



# Terminology Services

**An overview of the data standardization capabilities offered by the CareEvolution RHIO Technology Platform.**

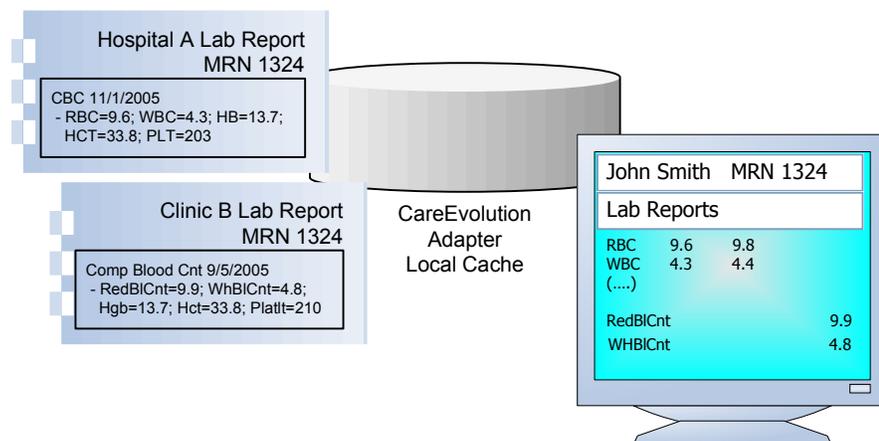
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## Background

Achieving interoperability between heterogeneous healthcare information systems is a challenging problem. One of the primary obstacles to interoperability is the use of independent sets of terms and codes by the participating systems. When disparate healthcare information systems refer to clinical concepts and orderable items using distinct terminologies the data exchanged by these systems cannot be easily analyzed, compared, or rationalized for visualization.

Message exchange standards (i.e. HL7 v2.x) fail to adequately address this problem. Message standards specify the format and structure of a message so that the message recipient can fully extract all the data transmitted by the sender. However, the messages can refer to the same clinical concept using a different term or code unless a common terminology standard is also adopted.

A failure to resolve the use of independent terminologies can result in a wide range of interoperability problems. Displays using this data may be confusing and require additional effort for a care provider to understand; this may result in duplicate tests or misinformed clinical decisions. Applications that require data to be represented using a specified set of terms (i.e. a system checking drug-allergy interactions) may not function. An effective solution for healthcare information exchange must address these problems caused by the limited adoption of standard terminologies.



Lab results from disparate clinical data sources cannot be rationalized for visualization if multiple terminologies are used for test names

## **The Long Term Solution: ONC Drives Adoption of National Standards**

There is broad agreement that standard terminologies should be widely adopted in order to facilitate interoperability. There are several national initiatives that embrace the widespread use of terminology standards in healthcare. The Office of the National Coordinator for Health Information Technology (ONC) called for the development of technologies to facilitate deployment of a National Health Information Network (NHIN) in 2004. Proposals to develop the NHIN identify the adoption of industry standard terminologies as a critical step to achieve interoperability. To achieve this end, the Department of Health and Human Services (HHS) awarded a contract in November 2005 to the American National Standards Institute (ANSI) to create the Healthcare Information Technology Standards Panel (HITSP). The HITSP's charter is to unify existing healthcare standards in order to support interoperability among healthcare applications.

Further, the ONC has integrated the Consolidated Health Informatics (CHI) initiative into efforts to create the NHIN. CHI is a collaborative effort between the Department of Defense, the Department of Veterans Affairs, and HHS to aggressively adopt health information standards for use by all federal health agencies. As part of the CHI initiative, the agencies have agreed to endorse 20 sets of standards that enable information to be shared across agencies and serve as a model for the private sector.

The National Library of Medicine has developed the Unified Medical Language System (UMLS) Metathesaurus in order to provide the single most comprehensive compendium of healthcare standards. It includes over 100 constituent vocabularies.

HHS signed an agreement in 2003 to license a standardized medical vocabulary developed by the College of American Pathologists for free use in the United States. The College's Systematized Nomenclature of Medicine (SNOMED) Clinical Terms creates a common clinical language that is a necessary element of a health care information infrastructure.

