Cognizant

Cognizant's response for

Texas Health Services Authority

EMR-HIE Interface Development Services RFI

June 16th, 2015

BETTER. DIFFERENT.

Cognizant Technology Solutions

211 Quality Circle, College Station, TX 77845

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Cover Letter

June 16, 2015
Texas Health Services Authority
5900 Southwest Parkway, Building 2, Suite 201
Austin, TX 78735

Dear Mr. Gilman,

Cognizant Technology Solutions (Cognizant- www.cognizant.com) is pleased to provide Texas Health Services Authority (THSA), with the attached response to the Request for Information (RFI) for Interface Development Services. We offer a strategic partnership, that combines innovative healthcare domain expertise with EHR/HIE integration knowledge required to transform HIETexas' multi-stakeholders into a value based High Performance Integrated Networks (HPIN).

Cognizant supports THSA's mission to provide market based technology solutions that improve the availability of patient centered care collaboration. Our extensive EHR and HIE integration experience with many of the HIETexas vendors will facilitate true speed-to-value in leveraging existing community investments. In addition, we understand that successful delivery in a value-based care model requires robust, transparent collaboration between all HIETexas stakeholders, patient consumers and care continuum participants.

Cognizant is a **Fortune# 308** company that provides IT services, consulting & business process solutions to govt. entities & private companies around the world. Cognizant is one of the most successful IT companies in the world, with annual revenue of **$10.26+Bn(2014)** and **217,700** employees working across the globe, serving different business verticals and technology horizontals. Healthcare is one of the largest focus areas for Cognizant, contributing **30.2%** to the overall revenue. With over **36,000** professionals in our global healthcare practice, Cognizant has delivered **180+** engagements and solutions to a diverse client base including care providers, health plans and healthcare product vendors. Cognizant's provider practice has a dedicated clinical council consisting of Medical Professionals and Functional Consultants with extensive domain expertise to continually drive value and facilitating a 360° perspective to our healthcare clients. Cognizant shall leverage its team of EHR, HIE & Clinical Data Integration experts, along with an industry leading Govt. practice, to deliver this project. We are confident of addressing key program objectives of this initiative and bringing value to THSA's current and future requirements.

Cognizant views THSA as a strategic client, and is highly committed as a partner to bring together, a talented and passionate team of experienced integration and project management professionals, quality policies and high-touch responsive model. This will be coupled with a strong executive commitment to deliver our best in class services to the proposed engagement and position us as the right partner for THSA in this initiative and beyond.

Thanks & Regards,

Madhusudan Voruganti (Healthcare Public Sector Lead)
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Phone number: 201-838-6244

1. Executive Summary

OUR UNDERSTANDING

Cognizant recognizes the strategic importance of EHR and HIE connectivity, in helping drive value and adoption of HIE in Texas. To the extent THSA is successful in providing affordable integration support of HIETexas stakeholders, healthcare delivery will truly be transformed into a high quality patient centered delivery ecosystem that improves the safety, quality and cost of care for all Texans. This transition is expected to support the improvement and availability of HIE and HIT throughout the state, and to ensure that the right information is seamlessly available to the right health care providers at the right time. Cognizant understands the current interoperability needs as well as the scalability needs, for facilitating care collaboration across the state.

Cognizant, as a strategic partner, will bring together the best of talent, capabilities, performance, agility, and proven delivery experience to understand and enable the business needs of THSA. Our team will work collaboratively, to ensure the availability of right information about interface services and the technicalities linked to the same.

Cognizant is looking forward to play a constructive and consultative role in this engagement, with its wealth of integration experience and scale to deliver the nature of services, required for state of Texas. We will leverage our expertise in Clinical Data Integration and HIE's, ranging from consulting, development / enhancement and validation to implementation, deployment, testing, integration and migrations/ upgrades. Cognizant team has experience of working in 15+ HIE related engagements which includes supporting 10+ implementations. Our experts have handled aggregating clinical data in multiple formats, and interfaced with disparate healthcare IT systems and applications with the help of ready-to-use adaptors and interface engines.

OUR SOLUTION APPROACH

We understand, that a large scale EMR-HIE integration, typically involves many entities such as hospitals, other HIE's, radiology centers, labs, physician practices and other specialty services. Successfully deploying a network that enables seamless communication between these different entities requires a systematic multi-phase, multi-stage deployment life-cycle approach. Our recommended solution includes a combination of consulting and project management services to create, test and implement EMR/HIE integration across the HIETexas community. Cognizant has carefully considered things that would be of prime importance, and the final deliverable for HIETexas stakeholders will be designed to achieve the following:

- Meet the State's desired goal of provider practice transformation through improved clinical data availability with connected EHRs to HIEs
- Reduced cost and improved patient safety and quality of scalable data sharing between EHRs and HIETexas stakeholders

WHY COGNIZANT?

Based on our evaluation of the requirements, we believe that the best vendor for this engagement should be a trusted partner who will bring field proven "**delivery excellence**" to the table while being "**cost-effective**" and has **large pool of qualified resources** experienced in HIE with proven track-record of **successful engagements** and **project delivery in government healthcare** provider settings. As part of this engagement, Cognizant shall bring the following to THSA:

- Capabilities in Standards based interfaces, HIE data standards, Scalability, Flexibility, Reusability, Appropriate Environment and Data Security
- Cost effectiveness and Flexible pricing models
- Understanding of the typical interface and integration challenges/complexities and strategies to address the same
- End to end management of services from assessment, development, configuration, testing and maintenance
- Proven team experienced in Integration technology, healthcare domain and quality standards
- Our established presence in the healthcare arena, in-depth knowledge of managed care products including HIE, and rich experience in government healthcare

We look forward to discussing our approach with you, and strongly believe that we can create value for THSA through this partnership. It is our intent that our solution and overall approach will meet and exceed THSA's explicit expectations and accelerate HIE adoption across the state. We intent to leverage our knowledge and expertise, to lower the cost of EMR to HIE integration. We strongly believe that our capabilities and our unequivocal commitment to the success of the engagement position us to be the partner of choice for THSA.

OUR VALUE ADDITIONS & DIFFERENTIATORS

Cognizant believes, that it can bring immense value to THSA as part of this engagement, because of its capability to deliver high quality, business compliant solution and associated services with the flexibility required to meet THSA's specific/dynamic business needs. We believe that there are certain key differentiators that set us apart from other vendor organizations in delivering an enhanced value.

