SOLIX®

Empowering the Data-driven Enterprise

Data-driven Healthcare for Payers

Empowers the healthcare industry with a common data platform to discover untapped data-driven opportunities.

EXECUTIVE SUMMARY

Healthcare data and its impact upon the patient care decision process via accurate, real-time, reliable data from disparate sources is creating a digital health revolution. Physician groups, nursing facilities, hospitals, pharmaceutical companies, clinical researchers, and medical equipment manufacturers are all churning out vast amounts of data during their daily operations. This data has tremendous value and can revolutionize patient care, diagnosis, real-time decisions and help deliver new, unimagined innovations with quality of patient care.

Data driven healthcare is beginning to have a huge impact with Payers. The primary drivers include controlling the spiraling medical costs and building cost optimization and efficiencies into the payer model on the basis of data and business insights, One of the payer challenges is developing a customer centric approach coupled with analytics offering actionable insights to help them resolve customer issues and complaints, gain customer loyalty, help patients manage their own health, and adapt to the dynamic patient care needs. There is a greater sense of urgency to implement changes within the healthcare payers and delivery systems quickly and efficiently by developing the right strategy and operating model. Big Data analysis can quickly and easily provide evidence to fine tune the quality of care for a patient, leading to tremendous healthcare efficiencies, better, optimal, precise payer services and a healthier world of tomorrow.

The tremendous opportunity of a data-driven strategy is apparent to the payer ecosystem. Data-driven technology solution such as the **Solix Common Data Platform** (**CDP**) provides a next generation data management platform that not only meets the analytic demands of the data-driven organization but also addresses the cost, compliance, and governance challenges that come along. The **Solix CDP** combines human and computer analysis based on huge volumes of data to produce optimal decisions at every level of the healthcare business. Providers can take complete advantage of the data-driven healthcare revolution by adopting such a technology foundation significantly enhancing patient care, and achieve tremendous efficiencies themselves.

Healthcare Revolution and Challenges En Route

We are witnessing a data-driven healthcare revolution with widespread digitization of electronic health record systems. But with compelling opportunities, we also see massive data volumes, evolving patient expectations, and expanding regulations. Data in varying formats from an increasing array of sources must be integrated to ensure optimal outcomes, whether obtaining a diagnosis, ensuring accurate claims processing, developing new pharmaceutical treatments, or addressing regulatory challenges.

To accelerate this healthcare revolution, the industry has to manage key challenges such as government regulations, information security, privacy protocols, changing technology landscape (such as electronic health records, data analytics), while also containing the cost of rolling out new drugs, plans, and products into the healthcare market. Government healthcare programs are growing rapidly and cannot be ignored. The healthcare organization's need to comply with government requirements such as accountability, the performance improvement mandate, and evidence-based outcomes, will require considering technology options to create efficiencies. Payers, providers, the pharmaceutical industry and medical equipment suppliers have unique challenges that are largely intertwined and require a concerted industry plan crafted in unison.

Payers are being challenged as the industry shifts from volume-based care to a value-based reimbursement structure that would benefit the patient, the healthcare provider and the payer. New payment models including fee-for-service only and pay-for performance creates impetus for payers to acquire, aggregate, and analyze data, not just within a siloed network, but across healthcare exchanges that include financial and clinical information about the patient. Payer challenges include compliance with the Patient Protection and Affordable Care Act (2010), implementing this value-based reimbursement and understanding the Total Cost of Care, which means working on a strategy for population health management, applying the right technologies such as analytics, and entering into new types of risk-based contracts, based upon data analytics, with the ability to identify fraud practices quickly.

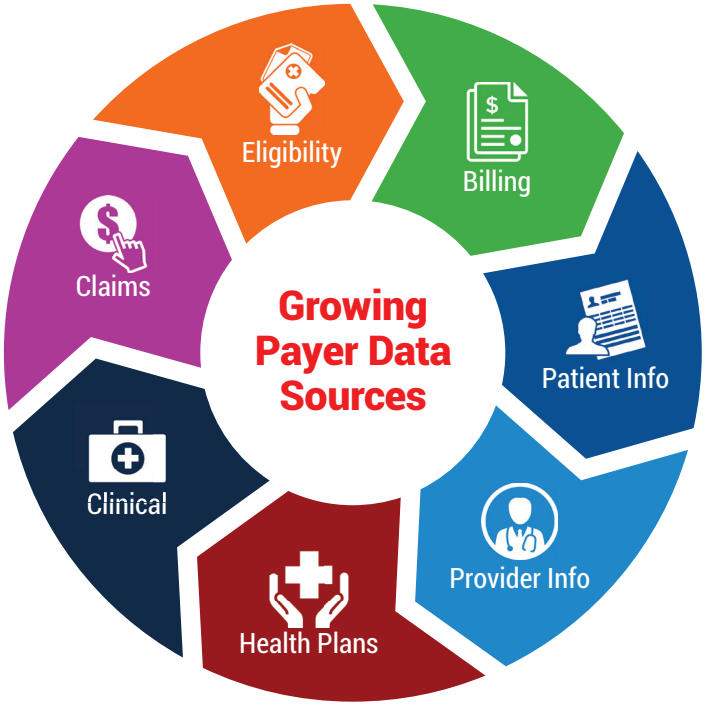
- New payment models
- Pay for performance
- Compliance with evolving regulations
- Value-based reimbursement
- Total cost of care
- Population health management
- Fraud detection