Together, these initiatives create a system of standards that will facilitate interoperability. The following standards are critical to RHIO development and are among the standards adopted by the CHI initiative and incorporated in the NLM's UMLS Metathesaurus:

Diagnoses	ICD-9-CM
Procedures	CPT-4
Text Reports	HL7 CDA
Documentation: Problem lists, Nursing	SNOMED CT
Lab Results	LOINC
Demographics, Encounters, Units	HL7
Instrument Data Exchange	IEEE 1073
Retail Pharmacy	NCPDP
Inpatient Pharmacy	NDF-RT/RxNorm

Adoption of these standard terminologies helps to solve many additional problems in healthcare. In addition to facilitating interoperability, terminology standardization can facilitate the adoption of best practices and drive evidence-based medicine. It can promote healthcare delivery efficiencies by reducing duplicate tests and procedures. Finally, it can help advance the cause of medical research by making clinical data more suitable to automated data mining techniques.

### **Achieving Interoperability: An Incremental Approach to Standardization**

It is clear the wide adoption of terminology standards would greatly facilitate interoperability. However, given that several key standards are not widely adopted today, demanding adoption as a prerequisite to data integration can greatly inhibit interoperability. Any integration project that requires full adoption of standards specified by the HITSP risks bogging down in months of terminology rationalization before any data exchange can take place. While these rationalization efforts can have great long term value, clinicians will be missing critical clinical data that would drive better informed decision making in the near term. It must be accepted that voluntary standards adoption will require a massive retooling of current systems and will be an expensive decade-long process.

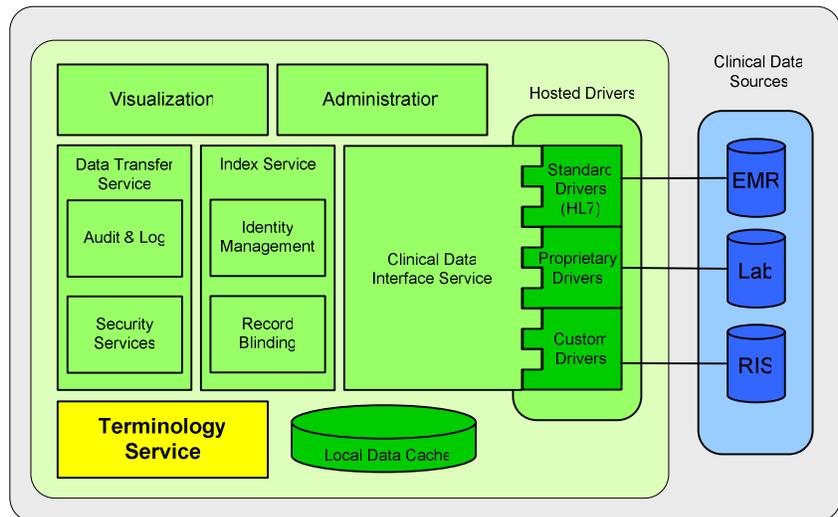
Useful lessons can be drawn from existing models. The current model for the majority of medical data in the United States is a paper based system; data is exchanged by transporting paper charts, making photocopies, and sending faxes. While there is very little terminology standardization, better decisions are clearly made when a portion of the paper chart is available. Leading researchers in information exchange such as the Regenstrief Institute also advocate the adoption of “high-value” standards that already possess a critical mass of adopters while waiting to implement other standards in the future. The

KatrinaHealth initiative that has consolidated prescription medication information from a variety of sources for patients in the Gulf Coast region is another compelling example of incremental adoption. The service has yielded great value to physicians, pharmacists and patients by making limited data available quickly even if it is not fully standardized.

Incremental adoption follows two key principles. First, efforts to deliver immediate value to clinicians should be emphasized, even at the cost of failing to completely resolve terminology challenges. Second, data exchange should proceed in a means that is never inconsistent with the long term adoption of national terminology standards; these terminology challenges should be resolved as standards are adopted and as resources permit. Together, these principles balance providing near term value for clinical decision makers with achieving a full featured NHIN in the long term.