Healthcare Maturity

Cognizant has extensive experience in working with clients in the healthcare space. With a global healthcare team of over **36,000 healthcare associates**, Cognizant has enabled several of the world's largest healthcare companies overcome business & IT challenges to realize competitive advantage in the market. Cognizant's Healthcare practice serves over **180 healthcare clients** around the world and accounts for over **30%** of Cognizant's overall revenue. Cognizant has over **150,000 person** years of Healthcare IT experience in varied technologies. It is ranked as **6th largest Healthcare IT provider** by Healthcare Informatics.

HIE & Clinical Data Integration Service Offerings

Service Offerings

Consulting Services	HIE Services	Integration Services
• Clinical Landscape & Infrastructure Assessment for Data Integration • Data Aggregation, Migration Strategy and Implementation Roadmap • Vendor evaluation - Technology and products assessments	• HIE Product Development, Maintenance & Support • HIE Implementation Services • HIE QA/ Testing Services • HIE Infrastructure Services • Clinical System Integration (Standards-based)	• Integration Engine Development & Configuration • Interface Analysis, Configuration, Validation & Extensions • Semantic Normalization • Parser Development and Maintenance • Clinical Warehouse & Business Intelligence

Integration Engines Expertise	InterSystems Ensemble | Mirth | Cloverleaf | Oracle Egate | EPIC bridges | MS Biz Talk | Orion Rhapsody
Supported data standards/ formats and code sets	HL7 | DICOM | CCD/CCR | NCPDP | X12 | EDI (IHE Profiles) SNOMED | RxNorm | LOINC

Experience Summary and Credentials

30+ Engagements	Solution Accelerators
• 5 State level HIE implementation/ enablement engagements • 20+ clinical data integration engagements through partners • 300+ Physician practices - Interface migrations experience	• HL7 Data Simulation Tool • HIE Transformer • CCD-CCR Conversion Tool

HIE competency

Our assets in HIE include **35+ HIE consultants**, **1000+ medical professionals** and relationships with **5+ leading HIE vendors,** which enable us to bring the expertise required to drive HIE consulting, development and integration. Cognizant's team of integration experts have worked along with the client teams in multiple engagements to develop interfaces for data integration across US hospitals. Our implementation and integration experience spans across hospitals, hospital networks and Health Information Exchanges (HIE) with expertise in upgrades as well as new implementations. Cognizant has completed more than **20+ integration engagements** that include clinical data integration and **five state-level HIE implementations** engagements through product partnerships. Cognizant has a strong experience in clinical data integration in industry leading integration engines and owns proprietary tools and solution accelerators for HL7 data simulation and interface testing tools.

Clinical Data Integration competency
Cognizant has considerable experience in extracting and integrating data from various source systems typically housed in healthcare provider settings. In multiple engagements, Cognizant team has handled aggregating clinical data in multiple formats, and interfaced with disparate healthcare IT systems and applications with the help of ready-to-use adaptors and interface engines. Cognizant has done several engagements (including interface migrations) with leading interface engines such as **InterSystems HealthShare, Medicity, Orion, Mirth, Cloverleaf, OpenLink etc**. and worked with multiple source/ destination clinical /non clinical systems **like EMRs, LIMS, PACS, Disease surveillance systems, Immunization registries etc.** Cognizant's has a dedicated **Clinical System Integration CoE**, which provides advisory and technology support on integration services for a multitude of clients across their hospital and enterprise systems particularly to drive Clinical Integration Strategy and Clinical Integration Architecture, and facilitate implementation through Interface Engines and accelerators. Cognizant has expertise in providing Enterprise Integration Services including Application, Process and Service integration services, leveraging platforms such as TIBCO, WebSphere, Biztalk etc.
Expertise in handling standards based communication
Cognizant has experience in supporting formats like HL7 2.x, HL7 3.x,XML; CCD/CDA; XDS IHE; X12; DICOM, NCPDP which enable patient health information to be exchanged in real time among disparate clinicians, other authorized entities, and patients, while ensuring security, privacy, and other protections. Currently our interface engine/clinical data integrations support over **2 Billion transactions per year.** Our team of experts consists of **150+** associates certified in HL7.
Experience in EMR domain
Our **EHR Centre of Excellence** offers a wide gamut of services by certified professional across various technologies including **Epic, Cerner, AllScripts, Caradigm** etc. and services spanning across integration and interface development. Our experience includes : • Maintenance and support of EHR product from a leading clinical solutions vendor. • Enhancement, testing, end-to-end support and deployment of Peri-operative workflow product • Development of patient and provider portal solutions for a leading technology product vendor
Experience in working with state/county level government/Health authorities
Cognizant has a dedicated **Government Center of Excellence (CoE)** which has built the capability and capacity to partner with the government health entities in North America on specific IT/ consulting opportunities .Cognizant has over **2000+ associates** today working in the government healthcare space. Team Cognizant has worked with several governments state/county level health clients. In the healthcare space, Cognizant has so far worked directly with **21 State governments** such as State of Illinois, Texas etc. for various healthcare projects and has been successfully delivering several provider specific implementations related to interface engines, and HIEs. It has been partnering with other vendors in areas like MMIS, PBM, eligibility, HIE and HIX areas. Cognizant has also worked in multiple managed Medicaid engagements through health plan clients.
Cognizant's Public Sector Experience in Texas
Cognizant has a strong economic footprint in the Lone Star State; we employ over 2,800 residents (2014), service 7 of the state's top 59 largest employers and 19 of the 52 Fortune 500 companies based in Texas. As a commitment to the state's competitiveness, Cognizant has donated over $4.6 MN towards science, technology, engineering and mathematics (STEM) education programs.

We have taken concrete steps in setting up procurement vehicles through DIR to enable State agencies to utilize our services in various capacities. The following DIR contracts are currently active:

- Deliverables Based Information Technology Services (DBITS) for 4 categories (Application maintenance and support, Project management, Technology upgrade/migration and transformation, IT assessments and planning)
- DIR - Cloud Assessment Services

TX Health and Human Services Commission (HHSC) has awarded 4 contracts to Cognizant over the last 1 year; *Enterprise Services SharePoint Maintenance, and Support; Balance Incentive Program (BIP) Portal Center of Excellence (CoE); Balance Incentive Program (BIP) Workflow Center of Excellence (CoE) and DADS- Improve Client Assignment and Registration (CARE) Systems – Enterprise/CARE Retirement Planning.*
A brief on our active engagements is given below:

HHSC CARE (Client Assignment and Registration) Retirement Planning: Cognizant was awarded a contract in Feb 2015 to perform an assessment and propose a modernization roadmap for a legacy application called CARE, an Intellectual Disabilities (ID) and Mental Health and Substance Abuse (MHSA) registration system used by the agencies Department of Aging and Disability Services (DADS) and Department of State Health Services (DSHS).

