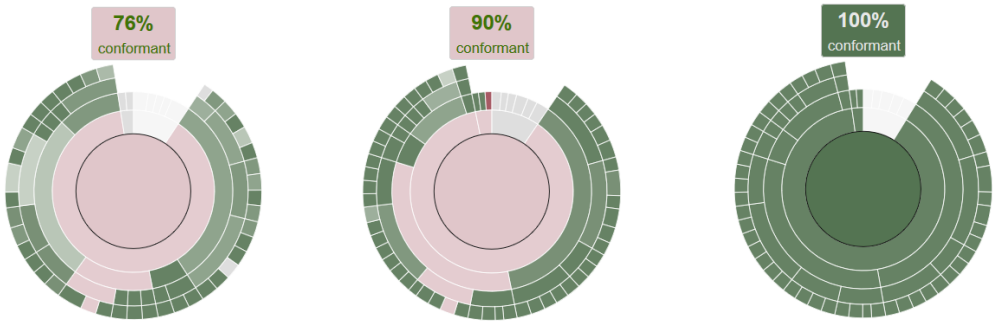
TOUCHSTONE

AEGIS.net

CONFORMANCE TESTING PLATFORM FOR SUCCESSFUL FHIR DEPLOYMENT



Measuring Interoperability to Ensure High Quality Healthcare

August 2019

Overview

Interoperability is the ability of health information systems to work together within and across organizational boundaries in order to advance the effective delivery of healthcare for individuals and communities. Patient safety, provider satisfaction, and population health management each depend on interoperable electronic health records.

Touchstone by AEGIS provides an easy-to-use, repeatable litmus test for health information exchange that decisively measures electronic health record interoperability. For over five years, AEGIS has created and maintained the premier testing platform for Electronic Health Record system interoperability against the most advanced healthcare standard, FHIR.

This paper explores the risks associated with health information exchange that is not quality controlled to adhere to a standard specification and why Touchstone by AEGIS is the solution that will enable healthcare providers to:

- Buy new EHR systems with confidence.
- Hold vendor partners accountable for safe, secure health information exchange.
- Perform repeatable interoperability testing as technology and standards evolve.

Background

Widespread standards-based interoperability has been a goal of the healthcare industry since the early adoption of PACs systems in 1982. Proprietary protocols and data-sets made it difficult if not impossible for an image generated on one vendor's device to be archived or displayed on another vendor's hardware. By the mid-1980s, with the threat of government oversight looming, work had begun on the creation of a standard for both transmitting and storing medical imaging data from and between disparate hardware manufacturers. In 1993 the third release of Digital Imaging and Communications in Medicine (DICOM) became the first full-fledged Health IT Standard. The standards have evolved and undergone many harmonization efforts in the past three decades, but the national mission of true interoperability remains the same.

Healthcare is no longer at the mercy of multiple standards that deliver point-to-point interfaces and crosswalks. Web standards and accompanying technologies have improved considerably since the advent of DICOM. The use of Application Programming Interfaces (APIs) to advance real time information sharing in healthcare enables providers to diagnose patients faster, patients to view results in minutes instead of days, and payers to provide prior authorization so that patients can receive timely care. Never until the use of APIs could system developers build dynamic interfaces that provide a specified software with a standard public interface to enable any system to send and receive data as long as they have the proper security authentication. When EHRs use APIs, countless third-party

applications and downstream systems leverage existing data within the EHR's database. APIs are extremely valuable in healthcare and widely used in other industries.

The most popular standard for health information exchange today is the *Fast Healthcare Interoperability Resources (FHIR)* standard developed by HL7 International (HL7). Unlike previously relied-upon standards, FHIR allows for much more granular and specific sharing of healthcare data. In addition, the RESTful nature of FHIR's technical architecture aligns with modern software development best practices, so it's easier and more cost-effective for developers to learn and implement. **The FHIR standard is the first Health IT standard that has the potential to improve population health by delivering the right data to the right people at the right time. Every time.**

Further, the business and financial side of the healthcare industry sees value in interoperability. Initiatives such at the *HL7 Da Vinci Project* and HHS Office of the National Coordinator for Health IT (ONC*) FHIR At Scale Taskforce (FAST)* have brought the Payer community into the standards and interoperability discussion. These organizations take advantage of APIs to make better coverage decisions and send pharmacy benefit information faster. With those who pay the bills taking an interest in it, vendors are driven to demonstrate substantive progress toward the goal of nationwide interoperability.

