If your organization is looking to take the next step towards full interoperability, your first step is to understand your options and the available integration standards.

Interoperability has been a longstanding goal for our nation’s healthcare system that has not yet been fully achieved. It means assuring that health information technology systems are working together to communicate, exchange data, and use the data that has been exchanged. There are three levels defined by HIMSS – foundational, structural, and semantic – that allow for interoperable health information exchange. In foundational interoperability, data can be exchanged from one IT system to another without the need for the receiving IT system to have the ability to interpret the data. Structural interoperability defines the format of the data exchange that allows the clinical or operational purpose and meaning of the data to remain intact. At the highest level, semantic interoperability is the ability of two or more systems to exchange information and use it. Healthcare interoperability allow patients to benefit from improved, coordinated care when providers and caregivers in different facilities or even departments can exchange data that presents a concise picture of the patient’s condition and needs.

By 2024, the Office of the National Coordinator for Health Information Technology (ONC) envisions an interoperable health IT infrastructure for our nation – currently struggling to provide better, more affordable care through the connectivity of electronic health information. In its 13-page, 10-year plan, ONC describes the crucial need to get the right data to the right people at the right time, and the principles, if followed, that support it. ONC considers our existing health IT infrastructure as the foundation for which to build upon with increased interoperability and functionality, and notes that simplifying solutions is the way to begin. Like any aspect of healthcare, patients need to be engaged in the care delivery system, and ONC believes empowering individuals to become more active partners in their health is a guiding principle toward its vision of nationwide interoperability.

ONC plans to improve interoperability of existing networks and further standardize the vocabulary and structure of health information as part of the first three years of its plan, focusing on the ability to appropriately search for and retrieve health information. Its 6-year agenda includes expanding interoperability for individuals, care providers, and public health departments, and refining standards, policies, and services for continuous quality improvement. After 10 years, ONC’s efforts will provide our nation with a health IT infrastructure that supports a more connected health care system.

One of the 5 major building blocks of ONC’s plan is developing core technical standards and functions for aggregating and sharing data, and it isn’t the only one working toward this goal. Below is a list of standards and organizations dedicated to supporting the exchange of electronic health information throughout our nation’s healthcare system.

**Estenda Solutions, Inc.**
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Data Nomenclatures

Nomenclatures are used to define the data and provide meaning to the information. They are common languages to understand a patient’s medical history.

ICD-9/ICD-10 – The International Classification of Diseases is a system that provides diagnostic codes for diseases, including a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease. ICD-9, used by the US since 1979, is no longer robust enough to handle the current and future healthcare system. With over 5 times more codes than ICD-9, the latest revision, ICD-10, will be effective October 1, 2015.

CPT – In 1966, the American Medical Association published Current Procedural Terminology – a list of standardized descriptions and five-character, alphanumeric codes for medical coders and billers to report health care services and procedures to payers for reimbursement. The codes have since expanded to include diagnostic and therapeutic procedures in surgery, medicine, and the specialties and are evaluated three times a year by the CPT Editorial Panel for issues. The Editorial Panel also discusses emerging technologies and difficulties with procedures and services relating to the codes.

NDC – The National Drug Code Directory was developed after The Drug Listing Act of 1972 - requiring drug establishments to provide the Food and Drug Administration (FDA) with a current list of all drugs manufactured, prepared, propagated, compounded, or processed by it for commercial distribution. A drug’s NDC is a three-segment number that serves as its universal product identifier and is listed in the NDC Directory, which is updated daily.

LOINC – LOINC, developed in 1994 by the Regenstrief Institute and the LOINC Committee, is a coding system designed to facilitate the exchange and pooling of results for clinical care, outcomes management, and research. The LOINC database contains universal identifiers for laboratory and clinical observations that work to solve the problem of inconsistencies between care systems. LOINC is now mandated by meaningful use stage 2, so its slow adoption should begin to pick up quickly.

SNOMED CT – SNOMED Clinical terms is considered to be the most comprehensive, multilingual clinical healthcare terminology in the world. Developed and maintained by the International Health Terminology Standards Development Organisation, SNOMED CT is easily implemented in software systems, providing more than 311,000 clinically-relevant concepts and definitions used to produce electronic health records.
**UMLS** – The Unified Medical Language System is a set of files and software that brings together many health and biomedical vocabularies and standards to enable interoperability between computer systems. UMLS can link terms and codes between doctors, pharmacies, and insurance companies and can help coordinate patient care among several departments within a hospital. Created by the U.S. National Library of Medicine, UMLS uses three tools – a Metathasaurus with terms and codes, including LOINC and RxNorm, a Semantic Network of broad categories and their relationships, and SPECIALIST Lexicon and Lexical Tools for language processing.