HHSC Balance Incentive Program (BIP) Workflow Center of Excellence (CoE): As part of this project Cognizant is managing a Workflow Center of Excellence (CoE) to provide the deliverables-based services of updating and maintaining:

- Process Frameworks - involve business process management of activities, such as the creation, attributing, routing, or assignment of calls and tasks.
- Queue Frameworks - govern the navigation between pages in the user experience.

This engagement started Aug 2014 and is proceeding successfully.

HHSC Balance Incentive Program (BIP) Portal Center of Excellence (CoE): As part of this project Cognizant is managing a Portal Center of Excellence (CoE) to provide the deliverables-based services of updating and maintaining:

- The existing enterprise Style Guide that defines the user experience requirements, conventions and technologies to support portal interoperability.
- A set of Portal Frameworks that codify and implement the reusable elements of the Style Guide

This engagement started in July 2014 and is proceeding successfully.

DBITS Enterprise Services SharePoint Maintenance: Cognizant was awarded the contract for maintaining Enterprise SharePoint Services for HHSC in Feb 2014.
Our overall presence in Texas and our contribution to the Lone Star State is depicted below:

COGNIZANT TEXAS PROFILE

A PILLAR OF AMERICAN ENTERPRISE & INNOVATION

With over 27,000 U.S. employees, Cognizant is a fast-growing Fortune 500 company providing Texas's best companies with high-skilled talent, technology and business processes needed to produce the best products and services for a growing America. Cognizant has a strong economic footprint in the Lone Star State; we employ over 2,600 residents (2013), service 7 of the state's top 59 largest employers and 19 of the 52 Fortune 500 companies based in Texas. As a commitment to the state's competitiveness, Cognizant has donated over $4.6 MN towards science, technology, engineering and mathematics (STEM) education programs.

" By inspiring STEM education and facilitating highly-skilled careers, we are contributing to Texas's innovation economy and workforce. " - Francisco D'Souza, Cognizant CEO

- U.S. Corporate Headquarters in **COLLEGE STATION**
- Sales Office in: **IRVING**
- Talent Recruitment from the **UNIVERSITY OF TEXAS**

COMMITTED TO BUILDING OUR COMMUNITY

$100,000 grant	National Academies Foundation (portion of national grant allocated to TX)
$150,000 grant	Citizen Schools
$25,000 grant	VentureLabs (San Antonio) afterschool and summer programs
$25,000 grant	Boys and Girls Clubs of America, Richardson
$25,000 grant	Pratham USA, Houston
$5,000 donation	American Heart Association, Austin
$3,000 donation	American Heart Association, Dallas
$1,500 donation	National MS Society, Houston
$1,000 donation	Susan G Komen Foundation, Dallas

COGNIZANT AT A GLANCE

- **$8.8 B** 2013 Annual Revenue Expected
- **27,000+** U.S. Employees
- **$4.6M+** Donated towards STEM (to date)
- **5,400+** Green Cards Sponsored (FY08-12)
- **200+** Veterans Currently Employed
- **170+** Fortune 500 Customers

TEXAS BY THE NUMBERS

- **$1.5M+** In Annual State Sales and Payroll Tax
- **2,600+** Texas Employees
- **$336K+** Donated towards STEM (to date)

SERVING TEXAS'S TOP COMPANIES

- **7 of the Top 59** Largest TX Employers
- **19 of the 52** TX-Based Fortune 500 Companies
- **2 of the Top 17** Healthcare Companies
- **2 of the Top 7** Consumer Companies
- **The Top Retail** Company
- **1 of the Top 3** Logistics Companies

Best practices in project management

We adopt a number of best practices to establish rapport, win the confidence, cherish, and sustain a lasting relationship with our clients. Some of the key best practices are Multi-partner program management, Transparency in Project Management, Continuous project status tracking, Project change management, Identify risks upfront , Resolve issues quickly, Project guidelines, Ownership and accountability and Periodic site visits

Broad range of technology capabilities

Cognizant's **specialized Centers of Excellence (CoEs)** help Cognizant teams incubate technological and process innovation on a continual basis, and provide deep technical/process leadership including various tools and accelerators and any other support required for executing projects. These teams conduct extensive technology research and development and explore how technology will evolve, converge and shape business in the future, thereby bridging the gap between state-of-the-art technology and business solutions. Cognizant healthcare has a dedicated team to track health industry market trends, client needs and design relevant point solutions and frameworks

KEY ENGAGEMENT HIGHLIGHTS

State HIE Implementation for a leading HIE vendor
Client Situation: Client approached Cognizant to provide integration/HL7 experts to augment the client's team and support state, community and organization level HIE implementations. **Highlights**: • Cognizant's team of 24 associates supported the client's integration and interface development experts to develop interfaces for data integration across hospitals in a key US state leveraging onsite-offshore delivery model • Cognizant associates performed requirements gathering, gap analysis, HIE configuration, implementation, deployment and testing • Client benefited with faster time-to-market, 24/7 global delivery, Cost arbitrage through offshore resources and Productivity gains
Clinical data aggregation for vendor developing innovative solutions for providers
Client Situation: Client approached Cognizant for implementation of its product across multiple hospitals **Highlights**: • Cognizant's dedicated implementation team collaboratively worked with client team to support 30 + implementations of HL7 based HIE product across multiple hospitals. • Engagement included Project Management, Parser builds for HL7 feeds from various hospital systems and Database and Infrastructure support • Cognizant benefited the client by serving as a growth multiplier for number of implementations made by the partner. Cognizant offered availability of niche skilled resources (HL7 Experts, Pharmacists), geographic expansion of the product by leveraging Cognizant's global footprint, cost savings and knowledge self-regeneration to eliminate training & development costs
EHR integration with physician practices for client's oncology network
Client situation: Client owned EHR product had to interface with the EMR of community oncology professionals to provide the oncologists a single platform to keep track on their patient's details such as demographic details, scheduling details and laboratory results. As part of this, ADT/SIU/ORU interfaces had to be created based on the HL7 messages received for a particular customer. **Highlights**: • Cognizant's dedicated team collaboratively worked with client team to convert the unformatted data (demographics, scheduling or laboratory information), into HL7 compliant data which can be accepted by the EHR. • Cognizant team analyzed the unstructured messages and applied PERL scripts to convert them to HL7 compliant data so that they could be processed efficiently by the interface and sent to the EHR. • Cognizant team performed the analysis and interpretation of patient data from PMS, LIS and REF lab system manually, to push the data into their EHR application

- Team also developed and supported an interface service which delivered Public Health and Vaccination information from the EHR application to state agencies based on the requirements from the state government

HIS Integration with other hospital systems

Client Situation: Client wanted to make a foray into the US market with its flagship HIS product. Client's product had to be localized and made compliant to the US Healthcare regulations /standards, integrated with other EMR systems through HL7 parsing and certified for Meaningful Use (MU). Client also needed support in training of physicians and nurses for adoption.

