

**INFORMATION BLOCKING & INTEROPERABILITY CHALLENGES  
IN SOUTHEASTERN PENNSYLVANIA:**

**PERSPECTIVE FROM A REGIONAL  
HEALTH INFORMATION EXCHANGE**

**February 2016**

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## Document Control

Date	Author	Version	Change Reference
11/23/15 HSX Board Retreat	John Donnelly Yolande Greene Jennifer Natale	1.0	
12/14/15 Document Review	Yolande Greene	1.1	Incorporated feedback and updated content
2/26/16 HIMSS 2016	John Donnelly Yolande Greene Jennifer Natale	1.2	Updated Content. Final review vetted for document distribution prior to publishing.

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\*If viewing in electronic format, click on author's name to be redirected to author bio on HSX website.

## About HealthShare Exchange of Southeastern Pennsylvania, Inc.

HealthShare Exchange (HSX) is the regional health information exchange (HIE) for the five-county region of Southeastern Pennsylvania (SEPA). SEPA is the largest and most densely populated healthcare market in the state, accounting for 32% of the state's population<sup>1</sup>.

Currently, this member-based HIE that serves over 4 million patients is composed of:

- 37 acute care hospitals
- 3 behavioral health entities
- 3 health plans
- 1 accountable care organization
- 1 clinically integrated network
- 50 plus ambulatory and independent providers

The sheer complexity and diversity of this healthcare region creates its own challenges to care coordination and patient care which HSX is committed to improving.

## Introduction

In the April 2015 report to Congress on Health Information Blocking, the Office of the National Coordinator of Health IT (ONC) reported that information blocking presents various barriers to interoperability. According to the report, information blocking occurs when persons or entities knowingly and unreasonably interfere with the exchange or use of electronic health information.<sup>2</sup>

In Southeastern Pennsylvania (SEPA), HealthShare Exchange (HSX) is familiar with many of the items ONC discusses in the report, as they relate to information blocking and the impact this has on establishing a robust regional health information exchange (HIE) in the greater Philadelphia area.

Due to the number of electronic health record system (EHR) vendors and various health information service providers (HISP) that exist in the SEPA market, HSX has experienced many interoperability challenges. To address these challenges, HSX developed a comprehensive interoperability testing process in early 2015, which is used to onboard members and participants with Direct messaging and related services with the HIE.

The purpose of this paper is to discuss HSX experiences with some of the information blocking examples ONC highlights in its April 2015 report, lessons learned related to interoperability and testing and recommendations for how to alleviate some of the barriers HSX knows exist in the market today.

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<sup>1</sup> US Census

<sup>2</sup> ONC Report on Information Blocking;

[https://www.healthit.gov/sites/default/files/reports/info\\_blocking\\_040915.pdf](https://www.healthit.gov/sites/default/files/reports/info_blocking_040915.pdf); pg. 11

The document will be updated, as needed, as both the industry and health information organizations (HIO), like HSX, continue to experience and develop solutions to address these challenges.

## Major Information Blocking Themes from ONC Report

### ONC Theme 1:

### **Contract terms or policies that restrict the exchange of health information**

#### ***HSX Perspective***

HSX works with its members and participants to ensure they understand what is covered under HIPAA, as well as how the HIE's Direct Secure Messaging use cases benefit patients. HSX helps participants determine how this technology could enable them to meet meaningful use thresholds. HSX has agreements with all of its members and participants that govern how information can be shared but also how information will be protected. HSX's Participation Agreement (PAR) and corresponding Business Associate Agreement (BAA) was established with the involvement of the legal counsel and privacy officers of the HSX membership. The PAR and BAA, along with HSX established policies, govern and dictate the appropriate sharing and permitted use of patient data. Furthermore, these agreements and policies also establish requirements around the deployment and adoption of HSX services and use cases for all participating and contracted organizations.

To facilitate information sharing, HSX provides HISP services for thirteen hospitals in SEPA, providing Direct Secure Messaging capabilities that allow these organizations to share patient information. HSX enables a greater level of interoperability for participants in this region by using a Direct Trust accredited HISP.