**RxNorm** – The National Library of Medicine (NLM) produces RxNorm as a normalized naming system for generic and brand name drugs. RxNorm, written from a prescriber’s viewpoint, is used by hospitals’, pharmacies’, and other organizations’ computer systems to record and process drug information, classifying based on ingredient strength and dose. RxNorm’s production process includes grouping source data into collections of concepts, creating a normalized name for each concept, assigning an RxNorm concept unique identifier to each concept and an RxNorm atom unique identifier to each atom, including relationships and attributes from the source data, and creating related RxNorm names and relationships.

**Electronic Health Information Messaging Standards**

These messaging standards are used to define the structure of the messages that are shared between systems. Within each standard, the nomenclatures are used to define the data.

**HL7** – Health Level Seven International, a not-for-profit, ANSI-accredited organization provides standards for interoperability for electronic health information exchange, integration, sharing, and retrieval within the healthcare community of stakeholders, providers, government agencies, vendors, other Standards Developing Organizations, and patients. HL7 is the seventh level of the International Organization for Standardization (ISO) communications model for Open Systems Interconnection (OSI).

**HL7 V2.x** is one of the most widely implemented standards for healthcare information in the world and is considered the workhorse of electronic data exchange in the clinical domain. Designed to support a central patient care system, HL7 V2.x provides a framework for negotiations of what is not in the standard, reduces implementation cost, and is generally backward compatible. More than 35 countries have HL7 V2.x implementations and 95% of US healthcare organizations use it.

**HL7 V3.x** is HL7’s Normative Edition that represents a new approach to clinical information exchange based on a model driven methodology that produces messages and electronic documents in XML syntax. V3 was designed for universal application so that the standards can have the broadest possible global impact, and provides consistent representation of data laterally across the various HL7 domains. It focuses on semantic interoperability, allows implementers to take
advantage of the latest and most effective implementation technologies, and assures consistent development and the ability to store and manipulate the specifications in robust data repositories rather than as word-processing documents.

HL7 FHIR, Fast Healthcare Interoperability Resource aims to simplify implementation without sacrificing information integrity. FHIR is built from a set of modular components called resources, which solve the same real world clinical and administrative problems as other electronic health information exchange standards at a lower cost and easier implementation. All systems can easily read and retrieve information using FHIR’s simple framework for extending and adapting existing resources. FHIR is new to the market, and not yet widely used or formally adopted as a standard.

C-CDA – Consolidated Clinical Document Architecture is an XML-based markup standard designed to code clinical documents for electronic exchange. It is an HL7-related standard that is required for meaningful use stage 2, but does not specify how documents are transported. Instead, CDA, which can contain structured and unstructured information, specifies how critical elements should be encoded for exchange and interoperability.

CCR – The Continuity of Care Record, jointly developed by organizations such as ASTM International and HIMSS, is a health record standard specification for creation of flexible documents that contain patients’ timely and most relevant health information for electronic exchange between health care providers. The documents, which contain a snapshot of patients’ overall health statuses, are expressed in standard data exchange language, XML, to be created, read, and interpreted by an EMR.

CCD – The Continuity of Care Document, jointly developed by HL7 International and ASTM International, is a constraint on CDA that establishes a rich set of templates representing typical sections of a summary record. CCD allows physicians to send electronic medical information to other providers without loss of meaning, while providing a “snapshot in time” a constrained summary of pertinent clinical, demographic, and administrative data for a specific patient. CCD supports the ability to represent professional society recommendations, national clinical practice guidelines, and standardized data sets.

HITSP C32 – HITSP C32 is a component of the HL7 CCD document, which summarizes a consumer’s medical status for health information exchange, including administrative data, such as registration, demographics, and insurance, and clinical information about problems, medications, allergies, and test
results. C32 defines this content to promote interoperability between participating software systems (PHRs, EHRS, etc.)

**Blue Button** – Blue Button was developed by the Veteran’s Association, in collaboration with the Centers for Medicare and Medicaid Services (CMS), the Department of Defense, and the Markle Foundation’s Consumer Engagement Workgroup, for veterans who use MyHealthVet, to have easy, secure online access to personal health records for keeping track of complete medical history, including medications and vaccinations, to share with caregivers or to reach personal health goals. In 2013, Blue Button was expanded to include more timely access to information and more types of self-reported information, as well as an enhanced user interface.

