Transformative Health System (THS)

Case Study

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I. THS Background and Environment

Transformative Health System (THS) is a community health system in the Midwest United States. Through the merger of two additional community hospitals in 1999 the THS Hospital Division consists of three hospital campuses (THS North, THS South and THS Specialty) that cover a geographic service area of approximately 120 miles. THS also includes 100 employed physicians, 12 medical mall ambulatory locations, 5 urgent care centers and a number of joint venture partnerships involving post-acute care, senior residences outpatient pharmacy management and population health organizations.

THS Business Environment:
The THS business environment is indicative of changes happening all over the U. S. Inpatient volume projections beginning in fourth-quarter 2018 through second-quarter 2019 are between 3% to 5% below budget projections. This reflects a shift from patients being admitted through the inpatient services to observation status. The shift toward utilizing observation beds which results in lower levels of reimbursement is a national trend. Also, THS has seen a 7% above budget increase in ambulatory volumes in their medical mall locations and urgent care centers in the surrounding communities.

THS Strategic Goals:
The THS organizational Strategic Roadmap includes a five-year Plan for the Health System, approved by the Board of Directors in 2016 which includes: maintaining current market share in the 120-mile radius served by THS, exploring the strategic partnerships to expand sources of revenue and reduce clinical and administrative expenses for the health system and continue to support service lines and community initiatives that serve the community-based health mission of the organization.

THS Consumer Business Strategy Focus:
Because of the change in business in the THS has decided to focus on leveraging the IT investment in order to improve consumer access and promote consumer retention. The organization is also shifting its focus to provide seamless IT solutions to both internal stakeholders such as clinical and nonclinical staff as well as external stakeholders such as consumers and the surrounding communities. The business strategy supporting this approach has to do with the organizational value of both consumers and their provider teams being satisfied with their respective experiences at THS. Focusing on the shift in delivering care solutions to consumers in their home environment and other non-ambulatory environments such as medical miles, office spaces etc.,

THS is launching a new consumer brand called ***THS Care2U.*** This is a comprehensive consumer stakeholder strategy that focuses on individual consumers in the community, employers, broad community constituents as well as the internal stakeholders such as providers and administrative staff. The ***THS Care2U*** brand strategy is based in the concept of optimizing relationships of all the stakeholders to support the most optimal delivery of care solutions at the most reasonable cost. Information technology and evidence-based information management are at the heart of this Strategy.

IT Environment and Drivers:
The formulation of the original IT Strategic Plan was accomplished in February of 2000 as part of the newly founded organization's efforts to address its immediate and future information challenges with a structured and consistent approach to the complex and ever-changing IT market. The environment at the onset of the Strategic Plan challenged us with highly disparate information infrastructures; we were unable to communicate electronically, duplicate high cost applications were being maintained, automated sharing of common data between systems was non-existent, and the ability to perform basic information management as a total system was impossible. With the continued changes in healthcare the demand for sharing and integrating clinical and financial information to facilitate strategic partnerships, meet healthcare reform requirements, and simply to manage our patients cost effectively continues to make our IT Strategy a critical imperative to our success. Security of Protected Health Information (PHI), consumer focused initiatives, and positioning for population health management are now key drivers for IT.

IT Strategic Goal/Objective:
The initial goal set forth in 2000 was to "provide a Clinically Driven Information System that is accessible across the Integrated Delivery System (IDS)". Utilizing the integration infrastructure and original Clinical Data Warehouse we have developed over the last 10 years we are now implementing a Consumer Relations Management (CRM) strategy that ties our customer facing kiosks, customer mobile apps, and e-marketing to support improved access to care and better customer experiences. We have also focused on providing our clinicians integrated views within our core EMRs (acute – Allscripts Sunrise Clinical Manager and Physician Office – Allscripts Touchworks) of all clinical data from both acute and ambulatory environments. The implementation of dbMotion in FY 2019 will provide a normalized continuum of care database for clinically based population management during encounters and enhanced notification for allergies and medications by allowing ingestion of appropriate ambulatory data into an acute encounter. Clinicians also have access to the ClinicalConnect HIE within their EMR; we are a leading member of ClinicalConnect and have contributed over 2 million records to the HIE.