Data-driven Healthcare Can Help Overcome Industry Challenges

The healthcare industry has recognized the emerging challenges well, is reconciled to the new versus traditional business model, and is embracing the technology innovation that will position players for long-term success. Every healthcare ecosystem partner will need to optimize its business models, grow its customer base, address regulatory pressures with emerging technologies such as artificial intelligence, machine learning, block chain, and virtual reality, along with data mining, Big Data, and analytics-based approaches.

Data powered tools can accelerate this healthcare revolution with innovations shaping and improving the healthcare system to respond better to patient needs via accurate, collated, aggregated, and meaningful data that provides information and actionable insights for every segment. Payers need tools that can respond on demand to provide recommendations incorporating all the existing data and the latest medical research, while reducing the cost of healthcare and optimizing their own balance sheet. Addressing the demand for accurate, reliable data is key to success. Healthcare data is created at the source by providers such as physician groups, pharmacies and medical equipment manufacturers. Ultimately, some of this financial, clinical, and administrative information ends up with the payer, third party vendors, and government agencies.

But the challenge lies in how payers come to grips with the explosion of data and make it available in a usable form to practitioners, insurance underwriters designing new health insurance products, and private individuals trying to pick the right plan to manage their family's specific healthcare needs.



The current landscape of healthcare payer systems is complicated and fragmented across the industry with many data sources. The cost and complexity of integrating, managing, and storing data is a constant issue for everyone within the healthcare ecosystem. The payer ecosystem has multiple disparate systems exist that have a variety of data formats that make integrating, exchanging, and harnessing data a challenge. Analyzing all this data from all these sources and staging them for advanced integration and analytics is hard but very fruitful. The alternative is missed financial opportunities and a not so optimized approach to payers working with patients, providing customer satisfaction, keeping an eye on income and revenue.

The industry finds it imperative to capture and store all sorts of data that will provide the ability to run a 360-degree analysis of the patient, with an optimal patient care recommendation. The new definition of data includes free-form text such as doctors' notes, radiologists' reports, medical journal articles with the latest findings and discoveries, emails, still images such as CAT scans, videos, recorded speech, patient historic data, social media data, genome files, biometric, and other scientific data from clinical research and drug development. It also includes data from stand-alone systems - EMR, PACS, RTHS, EMPI, LIS and PMS, and Internet-of-Things (IoT) data from wearables, medical devices, respirators, blood pressure monitors, and other connected devices. All together the resulting insights can contribute to the 360-degree view of the patient, making a huge difference in the quality of care.

There is an estimated 50 petabytes of data in the healthcare realm, predicted to grow to 25,000 petabytes by 2020.[2] There are many new systems including wearables and mobile apps rolled out daily, that are adding velocity to the data growth. But there is value only if we can analyze this data quickly and effectively. The healthcare industry has realized quickly that extracting more meaningful insights via Big Data can make a tremendous difference.

[1] *http://www.zdnet.com/article/solix-launches-healthcare-data-management-platform-based-on-Hadoop/*