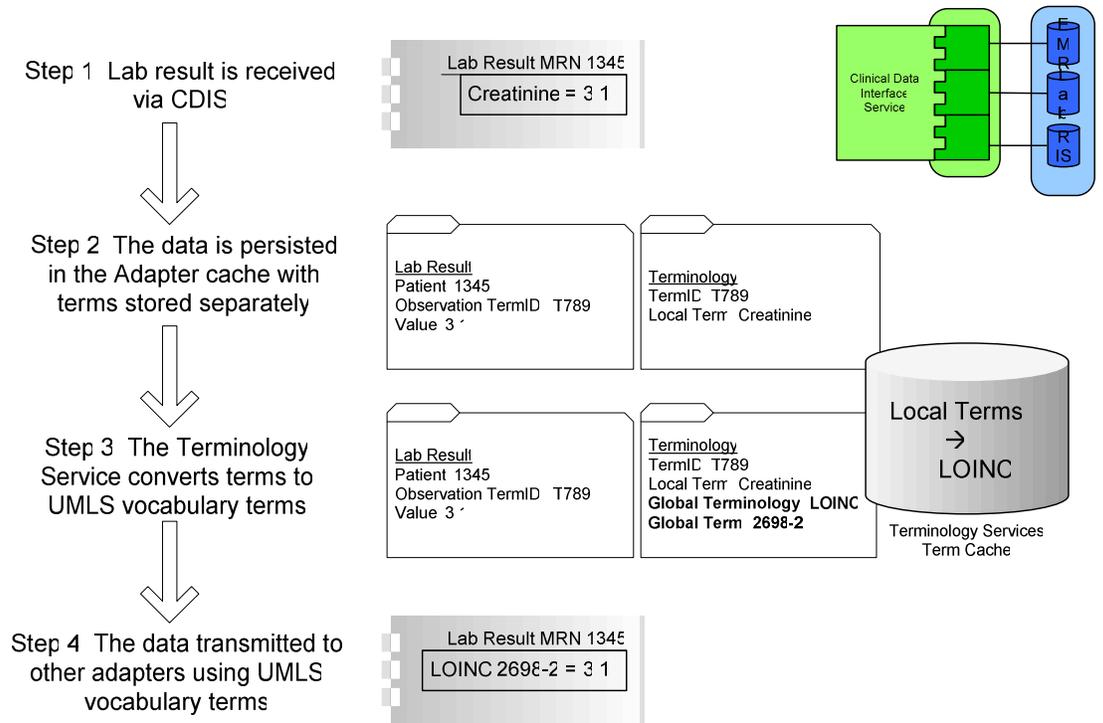
**The CareEvolution Terminology Architecture**

The CareEvolution RHIO Technology Platform provides the technical foundation to achieve interoperability while emphasizing incremental adoption of standard terminologies. Terminology management is implemented within the CareEvolution Terminology Service, a software module integrated within the CareEvolution Adapter architecture.



CareEvolution RHIO Technology Platform Adapter

The Terminology Service is tightly integrated with the Clinical Data Interface Service and the Data Transfer Service in order to provide translations to and from vocabularies supported by the UMLS Metathesaurus as clinical data moves through the RHIO. A set of tools are provided to create and manage these translations.



The CareEvolution Terminology Service is implemented using the following design principles:

- All clinical data that is received by a CareEvolution Adapter from a clinical data source (i.e. ADT, lab, pharmacy) is cached using terms and codes from the originating clinical system. This ensures that terminology translation will not degrade the quality of the original data.
- Any terms from a clinical data source that are not managed using a vocabulary supported by the UMLS Metathesaurus are translated to a

UMLS-supported vocabulary immediately on receipt if a translation is available. This translation is cached within the CareEvolution Adapter to ensure that clinical data can be efficiently referenced using a standard terminology during information exchange.

- Clinical data is exchanged between adapters using vocabularies that are supported by the UMLS Metathesaurus whenever possible. However, if translations to a UMLS-supported vocabulary are not available, the data will still be transmitted with terms from the originating clinical system.
- Visualization of clinical data can occur with both a UMLS-supported vocabulary and a locally supported vocabulary if a translation is available.
- A set of tools and services provide a means to manage terminology translations. They also provide a mechanism to “retranslate” existing data cached in a CareEvolution Adapter from previous terminologies as translations are created or standard terminologies are adopted.