To prevent Direct Trust HISP accreditation as potential contractual blocker for enabling information exchange in our region, HSX also conducts one-on-one trust anchor exchanges to benefit other trusted, HSX-participating entities. Although Direct Trust as an organization completes extensive testing among the HISPs in the accredited trusted community, this does not guarantee interoperability. HSX has found interoperability challenges still exist at the HISP (to some extent) as well as EHR levels and, as a result, has implemented its own rigorous testing procedures to assess and ultimately, address those challenges.

#### ***Recommendation for other HIEs & HISPs:***

- Consider providing one-on-one exchange with trusted, high priority entities.
- Make sure benefits are communicated well and risks are addressed with participating providers.

#### ***HSX Progress to Date:***

As of February 2016, the HSX PAR has been finalized by all HSX Founding Members. The PAR establishes ground rules for how health data will be shared and used. Aligning to a single data sharing agreement with all HSX founding members, that includes financial commitment to enable financial sustainability, is a major achievement for the healthcare

community in the SEPA region. This agreement has now established a trusted community of healthcare entities that enables further collaboration on ways to share health data for preventative and cost effective care; improve the quality of care; and facilitates the transitions of care for the SE PA region.

## ONC Theme 2:

### **Charging prices or fees that are cost prohibitive**

#### ***HSX Perspective***

Fortunately, HSX founding members have made participating in the HIE financially easy for independent ambulatory providers in the greater Philadelphia region. For Direct Secure Messaging, independent ambulatory practices, City Clinics and federally qualified health centers (FQHCs) can participate with the HIE for Direct services and gain access to the HSX Master Provider Directory (i.e. the ‘white pages’ of Direct addresses) at no cost. Currently, HSX has more than 26 different EHRs represented in its ‘trusted community’. Much of this variety can be attributed to HSX’s willingness to work with practices of all sizes that use all types of systems.

When EHR vendors have charged fees that have stalled participating with the HIE and with Direct Secure Messaging, in particular, HSX has advocated on the provider’s behalf; bringing all key stakeholders to the table for discussion about why the fees are cost prohibitive and why it’s important for these providers to be engaged with Direct Secure Messaging and HSX more broadly.

HSX has had success with this approach with one of the most prevalent EHRs in the ambulatory environment in Greater Philadelphia; this vendor’s willingness to centralize implementations and reduce fees for participation has helped many practices get up and running with Direct in a timely fashion. There is still room for improvement, but reducing costs to eliminate barriers to entry gets things moving in the right direction.

#### ***Recommendation for other HIEs & HISPs:***

- Be a facilitator of the discussion between the EHR vendor and its customer regarding adoption of recognized standards on a timely and cost effective basis.
- Find a go-to person within each EHR and HISP vendor who can provide insight about their approach for Direct and interoperability.

#### ***HSX Progress to Date:***

HSX facilitated a discussion with the appropriate business leaders of a prominent EHR vendor in the region that allowed impacted HSX participants to renegotiate their contracts; improving their services at a lower cost.



### ONC Theme 3:

## **Failure to use Health-IT standards that can increase the cost, complexity, and or burden of sharing electronic health information**

### ***HSX Perspective***

Although the ONC, Direct Trust, and other standards driven bodies like Integrating the Healthcare Enterprise (IHE) have published criteria that govern health information technology (HIT), the interpretation of these standards has led to variations in available data exchange capabilities adding to the interoperability challenges experienced by HIOs.

Here is some of what HSX encounters when its staff are working in the community with healthcare providers and administrative staff...