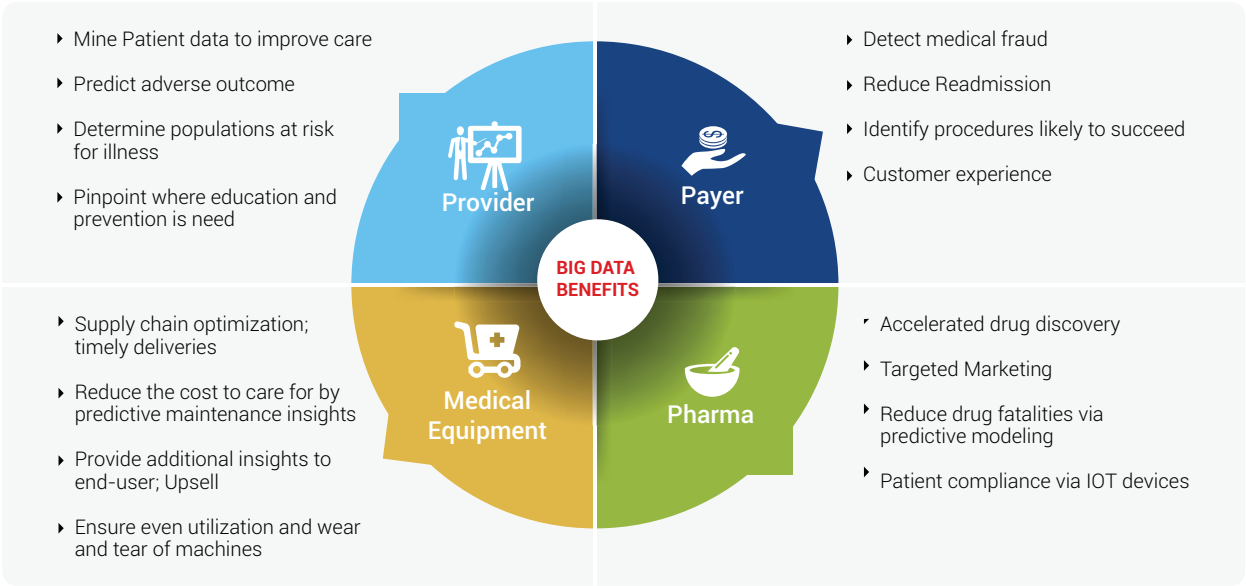
[2] *http://www.scribd.com/doc/107279699/Big-Data-in-Healthcare-Hype-and-Hope*

Big Data Can Revolutionize all the Healthcare segments

The healthcare world has created a *volume, variety and velocity* of healthcare data, a unique trifecta that, once addressed, can make huge strides in healthcare decision-making and patient care. The volume of data in healthcare, a lack of standardization of healthcare data from various sources such as providers, payers, disease-management groups, social media, medical laboratories, personalized genetic testing companies, patients' personal information, along with the need for urgency and real-time analytics that could potentially save lives, makes Big Data ideally suited to work its magic in healthcare. Big Data can be applied to prevent deaths, identify medical conflicts, even predict epidemics and cure diseases. It can proactively identify a child's potential upcoming health issues and recommend protective measures, and chart out a plan to alleviate the spend in healthcare disbursements over the child's lifespan. Big Data and advanced analytics can improve healthcare decisions on patient care at all levels, from supporting Real-Time Health Systems (RTHS) to all forms of digital medicine.

Big Data can reduce the cost of healthcare and of insurance significantly, helping to make a huge expansion of healthcare coverage a reality. Decision algorithms can provide an additional layer of support and interaction with the patient, in addition to the doctor. Big Data analysis can incorporate patient lab results, the longitudinal patient record, medical imaging, etc., to make treatment recommendations, providing better treatment while relieving the busy, overtly stretched medical professional from hours of work, allowing her to focus on higher value activities.

Providers can optimize their existing offerings by leveraging intelligent data-driven strategies to reduce soaring healthcare costs. Big Data analysis can optimize provider resources, distributing it among patients based on their condition and specific need. For the payer, application areas range from fraud detection to real-time continuous patient monitoring outside the clinical setting using personal/ IoT sensors. Other verticals have successfully targeted customers with campaigns that have increased business. The healthcare industry can do the same, but in this case to provide better patient care, to optimize existing resources, and ultimately increase revenue, providing immense benefit to the patients.



Hospitals are starting to apply Big Data to sift through complex variables such as lab tests, family history, and diagnosis, taking into account a variety of disparate data elements, in some cases to provide proactive intervention with a patient to head off a long-term costly health challenge. Payers are leveraging Big Data analysis to identify and prevent medical fraud early, saving billions annually. Pharmaceutical companies are leveraging Big Data to streamline and reduce the cost of screening compounds in drugs discovery research.

Predictive analysis models working on massive virtual databases of molecular and clinical data can accelerate the process and reduce cost, identify risk factors and can optimize yield from the drug manufacturing process. Big Data's impact upon order management for medical equipment manufacturers can improve demand planning, identify customer behaviors, and provide insights to deliver goods in a timely fashion. These are only some of the many use cases that benefit from applying Big Data.

