



Clinical Data Integration

Introduction to the data consolidation and integration services offered by the CareEvolution RHIO Technology Platform.

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Background

Every organization that wishes to participate in a RHIO by definition has an existing suite of healthcare IT applications such as lab, radiology and registration, EMR, and dictation. Each of these systems in turn has its own functional capabilities, data formats, and levels of standards compliance. One of the core value propositions of the CareEvolution RHIO Technology Platform is to integrate these heterogeneous data sources and enable data sharing between other health organizations on the CareEvolution RHIO Technology Platform network. The CareEvolution RHIO Technology Platform provides a clinical data integration service that minimizes custom engineering work needed to integrate clinical data sources while maximizing the flexibility and manageability of an organization as its own clinical data systems evolve.

Traditional Approaches

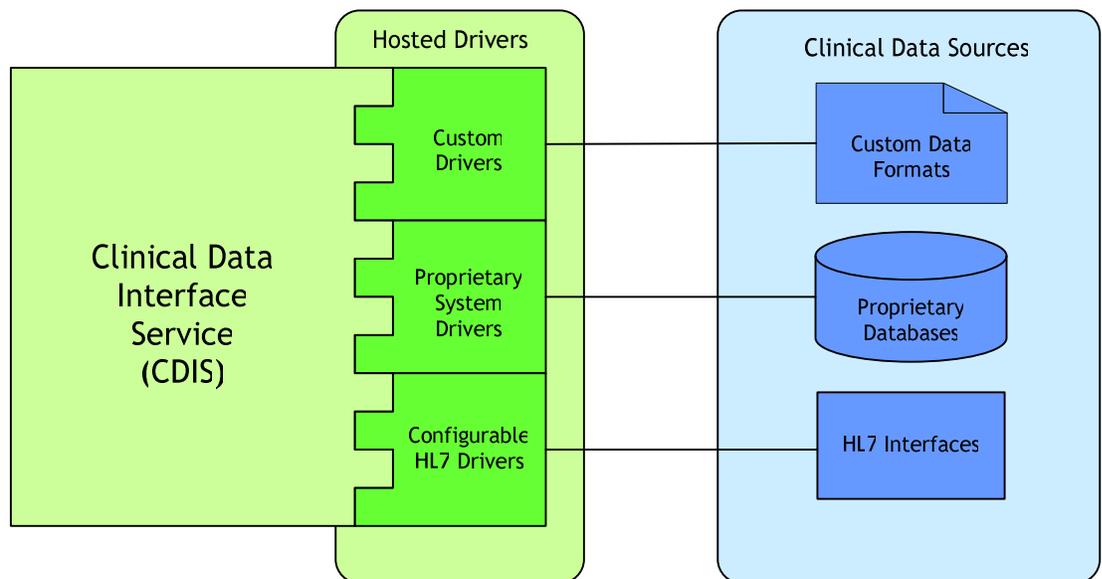
Within organizations, clinical data integration is a major challenge. The problem has typically been addressed by utilizing integration servers such as SeeBeyond's eGate or Microsoft's BizTalk Server. These integration servers provide rule-based routing of HL7 messages, data transformations, architecture for custom adapters for custom data sources, and other features. Integration servers are then configured and modified so that live data feeds from various clinical data sources are streamed to applications such as a clinical data repository (CDR) for visualization and inspection by clinical staff.

While these capabilities should be leveraged when constructing a RHIO platform, they are not wholly sufficient to address cross-organizational data integration. In order to share complete medical histories a service is needed to query both existing data stores in real time and pre-loaded historical data. HL7 Query-Response would be ideally suited to handle this problem but is not consistently implemented in clinical data systems.

In the absence of clinical data sources with query-response capabilities, a key function of the CareEvolution RHIO Technology Platform is the ability to integrate real time interfaces and historical loads in order to provide a complete medical history for sharing across a RHIO. The CareEvolution RHIO Technology Platform clinical data interface service does this by providing a pluggable architecture that integrates with live interfaces and historical data extracts and then persists that data for future, secure sharing based on our identity management services.

CareEvolution's Approach to Clinical Data Integration

The core element of the CareEvolution RHIO Technology Platform that enables clinical data integration is the Clinical Data Interface Service (CDIS). The CDIS is a dynamic, pluggable architecture that allows drivers to be loaded to interact with existing clinical data sources. A driver is a reusable software component that is written and/or configured to enable integration between the CareEvolution adapter and a particular clinical data source, such as lab or registration system.



The hosted, componentized nature of the driver confers a number of advantages on the CareEvolution RHIO Technology Platform:

- **Reuse:** Once a driver has been written or configured for a particular clinical data system this driver can be reused at other health organizations that also use that clinical data system.
- **Modularity:** Adding, removing, or changing a driver is a matter of reconfiguration, not reinstallation. Clinical Data Sources can be changed and retooled to adjust to the requirements of adopting organizations while minimizing impact on the existing installation.
- **Isolation:** The complexity of integrating with preexisting clinical data sources is isolated to this part of CareEvolution RHIO Technology Platform.

The CDIS completely isolates failures that occur in any given interface and logs them appropriately for resolution.

