
Accelerating Health Data Interoperability with L32 White Paper

As of: October 30, 2009

Abstract

The existing Healthcare Information Technology Standards Panel (HITSP¹) recommended and federally recognized standard for exchanging continuity of care data, the HITSP/C32 Specification, is open to many interpretations. Differing interpretations can result in interoperability issues. The L32, or “Lightweight C32 Implementation,” introduces the first Extensible Markup Language (XML) schema for the C32 specification. The L32 is not a new standard, rather, it captures a machine-interpretable implementation of the C32 specification to make it easier to electronically create and electronically read (i.e., produce and consume) C32 documents. This paper summarizes a MITRE funded initiative to accelerate health data interoperability that resulted in the development of L32 to accelerate current interoperability approaches and provide an avenue for experimentation with new more lightweight approaches to health data interoperability.

Background

Who is MITRE and Why are we Interested?

The MITRE Corporation is an independent, not-for-profit organization that is chartered to work in the public interest. As such, it is MITRE’s mission to address issues of critical national importance such as health care. Also, MITRE’s focus on health care aligns with MITRE’s corporate goal to broaden our public service and advance the nation’s progress toward an integrated health system.

Initiative Approach

MITRE funded the C32 initiative to help accelerate health data interoperability between the Department of Defense (DoD), the Department of Veterans Affairs (VA), and their external partners. However, the approach it pursued can be used to meet health interoperability needs across the nation. Two key themes in our approach were building upon relevant experience and working in partnership. First, MITRE built on many relevant experiences, chief among them was the development of Project Laika², an open source health data interoperability standard compliance testing tool for the C32. MITRE developed Project Laika in partnership with the Certification Commission for Health Information Technology (CCHIT)³ and learned that the C32 specification was very difficult to implement. The organization’s second theme was partnership. MITRE developed L32 in partnership with the Veterans Health Administration (VHA) to ensure its initiative results would help meet federal needs. MITRE also partnered with another of its funded initiatives, discussed below, called Project hData⁴.

¹ <http://www.hitsp.org/>

² <http://projectlaika.org>

³ <http://www.cchit.org/>

⁴ www.projecthdata.org

What is C32?

The C32 is the HITSP standard recognized by the Secretary of the Department of Health and Human Services for exchanging continuity of care information in XML format. The C32 summarizes a patient's medical status and may include administrative and clinical information. The C32 is based on the HL7⁵ Clinical Document Architecture (CDA)⁶. While the CDA does have an XML schema, the C32 is captured as a human readable document. Also, the C32 is not a simple extension of the quite complex CDA XML schema.

Introducing the L32

What is L32?

The L32, or "Lightweight C32 Implementation," introduces the first World Wide Web Consortium (W3C)⁷ XML schema for the C32 specification. The L32 is not a new standard, rather, it captures a machine-interpretable implementation of the C32 specification to make it easier for a machine to create, validate, and read C32 instances. The L32 includes all C32 modules, except the Comment module, as shown in the figure on the right. MITRE omitted the Comment module from the L32 implementation to avoid adding considerable complexity to the schema and because comments may already be included in the narrative portion of each module.

C32 Modules Implemented

- Person Information
- Healthcare Provider
- Condition
- Medication
- Information Source
- Result
- Language Spoken
- Support

The L32 comes packaged as a set of XML schema files and two XML style sheets. The style sheets are used to add and remove some XML type declarations. The XML type declarations make the XML schema structure easier to understand and better able to capture the C32 constraints. This L32 package can be used to create and validate fully-conformant C32 XML documents (called C32 instances).

Why the L32?

The L32 makes it easier for software developers to electronically produce, validate, and consume C32 documents. It does this by greatly reducing the number of options available to someone generating a C32 document and by ensuring that a module contains only relevant data elements. There are three key benefits to using the L32.

1. **One C32 Interpretation Leads to Increased Interoperability:** First, as a W3C XML Schema, the L32 offers a single, machine interpretable C32 specification implementation. As such, it enforces C32 constraints, removes ambiguity for developers, and provides guidance for the overall structure of a C32 document. Today, each developer interprets the specification and writes custom code, therefore, C32 interpretations are likely to vary. The L32 XML schema provides a single interpretation of the C32 specification. Also, the use of an XML schema and its built-in data types means less hand-written code for implementers.
2. **Much Lower Learning Curve for Developers:** The C32 specification is a human readable document that is built upon other related specifications. Therefore, when trying to implement the C32, one must examine hundreds of pages across at least three different documents to grasp all that a C32 instance encompasses. The L32 provides a single source, the XML schema,

⁵ www.hl7.org

⁶ <https://www.hl7.org/store/index.cfm>

⁷ <http://www.w3.org/>

where one is able to determine the structure of a C32 instance, which elements are optional versus required, and what data occurs once or is repeatable. The C32 is a human readable specification. The L32 is a machine interpretable XML schema. This is a key difference. MITRE anticipates a software developer learning curve drop from months to days.

3. **Developers can use Standard XML Productivity Tools:** With an XML schema, commercial off-the-shelf (COTS) and open source XML tools may be used to easily generate an application programming interface (API) and validate XML instances. The auto-generated API can be used to create and consume a C32 instance. This results in much less custom code.