Big Data in Action

Power clinical recommendation engines using electronic medical record data. The University of Michigan Medical School harnesses intensive care signals and integrates them with their ICU patient charts. It mines data and creates tools that combine bedside real-time facts with clinical rules to signal potential dangers within the ICU. This solution flags risk and recommends diagnostic and treatment options for the critically ill patients. Like most of these types of development initiatives, the school uses its own institution as its spearhead client. It is developing the business programs necessary to bring these insights to market once it feels confident of the efficacy of the solution.

Create an institutional benchmark for cancer treatment. Memorial Sloan Kettering Cancer Center built a longitudinal repository of individuals with cancer with great fidelity. It combined publicly available Centers for Medicare and Medicaid Services (CMS) data's administrative facts such as diagnosis, procedure codes, and provider IDs with clinical facts, such as what cancer stage, from the National Program of Cancer Registries. This greatly enhances the meaning of the administrative data allowing the center to compare one institution's results for similar cancers to another. The melding of two public data sources to gain insight about the efficacy of cancer treatment across the US is a significant achievement.

Ref: *Forrester Research report, 'Seven Ways Big Data Improves Healthcare Outcomes'*

Big Data Needs a Big Technology Shift

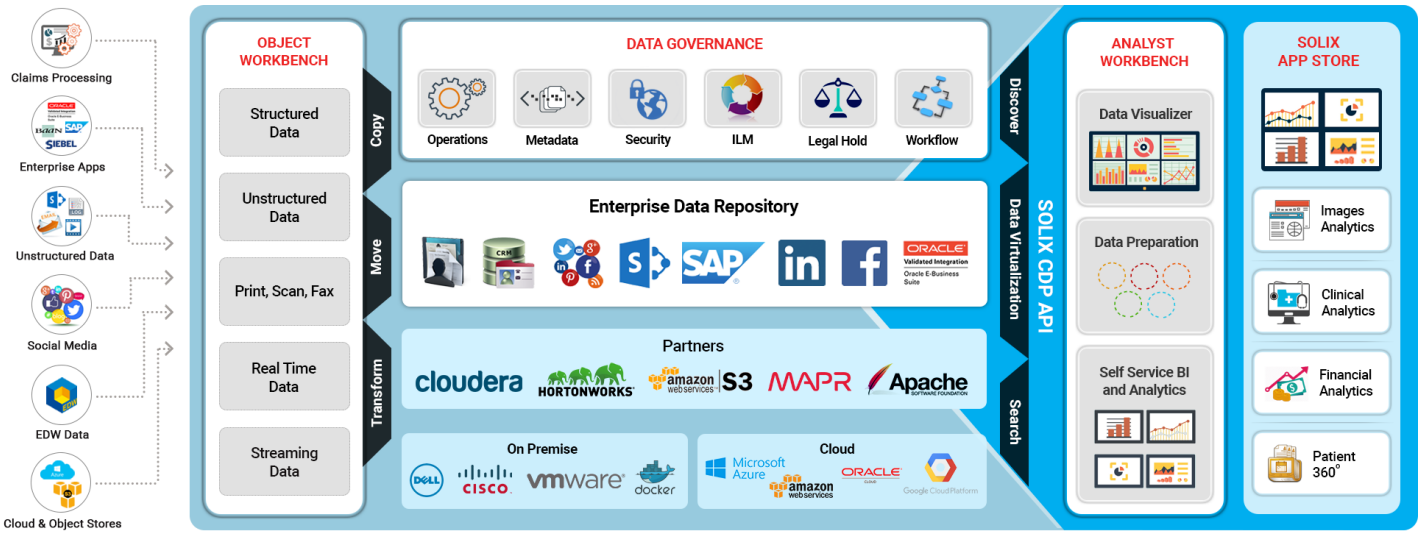
Traditionally, organizations depended on the Enterprise Data Warehouses (EDW) for all their analytic and business intelligence requirements. However, with the rapidly evolving analytics landscape and the adoption of Big Data, traditional EDWs are falling short of the capabilities needed. Not only are EDWs prohibitively expensive, they lack the ability to store and process unstructured data, and the healthcare industry has more unstructured than structured data. Additionally, due to its schema-on-write requirement, EDWs cannot support the ad-hoc rapid exploration of data which is now become a key requirement of every data driven organization.