*“If you have an accredited HISP and I have an accredited HISP and a system that’s meaningful use certified, shouldn’t this work without issue?”*

*“This worked last month when we tried with another practice that uses ‘x’ but then we went through an upgrade and now things are messed up. I don’t understand why this happened.”*

*“I sent the Continuity of Care document like I thought I was supposed to and it contained all the necessary patient information, but the recipient said it was missing x, y, z, information. What gives?”*

*“The packaging of the message matters? I thought an XML document should be standard.”*

*“I just want to send the primary care practice I work with a PDF of my last consult note or the last test that was done in the office...what do you mean they may not be able to receive it and render it appropriately?”*

Unfortunately, HSX hears these issues and complaints too often from existing and new members and participants. Just because one system is certified and worked once with another certified system, it does not mean it will always work with every implementation instance. The Direct “real world” remains unpredictable.

### ***Data Content is a Primary Point of Contention***

HSX has experienced that there are many interpretations or partial support of the same standard regarding information sharing, especially related to continuity of care documents (CCD). Additionally, even though Direct was not created to discriminate against different types of documents and the underlying HL7/IHE standards provide guidance for different document types, many EHR vendors have focused to date on CCDs only, which prevents a lot of other information from being shared.

Providers do not just want to send transitions of care in Extensible Markup Language (XML) format; they want to send consult notes, test results, a whole patient record, text only messages, etc. Having systems reject payloads of anything other than a CCD prevents important patient information from being transmitted between providers who are caring for the same patients.

Additionally, issues exist even when CCDs are the payload, as they are transformed by different systems that follow the same standards but have varying interpretations. This results in style sheets not being available or being properly applied, missing patient information from the CCD header preventing the ability to preview messages before incorporating them into the patient record, etc.

To address these challenges, HSX implemented an interoperability testing process as part of onboarding new entities to the HIE. This process assesses the capability of member EHR systems to send, receive, view and import CCDs from disparate systems. Although many of the EHR systems in the region are Certified Electronic Health Record Technology (CEHRT) under ONC, HSX made no assumptions about a system-specific implementation instance's ability to send and receive patient information to and from other systems. This interoperability testing process has proven to be very effective in assessing interoperability and identifying any issues for resolution prior to an entity going live and fully participating in information exchange with the rest of the community<sup>3</sup>.

Through this testing process, HSX identified issues related to:

- Formatting of transition of care (ToC) documents that affect the ability to receive documents from one entity to the next.
- Missing information that affects the ability to accurately match the document with the patient record.
- Inability to view the message due to system rendering incompatibility, and much more.

In general, the interoperability testing process enables HSX to be proactive in identifying and resolving issues that could potentially affect the treatment and care of patients in SEPA. In addition to the data content itself, it has become increasingly important for HSX to facilitate the content rendering discussion with its members. At this time of workflow transition for hospitals and practices, this may include the presentation of the clinical content in a variety of mediums (e.g on screen, paper, etc)

Today, HSX is investigating new industry tools, such as content validators, for testing documents and assessing conformity to standards as an automated way of overcoming

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<sup>3</sup>HSX Interoperability Testing Matrix-  
<http://hie.hsxsepa.org/hsx-memberparticipant-interoperability-status>

issues with interoperability. Early results of this due diligence are highlighted in [Appendix II: CCD Content Validators](#).

### ***HIO as Primary Interoperability Point of Contact***

While on the path to interoperability, providers need to be able to rely on vendors and HIOs, like HSX to help them understand how to test and best incorporate possible solutions into their respective workflows. Vendors telling them to open a ticket or call “1-800-SUPPORT” are not viable solutions. As the interoperability dialogue continues, it is critical that providers and HIOs like HSX have a clear escalation path for troubleshooting interoperability challenges experienced within each EHR and HISP vendor.

Overall, the use of HIT standards is envisioned to help create a more cost-effective, interoperable care delivery ecosystem. However, the realization of that “in the field” is that this is still very much a work-in-progress due to the EHR upgrade cycles by provider organizations. In addition, the clinical professionals using these systems are still learning how to best leverage their various systems, and, as such, standards development organizations (SDOs) are only just now getting sufficient empirical feedback.