Highlights:

- Cognizant provided assistance for product integration, implementation and support and consulting services on insights of Meaningful Use certification
- Cognizant team integrated EMR documentation module with HIS modules using Cloverleaf interface extensions and customer interfaces.
- The team developed HL7 parsers to integrate the product with other HIS systems and assisted the client development team to build APIs to store HL7 parsed feeds
- Cognizant team integrated multiple inbound Lab feeds such as General Lab, Microbiology, Pathology and Blood Bank Reports
- End user training was provided, to enable the physicians and support staff to understand the product workflow and navigation

2. Response Content

OUR SOLUTION PROPOSITION

Cognizant's integrated team of business, technology and project management experts will work in collaboration with HIETexas stakeholders, members of local HIE's and EMR's involved, to deliver the integration services, taking into consideration the interface requirements and scalability needs. In order to achieve the objectives of this strategic initiative, of ensuring interoperability between EMR's and local HIE's and availability of health information, our team proposes to develop bi-directional HIE interfaces required for the list of all HIE community participants including Labs, Radiology Centers, Hospital Facilities (HIS Systems), Ambulatory EMRs, Pharmacies and Immunization Registries.

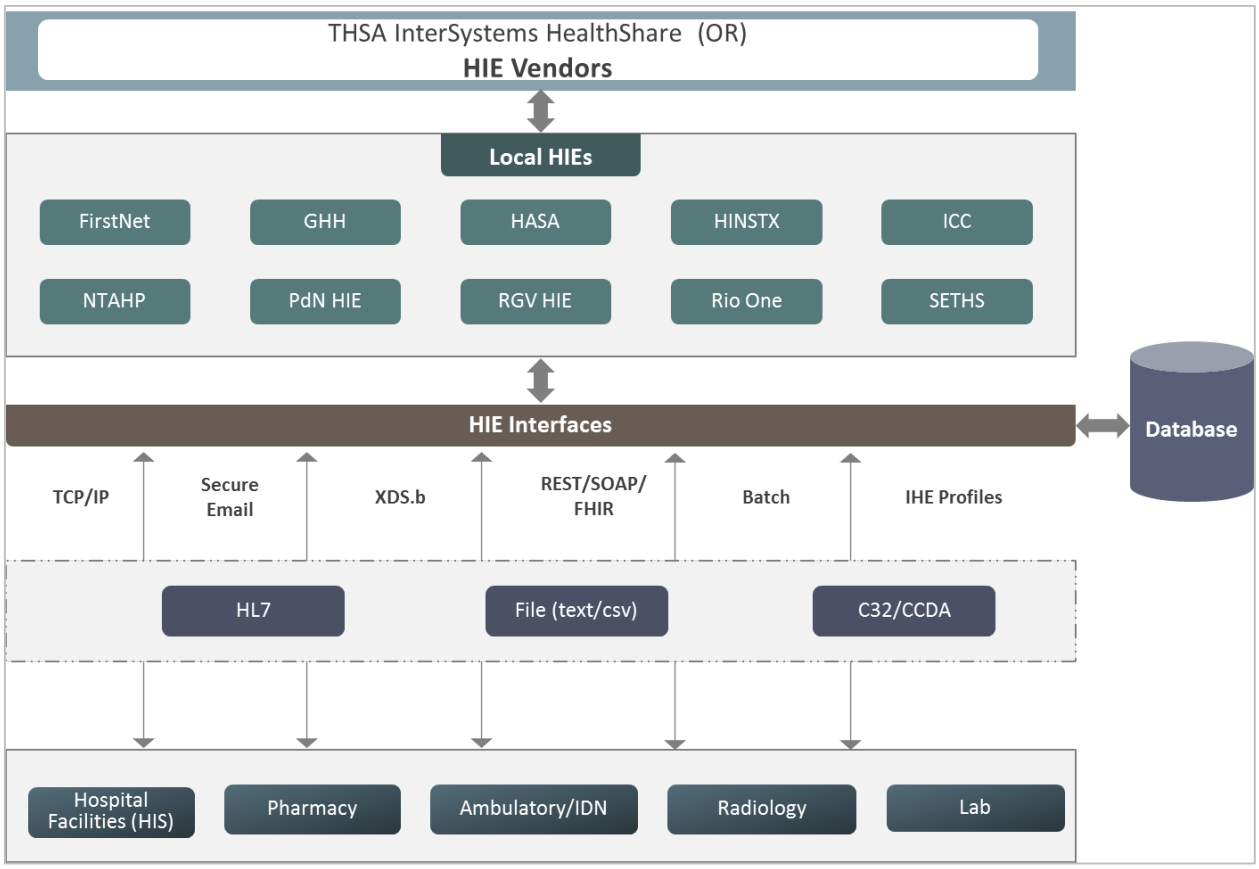
To cater to the business requirements of THSA, development of bi-directional interfaces between every EMR and local HIE, would be done via the Interface engine available. Push and pull of data from the EMR's (Ambulatory & Inpatient) to the local HIE's, would be via the developed interfaces in the Interface Engine.

The interfaces developed for various HIE vendors will mediate and process the HL7/CCDA messages from EHR to HIEs and vice versa. The HIE Interfaces shall support the standard transportation standards as specified in the RFI. The connectivity to the interfaces will be established through the below listed transport mechanisms.