A Big Data technology platform such as Apache Hadoop provides in-built advantages to help realize the data-driven healthcare vision by ingesting a wide variety of healthcare data, whether structured, semi-structured, or unstructured, in a single repository in low cost bulk storage, eliminating costly and slow ETL processes. The data is stored "as-is" and applies a schema on read. This allows ad-hoc analytic query and in-memory processing in real-time as and when needed. Apache Hadoop also provides massively scalable distributed processing, which is required for complex machine learning and analytic use cases. Finally, Hadoop enables advanced text and voice search, structured queries and advanced analysis tools working seamlessly against multiple data types and formats. Hadoop provides the ability to ask ad-hoc questions to get quick responses, along with the ability to drill down to precise information based upon a natural language search.

However, Apache Hadoop does not provide enterprise grade capabilities such as codeless data ingestion, metadata management, Information Lifecycle Management (ILM), data governance and security. Additionally, the constantly evolving Hadoop ecosystem makes it a daunting task for enterprises to identify which newer Hadoop technologies are worth incorporating as part of their Hadoop cluster. What exacerbates the problem is that Apache open source technologies are not designed to work together and have no industry standard interfaces, making building a full technology stack a daunting task requiring scarce skills. Organizations need an enterprise grade Big Data management system built on Apache Hadoop such as the Solix Common Data Platform (CDP) for Healthcare.

Introducing Solix Common Data Platform (CDP) for Healthcare

The Solix Common Data Platform (CDP) is a highly scalable and robust next-generation Big Data management platform that features uniform data collection, metadata management, data governance, ILM, data security, data discovery, and a full set of interfaces to support plug-and-play stack creation and modernization. It leverages the high-performance and low-cost characteristics of the open source Apache Hadoop framework to allow economical storage and real-time processing of petabytes of structured and unstructured healthcare data.



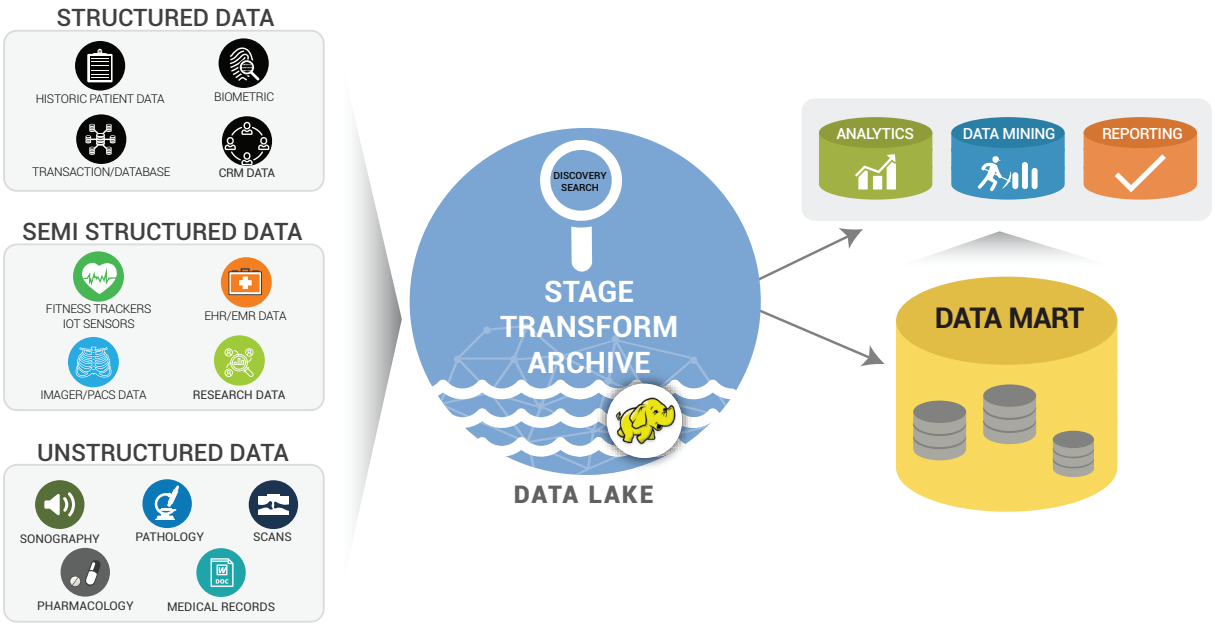
Solix CDP stores data "as-is" to eliminate costly ETL operations during data ingestion and provides an ability to transform data post-ingestion to feed the unique needs of downstream NoSQL and analytic applications. It includes modern Big Data processing engines like Apache Spark, Impala and Hive, to meet the machine learning and advanced analytic needs of today's real-time Data-driven organizations.

With a built-in enterprise data lake, enterprise archiving, application retirement, and eDiscovery solutions, Solix CDP provides organizations with an unparalleled enterprise data management and analytic tools and framework. This makes it possible for organizations to leverage data for effective medical diagnosis, clinical trials, drug discovery, and fraud prevention, while saving on storage costs and complying with complex healthcare regulations (including HIPPA, HITECH, CFR etc.).