HSX acknowledges HIT standards as critical to achieving successful interoperability but however maintains that allowing enhancements or exceptions in the near-term to the use of these standards, with discretion, will guarantee more overall success in the long-term.

Like most other multi-HIO states, HSX will also serve as a conduit to state-level healthcare interoperability initiatives and participate in a solution, enabling an individual’s health data to be shareable with other HIO’s in the state and the surrounding geographic area. For most of these PA programs, HSX has stepped up as an early adopter as one of the lead participants from the HIO community in the design, creation and testing of the interoperability solution in the state. Using the HIT standards promoted by other national initiatives (e.g. ONC CEHRT MU, the Sequoia Project eHealth Exchange) which are grounded in HL7 and IHE technical specifications was the first preference in all cases and is now the underpinning of PA ehealth Partnership Authority’s data exchange architecture.

### ***Recommendations for other HIEs:***

- TESTING!
  - HIEs are in a position to help facilitate streamlined, effective testing processes.
  - Use automated conformance assessment tools, whenever possible, to enable adherence to national standards.
- More stringent, better written standards with less room for interpretation.
- Alignment across the HIT vendor community about what is required to get things to where they need to be and an associated timeline and communication with client provider organizations and HIOs
- Acknowledgement from the vendor community about shortfalls and full transparency about what is being done to correct them.

- Better operational support for providers post technology implementation to ensure interoperability and workflow adoption.
- Clear escalation path for providers and HIEs for resolving issues.
- Active participation with state-wide healthcare initiatives in the interest of improved patient-centric and population health objectives.

***HSX Progress to Date:***

By facilitating interoperability testing as part of the onboarding process for new Direct messaging participants, over 42 organizations have published their Direct addresses in the HSX Provider Directory bringing the current directory total to over 9000 Direct addresses. This resource has provided significant value to the provider community and the exchange of patient information in the SEPA region.

Additionally, HSX is currently in the process of evaluating two content validator tools that will eventually be integrated into the HIE platform to validate the structure and content of CCDs from participating organizations. The objective of using this type of tool is to formally assess and “score” the adherence of the clinical records being generated and shared by HSX members. This would allow HSX to set a conformance goal for data content and manage the adherence by its member organizations towards it.

**ONC Theme 4:**

**Implementing or developing Health IT in ways that will “lock in” users**

***HSX Perspective***

As a member driven organization, HSX services are developed based on the need of its community and are available to all HIE participants. The development of any use cases and services are prioritized by a Clinical Advisory Committee that is representative of the HSX community. Implementation and use of these services by an organization is determined by the effectiveness, applicability and potential benefit of the service as well as the technological capability of that organization’s EHR system and the organization’s policies.

In an effort to continue developing technologies and services that enhance the delivery of care in this region, HSX has, by policy, established a periodic services assessment vs. long-term contract. This promotes a clear “customer service” paradigm between HSX and its members that involves an annual evaluation of HIE services, assessment of the value of those services and discussions about potential services that should be considered and prioritized in upcoming cycles.

An example of a value-added service that HSX provides to its members is the Clinical Activity History (CAH) use case, where a longitudinal record of a patient’s medical history, derived from claims data from the health plans, is sent directly to the Emergency Department EHR system where the patient is admitted. Any Emergency Department that wishes to utilize this use case needs to have the ability to receive a PDF (or as is currently in development, a CCD) into its EHR.

A second example of a value-added service is the Automated Care Team Finder (ACTF) service which provides an alternative option to the transmission of the standard discharge summary document from a hospital to a physician practice or primary care provider (PCP). This service helps to resolve the information gap of the patient's PCP being unknown to the discharging facility at the time of patient discharge. Leveraging the payer's provider attribution logic and the HSX Provider Directory of provider Direct addresses, the discharge summary is routed to the identified PCP via Direct message. The only requirements to deploying this service is that the facility's EHR system has the ability to automatically send discharge information and that they are providing Admit Discharge and Transfer (ADT) feeds to the HIE.