- TCP / IP
- Secure Email
- XDS.b
- REST/SOAP/FHIR
- Batch - FTP /SFTP
- IHE Profiles

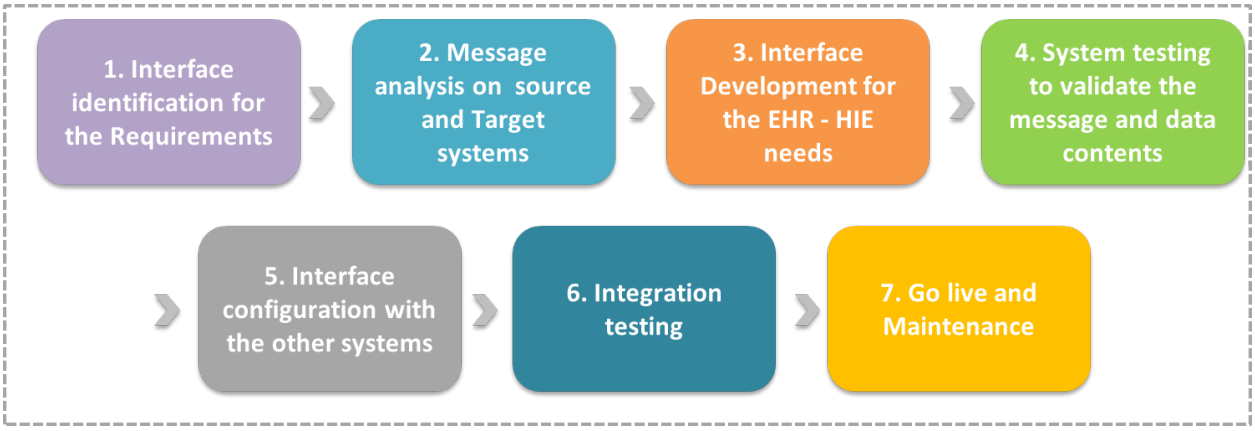
The transportation protocol will be implemented based on the support provided by the appropriate HIE vendor.

Below representation depicts our proposed solution:



INTEGRATION APPROACH

Cognizant will follow the below steps/activities as an integration approach to connect EHR's and HIE's.



1. **Interface identification** - Understand the business scenario as well as communication between EHR and HIE to identify the suitable interfaces which need to be built on integration engine. Based on the functionalities, we are assuming the following interfaces are required;
   - ✓ C32/ CCDA
   - ✓ Admit Discharge Transfer
   - ✓ Lab Orders
   - ✓ Microbiology
   - ✓ Radiology
   - ✓ Immunization

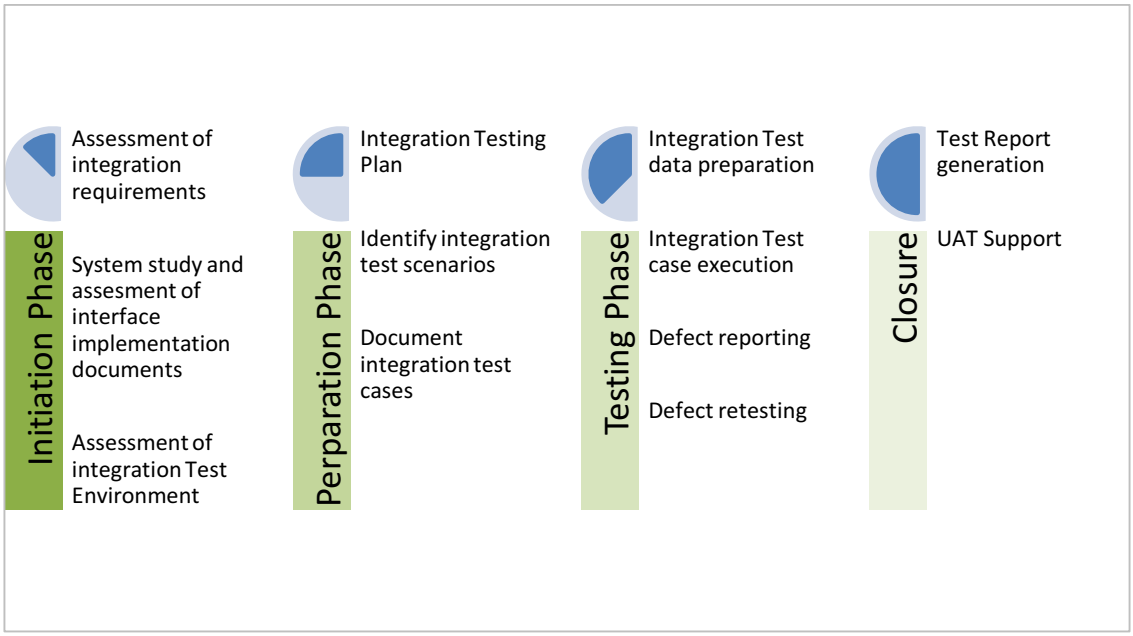
2. **Message analysis:** Sample messages will be analyzed from various interface feeds like ADT, ORU, ORM messages from EHR systems. During this phase, Cognizant team will identify the key data for any message integrations and validate it.

3. **Interface development**: Developing the list of interfaces identified in first step would contain the following activities to achieve the complete transmissions
   - **Inbound component configuration** – To receive the messages in the specific communication protocols on a regular intervals
   - **Rules engine and Router component configuration –** To determine the message process based on the message content and routing to the appropriate HIE
   - **Outbound component configuration –** To push the messages into the HIE on the specified time intervals or real time if desired

4. **System testing**: Detailed testing approach elaborated in "Overall Testing Solution" section below.

5. **Interface configuration**: Configure the HL7/C32/CCDA messages, structure, source system name, source system transmission mode, receivers name, receivers transmission mode, credentials to validate the messages, routing logics(if any) and other detailed information's about the services, methods, parameters and etc.

6. **Integration testing -** Integration testing will be done as a final phase before the product goes to the production environment where the local HIE's and engine would be virtually connected with real-time or near real-time systems to send & receive the communications based on the needs.



Overall Testing Solution: Key objective is to ensure that solution developed is efficient, covers all the functional and technical requirements and is scalable & flexible enough to meet THSA's future needs. Cognizant's overall testing solution is aimed at comprehensively addressing the quality assurance needs for the data extraction, transportation, and integration and user access capabilities.

Key Considerations: Based on Cognizant's extensive experience with similar type of engagements, we believe following key considerations will help in ensuring successful go-live for THSA HIE solution implementation:

- Test planning: Considering size and complexity involved in this engagement, it is critical to have robust test plan in place early in the SDLC to govern testing activities
- Interface testing: sharing of information through different transactions among various external entities integrated with HIE will be a complex solution and will require validation of interoperability while exchanging information

Test strategy / planning creation approach: Cognizant's test plan approach is based on proven methodology to ensure scheduling and coordinating of testing activities as well as define procedures and guidelines aligned with THSA's HIE solution implementation program goals.

Cognizant will prepare detailed test plan addressing various aspects specific to testing including list of activities to be performed for each testing phase, approach for executing in scope testing type, defect tracking and management, environment management, updating RTM based on results, progress reports, staffing plan, reporting and reviewing processes, templates, checklist and other artefacts usage and so on.