FHIR Implementation Challenges in the Marketspace

With powerful API technology and the most rigorously defined standard the industry has ever developed, technology vendors are setting out to create EHRs that forego request - response workflows of the past and offer immediate data for healthcare providers, patients, and health departments everywhere. However, achieving widespread interoperability through FHIR-based electronic health information exchange is a significant challenge for several reasons:

1. *Motivation for product vendors to interoperate is minimal.*

Electronic Health Records are expensive to develop and maintain, and the marketability of them depends on their differentiators. Unfortunately, many healthcare software vendors have not demonstrated meaningful effort toward ensuring industry-wide interoperability. Some reasons for this may include privacy concerns, perceived legal liabilities, or simply competitive interests. Ensuring interoperability does not always map to increase in a vendor's bottom line, as they are no longer able to repeatedly charge end users for expensive crosswalks or proprietary interfaces. One major EHR company was famously fined in 2017 for holding EHR data hostage when providers did not upgrade to the "more interoperable version" of their software. Competitive markets can preclude software vendors from doing the right thing by making software that shares data easily with their counterparts.

2. Interpretation of standards among developers is inconsistent.

Developers often build solutions based on one owner or one company's internal interpretation of a standard specification. Failures occur when they start sharing data with exchange partners who made different, conflicting interpretations of the specification. This may seem external to a single contract or development team, but the enterprise and industry-view leads to unintentional information blocking.

Developers leverage FHIR Implementation Guides to architect the production of healthcare APIs and decide where to constrain datasets. Implementation guides are helpful, but as an industry adoption solution could be likened to diagnosing and treating a patient for cancer based on physician observation instead of a blood test. No patient would allow a doctor to pump their body full of poisonous chemotherapy chemicals without commonly accepted test results to validate the diagnosis. Yet every day we take risks of equal magnitude to patients by assuming that healthcare APIs are sending diagnostic data to the right place at the right time instead of *ordering a readily available test* to ensure the system is exposing data in the way the standard intended, instead of the way a software developer interpreted the standard.

3. Healthcare providers must demand interoperability through FHIR Conformance.

While many EHR vendors and some large healthcare provider organizations such as the Cleveland Clinic have been building APIs into their systems for several years, an increasing number are requiring conformance to the FHIR standard. Not following this standard comes at the expense of interoperability for the industry. According the FHIR Management Group at HL7 International, not ensuring FHIR Conformance adds additional risks to health IT.

AEGIS has been participating in standards testing events and aiding organizations in adopting standards for over a decade, including partnering with EHR research and development teams to support learning about the standard. By engaging at this level, healthcare provider organizations can both mandate that their software is conformant to the FHIR specification and further test using Touchstone to verify

Providers using system APIs without ensuring FHIR Conformance carry risk in two ways:

FHIR has been subject to a level of review and vetting unlikely to be received by any non-conformant variation; variations may result in introduction of undetected risks.

FHIR-like solutions (based on FHIR, but not conformant) may set expectations by trading partners which are not met due to the non-conformance of the system and these un-met expectations may also result in risk.

~HL7 FHIR Management Group

compliance levels. Without this tool, there can be common deviations from the standard whether by design, interpretation, or simple error.

Testing of healthcare data sharing software has been insufficient due to the inability to create and test against the standard in an environment that properly mimics complicated production interrelationships. There are several problems that needed to be addressed to perform at a successful level and ensure end user viability:

No account for specification evolution by ensuring software conforms to the same version of the FHIR standard implemented by exchange partners. This leads to both forward- and backward-compatibility issues which are often not adequately considered by developers and not discussed in contractual or in-sprint Agile SAFe development reviews.

Failure to test in an environment that properly exercises interoperability. Testing the same way point to point interfaces have historically been tested fails to take into consideration the dynamic nature of APIs in an ecosystem comprised of systems-of-systems, especially in light of the version challenges noted above. This prevents a focus on real-life scenarios which will be a part of the ecosystem and may also prevent discovery of a small problem today that can become a significant risk in the future when large amounts of data are tied into an errant ingest or table assignment at the data layer.