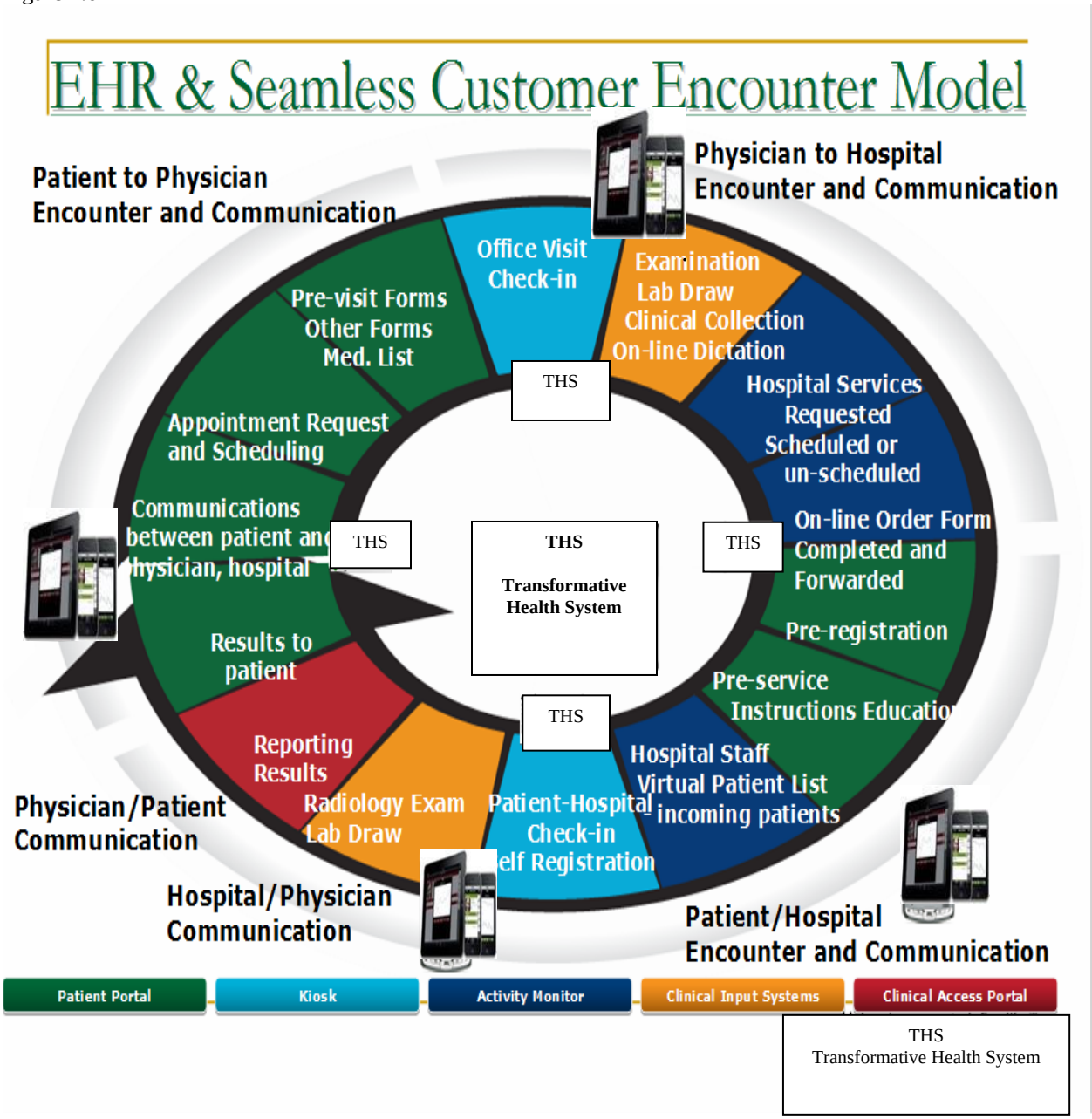
In support of the ***THS Care2U organizational brand*** a new consumer "Boarding Pass" solution will be implemented in FY 2019 that will enhance customer check-in through tablets and kiosks and allow for real-time tracking of patient orders, monitoring for leakage, and predictive modeling of patient utilization of our outpatient services. Utilizing the integration infrastructure and original Clinical Data Warehouse we have developed over the last 10 years we are now implementing a Consumer Relations Management (CRM) strategy that ties our customer facing kiosks (Boarding Pass), customer mobile apps, and e-marketing to support improved access to care and better customer experiences. Feasibility studies for the patient consumer mobile platform and internal provider mobile platforms are being conducted.

Figure 1.0 demonstrates how current IT investments such as the EHR are incorporated into the integrated customer model.

The Information Technology (IT) Strategic Plan Update has (4) objectives:

1. a historical view of our execution of the plan
2. a clear understanding of the current state of the plan
3. a twelve-month plan projection (FY 2020 Update)
4. a 3-5-year projection outlining the key initiatives expected to be accomplished

Figure 1.0



Oversight and Management:
The Original IT Strategic Plan was presented to the Board in February 2000 and received the Board's full approval. Annual reviews of the plan (specific updates on deliverables to date, required adjustments, budget status, and next phases of the project) have been provided to the Board every 12-18 months by the Chief Information Officer. In order to maintain business and clinical alignment of the IT plan, adjustments have been made each year as the senior management team balances the strategic vision with the operational and financial realities of the organization. The development of Strategic Imperatives has provided points of focus which have been utilized to guide and assess the annual IT goals and related plan adjustments. A continuous process of evaluating and adjusting our IT objectives to meet the organization's strategic and tactical needs is in place. The IT Strategic Plan is revisited every 12-18 months and updated to reflect historical progress as well as new goals and objectives as conditions change. Goals related to the design implementation and adoption of the clinical record (HER) are outlined.

The Board is updated through the weekly CEO Blog of significant IT initiatives, CIO presentations, and on-line access to the IT Strategic Plan. The oversight of system selection and purchasing is provided through a structured process utilizing three areas of expertise or focus - Functional, Business, and Technical. The Functional team and leaders (specific service line directors and CMO or VP) guide the selection of applications and solutions to assure they meet operational requirements. The Business team and leaders (CFO, Purchasing Leadership, and Director of Finance) provide oversight of the request for proposal (RFP) process, assure that the vendors have long term viability, and negotiate final contracts and pricing. The Technical team and leaders (CIO, CTO, and CISO) ensure that the products purchased support the long-term strategy and can be integrated into the existing infrastructure.