System test design approach: Cognizant will leverage its experience in healthcare industry to ensure effective test scenarios / test cases preparation for HIE solution testing. Based on THSA's functional and technical requirements, Cognizant will prepare high level test scenarios and corresponding detailed test cases addressing all the impacted functionalities for each of the in-scope testing types. Cognizant will also identify test data requirements for executing test cases and request THSA to provide PHI sanitized data for various types of testing.
Following activities will be performed as part of test design phase for in scope testing types.

- Test scenario preparation
- Test case preparation
- Test scenario prioritization
- Reusability of test scenarios
- Identification of test data requirements and communicate to THSA

Testing types: Cognizant will perform testing covering various testing types as outlined below for the successful validation on the product implementation:

- System testing
- System integration testing
- End-to-end testing
- User acceptance testing

System testing: As out of the box features are already tested, the focus of systems testing will be specific to development of any new component, customizations and interface built for integrating with various external entities. At the beginning of system testing, Cognizant will perform smoke test to determine that each and every component developed is thoroughly tested aligned with THSA HIE functional and technical requirements by Cognizant.

System integration testing: System integration testing will focus following two areas integration of external systems with HIE interfaces and information being processed with internal HIE components. Details specific to testing around these two areas are outlined below –
Key activities involved in system integration testing include:

- Review business requirements and specification documents to understand integration touch points, associated business rules and data flow among integrated components / systems
- Preparation of test scenarios / test cases
- Identification of test data, gathering required test data from THSA and execution of test scenarios / cases and logging issues in form of defects in defect management tool
- Publish test results

Integration testing for internal components: Once the data is received from external systems to HIE interfaces, same will be processed to various internal components of HIE solution. On receiving the files on HIE interface the HL7 files will undergo the process of enhancement, transformation and validation and as part of next steps the outbound files that are generated will be stored in a specific path (outbound directory).
Below is the high level list of indicative business workflows for which Cognizant will prepare end-to-end test scenarios / cases:

- Send and receive Admit, Discharge, Transfer (ADT) message types / various trigger types for industry standard HL7 format among various subscribers including hospital, physicians, specialist, labs
- Send ORM messages for validating lab orders and results and receive corresponding ORU messages
- Process and send Continuity of Care Document (CCD) specification for patient summary transfers based on each of the submitter
- Support messaging between providers to generate - direct messages to providers within the HIE solution

User Acceptance Testing Support: As part of user acceptance testing support, Cognizant will collaborate with THSA users to prepare UAT test cases and obtain sign-off. Cognizant in collaboration with THSA users will facilitate execution of UAT test cases and verify HIE solution for acceptance criteria.

7. **Go live and Maintenance:** After the successful integration testing, the appropriate interfaces will be moved into the Go live and Maintenance phase.

COGNIZANT'S APPROACH TO ADDRESS COMMON CHALLENGES IN INTEGRATION

Common Challenges	Cognizant's approach
Diverse Source Systems - Heterogeneous EMRs/EHRs	▪ Build an integration framework that ensures adherence to industry standards (Integration standards - HL7, CCD, CCR) and enable larger connectivity (e.g. HIEs, ACOs, etc.). ▪ Establish a flexible and scalable integration model to streamline communication between multiple EMR/ Hospital systems.
Interfacing with Legacy Applications	▪ Collaborate with participating providers' applications team to understand data pull/ingest formats. ▪ Build/deploy new interfaces which are simple, secure, scalable and standard based to enable connectivity with such systems.
Non-Standard/Custom Data Formats	▪ Support in data conversions as required by leveraging Integration Engines. ▪ Alternate mechanisms such as building custom scripts, ETL activities, parsers and conversion routines.
Transport Protocol support	▪ Leverage transport protocol support provided by the Integration Engines to facilitate the data exchange from different EMR via respective protocols
Post implementation Interfaces support	▪ With our experience working with wide range of Integration Engines in multiple provider engagements we will provide comprehensive support services while reducing dependency on product vendors if any.

2.1.1 PRICING

All interface development/deployment capabilities and pricing should reflect standards-based interfaces. Pricing information should reflect both start-up/implementation fees as well as any service or maintenance fees.

Response

Cognizant has considered standards based interfaces, to arrive at the estimates. Please refer to our response to section 2.2.1 for pricing details

2.1.2 CONTENT STANDARDS

Content: Provide information on the indicated set of HL7 2.x messages and assume that the HL7 messages do not contain embedded files. Firms responding to the RFI should specify the degree to which their interfaces will support the following content standards:

2.1.2.1. Content standards as defined by Meaningful Use 1 and 2, including C32 and Consolidated CDA

Response

The various content standards defined by Meaningful Use 1 and 2 as well as the C32 and the CCDA document types are listed below along with their support level. The Interfaces in the table given below are the 9 different document types as per the standards. Cognizant's solution will support these standards compliant document types. Any non-compliant document types not mentioned in the below table will not be supported.

Interfaces/ Requirements	Concepts	Data format	Support Level
C32/ CCDA (CCD)	Problems	XML	Uni-directional No Parsing, Only File will be exchanged
	Allergies		
	Medications		
	Diagnosis		
	Immunization		
	Advance Directives		
	Demographics		
	Vital Signs		
	Care Plan		
	Discharge Summary		
	Result		
	Smoking Status		
	Orders		
	Referral		
	Encounter		
	Consultation Notes		
	Discharge Summary		
	Imaging Integration, and DICOM Diagnostic Imaging Reports (DIR)		
	History and Physical H and P		
	Operative Note		
	Progress Note		
	Procedure Note		
	Unstructured Documents		Uni-directional No Parsing, Only File will be exchanged

Cognizant has extensive experience in handling and extracting CCDA documents received from inpatient or ambulatory EMR's via HIE's. Cognizant team has expertise in enabling features like:

- Saving the CCDA document, as received from various sources
- Parsing the individual concepts and normalizing them before submitting to the data base
- Parsing and saving Medications, Problems, Allergies, Lab results, Vital Signs, Encounters, etc. within the target application for:
    - Viewing
    - Input to care plans,
    - Stratification algorithms
    - Quality reporting
- System display of HTML (human readable) format of the CCDA
- Create custom transition document on the lines of CCDA, that consolidates patient information, generates a PDF document and sends as attachment to other providers via secure messaging

2.1.2.2. Texas Implementation Guide[1], CDC Immunization Information Submission Data Standard (HL7 2.5.1)

Response

Sharing of immunization information between disparate HIT applications via HIEs, is driven by standards based content and markup. To support this data transfer, HIT systems and HIEs should have the capacity to trigger, standardize, and securely transmit appropriate data. Cognizant has identified the message types as per the immunization information standards. The interfaces listed in the table below are the 5 message types as per those standards. Cognizant's solution will support these standards compliant message types. Any non-compliant message types will be treated as exceptional cases.