Point in time testing does not ensure consistent compliance. Many certification programs for interoperability have been set up to evaluate system conformance only once every year or two. Testing at a single point in time ignores the reality that healthcare technology operates within a constantly changing ecosystem. FHIR was designed to be a dynamic, aspirational model that is flexible enough to evolve as healthcare does. Touchstone is designed to allow for independent interoperability testing regularly – or continuously – to accommodate the changing needs of health information exchange using APIs.

Touchstone is Built to Resolve these Challenges Now and in the Future

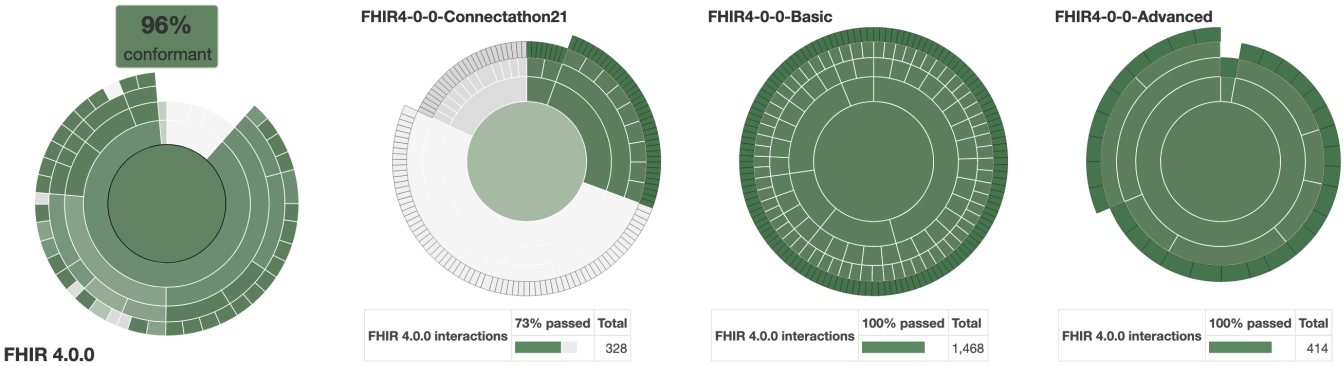
The most comprehensive FHIR testing platform, Touchstone is a complete ecosystem that simulates the dynamic healthcare environment in which FHIR APIs operate.

Touchstone's powerful validation engine is capable of simulating API transactions and reporting discrete feedback on compliance to the FHIR specification, implementation guides, and even a system's own capability statement.

Test scripts are customizable to meet specific program needs and can expose a system to multiple different versions of FHIR.

It is the only test platform that facilitates automated interoperability testing to integrate with continuous build and continuous integration environments common in modern software development. Results show clear metrics to guide developers toward FHIR conformance.

Touchstone lives up to its dictionary definition - a criterion for determining the quality or genuineness of a thing – by *offering thousands of tests* in an easy-to-use system for determining conformance and interoperability against published specifications, profiles, and FHIR implementation guides.