Implementation Planning and Guidance: Based on the specific implementation requirements (scope of project, change management issues, entities impacted), the members and structure of implementation teams have varied but the basic structure outlined below has been, and continues to be utilized to guide in the creation of an appropriate committee structure for communications and guidance during the design and implementation phases of the IT Strategic Plan:

Strategic IT Methodology – Object Oriented- Component Based Architecture:
In order to accomplish our goal, we utilized an object-oriented approach that has provided consistent structure while allowing for significant changes in technology over time. For example, "connectivity" – the ability to communicate and provide access to information has and will always exist; however, the specific technology and approach will change. Although the market environment and technology changes over time, the same objects are consistently relevant for long term strategic planning. The diagram below provides a graphic overview of the four core information technology objects that provide a consistent framework in the ever-changing IT environment. With the increase of on-line information and connectivity, security has become a major point of focus and is addressed under each object:

Connectivity – ability to communicate and access systems (network cabling and hardware required to connect application servers to workstations and other devices). Wireless is the prevalent connectivity to end user devices as mobility becomes a standard requirement to support all our customers' needs

Applications – front-end systems that provide data capture and viewing for specific functions based on entity (physician office, hospital, clinic) and functional requirements (Registration, Practice Management, Laboratory, and Radiology Systems)

Integration – automated sharing of information between systems and feeding of a common data repository (interface development and database aggregation)

Information management – the ability to integrate data from a variety of disparate systems into common databases and formulate information that is actionable, and value added to the organization (EPSi Decision Support, Nuance Clinical Quality Reporting, Allscripts Quality Reporting Tools, and Clinical Data Warehouse). Allscripts CPM Quality Tools for acute and CQS – Quality Tools for Physician Offices. During the 1st quarter FY 2016 we went live with dbMotion as the next evolution towards creating a normalized community data set to support Population Health across the continuum

II. Current State (2016-2019) and FY 2020 Projection

Summary of THS Information Infrastructure – Current Status: THS's Strategic Plan methodology has been to systematically address the critical components required to deliver our vision for the EHR, Pervasive Connectivity, Mobility, On-line Consumer solutions, and Population Health. Through our budget commitments and object-oriented approach, we have delivered:

1. Connectivity

Connectivity - Current State:

THS has a high-speed enterprise Wide Area Network (WAN) composed of four distinct components:

Corporate Network Infrastructure - provides the day to day connectivity between our physicians, staff, management, Board and patients to the critical information and systems. THS corporate network is composed of a structured cabling plant based on IEEE Ethernet Standards with fiber cabling provided to our distribution closets and category 5 or 6 cabling to the workstations. The Ethernet based infrastructure implemented in 2005 was built with Cisco Corp. equipment and provides a scalable network that can be expanded to meet the growth of bandwidth (network traffic) that will be required to support the evolving EHR. It is the backbone to our other connection strategies. Replacement of the hospital facilities main data switches is scheduled for 1st quarter FY2018. With the implementation of an upgrade to the Dragon voice recognition system bandwidth to the physician offices will require all T1 lines to be upgraded to 10mb or higher connections. An improved fault tolerant redesign of the main circuit entrance into the THS North Hospital facility will be complete by 2nd quarter FY2018. A new firewall was implemented 4th quarter FY2017 to provide enhanced security solutions.

Internet Access infrastructure The Internet infrastructure is utilized to provide a Guest wireless connection for customers, access for physicians for their iPads, and to provide access for the Board, as well as all levels of leadership and staff to key data housed at Transformative. Enhancement of our internet capacity (20mb) and redundancy were completed in 2007 and 2008 to support the growing bandwidth requirements generated by the use of remote PACS, E-prescribing, and other critical applications. An upgrade is scheduled for 2nd quarter FY 2016 to increase bandwidth to 100mb and to reduce cost.

In-house wireless infrastructure and cellular broadband connectivity – A secure in- house wireless network provides wireless support at all points of care within hospital facilities, all THS physician offices, and our clinics. Use of the wireless infrastructure includes bedside registration, iPad iCAP access, CPOE carts, and laptops. Upgrades to both Hospital Emergency Departments were completed to support a voice grade wireless network. An upgrade to the THS North facility was completed in 2016 and Transformative South is being assessed based on demand for in-house wireless VoIP needs.

Cloud Strategy - Transformative has two data centers (one at each hospital facility). A strategy to move into hosting and public cloud computing was initiated when Allscripts Sunrise products were purchased in 2012. The majority of the Sunrise solution is hosted by Allscripts. An RFI was developed and initiated 4th quarter FY 2018 to seek a vendor to move the majority or all server infrastructures to a cloud platform over the next 36 months. Our strategy has been to systematically shift to Software as a Service (SaaS) models when purchasing new software or upgrading existing software. We will combine a public cloud model with a SaaS model to reduce our data center needs to one data center and then to a "lights out" data center for software that is not cost effective in a cloud model or technically capable of running in a cloud model.

Connectivity – FY 2020 Projection: The next phase of the corporate network development will be focused on several key initiatives. We will complete the implementation of the two main Cisco switches at the hospital facilities. We will complete an enhancement to the internet connectivity at the hospitals. We will upgrade all T1 office connections to 10+mb connections by the 3rd quarter FY2020. The new firewall features will be implemented systematically over the 1st and 2nd quarter FY2020. Most importantly we will initiate our Cloud Strategy with the completion of an RFI and RFP process and transition of low risk applications to the Cloud. We anticipate that our e-mail (Microsoft Exchange) solution will be moved to a Public Cloud solution along with other targeted applications. Security will be enhanced through both training and new tools to reduce the risk of a breach.

2. Applications

Applications – Current State:

Core Acute Care Clinical - The Allscripts Sunrise Clinical Manager solution is stable and is effectively being utilized:

- Nursing documentation in place and being refined
- CPOE compliance is 90-93%
- Bar Code Medication Administration is 93%
- Physician on-line Documentation exists in the Emergency Departments and the OB units at both hospitals
- Meaningful Use Stage 2 Measures were being met – Attestation in October 2015
- Upgraded RL Solutions event monitoring 4th quarter FY2015
- Upgraded Nuance Dragon Voice Recognition
- Implemented Anesthesia Full EMR iPad based solution 3rd quarter FY2015

Ambulatory EMR

- 95% of all Transformative Medical Group physicians are utilizing the full EMR (Allscripts Touchworks) with documentation (combination of forms and Dragon), orders, and tasking
- 95% of all Transformative Medical Group offices are supporting Health Link patient portal with on-line scheduling, secure messaging, and prescription renewal. We now have 32,000 enrolled Health Link users.
- Transformative Pediatrics went live on the full EMR (Allscripts Touchworks) in July 2015.

