Innovation The Research Concept

Modernization of Health Care Processes using Big Data, Cloud, MDM and Hybrid Applications

Abstract

In this article -Why we need to use these technologies in Healthcare? Today when these technologies are being widely used in almost all area which touches human lives to take competitive advantages by data driven decision making. Similarly Healthcare sector –which touches everybody's lives – can take advantages of these technologies in an increasingly competitive and disruptive market environment. Data-driven decision making is the top reasons why organizations decide to embark on master data management (MDM) projects and incorporating MDM functionality into their analytics-based processes. MDM is a discipline that includes the people, processes and technologies for creating an authoritative view of core data elements in enterprise operational and analytic systems. Master data process clean and consolidate data coming from disparate source and represents golden records of data (Single version of truth). It deals with issues like data duplication, non-standardized of data and combining data from different domain/source systems. MDM have been implemented in multiple domains - Healthcare is one of them. In this paper we have done an in-depth analysis of the various challenges faced in healthcare domain and proposed a strategy for governing/dealing with healthcare data.

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Introduction

Master—Master data is the key for Healthcare business and generally fall into four categories: People, Things, Places and Concepts. Further they are grouped according to their Subject, Domain or Entity type. For example Peoples customer, employee, or third party personnel. Things as product, store, commodity orasset.Conceptsas agreement, warrantee, orlicenses.FinallyPlaces as office locations, sites or geographic divisions. Some of these domain areas may be further divided. For Example Customer may be further segmented based on their priority or credits. Product may be further segmented based on their category, sector or industry. In the context of the healthcare sector common master data includes information about patients, health plans, services, locations, other related entities and the relationships among them. Centralization of this data can create a single version of truth on which a healthcare organization can depends for its analysis and planning. Informatica has created a healthcare data management solution that enables healthcare providers to infer relationships among core business entities (Figure 3) and deliver rapid, reliable insight for decision making.

The Informatica healthcare data management solution is a combination of Informatica MDM – leading master data management software and a business intelligence technology of choice. It is based on a single platform with a flexible framework. This solution meets current needs while creating a foundation for future change.

Objective of the Study

Find out which data platform and analytics solution are best suited to process, predict and visualize the healthcare data that generates on continuous basis from different sources on 24/7 and 365 days basis (Big Data). Many Healthcare organizations have existing analytics solutions in place, where internal data are stored and analyzed. In case of Big Data large amounts of data need to be analyzed in real time. Existing solutions

can be replaced by following two cost effective solutions while taking the competitive advantages of business.

1. Cloud-based analytics solutions offer benefits in terms of scalability and cost effectiveness. Cloud services enable Healthcare's providers to scale up and pay only for what they use (gained processing power of cloud based solution) by using a payment model. Cloud services are an economical way for small scale healthcare organization to take the competitive advantages of business.

2. Hybrid Cloud solutions are for those who are not ready to move completely towards a Cloud solution instead wants to heal up career. This support organization to move partial amount of data to be analyzed as per their requirements with enhanced security of on premise solutions.

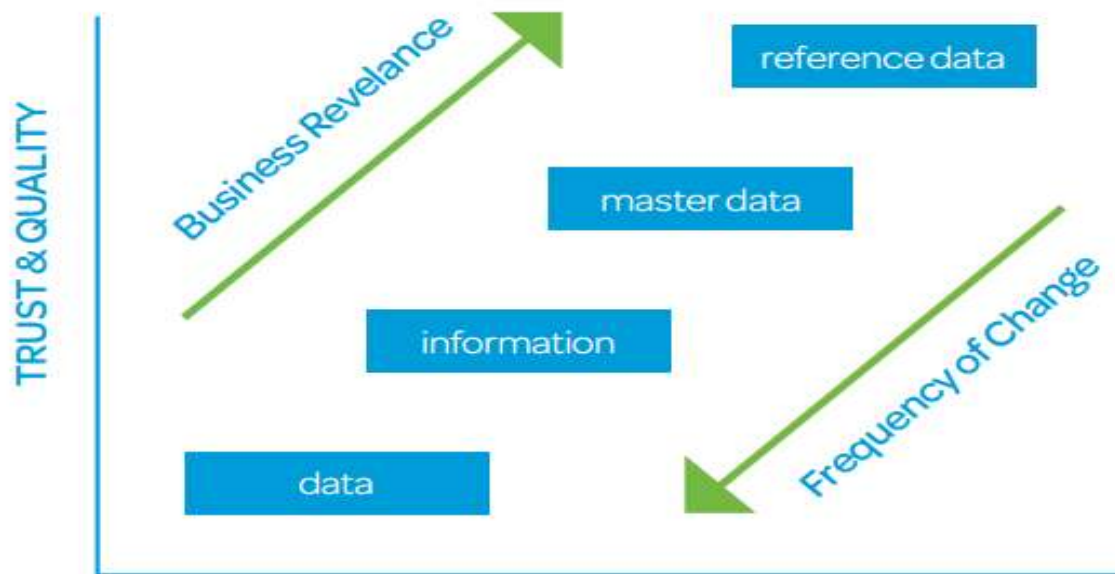**Common Challenges in dealing with Healthcare Data**