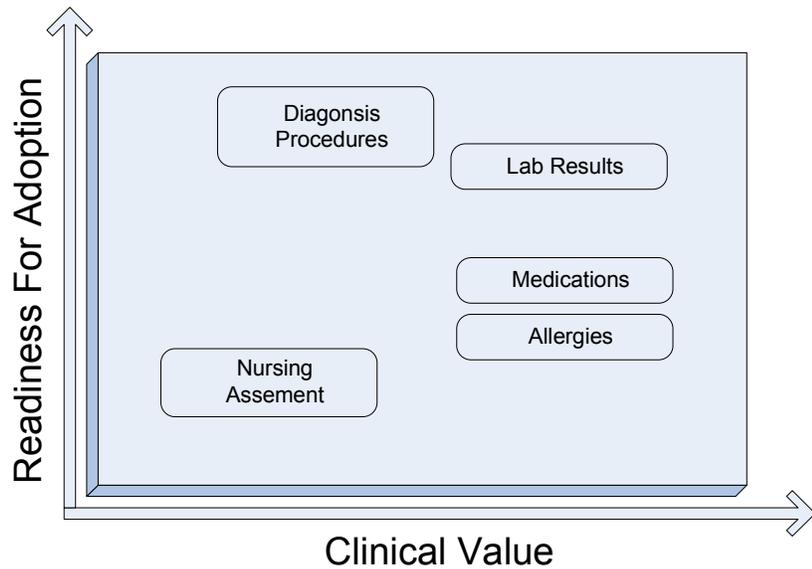
### CareEvolution Principles of Incremental Adoption

The CareEvolution RHIO Technology Platform provides the tools and technology services to achieve interoperability while adopting terminology standards incrementally. However, critically important to the development of a successful RHIO is an effective implementation philosophy that appropriately prioritizes the adoption of different terminology standards.

The value proposition offered by terminology standardization can be assessed by considering two key dimensions of the clinical data types being considered for standardization. First, it is important to understand that different classes of clinical data exhibit a wide range of **clinical value** that can be derived from terminology standardization.

Standardization efforts that directly impact clinical decision making deliver significant clinical value. For example, effective clinical decision making can be facilitated by an effective visualization of lab results that groups identical tests that are transmitted from multiple clinical data sources. Similarly, an automated system of drug-allergy interactions would reduce medical errors by evaluating allergies collected from multiple clinical data sources against medication orders. On the other hand, using a set of standard terms on a nursing assessment may not yield a significant benefit in terms of clinical decision making or automated processing after information is exchanged. Standardization efforts should focus on clinical data where the use of standard terminologies in information exchange will deliver the greatest clinical value.

The second critical dimension of the terminology standardization value proposition is the **readiness for adoption** of a particular standard. Readiness for adoption can be evaluated in terms of the number of actively competing standards and the penetration of the proposed standard. If other clinical systems within the RHIO do not implement a specific terminology standard (or, implement a competing terminology), it is clear that the adoption of that standard will be of limited value. Using these measures, terminology standards such as CPT and ICD-9 which are broadly accepted and widely implemented will rate very highly in terms of readiness for adoption. At the opposite end of the spectrum, relatively few clinical systems manage allergies with any sort of rigorously defined terminology; further, in practice there are several different allergy terminologies in use.



General Guidelines for Terminology Adoption

Clearly, each RHIO will have unique considerations that drive a specific measure of clinical value and readiness for adoption for various clinical data that will be exchanged within the RHIO. However, these broad guidelines provide a methodology to prioritize the adoption of various standards.

In addition to assessing the value that terminology standardization provides to information exchange, it is worthwhile to consider the impact that standardization will have to other initiatives in the clinical enterprise. Initiatives to drive more descriptive and reproducible clinical care can also derive value from terminology standardization. Additionally, implementation

of best clinical practices may benefit from the adoption of terminology standards. Finally, clinical research may strongly benefit from the use of standard terms and codes. Coordinating terminology standardization with complementary initiatives can reduce the perceived cost of adoption.

## **Summary : CareEvolution Drives Incremental Adoption of Terminology Standards**

RHIO implementation strategies that emphasize the incremental adoption of standard terminologies are essential given the current state of healthcare information systems. National initiatives to drive standardized terminology adoption will greatly facilitate interoperability in the long term. Until then, CareEvolution provides the technology and implementation philosophy to ensure that care providers will reap near term value from your RHIO implementation.

### **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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