Applications – FY2019 Projection:

Core Acute Care Clinical –

- Upgrade SCM to version 15.1 and implement dbMotion Fusion integration solution to provide Touchworks ambulatory data to SCM seamlessly 1st quarter
- Upgrade Dragon voice recognition 1st – 2nd quarter
- Full rollout of physician documentation across both hospital facilities with a goal to have 50%-75% of documentation being done on-line utilizing Dragon voice recognition by the end of the fiscal year
- Continued enhancement to clinical workflows
- Complete refresh of clinical workstations to Windows 7 devices 2nd and 3rd quarter
- Implementation of ROTEM Blood Analyzer 1st quarter
- Upgrade Kronos Time & Attendance solution to include integrated nursing self-scheduling and absence management

Ambulatory EMR

- Provide Improved EMR Solution to outlier offices 2nd quarter
  - Pediatrics Kasi & Kasi
  - FPA Hopewell
  - THS Shetty
- Continue to enhance Touchworks build and workflow
- Expand Consumer Connectivity – eHealth Functionality
- Support Access Management – Health Link Patient Portal

3. Integration

Integration - Current State:

Integration focuses on four key areas of the Electronic Health Record:

- The ability to share information between disparate systems – Interface Engine
- Aggregation of data from all points of care into a single cross continuum view – Clinical Data Repository
- Creation of a single point of reference and identification for our patients (Master Patient Index and Care Card)
- Integration to other entities through health information exchanges (HIE)

Interface Engine – A new Interface Engine (Core Point) was implemented in 2012. The integration infrastructure has grown to 224 interfaces. More than 57 disparate systems are integrated with 18+ million messages a month being transmitted and shared between systems or stored in our Clinical Data Repository.

The Clinical Data Repository - Provides a single point of storage and retrieval for all transactional patient clinical and administrative information. The depth of content stored in our Clinical Data Repository continues to grow as we implement the full ambulatory EMR solution as well as expand other ancillary solutions to capture more electronic data. The Clinical Data Repository is our strategic single point of capture and reference for all patient data regardless of the originating clinical system. In order to support Population Health initiatives, the dbMotion normalized data repository solution is being implemented. The solution is targeted for the 2nd quarter of FY2016 and will provide tighter integration between SCM and Touchworks as well as clinical alerts to assist in managing major disease groups such as diabetes, congestive heart failure, and asthma.

Master Patient Index (MPI) - A required component when combining patient data from all points of care is the ability to identify the patient accurately. Our MPI solution was developed in-house and provides the ability to link the disparate data for our patients. It will also play a critical role as we move into further development of the HIE, allowing us to link patient information beyond THS's points of care. A new tool for managing MPI issues such as duplicates and merging of patient records was deployed.

Health Information Exchange (HIE) - THS is one of the 9 founding members of the ClinicalConnect HIE. Provider members include Jefferson, St Clair, Butler, Altoona, Excela, Washington, Armstrong, and THS. THS played a key role in the creation of the HIE and currently our CEO is the board chair. THS was the lead organization piloting integration and access to ClinicalConnect and continues to lead both in governance leadership and execution of sharing of clinical data with over 2 million records sent since June 2012.

Integration FY 2019 Projection:

Interface Engine/Tools– Data sharing:
Support for the implementation of the dbMotion normalized data repository, expansion of ClinicalConnect HIE data feeds 4th quarter FY2016.

Clinical Data Repository – EHR Content: Integration of dbMotion and the Clinical Data Repository will continue through FY2019. The Clinical Repository will be utilized to develop a cloud-based Customer Relations Management solution (Boarding Pass) to support improved patient access and communication, targeted marketing, improved check-in and registration processes, integrated medical necessity and order authorization, and predictive modeling of outpatient activity.

Master Patient Index (MPI) and Care Cards – Patient Identification: A new Boarding Pass solution will be introduced in FY2019-20 which provides a QR code printed on every outpatient order produced by THS physicians, allowing customers to scan the QR code at any outpatient location providing automated registration. The QR code will connect the patient to the most recent and accurate patient identification data and all details of their orders. It is expected that the new solution will eventually replace much of the Care Card activity as an enhanced patient experience at check-in.

Health Information Exchange (HIE) Expansion of document feeds into ClinicalConnect is being reviewed and targeted for 3rd or 4th quarter FY2016. Focus is now on expanding the use of ClinicalConnect by all clinicians.

4. Information Management and EHR

Information Management and EHR - Current State:

Today THS possesses the following portals or Dashboards to facilitate Information Management at all levels of the organization:

Board and Foundation Dashboards – All Board members have been provided iPads and the Board and Foundation Dashboards have been ported to the iPad. Distribution of the Board paper packet has been discontinued.

Management Dashboard – The Management Dashboard has been modified to run on both an iPad and a traditional web environment. Senior management has been provided iPads and a roll out plan for middle management is in development. Allscripts Epsi provides comprehensive service line analysis and budgeting tools.

Employee Connection Portal – The Employee Portal provides employees the ability to access all critical information on-line. Feedback opportunities and other tools are provided to employees through the portal.

Clinical Access Portal (CAP) The iPad based iCAP solution is now the primary tool used by physicians to access the complete patient record. The Continuum of Care Tab in both SCM and Touchworks provides the same content view integrated directly into these Allscripts EMR products. Over 600 iPads have been distributed to date. Clinicians currently do not have access to smart phone solutions.