FIGURE 1: BUSINESS RELEVANCE

Types of data in organizations
Unstructured

This type of data found in e-mail, white paper, magazine articles, corporate intranet portals, product specifications, marketing collateral, and PDF files.

Transactional

Data related to sales, purchase orders, invoices, claims etc.

Metadata

This is data about data. It may reside in repositories or in various forms such asXMLdocuments, report definitions, column descriptions in a log file.

Hierarchical

Hierarchical data stores the relationships between variousdata. It may be stored separately as descriptions of real-world relationships such as company organizational structures or product lines as well.

Issue with healthcare Data

Data about patients, physicians, employees, services and locations are incomplete and fragmented across multiple systems, it's virtually impossible to

manage the relationships among all of these entities and derive insight from their interactions.

The most common information-based challenge for healthcare providers is the lack of complete, consistent master data. Which leads following key operational problems?

1. Inaccurate reporting for quality improvement
2. Difficulty in making patient growth strategies
3. Lagging organizational response

Healthcare data Management

Healthcare IT executives developing and operating solutions that integrate data from a range of Patients, clinical and back office systems to healthcare Providers, Payers, Technology and Pharmaceutical companies.

Master Data Management

From the patient diagnosis to systemic improvements in care delivery, Master data management (MDM) is a comprehensive method of enabling an enterprise to link all of its critical data to one file (Master File) that provides a common point of reference. When properly maintained. MDM streamlines data sharing among personnel and departments.

In order to effectively serve healthcare economics, finance, actuarial and a number of departmental medical informatics business units, data must be integrated. Data management teams must maintain a variety of data classifications to support a myriad of operational functional areas of a health care organization. Most commonly, these types of solutions are incubated in the form of data repositories, such as analytical data stores, operational data stores, data marts and

Data warehouses. Data governance and data stewardship programs are the primary tools to enabling accountable business and technical staff. In this context, it must be emphasized that controls and governance must be business steward driven for the classification of data domains.

Reference Data Management

RDM solutions are essential to turning the basis of healthcare reference codification into a human scalable exercise that can be directly plugged into a company's data integration or business intelligence functions.

Master Data Management

Master Data Management is considered an over arching practice of managing the most important data domains through your organization and across multiple systems in order to create an authoritative source.

Concepts and Hypothesis

Reference Data Management (RDM) can be defined as a specific domain of MDM practices revolving around codes, classifications and taxonomies.

In fact, these data domains may be different from organization to organization. It is important to understand this concept because it helps in clarifying the business value behind the problems that is addressed by MDM.

Some of the typical quick MDM and RDM definitions include:

Create a single source of the truth

1. Provide proactive data quality
2. Implement process for data
3. Allow cross organization collaboration
4. Enable a data governance strategy
5. Synchronize and aligns systems
6. Improve and enable more accurate reporting
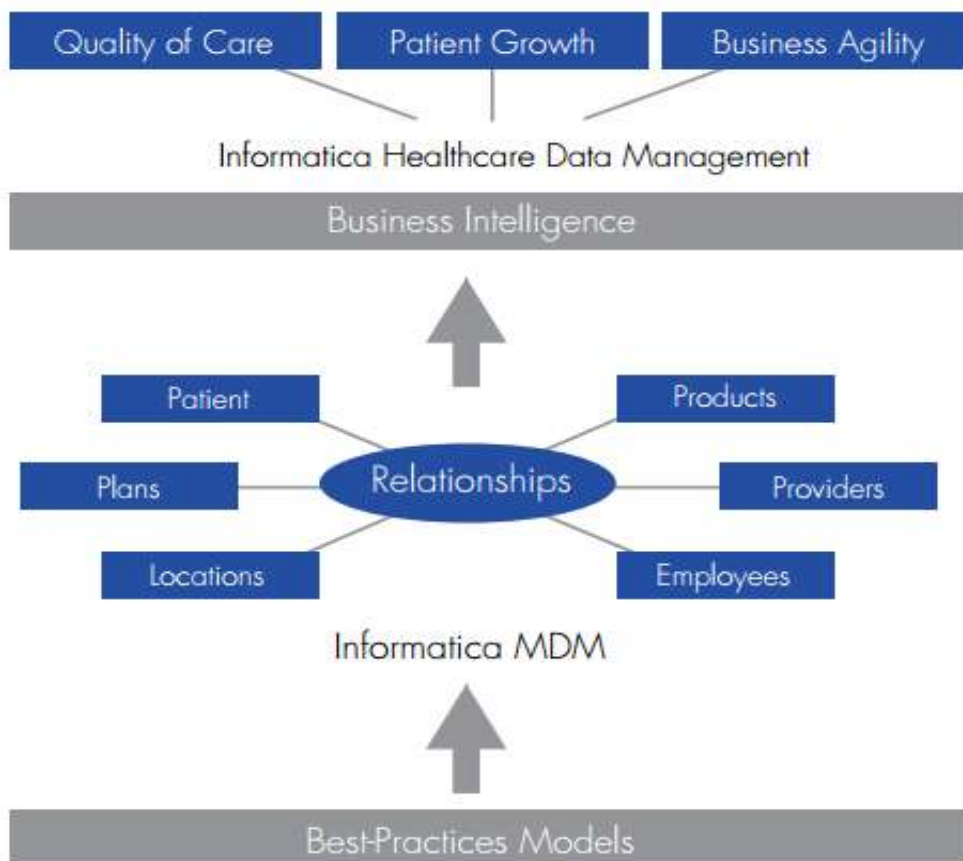7. Provides stronger ties for analytics and operational
8. Intelligence

Figure 2 : The Informatica- healthcare data management solution reveals relationships among multiple entities to improve quality of care, facilitate patient population growth, and create a foundation for business agility.

Data Governance

Encompasses the management and ownership of data within an organization. It includes people, processes and technology needed to make sure the data is secure, accessible, and available and used in an appropriate way.

Data Stewards

Are the people who understand workflow, enforce standards, maintain data quality and empowered to make decision about data. They help in making governance in reality in an organization.

Data Integration

This process make sure that all systems are using the Master Data from the system of record. Organizations can cascade their Master Data to other ancillary systems in either a transactional mode or a batch mode.

A transactional approach is more real-time whereas the Master Data is updated; Updated information is sent to ancillary systems immediately as all systems are synced.

An example of this would be, if any time a patient information is added/updated in the EHR (Producer of patient information), a real time HL7 message is sent to the LIS or RIS and other systems to make sure that the most updated patient information is available at all places at all times.

While in batch mode, data is extracted from the designated source system on a periodic basis and uploaded/updated to the ancillary systems. In this approach, there is a lag between systems (Source and Ancillary Systems). Although this is not the preferred way but is still better as not having any process in place.

Data Remediation

This process deal with data quality and data matching issues. Not all information can be matched using algorithms and sometimes manual intervention is needed for data matching issues.

Concept of MDM

To fully understand and take advantage of the benefits of MDM, you must be familiar with standard MDM functionality and corresponding methodologies.

MDM is a discipline that includes the people, processes, technologies and methodologies for creating an authoritative view of core data elements that empower critical enterprise operational and analytic systems.

This core data is typically described as the "nouns" in your business, such as customer, supplier, patient, healthcare organization or product.

It's also important to know what master data is not. Generally speaking, actions between two or more nouns in your business (a customer "buys" a product) and that are usually referred to as transactions are not master data.

You will find that data that is separated in silos are ripe candidates for mastering. Each data silo has its own business rules and data structures and these might not be compatible from system to system.

MDM frees data held in isolation and combines it with like data, thus multiplying its utility.

While there are many different approaches to MDM and just as many use cases, one common and convenient way to delineate MDM initiatives is by the way data flows through your information technology landscape.

The two most common categories of use cases are separated into operational MDM and analytic MDM. Operational MDM generally means that as you manage master data, you are integrating master data elements back into the systems that were the source of the data in the first place. The unique customer best records, which contain a combination of data elements from your billing system, call center, and reservation system, are made available to those systems, so they might benefit from the collective view of key customer information.

Operational MDM usually incorporates both batch and real-time processing. Analytic MDM, on the other hand, still generates entity best records in much the same way as an operational MDM framework would, often in batch processes.