For some HSX participants, limitations with their EHR systems have restricted them from benefiting from the use of these value-added services. In this instance, HSX has worked closely with participants and their vendors to develop appropriate solutions that would make these services available to participating organizations.

HSX technologies are developed in a way that enables a member to easily discontinue use or migrate to another HIE or HISP service provider if HSX does not perform as expected. This establishes continuous accountability between HSX and its members to provide and maintain a high level of service. Additionally, HSX technology and services follow industry standards, which allows for seamless connectivity and ease of use. However, any development or enhancements outside of these standards are properly vetted by the HSX Technology Standards Committee. For example, HSX has executed deployments of both the CAH and ACTF services (noted previously) that have deviated from the original design in order to accommodate member-specific usability and functionality such as allowing members to manually send CCDs to be delivered via ACTF (as a requirement for this service, HSX recommends that members be able to automatically send CCDs) as well as allowing records for the CAH use case to be delivered via another IT exchange, such as a cold-feed, rather than over Direct.

***Recommendation for other HIEs:***

- Customer satisfaction is always the goal.
- Openly promote the use of industry standards to enable efficient HIT implementation and interoperability but also to establish user confidence.
- Listen to real users within each participating organization.
  - Develop solutions that are increasingly user-centered.
- Establish good quality assurance processes and adherence product development standards.
- Enable some level of flexibility in HIE solutions to accommodate users.

***HSX Progress to Date:***

Based on feedback received from current users as well as the needs of the clinical community, HSX is actively working on enhancements to its services. HSX is currently in the development stages of establishing a CCD format for the clinical activity history

document that is sent as part of the CAH service that would allow users to consume the information provided in the document as discrete data, if they desire. Additionally, HSX in conjunction with the health plans are working on developing an enhancement to the ACTF use case that would identify the provider organization in order to send discharge summary documents to that provider level, where applicable.

## ONC Theme 5:

### **Health systems do not want to share information with outside providers**

#### ***HSX Perspective***

HSX contracts, such as the PAR and BAA, promote the value of community data sharing and the expectation that everyone connected to the HIE is a bi-directional participant. “Sharing is Caring” is the motto and HSX use cases are written to benefit a variety of provider types (e.g. primary care, specialist, emergency medicine, health plans etc.)

Additionally, consumers in the greater Philadelphia area have a multitude of high quality healthcare organizations to choose from when they need care. Because patients travel between organizations often and about 40% of the providers in the greater Philadelphia region remain independent, most HSX participating health systems are well on their way to appreciating the value of sharing information outside of their own organizations.

Initially, HSX recognized the potential reluctance of a few participants to share information and adopted two participation processes to abate concerns: 1) As an initial service, HSX provided Direct Messaging and developed all additional services or use cases leveraging that technology i.e CAH and ACTF. The expansion of any clinical data repository (CDR) or query/retrieve data exchange was put on hold to be discussed after a designated timeframe once the value of the initial use cases were realized; 2) The implementation cycle was an iterative phasing of “early adopter” proof of concept, pilot production deployments and then full scale production offerings. This permitted the capture and sharing of empirical results to help demonstrate value to providers and increase adoption and use in the future.

When it’s been discovered that sharing information outside of the organization is not on the ‘roadmap’ for an institution, the HSX team actively works with the member to come up with a priority list/plan for doing so. Where technical and operational barriers exist, the HSX team works to understand how they can be resolved. HSX recently used this approach with one of the major hospitals in the region, facilitating targeted interoperability testing between that organization and its high priority exchange partners. Following the successful outcome of the testing, this organization is now actively sharing information with providers outside of their health system; increasing care coordination efforts and availability of patient information.

#### ***Recommendations for other HIEs:***

- Leverage Direct Secure Messaging “push” services to enable an acceptance of and desire for information sharing amongst users.

- Meet your member where they are
  - Start small and work methodically to understand the organization’s ‘why’ for not yet sharing information and the plan for taking steps to enhance communication
- Be a partner and work collaboratively
  - Use data to help health systems understand where their patients are going which may motivate them to share data.
- Use leverage when necessary such as the need to provide data in order to receive data from a service.