Patient Portal (Allscripts PHR- FollowMyHealth) – The Allscripts FollowMyHealth patient portal branded as Health Link is now our Customer Portal solution

- Added 18,000+ New Customers FY2018
- Total Customer 32,000+
- Averaging 6000+ logins month
- Now able to provide:
  - Results/Documents/Meds/Allergies
  - Prescription Renewal
  - Secure Messaging
  - On-line Scheduling
- Requested functionality from Patient Portal Focus Groups
  - Online bill pay
  - Care online for routine illness
  - Monitoring online like blood pressures and glucose for diabetics

Clinical Quality Dashboards – Allscripts CPM acute setting and Team Practice CQS for physician offices provide individual provider, group, and enterprise views of our compliance to quality measures.

Information Management and EHR – FY2020 Projection:

Execution of the next phase of Information Management will focus on several enhancements to key infrastructure components of our Strategic IT Vision for developing a seamless service experience for our patients/customers and physicians:

- Continued growth of Health Link enrollment and use
- Improved On-line Lab Results viewing
- Feasibility, Design and Deployment of Mobile Solutions for External and Internal Stakeholders
  - Align with ***THS Care2U organizational*** *brand*
  - Mobile access for external and internal stakeholders (patients, families, providers)
  - Customer Feedback – "5 Star Rating" tool that allows customer to provide real time feedback regarding any of our service areas.
  - Trending and Average Scores by Service Area in real time

- Implementation of "Boarding Pass"
  - QR Code Printed on all (Allscripts Touchworks) Orders with associated back-end database table(s) storing all the latest order, demographic, insurance information
  - Ambulatory site check-in/out Kiosks and Waiting Room Tablets
  - Medical Necessity Checking and Authorization automated – prior to visit
  - QR Code scanned at every outpatient encounter will streamline registration – enhancing the experience for 50% of patients
  - Dashboard will provide real time tracking of orders/patient's activity
- Did they arrive at a THS outpatient site – when/where
- Outstanding orders – patients that did not yet visit THS outpatient site; Trending and predictive modeling of patient activity based on real time data allowing leakage notification, focused patient follow-ups (patients that have not arrived within defined timeframes for tests/procedures.
- The dbMotion normalized clinical data will be ready to be utilized by Population Health solutions. Claims based solutions are not being considered until appropriate partnerships are developed for claims-based Population Health initiatives.

5. Strategic Performance Index (SPI) GOALS FY2016:

Patient Portal – Health Link Goal ..... 10,000 new enrollments
Clinician Use of Clinical Connect HIE Goal .....800 unique users

6. Resources and Structure to Support the EHR Deployment:

With the increased use and integration between the ambulatory and acute settings the need for senior level clinical information resources to guide workflow and policy will be required. The existing role of the Senior Clinical Informatics Officer will be expanded from an acute focus to include the integration and workflow at all points of care. As we shift from implementation to operationalizing the EMR, we will need strong clinical analysts with a focus on workflow and process improvement. The next phase of the EHR development will require continued physician guidance to refine the acute care workflow processes as we move to a paperless environment. Physician office based EHR requirements will also require continued physician and office staff guidance.

In order to keep IT projects and objectives aligned with the needs of the organization we utilize the Senior Management Group (SMG), the Physician Leadership Group (3 physician leaders from campuses) the Physician IT Steering Committee (15+ employed physicians), and the newly formed Physician Advisory Committee (6 physicians from both campuses and a mixture of employed and independent) to communicate and provide forums for feedback.

CEO
CFO
COO
VPS
CIO
Clinical and Ancillary Leaders as needed

Physician Leadership Group

Physician IT Steering Committee
CIO

Physician Advisory Committee
Representation From:
Employed and Independent
Leadership forum - Hospital Campuses
Primary Care CPs
Specialists – Internists and Specialists - Cardiologists

7. Budget Status Summary:

The budget goal for IT has been to maintain total spending between 2%-4% of THS's total net revenue. Operating and capital IT spending is aligned annually with the strategic and operational objectives of the organization. With the expansion of new systems and services, operating expenses have increased over the last 5 years. Increases have primarily been in software maintenance for EHR applications such as Allscripts Touchworks and SCM, connectivity costs to remote sites, and security/network hardware infrastructure support. Additional IT resources to support the expanding systems and services have also impacted operational costs. Total IT spending (capital and operating) as a percent of net revenue has increased from approximately 2.5% to 3% over the last 3 years. IT spending is projected to stay within the 2%-4% goal and fluctuate within the range based upon an annual alignment of IT spending with the organization's goals and financial environment. IT Capital spending is projected to average approximately 5 million annually for the next 5 years.

Current State Assessment and Summary:

The IT Strategic Plan has addressed all facets of TSH's information technology needs and has been modified over time as challenges and major milestones across all imperatives (Financial/Human Resources/Quality/Market/Information Systems) have been encountered or achieved. We have stayed the course on our EHR development while supporting expansion and operational initiatives (Physician Office Growth, Convenient Care, and New Emergency Departments). The annual external audit process indicates that we have made significant progress on improving core operations including enhanced security and control processes while moving forward with strategic initiatives such as the dbMotion implementation, ClinicalConnect HIE, and our Consumer focused solutions - Health Link Patient Portal, iTHS App, Care Card, and kiosk check-in. THS has been recognized by:

