ASCEND®

CARDIOVASCULAR

Open schemas support data based decision making for real time health systems

Overview

Across the multitude of IT systems in every healthcare organization, from the EHR, to cardiovascular imaging and information systems, and emerging medical devices, there exists an extraordinary wealth of valuable, interconnected data. When leveraged effectively, this wealth of data can empower organizations to engage in proactive planning and decision making and define evidence-based opportunities for optimizing clinical, logistical, and quality performance across the healthcare continuum.

Unfortunately, much of this data is trapped in segmented silos that offer limited, if any, interoperability across integrated healthcare technologies. In some cases, data is controlled by vendor organizations who often require costly and time-consuming professional services to extract the data that is needed to make timely, informed decisions. In the cardiovascular space, many vendors do not provide free and open access to their database or schemas which makes it impossible to leverage the valuable insights that would otherwise be available.

Organizations in pursuit of a real-time health system (RTHS) that is situationally aware and therefore enables proactive planning and action requires a data foundation that is designed for openness – allowing full access to a well-organized, and well-documented schema that can be used for a wide variety of data analysis use cases. "The RTHS is characterized by curated, comprehensive clinical data – sourced and shared between all of healthcare's stakeholders and delivered in real time to the patient record and the decision-makers who can deliver informed care as a result.[1]" To become a RTHS and unlock the full value potential of their own data, healthcare organizations require:

- **Data literacy:** The ability to read, understand, create, and communicate data as information.

- **Data democracy:** The ability for non-specialists to access digitized information so that it can be collected and analyzed without reliance on external resources.

- **Data portability:** The ability for systems to join and interface so that data can be shared without limitation or modification.

The foundation of these pillars of the data-driven real-time health system is a healthcare information system with an open data management model.

[1] https://www.healthcareitnews.com/blog/real-time-health-system-adapting-healthcare-new-normal

Data literacy

Data literacy refers to the ability for users to understand what data is available within their organization, how it is applicable to their business, and how it can be augmented or enriched to overcome its limitations[1]. Operationally, data literacy enables department managers to replace anecdotes with meaningful, measurable data that informs compelling, actionable solutions to performance issues, blockages, and risks. Clinically, data literacy allows practitioners to identify patient cohorts for proactive interventions to reduce morbidity and enable evidence-based disease management.

Josh Bersin, who is globally renowned as a leader in talent management, recruiting, and technology, recently stated the following in a post by the Harvard Business Review: "Data literacy has become important, for almost everyone. Companies need more people with the ability to interpret data, to draw insights, and to ask the right questions in the first place."[2]

Absolutely paramount to the formulation of a data-driven culture and data literacy within an organization is open, unfettered access to your own data. Data transparency requires that health information systems allow users without specialized knowledge to find, extract, and utilize data quickly and easily.

> A standardized, open data management model central to data literacy, data democracy, and data portability
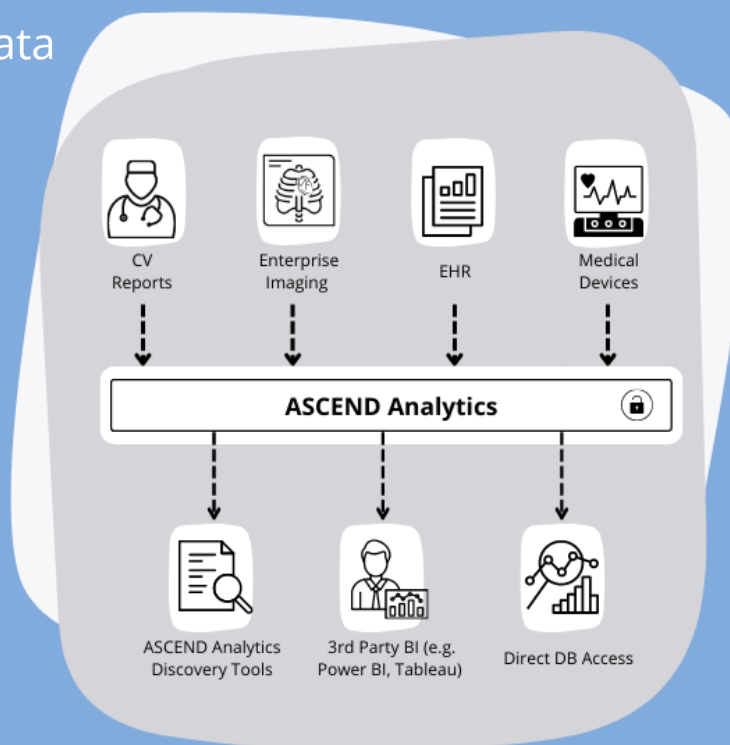
[1] https://www.precisely.com/blog/data-integrity/data-literacy-what-it-is-and-why-it-matters
[2] Ibid.