Solix CDP is certified to operate with both the Cloudera and Hortonworks Hadoop distributions. Additionally, it can be deployed on-prem or on the cloud (supports AWS, Azure, Oracle and Google cloud).

Solutions Overview:

Enterprise Data Lake for Machine Learning and Advanced Analytics

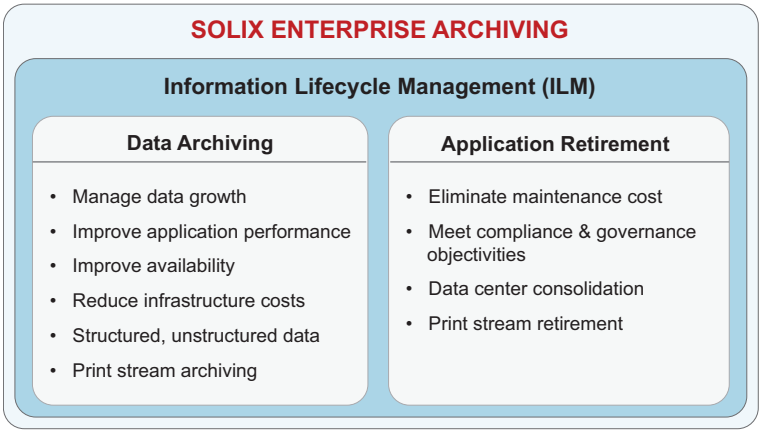


The Solix CDP-enabled healthcare data lake is a self-contained enterprise data hub that provides robust data collection, data governance and data preparation tools with self-service visualization and business intelligence. It provides authorized data consumers with a singular repository of structured and unstructured healthcare data from a wide range of data sources including EHR, PACS, health trackers, diagnostic equipment, published research, and more. This data is captured into the repository by Solix CDP in an "as is" form along with its associated metadata. This eliminates the need for costly ETL during the ingestion process, while making it easy to discover, understand, and consume data. It would be nearly impossible and extremely expensive for any traditional EDW to incorporate such variety and large volume of information at such velocity.

The metadata captured during data ingestion coupled with the strong data governance and data security features of the Solix CDP ensure the data in the healthcare data lake is made securely available to the right people with little or no support from IT. Additionally, the in-depth data preparation features and the inclusion of advanced open source data processing engines, like Apache Spark and Impala, make the healthcare data lake an ideal platform for machine learning and advanced healthcare analytics.

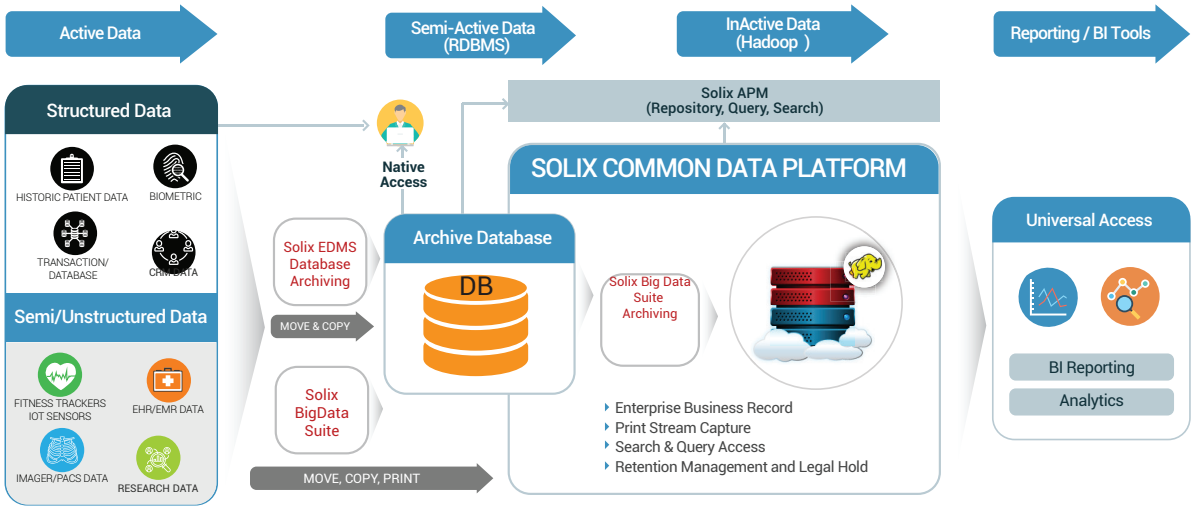
Owing to its advanced data storage and data processing capabilities, the healthcare data lake can enable a wide range of predictive and prescriptive analytics necessary to support delivery of quality healthcare services leading to better patient outcomes, cost reduction, identification of abuse and fraud, better clinical research, and more.