- Most Wired 2014 & 2015
- HIMSS Stage 6 2014 & 2015
- HAP - 2010 Innovation Award for Mobile Clinical Access Portal (M-CAP)
- Health Imaging & IT magazine - Top 25 Connected Healthcare Facilities Nationally
- Microsoft Health Users Group (MS-HUG) for our work on M-CAP
    - 2010 Winner MS HUG Awards
    - 2009 Finalist MS-HUG Awards
- HAP - 2009 Innovation Award for KIOSK Pilot Implementation Outpatient Test Center
- Agency for Healthcare Research and Quality (AHRQ) - Innovation Exchange for our Kiosk strategy has earned Transformative national recognition

FY2020 Projection Summary:

- Enhance Security Protocols and Tools – Implement New Firewall Features
- Enhance Security Education and Policies
- Design and Implement Allscripts Sunrise Clinical Manager Physician Documentation utilizing structured notes and Dragon Voice Recognition; 50 % of acute documentation transitioned from dictation to Dragon.
- Complete the implementation of the enhanced Allscripts Ambulatory EMR implementation – All physicians with the ability to use tasks, order, document, and support consumer solutions such as on-line scheduling, prescription renewal, results access, and secure messaging. Enhance workflow and forms though out the year.
- Implementation of Fusion – Native integration of Touchworks data into Sunrise Clinical Manager through dbMotion integration.
- Implementation of dbMotion Agent in Touchworks, allowing Sunrise Clinical Manager data to be integrated into Touchworks.
- Continue to integrate independent physicians into THS through the ClinicalConnect HIE or other direct integration solutions (ADT and results via HL7). Expansion of ClinicalConnect feeds from THS – include all documents.
- Continue to grow Health Link Patient Portal usage.
- Replace all pilot kiosks with THS solution for consistent customer experience, improved integration, and support of Boarding Pass
- Implement the Boarding Pass solution across all THS offices and outpatient centers allowing tracking of all outpatient orders/patient activity and streamlining the patient registration process.
- Research the feasibility of and plan mobile solutions for consumers and internal provider customers to support the THS Care2U Briand.

III. 3-5 Year Strategic Projection

IT Enables Technology

THS Board of Director's decision to make Information Technology a strategic imperative and consistently invest capital has positioned us to meet the demands of the ever-changing healthcare landscape. The need to apply information technology within healthcare to achieve cost reductions, improve quality, and to stay competitive is now widely understood by both government leaders and payers as demonstrated by the "Meaningful Use" incentive program instituted by the federal government and the aggressive initiatives for HIE development by payers.

The 3-5-year strategic goal for THS is to deliver a HIMSS Analytics Stage 7 environment and support the THS Care2U Consumer/Stakeholder Brand including:

- Completion of Physician on-line documentation across all acute settings
- Capture of all documents – external or internal associated to a patient's acute encounter
- Conversion of Inpatient Psych to EMR
- Robust Population Health reporting and notification solutions
- Full implementation of dbMotion solution integration between Touchworks and SCM
- Feasibility, Design and Deployment of external stakeholder mobile solutions
- Feasibility, Design and Deployment of internal stakeholder mobile solutions

Continue to Enhance Security – People/Process /Tools. With the continued and growing threats of a potential security breach, considerable capital and staff will be required to help mitigate the risks.

Cloud Strategy – We are executing a Cloud Strategy that will move the majority of all systems to a public or private cloud within the next 3 years with a goal of improving security, improving up time, providing a flexible on-demand IT infrastructure, maintaining updated technology, and managing infrastructure costs. Our goal is to provide maximum IT flexibility and nimbleness to the organization when expansion (merger) or change of facilities occurs in the future through minimizing on premise investments in Data Center infrastructure.

Consumer Solutions - Complete a robust suite of fully integrated Customer Focused solutions to manage the customer experience including mobile solutions that support customer notifications of all types, communications between care givers and customers, ease of access to care, and immediate access to their clinical record.

Meet Meaningful Use Stage 3 reporting and criteria for both acute and ambulatory settings.

HIE Expansion - Continue to expand integration of HIE use and functionality. Integrate into State and National exchanges while facilitating local integration with independent providers.

Population Health Tools - Complete implementation of solutions leveraging our dbMotion and Clinical Data Warehouse to support Population Health with real-time point of care clinical gap notifications based on our community data for key disease groups. Implement Population Health management tools that leverage the community data being populated in dbMotion. The final design for a comprehensive Population Health solution utilizing integrated claims and clinical data will depend on our strategy to partner with payers or other providers to evolve our Population Health Management capacity. Its focus will be on providing a mature clinical warehouse and integration infrastructure that can quickly and cost effectively support THS's need for managing our population regardless of our final partner(s) or Population Health tools.

5 Year Budget Projection

The following 5 Year IT Capital Budget Projection directly supports the IT Strategy, as well as the key business and clinical goals of the organization

Projects	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	5 Year Total
Acute Care Core Systems	**$1,174,552**	**$1,603,628**	**$1,603,628**	**$1,653,628**	**$1,653,628**	**$7,689,064**
Sunrise Clinicals						
Sunrise Revenue Cycle						
Ambulatory Core Systems	**$641,966**	**$655,000**	**$655,000**	**$941,966**	**$941,966**	**$3,835,898**
Touchworks						
Revenue Cycle						
Data Warehousing/Analytics	**$905,000**	**$905,000**	**$905,000**	**$905,000**	**$905,000**	**$4,525,000**
Clinical Data Repository/CAP						
dbMotion						
Patient Engagement	**$200,000**	**$400,000**	**$400,000**	**$400,000**	**$400,000**	**$1,800,000**
Kiosks						
Portal						
Customer Relations Management						
Infrastructure/Security	**$2,086,488**	**$2,086,488**	**$2,086 488**	**$1,586,488**	**$1,586,488**	**$9,432,440**
Projected Total Budget	**$5,008,006**	**$5,650,116**	**$5,650,116**	**$5,487,082**	**$5,487,082**	**$27,282,402**