But rather than providing a round trip for the generated master data back to source systems, Analytic MDM usually pushes the master data in one direction toward a data mart or other repository that provides source data to analytic, decision management or reporting systems.

MDM is cross functional, it benefits from an organization that fosters collaboration between business and IT. Rapidly changing technology drive periodic application reengineering but the business customer remain with the organization .Clean, consolidated and accurate master data seamlessly propagated throughout the enterprise can save millions of dollars, increase market base, improve customer loyalty and support sound corporate governance.

Most organizations will continue to maintain a variety of on-premise and cloud-based applications and a common platform for hybrid integration enables them to reduce the overall cost and IT time associated with delivering, testing, and maintaining integration over time.

A hybrid integration solution leverages the benefits of the cloud while addressing the complexity and scale demands of traditional enterprise application integration, driving faster time to value and lower initial and ongoing costs. Companies adopting them gain the flexibility and agility they need to maximize the value from their cloud applications while ensuring their existing on-premise application investment can be optimized as well.

Review of Literature

Increased adoption of cloud applications has driven demand for integration of those applications with other cloud and on-premise applications and both traditional integration providers and cloud startups responded with cloud integration solutions that fit the typical cloud application paradigm. In most cases, they were based on a set of prebuilt adapters, designed for less-skilled developers or business analysts too rapidly link cloud applications and data together and supported ongoing iterative changes and

the kind of self service expected by users of cloud applications.

Research Design

Reduced training and staffing costs. Although moving to a new hybrid solution requires some initial training costs, use of common integration architecture for all integration needs reduces ongoing retraining and relearning time and cost, increases the possibility of reuse to reduce the overall time to deliver new integrations and reduces the overall maintenance burden.

Reduced overall integration technology (software) investment. Rationalization of an organization's integration portfolio reduces overall software costs by increasing the volume of integrations managed by one platform and the need for additional point purchases to meet specific cloud or on-premise needs. Rationalization also eases initial and ongoing vendor management and finger-pointing in a complex integration environment.

Faster time to value. A common toolset and reuse capabilities, as well as the ability to leverage the advantages of a more streamlined user interface, reduces the time for business analysts and SaaS administrators to deliver new integrations and reduces the reliance on limited IT developer resources.

Conclusion

Improved Quality of healthcare services

The Informatica healthcare data management for Providers solution leverages MDM for consistency in patient, provider, procedure and facility information. Using this data both specifically and in aggregate, healthcare organizations can achieve a deeper understanding of patient populations and pinpoint procedures and facilities ripe for quality improvement. The solution also centralizes information about specialty provider relationships, making it easier to compare provider performance as well as to identify and replicate best practices from in-network physicians.   Healthcare businesses who take the opportunity now to evolve their business practices by bringing the power of cloud and advanced analytics to their companies find themselves uniquely suited for a competitive advantage in an ever tightening Healthcare marketplace.

The Healthcare Data Management for Providers Solution Master data is core business information used repeatedly across applications and business processes.

References

1. *MDM in the Context of Data Governance for Healthcare Management :http://www.damachicago.org/wp-content/uploads/2012/01/DAMA-Spring2013-DG-and-MDM.pdf*
2. *Healthcare Data Management for Providers https://www.informatica.com/content/dam/informatica-com/global/amer/us/collateral/white-paper/healthcare-data-management_white-paper_2117.pdf*
3. *Cleven, A., Wortmann, F., (2010). Uncovering four strategies to approach master data management. Proceedings of the 43rd Hawaii*
4. *Dyche, J., Levy, E., (2006). Customer Data Integration: Reaching a Single Version of the Truth. John Wiley & Sons.*
5. *Joshi, A., (2007). MDM governance: a unified team approach. Cutter IT Journal, Vol. 20, No. 9. 30-35.*
6. *White, A., Newman, D., Logan, D., Radcliffe, J. (2006). Mastering Master Data Management. Gartner Research, ID Number: G00136958.*
7. *Prescription for Reducing Health Risks : One Dose Technology, One Dose Data Strategy http://www.business2community.com/health-wellness/prescription-reducing-health-risks-one-dose-technology-one-dose-data-strategy-0773304#Ff7PodT41d7Hdm9b.97*
8. *Dahlberg, T., (2010). The Final Report of "Master Data Management Benchmark Best Practicess Research Project".*
9. *ibm.com/redbooks International Technical Support Organization*
10. *A Practical Guide to Managing Reference Data with A Practical Guide to Managing Reference Data with InfoSphere MDMRef M Hub May 2013*