Enterprise Archiving and Application Retirement



In a typical enterprise, up to 80 percent of data in core production applications is inactive and up to 40 percent of enterprise applications are rarely used. This holds true even in the healthcare industry with large volumes of unused data in EHR, PACS, ERP systems, and the many legacy applications occupying the IT environment.

At a time when organizations are looking to reduce costs, reallocate resources to high ROI driven IT activities, enterprise archiving and application retirement are a boon. As part of enterprise archiving and application retirement, application data running online is first moved into Tier 2 or Hadoop infrastructure, and then purged from its source location, according to data retention policies defined as part of the ILM strategy. Archived data is further classified for security and compliance requirements such as legal hold, and universal access is provided for business users through role-based structured reports and full text search.

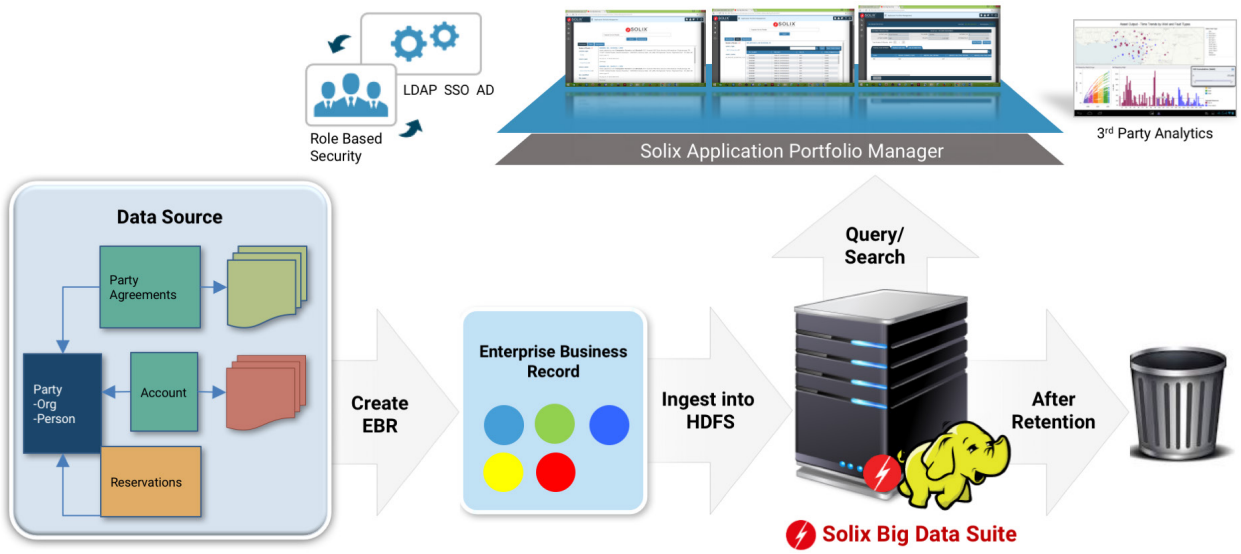


Enterprise archiving and application retirement frees up valuable resources in production environment and eliminates unnecessary license and maintenance costs. This could translate into millions in potential savings for a healthcare organization.

Enterprise Business Records (EBRs)

By modeling, ingesting, and managing all types of data into a single Hadoop repository, the Solix CDP enables the creation of an Enterprise Business Record (EBR). An EBR is a denormalized, point-in-time snapshot of a business transaction, which may include structured, semi-structured, or unstructured data elements.

EBRs support both the regulatory and analytic use cases by providing a quick and well-structured access to complete transactional data along with a history of changes. EBRs are accessible via text or voice search and Restful APIs.