Conclusion

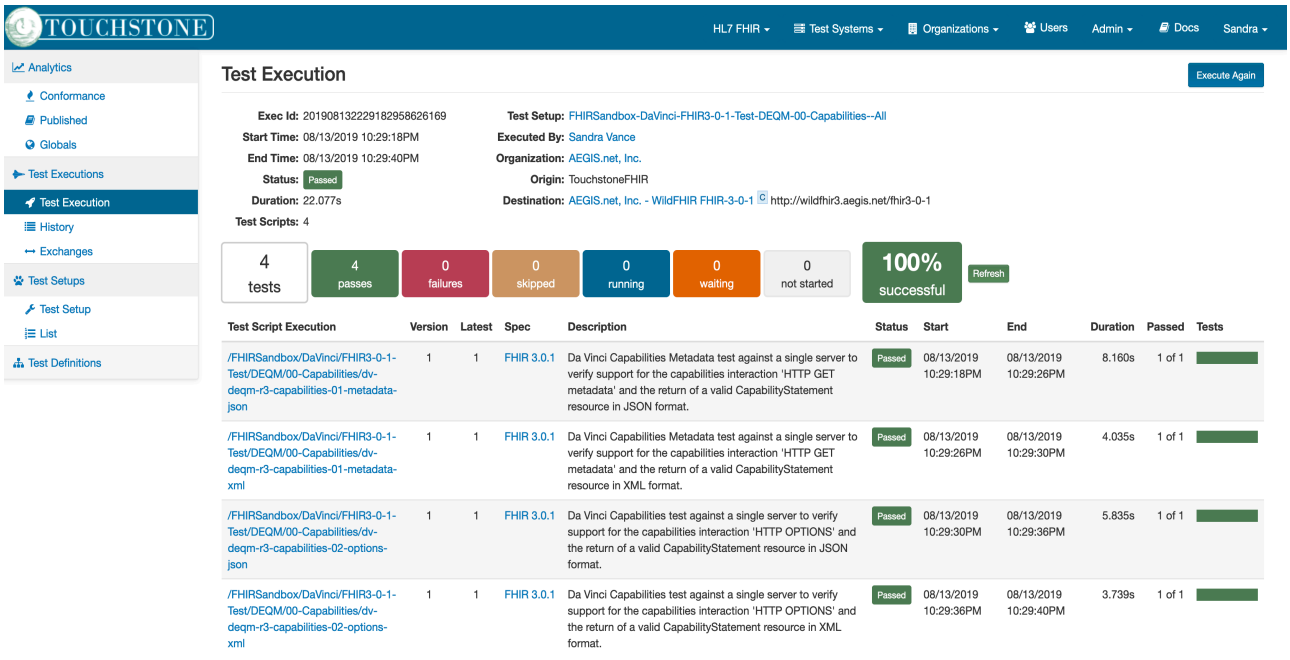
From an adoption perspective, interoperability is an enormous challenge because HL7 FHIR has all of the technical capacity but not enough guardrails to ensure quality implementations that actually work. Deployment of Touchstone as you work to implement FHIR-based solutions will bring transparency and measurability to your project or program. The platform gives IT staff, contractors, product vendors, and community partners clearly reported metrics backed by objective data from an independent testing platform and service. Most importantly, Touchstone will empower your organization to lead the healthcare industry to better outcomes for patients everywhere.

Touchstone provides a litmus test on FHIR Interoperability for…

- Buyers of clinical information systems to ensure patient safety
- Certifying organizations to validate specific use cases
- EHR vendors to vet partner systems
- Health Information Exchanges to measure member capabilities
- System Developers to simulate data exchange and correct their code

Touchstone Features

- Automated, internet-based interoperability testing
- High functioning blend of Test-Driven-Development (TDD) methodologies and Natural Language Processing (NLP) test scripts
- Tests interoperability with both FHIR Server and FHIR Client implementations
- Peer to peer testing of message exchanges as an intermediary
- Detailed results reporting with drill down feature for rapid development
- Customizable test scripts and test set up screen for program use
- Role based access for systems, test scripts and results



Resources

1. Dickshinski, "AEGIS Engages with ONC FHIR Task Force", AEGIS Insights blog, 11/19/2018, https://blog.aegis.net/aegis-engages-with-onc-fhir-task-force/
2. Sullivan, "Customer says eClinicalWorks holding patient data 'hostage'", Healthcare IT News, 7/10/17, https://www.healthcareitnews.com/news/customer-says-eclinicalworks-holding-patient-data-hostage
3. Vance, "FHIR Testing Helps Healthcare Projects Accelerate Adoption", AEGIS Insights blog, 1/11/2019, https://blog.aegis.net/fhir-testing-helps-healthcare-projects-accelerate-adoption/
4. Walonski, et al., "Validation and Testing of Fast Healthcare Interoperability Resources Standards Compliance: Data Analysis", Journal of Medical Internet Research (JMIR) Medical Informatics, 10/23/2018, https://medinform.jmir.org/2018/4/e10870/
5. Wiley, "The Prophet Motive: How PACS Was Developed and Sold", Axis Imaging blog, 5/1/2005, http://www.axisimagingnews.com/2005/05

Contact Us

Sandy Vance
Director
(614) 273-5916
sandy.vance@aegis,.net

Jason Hannah
Vice President
(703) 893-6020 x705
jason.hannah@aegis.net

Mario Hyland
Sr. Vice President & Founder
(703) 893-6020 x707
mario.hyland@aegis.net