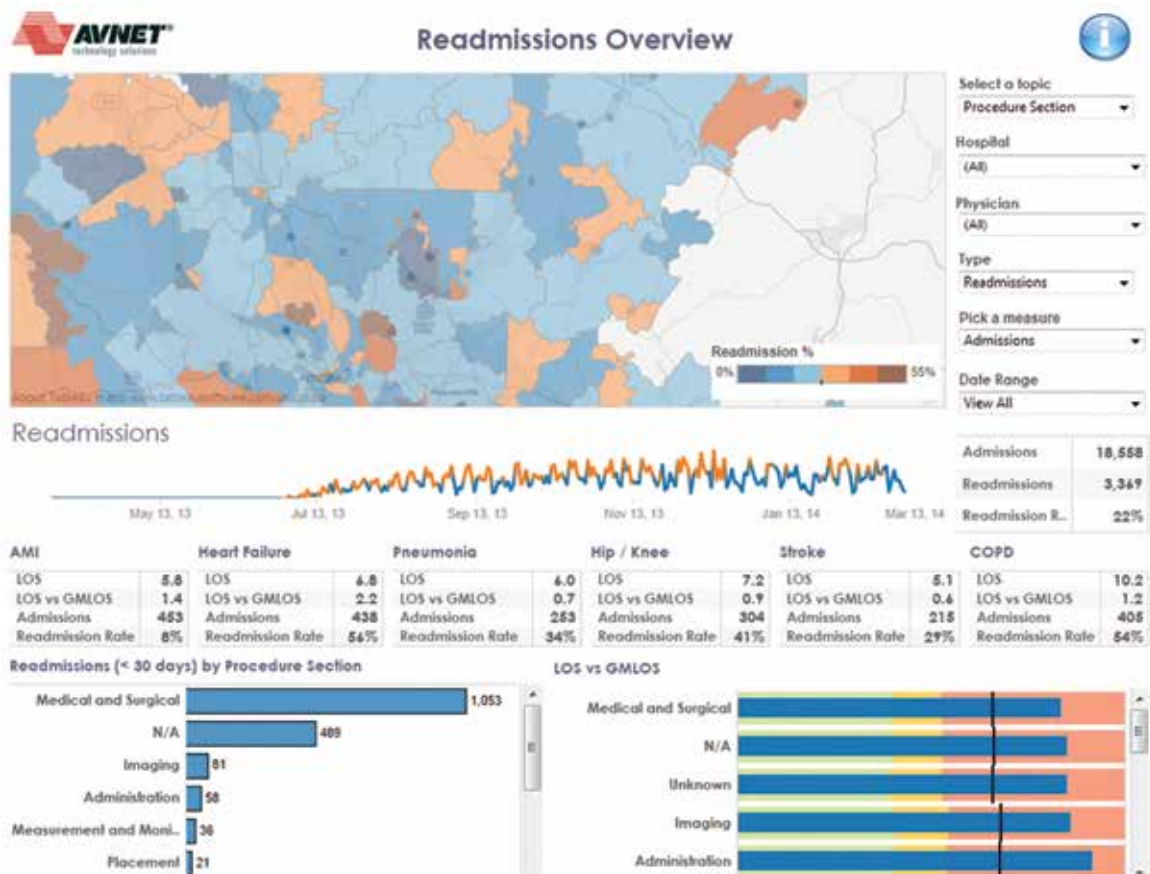
The Avnet HealthPath Analytics Platform is a modular and fully extensible platform that can include the existing and future data sources unique to your environment. With targeted modules aimed at various clinical practices, providers will be able to address specific readmissions, population management, outcomes, financial performance, and HIPPA compliance needs.

The two modules currently available feature dashboards, reports, and alerts that will aid healthcare providers in raising the quality of care, improving coordination across all care settings, and applying this approach over a much longer period than just a single episode.

The modules include:

Readmissions: This module enables healthcare providers to analyze the data across all of their systems to identify trends retrospectively that have resulted in patient readmissions. This historical data can be used to identify risk factors during a patient’s visit, allowing the physician to apply special protocols if needed. The accompanying dashboards offer a wide range of views, including insights on the unit and physician attending each patient. This is available immediately through Avnet’s community of solution provider, system integrator and value-added reseller (VAR) partners in the U.S. and Canada.