Data democracy

At its core, the democratization of data means that data is accessible to anyone. Users within an organization must be able to access their data in a digital format without work orders or technical gatekeeping that hinder and elongate the process. Moreover, it is not sufficient that data should simply be available; it must also be organized, standardized, and documented in a way that makes it readily usable to inform decisions and uncover opportunities within an organization. The goal is to have anybody use data at any time to make decisions with no barriers to access or understanding. [1]

The tremendous amount of data that is created each day (what is typically referred to as "big data") had spurred an influx of visualization and analytics technologies that are now the driving force behind the democratization of data. Business intelligence applications have made it easier for non-technical users to access, interpret, and use data analytics to quickly identify and act on impactful clinical and operational insights. However, the reach and efficacy of these types of applications is limited when access to data is bottlenecked by technical specialists or professional services which makes data openness pivotal to the democratization of data.

Data portability

Lastly, data portability has been central to the healthcare landscape since the beginning of digitization in medicine. Over 25 years ago, HIPAA set guidelines for health information portability and encouraged the adoption of standards (such as universal nomenclature and the establishment of health information exchanges) that facilitate the exchange of data across healthcare technologies.

More recently, as part of the Health Information Technology for Economic and Clinical Health Act of 2009, the Office of the National Coordinator for Health was created with the mandate to advance the electronic exchange of health information. One of the department's core mandates is to advance connectivity and interoperability of health information technology (health IT). The term "interoperability," with respect to health information technology means "health information technology that enables the secure exchange of electronic health information with, and use of electronic health information from, other health information technology without special effort on the part of the user." [1]

[1] https://www.forbes.com/sites/bernardmarr/2017/07/24/what-is-data-democratization-a-super-simple-explanation-and-the-key-pros-and-cons

Vital to the exchange of information is data standardization and accessibility. Data normalization and openness promotes multi-system interoperability and the accumulation of data into a shared record that can open doors for "big data" initiatives such as artificial intelligence, business intelligence, and clinical insights that are essential to analyze, adopt, and apply information in real-time health systems.

To facilitate the data accessibility, extractability, and standardization that are necessary for data literacy, data democracy, and data portability, healthcare information systems that employ the open schema data model are not just advantageous; they are essential.

The open schema

The database, which organizes data using tables, indexes, fields, and data dictionaries, is the backbone of most cardiovascular and healthcare information systems. In turn, the backbone of the database is the database schema. The schema acts as a blueprint, or set of rules that define how data will be stored and how each table in the database relates to the others. Therefore, the keys to extracting and traversing the data in any healthcare information system are housed in the schema and its corresponding data dictionary where the fields, properties, and relationships are defined and standardized. Historically, healthcare IT vendors, including those in the cardiovascular space, have resisted sharing their schemas for a few reasons:

- **Complexity:** As a result of being expanded over decades of product development, database schemas often hold unnecessary complexity which can make it difficult for an outside data analyst to understand. If inefficiently mined by an unfamiliar data analyst these complexities can result in significant performance issues and limitations that vendors are not keen to expose.

- **Intellectual Property Protection:** Concern over intellectual property rights results in a "black box" approach to data management that can include licensing and project management fees, laborious scheduling and work order processes, as well as lengthy wait times for the production of even basic reports.

- **Data Structure:** Data is often unstructured or disorganized, which limits its ability to deliver diverse and meaningful insights.

[1] https://www.healthit.gov/topic/about-onc

As products evolve, relationships between datapoints become more complicated, and schemas and dictionaries can become disorganized, inconsistent, and incomplete over time. As new data points are added, existing data fields may be repurposed, and data is shoehorned into place, often with the intention to eventually build a more robust solution that never transpires. The accumulation of such 'technical debt' is a normal, continuous process during the lifecycle of a product, which makes it difficult for outside users to extract, let alone analyze the data – even when inside experts are available to assist.

Conversely, the open schema model, a novel concept in the cardiovascular industry, includes self-descriptive, standardized information that is immediately available to the user. The open schema is constructed and documented in a systemized way that allows users to identify and extract data points for use in their own projects, without having to have an intimate knowledge of the source system.

The metadata within includes information on the relationships between data points that may appear rudimentary on the surface (e.g., Is it a parent or child? Are there other siblings of this data point in the organization? What type of data is it: text, number, etc.?), but which are vital to be able to quickly traverse and extricate data for reporting purposes. This open and standardized approach to data management is fundamental to the three pillars (data literacy, data democracy, and data portability) of real-time health systems.

Conclusion

Open access to data is crucial for data-based clinical and operational decision making within healthcare organizations. In the pursuit of a real-time health system, organizations should seek cardiovascular imaging and information systems that provide a well-organized, and well-documented open schema that adheres to standardization practices that are fundamental for data literacy, data democracy, and data portability.

About ASCEND Analytics

ASCEND Analytics automates the collection and correlation of data elements from across the enterprise in real-time, allowing you to implement actionable improvement programs that:
- Provide situational awareness that enables proactive planning and decision making.
- Reduce morbidity, complications, and readmissions.
- Accurately measure realized patient and procedure volumes against projected capacity.
- Inform capacity, service line expansion, and new accreditation planning.
- Enable proactive, evidence-based cardiovascular disease management.

ASCEND Cardiovascular
801 Warrenville Road Suite 200
Lisle, Illinois 60532
 (844)413-2610
www.ascendcv.com