This architecture does not completely eliminate the need for custom engineering at adopting organizations. What this architecture does is address the reality that clinical data sources will run the gamut between standards-compliant, widely-used systems to homegrown, customized software particular to an organization. Drivers hosted within this architecture correspondingly vary on their level of reusability through the CareEvolution RHIO Technology Platform network. We divide these drivers into three categories:

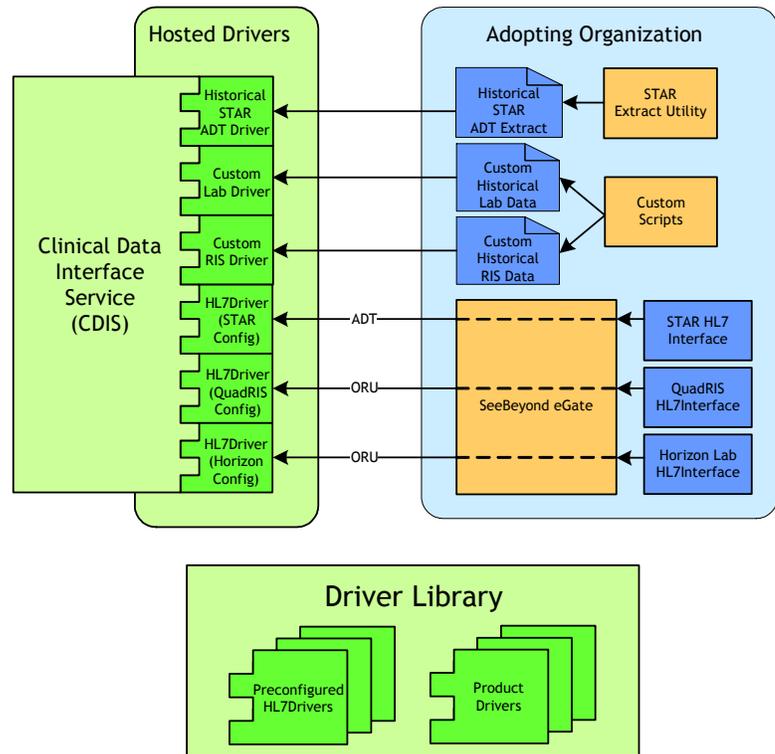
- **Standards-Based Drivers:** Drivers based on a clinical data standard (e.g. HL7) that can be configured to interact with an installation of a product that conforms to that standard.
- **Product-Based Drivers:** Drivers that are based on a particular product, and must be configured to interact with a particular installation of that product.
- **Isolation:** The complexity of integrating with preexisting clinical data sources is isolated to this part of CareEvolution RHIO Technology Platform. The CDIS completely isolates failures that occur in any given interface and logs them appropriately for resolution.

While custom drivers by definition will only be deployed to one site, our standards- and product-based drivers can be reused with appropriate configuration throughout the CareEvolution RHIO Technology Platform network to facilitate faster implementation. The CareEvolution RHIO Technology Platform also provides a rich set of administrative tools to manage these drivers. This allows administrators to easily monitor these interfaces, deactivate or activate them (for example, after a historical load), and reconfigure them as necessary.

Example Implementation

A hospital with a mature IT healthcare infrastructure seeks to adopt the CareEvolution RHIO Technology Platform. This hospital wishes to enable data sharing with other RHIO members on both historical data and live interfaces going forward. This hospital has the following systems they wish to include in the initial data exchange:

- McKesson Horizon Lab System
- McKesson STAR Registration System
- ADAC QuadRIS RIS System
- SeeBeyond eGate Integration Server



Let's further assume that since the McKesson Horizon and STAR systems have been previously integrated into the CareEvolution RHIO Technology Platform where they were implemented as specific configurations of our standard HL7Driver. These configurations can be reused "out-of-the-box".

The ADAC QuadRIS system supports a well-established and -behaved HL7Interface so this merely requires a new configuration of an HL7Driver.

The hospital also wishes to integrate historical information from their Star, Lab and QuadRIS systems. These historical loads require some custom engineering. The hospital has data extract scripts for the Horizon Lab and QuadRIS systems that can be used. However, the data format these scripts output is custom and particular only to this site. Custom drivers must be written for this historical load. The STAR extract utility can stream historical ADT transactions to a file. The adopting hospital already has purchased a license for this product standard utility. The ADT transactions produced by the utility differ from the live HL7 feed so a product-based driver is used.

Summary

The problem of integrating heterogeneous clinical data sources across multiple organizations has been one of primary barriers to RHIO adoption. Clinical data sources can vary from widely-used, standards-compliant products to custom data formats particular to an organization. The CareEvolution RHIO Technology Platform addresses this problem with an architecture that hosts reusable, modular drivers that - like the data sources they integrate - can be standards-based, product-based, or completely customized. Hosting these drivers within this architecture allows the CareEvolution RHIO Technology Platform to provide unified administration, configuration, and monitoring tools for an organization's various systems and interfaces. By providing "out-of-box" integration solutions when possible and customized integration solutions when necessary, all within a unified architecture, the CareEvolution RHIO Technology Platform can effectively address the range of integration challenges with maximum reuse and manageability.

About CareEvolution, Inc.

CareEvolution is a leading provider of secure interoperability solutions. Our RHIO platform offering is a robust Service Oriented Architecture (SOA) to enable RHIOs' heterogeneous underlying EMRs to "share" clinical information in a secure, reliable, and incremental manner. Distinct component such as Identity Management, Record Location, Clinical Data Integration, Audit & Log, Data Persistence, Visualization, Terminology, and Data Mining may be adopted piecemeal or as a comprehensive technology platform.

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