Collectively, these differences lower the barrier to adoption of the C32 specification. In other words, they make it easier for software developers to build and maintain code to produce and consume C32 documents. Less custom code and easier to understand specifications implies lower lifecycle costs. It also implies a larger pool of software development talent available, as the skills needed to implement the L32 are more generally available (i.e., knowledge of XML schema and common XML tools rather than in depth knowledge of the contents of the C32 and related specifications).

Pathway for Further Innovation

MITRE's experience is that more lightweight, agile information exchange standards lead to accelerated adoption.⁸ Its experience implementing Project Laika led to a desire to experiment with a more lightweight and agile approach for exchanging continuity of care and other electronic health data. Thus, MITRE funded Project hData.

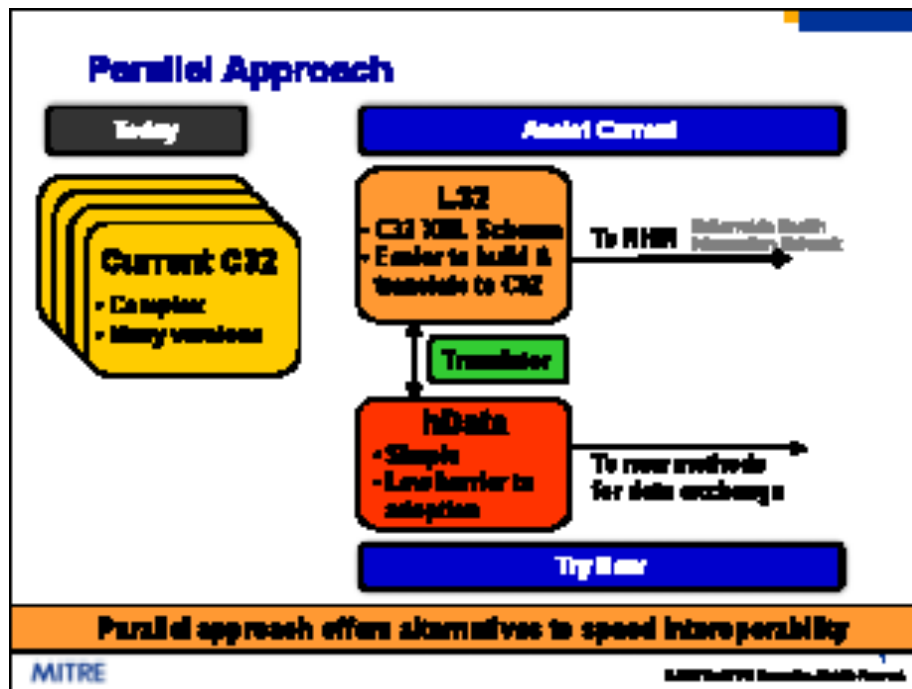
MITRE's hData is a simple XML framework for the creation, storage, and exchange of health data. As such, it lays the foundation for efficient health IT technologies. hData is designed for ease of implementation and improved efficiency by reducing the size of the data set, implementing a single way to represent data, and using standard XML best practices while leveraging the content work the health care industry has spent years harmonizing.

However, hData is a significant departure from current federally approved health IT standards. At the same time, hData can be profiled for usage with continuity of care records, lab results, or any other use case scenario. While hData protocols and transport differ from those being proposed by our nation's federal partners to exchange electronic health information over the emerging Nationwide Health Information Network (NHIN⁹), it can fit smoothly into this overall architecture and offers a lighter weight approach to health information exchange. Therefore, MITRE proposed and prototyped hData as a complementary approach that offers alternatives to speed interoperability and enables completely new features such as patient-centric medical federation, which in turn enables new scenarios such as advanced protection against medical identity theft.

With a constrained XML schema for the C32, one can start to integrate other approaches for sharing continuity of care data, such as hData. So, MITRE prototyped an L32-hData translator that allows one to prepare for using hData for health data exchange with hData enabled Electronic Health Record (EHR) systems, while complying with the mandate to use the recognized C32 specification for data exchange over the NHIN. This parallel approach is shown graphically in the diagram below.

⁸ This includes MITRE experience on a lightweight event schema called "Cursor on Target" that is being used throughout the Department of Defense (DoD) (<http://cot.mitre.org/bin/view/CoT/>) and subsequent efforts on a DoD Universal Core XML schema (<https://ucore.gov/ucore/>). The view that simple is best is supported by many others (e.g., <http://adambosworth.net/2009/10/29/talking-to-dc/>).

⁹ <http://www.nhin.com/>



Available for Use

Both L32 and hData are open source and are available for use at www.projecthdata.org

Possible Futures

MITRE continues to have discussions with stakeholders in the health community regarding possible application of L32 and hData to help accelerate health data interoperability. One possible avenue is to add these tools to the Federal Health Architecture (FHA)¹⁰ CONNECT gateway for use by anyone wishing to exchange data over the Nationwide Health Information Network (NHIN).

For More Information

For further information please see the public web site: www.projecthData.org or contact:

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¹⁰ <http://healthit.hhs.gov/>