Interfaces/ Requirements	Concepts	Type	Events	Support Level
Immunization	Immunization Query and Update	VXU, VXQ	V04,V01	Bidirectional No Parsing, Only File will be exchanged

Our credentials in Query based exchange include experience in using PIX/ PDQ queries with multiple HIEs to validate demographics, add patient to community record, manage patient matching issues via a single EMPI (primary HIE) . We also have the experience in setting up the web service and data in a secured zone to serve such queries through exchange.

2.1.2.3. Texas Implementation Guide, CDC Electronic Lab Reporting Data Standard (HL7 2.5.1)

Response

Sharing of Electronic Laboratory Reports (ELR) to report test results between EMRs and public health authorities, is driven by standards based content and markup. To support this data transfer, EMR systems should have the capacity to trigger, standardize, and securely transmit appropriate data. Cognizant has identified the message types as per the Electronic Lab Reporting standards. The interfaces listed in the table below are the 10 message types as per those standards. Cognizant's solution will support these standards compliant message types. Any non-compliant message types will be treated as exceptional cases.

Interfaces/ Requirements	Concepts	Type	Events	Support Level
ADT	Patient Admit, Discharge, Transfer	ADT	A01, A02, A03	Unidirectional No Parsing, Only File will be exchanged
Microbiology	Microbiology	ORU	R01	Unidirectional No Parsing, Only File will be exchanged
Radiology	Radiology	ORU	R01	Unidirectional No Parsing, Only File will be exchanged
Lab Orders	Lab Orders	ORM	O01	Unidirectional No Parsing, Only File will be exchanged

Cognizant has extensive experience in handling and extracting diagnostic lab data received from Lab Information Systems and inpatient/ ambulatory EMRs via HIEs. Cognizant team has expertise in enabling below listed features for various clients:

- Handling both HL7 and CCD formats including embedded documents
- Ensure patient matching when different patient EMPI IDs are received from various HIEs/EMRs/EHRs for the same patient
- Semantic normalization of data to enable uniform data input to care plan, stratification algorithms and quality measures reporting
- Categorization of lab results based on LOINC classification (General Lab, Microbiology, Blood Bank, etc.) to provide an EMR like user experience
- Algorithms for real time impact of lab results on care plan
- Development of over a 100 quality indicator reports on PQRS , Diabetes measures , Ambulatory Care Sensitive conditions and Immunization, Beta Blocker Treatment and BMI Assessment

2.1.3 TRANSPORT STANDARDS

Transport/Messaging: Provide information on the indicated transports. Firms responding to the RFI should specify the degree to which their interfaces will support the following transport standards:
2.1.3.1. TCP/IP inside VPN with optional MLLP
2.1.3.2. XDS.b
2.1.3.3. eHealth Exchange specifications leveraging XCA/XCPD (SOAP Web services)[2]
2.1.3.4. IHE profiles for EMR to HIE information exchange, including XDS, XCA, PIX, PDQ, etc.
2.1.3.5. Direct (Secure email) [3]
2.1.3.5 REST/FHIR
2.1.3.6 Other batch file transfer methods for exchanging clinical data

Response

The below HIE vendors support the protocols requested in the RFI, and as part of the integration the same will be enabled for data exchange.

Protocols	Medicity	Orion	Mirth	HealthShare
TCP/IP inside VPN with optional MLLP	√	√	√	√
XDS.b	√	√	√	√
eHealth Exchange specifications leveraging XCA/XCPD (SOAP Web services)	√	√	√	√
IHE profiles for EMR to HIE information exchange, including XDS, XCA, PIX, PDQ, etc.	√	√	√	√
Direct (Secure email)	√	√	√	√
REST/FHIR	√	√	√	√
FTP /SFTP for batch transport mechanism	√	√	√	√

IHE profiles use cases are listed below for the transport protocols

- PIX/PDQ
  - Perform a deterministic query against an EMPI
  - Perform a probabilistic query against an EMPI
  - Add or update demographic data held in an EMPI
- CCD
  - Generate a CCD document from an HL7 message and provide and register it to a repository.
  - Generate a CCD document by querying an internal database
  - Receive a CCD document (via a registry or point-to-point) and convert it to an internal format

2.1.4 USE CASES/EVENT TYPES SUPPORTED

2.1.4.1 Please indicate the HL7 v3 event types/message types supported.

Response

HL7's primary goal for Version 3 is to offer a standard that is definite and testable, and provide the ability to certify vendor's conformance. It represents a new approach to clinical information exchange. HL7 V3 defines the following document types which would be provided by the EMR to HIT applications. Cognizant's solution will support these standard compliant message types. Any non-compliant message types will be treated as exceptional cases.

#	Concepts	
1.	HL7 V3	Allergies
2.		Medications
3.		Diagnosis
4.		Immunization
5.		Demographics
6.		Vital Signs
7.		Discharge Summary
8.		Result
9.		Orders
10.		Imaging Integration, and DICOM Diagnostic Imaging Reports (DIR)

2.1.4.2 Please indicate the C32/C-CDA use cases/document types supported such as referrals, longitudinal care summary, discharge summary, etc.

Response

CCDA defines the following document types which would be provided by the EMR to the Care plan systems and other HIT applications, which require these documents. A consolidated CDA document type will have all the necessary XML sub sections for every document type mentioned below. Cognizant shall support the below listed document types:

#	Concepts	CCDA / C32 Document Types
1.	CCDA (CCD)	Problems
2.		Allergies
3.		Medications
4.		Diagnosis
5.		Immunization
6.		Advance Directives
7.		Demographics
8.		Vital Signs
9.		Care Plan
10.		Discharge Summary
11.		Result
12.		Smoking Status
13.		Orders
14.		Referral
15.		Encounter
16.	CCDA (Other Document Types)	Consultation Notes
17.		Discharge Summary
18.		Imaging Integration, and DICOM Diagnostic Imaging Reports (DIR)
19.		History and Physical H and P
20.		Operative Note
21.		Progress Note
22.		Procedure Note
23.		Unstructured Documents

2.2.1 INTERFACE MATRICES

2.2.1 Responses for interface capabilities should include all intersections between the most common ambulatory and inpatient EHRs and the HIEs used by the publicly funded HIEs in Texas. The content of each cell for which a responding entity is providing information should reflect the cost of developing the interface between the corresponding EHR and HIE along with any additional information regarding the cost or assumptions. Capabilities provided for this matric must performed within the United States and conform to all applicable federal and state legal requirements, as well as all HIETexas requirements. Respondents may also provide information in a third matrix on capabilities with Interface Engine software based on the 10 most commonly deployed interfaces engines in Texas, as determined by the respondent.