3-5 Year Imperative Assessment:

Human Resources Imperative –

- **Change Management** will continue to be the most challenging aspect of the evolution of our EHR strategy. It will require all levels of the organization to lead and promote change in order to maximize the value from our IT investments and new process workflows. Addressing change management proactively will be critical to our success. Communications with those impacted by change will need to be constant and multifaceted. This challenge directly correlates to the importance of physician alignment strategies to incentivize full acceptance of the EHR. Increased costs and resources and ineffective EHR solutions will be the outcome if physician alignment is not achieved.
- **Recruitment and retention** of qualified healthcare IT professionals will continue to be a challenge as demand is expected to grow with the on-going national focus on EHR development and the growing demand for technology professionals in the Pittsburgh region.
- **Effective use of Outsourcing** – Both pro-active strategic outsourcing of specific IT services and tactical outsourcing during implementations will continue to be a focus.
- **Work from home options** – Effective work from home strategies will be utilized to compete for high quality resources.
- **Investment in education** - Investment in staff training through supporting formal degree programs, seminars, and conferences will be important to create a culture of quality.

Financial Imperative –

- As presented in the five-year capital budget projection, IT capital expenditures are projected to average approximately five million dollars annually. Capital investments in IT will transition into additional operating costs for software support and maintenance agreements and will need to be offset by reductions of operating costs through improved on-line workflow processes, reduction of paper and supply costs, and automation of redundant manual tasks.
- Reduction in FTE's through automation, outsourcing IT infrastructure (Cloud Computing), and outsourcing of select positions will be the primary means of controlling costs.
- As financial pressures force additional hospital consolidations and collaborations, IT can play a key role in leveraging overhead and clinical departments into consolidated services capable of working from any location while supporting multiple health systems. Continued improvement of our revenue capture processes will be addressed through automated eligibility verification, on-line bill pays, and improved patient identification/verification processes.

Quality/Customer Service Imperative –

- As we address the trend towards a consumer-based healthcare environment with new customer tools for scheduling, communications, check-in, and clinical information gathering, we need to develop focus groups that provide us with the "voice of the customer". The complete implementation of our Consumer solutions (Customer Portal, Kiosks, and Mobile Solutions) under our THSCare2U Brand will provide customers with a consistent and efficient registration and check-in experience.
- Real time distribution of clinical information to physicians via wireless handheld devices will positively impact the quality of care for patients while improving the lives of our physicians.
- Patient Safety will be addressed through point of care solutions for medication administration.
- Implementation of on-line, standardized clinical documentation across our enterprise will allow for real time measurements and assessments of care practices
- Computerized Provider Order Management will enable standardized, efficient patient care practices utilizing evidence-based medicine. Development of Best Practice Order Sets.
- Support of our community health initiatives by providing patient educational materials on-line and targeted to address a patient's specific clinical challenge(s) i.e. Diabetes.
- Integration into the Health Information Exchanges will provide real-time clinical data from all points of care, including data from non-THS sources.

Market Expansion and Growth Imperative –

Information Technology will be a differentiator from our competition as we provide new and existing customers with solutions that meet their demands for simple and efficient scheduling processes, timely and consistent access to their results, and quick check-in processes regardless of where they seek care within our system. Transformative is a demonstrated leader in the development of Regional Health Information Exchanges (HIE). Leveraging our leadership role in the development of an open, standards based Clinical Data Warehouse (CDW) will allow us to connect to our regional healthcare partners to appropriately distribute the key clinical information, enabling physicians to better care for the community's health regard less of the setting (extended care homes, physician's offices, emergency department, and hospitals), thus making Transformative the preferred health care partner for both physicians and patients.

Summary of IT Strategic Imperative and Projections:

At the heart of our strategy is the desire to uniquely connect our patients, physicians, and community to the key information that will improve their health and make accessing healthcare as stress free and convenient as possible. Over the next 3 years THS will achieve HIMSS Analytics Stage 7 and implement cutting edge Consumer Solutions that will greatly simplify access to care and check-in. We will provide the tools to present Transformative as a transparent and accessible health service at any point of care. We will provide the analytic infrastructure to

cost effectively manage our population and provide the highest level of standardized care. Based on the continued strengthening of the leadership team at THS and the current status of the IT infrastructure, we are well positioned to bring to full fruition a community "Uniquely Connected for Life".

IV. Historical (1997-2014) Background

Major Accomplishments – Deliverables 1997 – June 2014:

The initial focus of the strategic plan was to provide basic connectivity (building a common communications infrastructure across all entities) that would allow for elimination of redundant applications, sharing of data between systems, and provide basic Information Management solutions and applications to reduce costs and variation. With the majority of our systems consolidated, we are now focused on full implementation of our Electronic Health Record and collaboration with other health systems for Health Information Exchange to provide the most up to date clinical information to providers and customers regardless of where patients receive care.

1. Connectivity – Historical Background: Under the connectivity component of our plan, a single high-speed corporate network was designed and deployed, standards for wiring and desktop hardware were developed and implemented, and out-sourcing options were initiated to provide cost effective monitoring of our new corporate network. Increased requirements for remote access, high availability, and network bandwidth are the standard for projects such as the Radiology Information System (RIS), the Radiology Picture Archive Communications Systems (PACS), and upgrades completed for online Nursing documentation in the patient care areas. The foundation that was implemented over the previous year's allows for the flexibility required to meet the organizational needs. All remote sites have wireless connectivity to support our mobile strategy for physicians and staff.