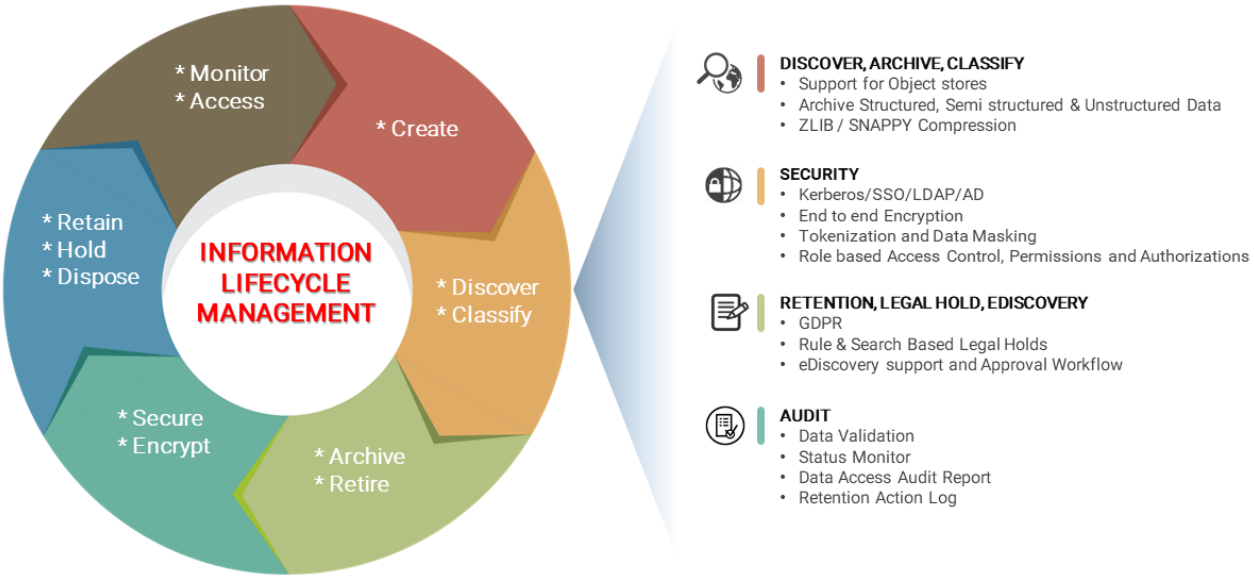
Data Governance, Security and Compliance

Proper data governance requires that compliance and security measures be in place, and nowhere is data governance more vital than in the highly regulated healthcare industry. One key question in any patient privacy audit is who has the access to sensitive information. Each time someone on the payer staff needs to access a patient record, proper authentication must occur to ensure that only those with permission to access records can do so.

The Solix CDP provides a robust, multi-layered security model:

- **Perimeter:** Kerberos and AD/LDAP protect the Hadoop cluster with authentication and network isolation.
- **Access Control:** Apache Sentry manages what the data users and applications can access by roles based permissions and authorizations.
- **Encryption/Masking:** End-to-end encryption for data when in motion and at rest, tokenization and data masking to restrict unauthorized usage
- **Audit:** Audit trail and reporting on the complete data lifecycle including security classification, lineage, access, retention, legal hold, etc.

Additionally, the Information Lifecycle Management (ILM) capability discovers and classifies enterprise data and then establishes rules and retention policies to manage the data throughout its lifecycle. Comprehensive retention policies with exception handling such as legal hold and GDPR help further in meeting complex regulatory and compliance requirements.



Data-driven Finance - Emagia Receivables Management Suite

The ready-to-deploy Emagia Receivables Management Suite (ERMS) is about finding the most cost efficient resources to accelerate cash flow. EMRS ensures the most effective receivables, credit policy management, and automation of credit-to-cash (CTC) and order-to-cash (OTC) processes.

EMRS is a leading data-driven solution helping customers improve their return on cash. With the introduction of new reimbursement plans (MACRA rules, QPP, MIPS, ACO) a huge amount of data needs to be analyzed to arrive at an appropriate reimbursement formula to maximize incentives. Emagia Cash provides enterprise OTC and CTC solutions to transform, automate, and optimize receivables, credit, and collections.

Furthermore, hospital networks have decentralized silos of financial information, each with separate cash management systems. By consolidating disparate cash systems with the Solix CDP, EMRS delivers dramatic credit risk reduction, DSO improvement and cash flow maximization.

Conclusion

Payers now have an impetus to optimize their plans, and build performance based metrics with the access of data and business insights. With the resultant access to vast amounts of structured, semi-structured, and unstructured data, they can potentially identify patterns to build a healthcare system that is not only efficient, but proactively addressing the patient needs, while avoiding data breaches and fraud.

To be able to draw meaningful correlations from these patterns, payer organizations need to embrace the best of Big Data technologies. Unfortunately, these technologies can be quite complex and daunting. The good news is Solix CDP is an enterprise grade Big Data management platform that leverages the best of open source technologies combined with enterprise class data collection, governance, and discovery features. In a world where data analysis is the key to success and data is measured in exabytes, the Solix CDP is vital.

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