Response

Cognizant has given the pricing for interface development between Inpatient/Ambulatory EMRs and local HIEs considering the below listed interfaces. The pricing is applicable per hospital/physician practice. Tables below detail out the pricing for Interface development for first Instance of Interface development as well as for every additional Inpatient/Ambulatory EMR.

1. **Cost for interface development for Inpatient EMR's**

Cost for Interface development for Initial, first instance interface to one Inpatient EMR				
Hospital/Inpatient Interfaces	**Medicity**	**Orion**	**Mirth**	**HealthShare**
CCDA (CCD), ADT, Microbiology Results, Radiology Results, Lab Orders, Immunization	$ 170,240	$ 167,680	$ 167,680	$ 166,400

Interface development for every additional Inpatient EMR				
Hospital/Inpatient Interfaces	**Medicity**	**Orion**	**Mirth**	**HealthShare**
CCDA (CCD), ADT, Microbiology Results, Radiology Results, Lab Orders, Immunization	$ 34,048	$ 33,536	$ 33,536	$ 33,280

2. **Cost for interface development for Ambulatory EMR's**

Cost for Interface development for Initial, first instance interface to one Ambulatory EMR				
Ambulatory Interfaces	**Medicity**	**Orion**	**Mirth**	**HealthShare**
CCDA (CCD), Patient Registration, Microbiology Results, Radiology, Results, Lab Orders, Immunization	$ 129,280	$ 121,600	$ 121,600	$ 120,320

Interface development for every additional Ambulatory EMR				
Ambulatory Interfaces	**Medicity**	**Orion**	**Mirth**	**HealthShare**
CCDA (CCD), Patient Registration, Microbiology Results, Radiology, Results, Lab Orders, Immunization	$ 25,856	$ 24,320	$ 24,320	$ 24,064

3. Interface Support for **3 years** (assuming for one hospital/physician practice and one HIE Vendor, This has to be revised based on additional hospitals/ physician practices added) - **$1,149,120.**

2.2.2 ASSUMPTIONS & OUT OF SCOPE

Responses for pricing should list all assumptions as they relate to costs.

Response

Cognizant's proposal is based on the following assumptions:

Assumptions

1. Estimates provided are for the listed interfaces only; CCDA (CCD), ADT, Microbiology Results, Radiology Results, Lab Orders and Immunization.
2. Scope of any interface is limited to standards based data exchange only. Parsing/extracting/mapping of individual data element (Problems, Medications etc..) from HL7 and CCD and any other development would be considered as additional effort and scoped & estimated separately .
3. ADT will be considered as one interface limited to Admit, discharge and transfer (A01, A02, A03).
4. CCDA (Other document types) is considered as another CCD, hence no separate estimate is provided for these.
5. All pricing assumes the HIE framework(s) perform all data translation required for interoperable sharing between systems and no additional coding is involved.
6. Text reports for microbiology and radiology results will be considered as result type two interfaces.
7. It is assumed that Problem, Medications and Pharmacy will be a part of CCD and hence no separate interface has been added for HL7.
8. The effort provided is for developing new interfaces, and the ones, which are existing within HIE's are not considered.
9. Cost for procurement of the interface engine is not included and it is assumed to be already available.
10. Necessary access to the interface engine's environment will be provided by THSA
11. Estimates provided don't include Hosting and Infrastructure cost.
12. Estimates are provided based on the understanding that interfaces development and testing would be carried out at Texas, USA.
13. Implementation cost will not be provided at this point in time as we do not have detailed requirements / specifications. This is will be provided only after the discussion with appropriate stakeholders during solution development.
14. The maintenance cost provided is subject to only the support for one hospital. The effort would vary based on the number of hospitals to be supported.
15. Helpdesk support details are not considered for this RFI and will be provided later when we go for detailed response.
16. The IHE profiles / protocols will be enabled subject to the feature availability in the Integration engine and no separate coding is needed.
17. Test Data like (Hl7, CCD and CSV) for Interface Testing and End to End, Functional Testing will be shared by THSA.
18. THSA will provide appropriate access to the test environment, Tools and necessary access for the external system during test execution.

Out of Scope

1. Any interfaces and functional concepts, trigger events which are not listed on section 2.1.2 Content

standards are out of scope.

2. Any type of Queries, Appointment, Referral and MDM related interfaces are considered out of scope
3. Any type of development or Enhancement to the EMRs or Local HIE's are considered out of scope
4. Data transformation, business logic and customization are out of scope for any of the interfaces.
5. Historical data migrations is out of scope
6. Support for existing interfaces is considered as out of scope
7. Alerts / Exception emails to the EMR are out of scope and not considered for estimates
8. No local patient information will be stored within the Integration Engine
9. Nonfunctional requirements are out of scope

3. Regulatory and Legal Comments

#	Description	Cognizant's comments
1	Page 2, Introduction: Based on information obtained in response to this RFI, the THSA intends to release a vendor and cost list that can be used by Texas HIEs and relevant stakeholders in contracting with vendors for interface development services.	Cognizant is willing to agree to THSA's release of the cost list with the Texas HIE's however, we would like THSA to withheld the release of pricing related information with other SI's/IT companies that may be taking part in this RFI process
2	**Page 8, 4.2 Texas Public Information Act:** Responses may be subject to the Texas Public Information Act, Texas Government Code, Chapter 552, and may be disclosed to the public upon request. Subject to the Act, prospective vendors may attempt to protect what they onsider to be trade secret and confidential information from public release. Trade secrets or other confidential information, submitted as part of a response, must be clearly marked on each page on which such information appears. Such marking must be in boldface type and at least 14-point font. Responders should review carefully Chapter 552, Texas Government Code, and in particular Section C, Information Excepted From Required Disclosure, for more information on exceptions to public disclosure of information under the Texas Public Information Act. Please note that the ultimate decision as to whether materials qualify for an exception under Chapter 552 rests with the Texas Attorney General's office.	Cognizant shall separate out Trade secrets or other confidential information. Cognizant would discuss the disclosure of confidential information with THSA.
3	**Page 8, 4.3 Warranties:** Responder has not contracted to provide similar services to a similarly situated customer on better terms and conditions, including price, than it is offering to the THSA and/or Texas HIEs through this RFI, and shall not do so during the contract term	Cognizant is prepared to discuss and negotiate the "most favored customer" provisions in the process of contract formation.