***HSX Progress to Date:***

With the execution of the PAR, HSX anticipates increased participation in the HIE and adoption of services in 2016. Under the direction of the HSX Board, the HSX Finance and Audit Committee has established a financial sustainability plan for the next 3-5 years. HSX is actively recruiting new members to expand the sharing of data across the continuum of care. Targeted recruitment efforts are underway for long-term care facilities, urgent care centers and home health entities. In addition, HSX wants to enhance its value by adding other Medicaid and commercial health plans and accountable care organizations. With the addition of a care coordination service currently under review, HSX is focused on a method to ensure that patient care is better organized by the health care entities participating in the HIE.

## Conclusion

HSX has taken a very targeted, member- and provider-centric approach to addressing interoperability issues within SEPA. As a HIE serving more than 4 million people, interoperability is of major importance and can only be achieved through continuous collaboration with providers and vendors; creating a space for all stakeholders to comfortably share their experiences and express their concerns.

In spite of efforts made on the local level, help is needed from Federal organizations, like ONC, to address the issue of information blocking on a larger scale. Even though progress has been made through the establishment of conformity assurance testing and requirements for certification based on CMS Meaningful Use (MU) initiatives, information blocking is still an issue. HSX believes that ONC is in a position to help HIEs resolve these information blocking issues more systematically and with greater expediency.

HSX will continue to work with its members and their respective vendors to resolve the interoperability issues that continue to plague this region; the results of which will be discussed in the next iteration of this document.

# Appendix I

## HSX Interoperability Testing Matrix- EHR Vendor

This matrix is used to record, monitor and communicate the outcome of HSX interoperability testing events with the respective EHR systems in the SEPA region.

HSX Member/Participant Interoperability Status		Receiver																			
Sender	HSX	Alberipis Professional	Alberipis Touchworks	CareEvolution HSP Portal	Corner	Corner (Siemens Invision)	Corner (Siemens Saurian-Mable-MD)	CPSI	eClinical Works	Epic	GE Centricity	Greenway Intergy	Health Fusion	McKesson Integreat	Medent	Meditech	NextGen Share	Office Practicum	Practica Fusion	STI Chartmaker	
	HSX MeritMail	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Alberipis Professional	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Alberipis Saurian	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Alberipis Touchworks	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
CareM8	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
CareEvolution HSP Portal	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Corner	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Corner (Siemens Invision)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Corner (Siemens Saurian)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
CPSI	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
eClinical Works	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Epic	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GE Centricity	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Greenway Intergy	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Health Fusion	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
McKesson Integreat	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Medent	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Meditech	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
NextGen Share	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Office Practicum	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Practica Fusion	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
STI Chartmaker	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
WellSoft	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Direct Operational: CCDA Message Sent & Successfully Received (manual attachment to pt chart)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Direct Testing in Queue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Direct Issues Exist	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Direct Currently N/A due to Inpatient System, DirectTrust, etc.	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey

This image can also be accessed on the [HSX Website](#).



## Appendix II

### CCD Content Validators

The National Institute of Standards and Technology (NIST) provides a publicly accessible document validator tool that HSX has utilized in many of the testing events it has facilitated. HSX has found this tool to be of value in communicating to HIE participants about any structural issues related to their documents that would need to be rectified by their EHR vendor in order to facilitate successful interoperability.

HSX is exploring more advanced tools from ONC and the private sector with the capability to deploy a more rigorous yet customizable conformity rules engine that could be integrated directly into its data exchange processes. On the HSX short list of content validator products from the private sector are:

- iQHD from Stella Technology [<http://stellatechnology.com/wp/products/iqhd/>]
- CCD Analyzer from Diameter Health [<http://diameterhealth.com/>]

These new tools are envisioned to enable a “quality scoring” approach to the data integrity validation process and permit HSX to set iteratively higher goals in alignment with its members and the EHRs serving them.