**Communications (APIs)**

The communication methods or application programming interfaces (API) are the protocols used to exchange messages between systems. The APIs are how systems communicate with each other.

**IHE** – Integrating the Healthcare Enterprise is an initiative to improve the way computer systems share information. Annually, the group of healthcare professionals and industry brings together healthcare IT users and developers and engages them in a four-step process that includes defining critical use cases for information sharing, creating detailed specifications for communications among system to address the use cases, implementing the specifications in HIT systems, and testing vendors’ systems at events called Connectathons.

**CONNECT** – The open source software solution that uses Nationwide Health Information Network standards to support interoperable health information exchange both locally and nationally is released 3-4 times a year, meeting needs identified by the CONNECT Change Control Board (CCB). Initially developed by federal agencies to support their health-related operations, it is now used by organizations all over the country and maintained not only by the CCB, but code contributors throughout the community.

**HITSP** – The Healthcare Information Technology Standards Panel is a group of experts from across the healthcare community, from consumers to doctors and hospitals to those who develop healthcare IT products to government agencies to organizations that write the standards. HITSP works to establish a partnership between public and private sectors to achieve widespread interoperability among healthcare software applications, harmonizing standards for the interchange of healthcare data and supporting the delivery of care and public health.
Carequality – This network of leading healthcare IT industry has set out to address the need for a unified set of implementation-level requirements that apply universally across all networks to enable health information to flow seamlessly and securely. Carequality is working to build these requirements through an industry consensus process that will engage a diverse group of stakeholders.

CommonWell Health Alliance – The CommonWell Health Alliance is a not-for-profit organization of health IT suppliers working to define and promote a national infrastructure with common standards and policies. CommonWell launched their initial services in January 2014 to Illinois, North Carolina, and South Carolina, which were selected based on Alliance member presence and potential for cross member and region patient referral patterns. CommonWell’s services will provide a way for HIT suppliers to quickly and accurately identify patients as they transition through care facilities, help providers locate and access patient records with a virtual table of contents, deliver a patient-authorized means to simplify management of data sharing consents and authorizations, and provide authentication and auditing services that facilitate secure data sharing among member systems.

Healtheway – Healtheway is a not-for-profit collaborative of public and private organizations that work to support the eHealth Exchange in exchanging health information and enhancing quality care and health outcomes. Healtheway fosters cross-industry collaboration and provides shared governance and service to its network or networks. Its members, including participants of eHealth Exchange, are able to improve clinical decision making and coordination, support meaningful use, enhance disease surveillance, and realize efficiencies and expedite provision of funding and services to individuals to support their care and well-being.

Current state of interoperability in US healthcare

Interoperability is attainable, but the many technical, social, and political factors are what make it a sluggish process. That is not to say that health IT hasn’t made great strides over the past years in all areas. Up 9% from 2008, 44% of hospitals had a basic EHR in 2012. 58% of hospitals exchanged data with providers outside their organization in 2012, which was a 41% increase from 2008. Although delayed, Stage 2 of Meaningful Use is hopeful to increase health information exchange and promote patient engagement through online access to their health information.

The standards available today open up a world of possibilities for healthcare providers to effectively exchange health information, and shared clinical data has the potential to elevate patient care. The technology is there, the benefits have been proven, now it’s time for all of the organizations working toward the same goal to collaborate with one another to achieve nationwide interoperability.
Call Estenda Solutions today at 610.834.2908 or email us at info@estenda.com for more information about how we can help you integrate your data and achieve interoperability.

Estenda Solutions is a project consulting and custom software development small business focused on advancing patient care, healthcare research, and medical informatics. Estenda Solutions collaborates with healthcare providers, research professionals, and industry from around the world to create innovative solutions. Estenda’s goals are to continuously provide tools to enable better patient care and management. Working with both large and small organizations and the individual researcher, Estenda enjoys the challenge of helping its clients’ initiatives grow.

Estenda has a rich history of work in disease management/chronic care coordination, registries, screening programs, data warehousing, population health, PCMH and ACO, clinical research program conception and grant writing, clinical study management, telemedicine, and data integration (HL7 and DICOM). Estenda is ISO 9001/13485 certified. Learn more at www.estenda.com.