Figure 3. Avnet HealthPath Analytics readmissions dashboard example



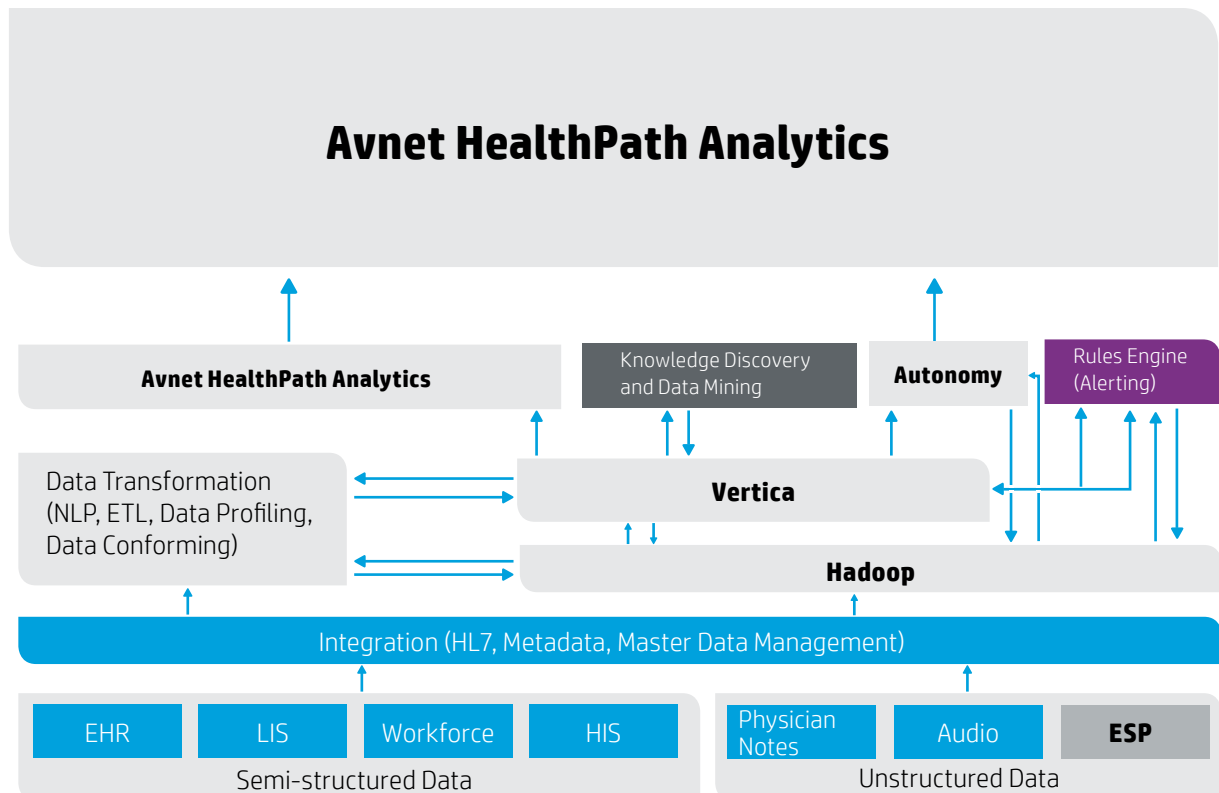
Population health management: Healthcare providers can use this tool to help them better understand how to apply their patient resources by combining disease type with demographics and other patient information. The data from the population health management module helps providers offer more patient-centric care, increase patient engagement, and enable a collaborative approach to intervention and measure outcomes. This module will be available in the second quarter of 2014 through Avnet’s partners in the U.S. and Canada.

Avnet Services is a global organization of experts in business, IT, lifecycle, and education solutions that collaborates with customers, partners, and suppliers to maximize the potential of data and IT systems. The company addresses complex business challenges with advanced technology services and solutions, delivering measurable outcomes and accelerated growth. Avnet Services acts as a single-source provider and trusted advisor throughout the continuum of a company’s hardware and software investments, from procurement through integration, operations, management, and disposal.

Avnet Services Healthcare Analytics practice brings

- a deep understanding and broad experience in healthcare technical innovation.
- certified experts across leading software platforms and Agile methodologies.
- internally created product and service solutions based on more than two decades of experience.
- integrated best practices, including the leading continuous quality improvement (CQI) strategies.

Figure 4. Avnet HealthPath Analytics on HP HAVEn



HP HAVEn

The HP HAVEn Big Data platform brings together everything you need: hardware, software, and services. A rich ecosystem extends the HAVEn platform with HP resources, partners, and integrators across the globe.

The HP HAVEn platform includes proven technologies from HP Software, including Autonomy, Vertica, and ArcSight, all of which run on COTS hardware. HAVEn also extends HP technologies with key industry initiatives such as the Hadoop distributed file system. Together, these solutions provide the capability to handle 100 percent of the data within your organization as well as external to it—structured, unstructured, and semi-structured—and securely deliver actionable intelligence from that data in near real time.

- **Hadoop:** Support for all leading Hadoop distributions with HP's open strategy
- **Autonomy IDOL:** Seamless access to 100 percent of enterprise data, whether human or machine-generated
- **Vertica:** A massively scalable analytics platform, custom-built for real-time SQL and NoSQL analytics on petabyte-sized datasets
- **Enterprise security—ArcSight:** Real-time collection and analysis of logs and security events from a wide range of devices and data sources, bridging both operational and security intelligence
- **n-Applications:** The combination of patented Big Data engines and more than 700 out-of-the-box connectors enables HAVEn to support a wide range of HP and third-party applications, content management systems, and databases. ISVs, integrators, and partners have adopted HAVEn to build new applications that address horizontal and industry-specific needs for information management and analytics. Avnet HealthPath Analytics is just such an application. It leverages the components of HAVEn to offer healthcare providers a complete analytics platform that presents a central view of quality and compliance, operations, and financial data across all clinical areas.

Choosing the right guide to your Big Data analysis journey

You need technology partners who understand the complexity of implementing an analytics solution in a healthcare setting and can help you identify the right questions to answer, the appropriate data sources to aggregate and fuse together, the proper algorithms to tailor, and how to navigate the implementation process. By partnering with Avnet Technology Solutions and HP, you can achieve peace of mind knowing that a solution is just right for your data and IT environments.

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