Deliverables:

1997 – 2001

- Standards Focused - Tied Existing Networks into a Common Corporate Network.
- Implemented Wiring Standards
- Common workstation connectivity and desktop.
- Dial-up access from home

2001 – 2002

- Bandwidth and Quality - New Fiber Network (Cisco Equipment) to the closet and enhanced stability and speed
- Outsourced network monitoring and high-level support to Compaq (HP)

2002 – 2003

- Internet Focus - VPN – Virtual Private Network
- High Speed home and office Internet Access (Cable Modem/DSL)
- Blackberry – Global Wireless

2003 - 2004

- In-house Wireless Focus - Vendor Selected – HP
- Wireless Hospital Wide Infrastructure Initiated

2004 - 2005

- Expanded Wireless access to select physician offices
- Initiated design for handheld version of CAP (M-CAP)
- Provided wireless access to Navinet Highmark portal

2005 - 2006

- Deployed production IPAQs with M-CAP into the environment requiring the installation of wireless at select physician offices
- Implemented high speed campus connection increasing the connectivity between hospitals from 45Mb to 1Gb

2006 - 2007

- Deployed wireless laptops/computer on wheels to support the GE Surgical Services system
- Wireless deployed at all physician offices and majority of satellite locations
- Upgraded Internet Connection from 4.5Mb to 20Mb
- Deployed redundant firewalls

2007 - 2008

- Core network upgraded in data centers to improve redundancy and increase network performance to the servers
- High speed redundant connections implemented for Radiology closets and remote sites
- Cranberry and Ellwood lab/draw sites deployed with Voice over Internet Protocol (VoIP) phone systems which utilize the data network for voice communications
- Upgraded all active e-Prescribe offices to 1.5Mb connections
- Installed Video Conferencing systems for cross campus and Excela meetings
- Digital Signage implemented in HVB and HVS cafeterias and entrances displaying current content featuring videos and Power Point presentations.

2008-2009

- Guest Wireless Network implemented at Hospital Facilities
- VoIP expanded to Moon Business facility
- Implemented VoIP for both new emergency departments
- Wireless VoIP phones implemented in emergency departments
- Implemented VoIP for all new ConvenientCare locations

2009-2010

- Guest Wireless Network expanded to remote sites
- Completed implementation of wireless infrastructure at all THS sites
- Implemented phase I of Beaver VoIP phone system (majority of clinical and administrative phones replaced)
- Implemented VoIP for additional Convenient Care locations, Business Office and Family Medicine
- Implemented Telestroke connectivity infrastructure
- Support for cross campus phone console completed

2010-2014

- HIE Connectivity – ClinicalConnect Health Information Exchange
- Wireless Upgrade Beaver
- Hosting of all acute core clinical – Allscripts Hosting Services
- Full implementation of Citrix for core applications
- Citrix Linger and Pre-launch – partial implementation
- VoIP – Standard new install for all remote offices/clinics

2. Applications – Historical Background: These components focus on the capture and processing of patient information during required administrative and clinical processes. The front-line application systems are specialized in nature and seldom have any strong inherent data sharing capabilities. The information gathered by these systems forms the core content of the EHR once the transactions are captured and integrated into a common database structure (Clinical Data Repository).

During 2012-2014 we successfully converted from McKesson to Allscripts Sunrise Clinical Manager for registration, clinical documentation and order entry. Within 90 days of the conversion we successfully attested to Meaningful Use Stage 1. We centralized all lab processing for the entire enterprise and continue to utilize the McKesson lab solution. Cardiology and Radiology utilize the GE Centricity PACS solution and have eliminated all paper copies of images. **In 2014 and 2015 Transformative was recognized as both Most Wired and HIMSS Stage 6.**

Deliverables:

1997 – 2001

- Consolidation Focus - Physician Offices – Elcomp Practice Management
- Selection of HBO&C as Core Hospital Clinical Vendor
- Consolidated Ancillary Systems – Lab/Transcription/Radiology/EKG
- Consolidated Financials – Patient Accounting, HR/Payroll, AP/GL, Materials Management
- Y2K Factor – managed via the IT Plan

2001 – 2002

- Upgrades and Consolidation - Horizon Orders Upgrade Beaver – Nursing Clinical
- ABN – Advanced Beneficiary Notice
- Patient Accounting Upgrade

2003 – 2004

- Upgrades and Consolidation - Hospital Registration Consolidated
- Dietary Room Service System
- Practice Management
- Physician Practice EHR Pilot – Initiated
- Enterprise Time and Attendance

2004- 2005

- Enterprise Nursing Orders and Online Documentation (Sewickley)
- Upgrade Enterprise Lab System
- GE OB Monitoring Upgrade

2005 – 2006

- Enterprise Learning Management
- Self Service Kiosk Pilot, Patient Portal

2006 – 2007

- Self Service Kiosk Expansion
- GE Enterprise Surgical Services Scheduling and Nursing Documentation
- Enterprise Pathology System
- Staunton Practice Management System
- Enterprise Blood Bank System

2007 – 2008

- Self Service Kiosk Expansion
- Picture Archive Communications Systems (PACS) – Integration into our Electronic Health Record (EHR) – North & South
- Ambulatory E-Prescribing
- Enterprise Case Management System
- Enterprise Medical Records Coding and Chart Management

2008-2009

- Redesign and Implementation of Nursing Online Documentation
- Pyxis Medication Cabinets
- EKG Monitoring Upgrade completed
- Infection Control System implementation

2009-2010

- Completion of Nursing Online Documentation – all Med-Surg areas-North & South
- Enterprise Print Management Solution
- Acute Care Lab Upgrade completed
- Design and Implementation of remaining areas of Online Documentation including Critical Care, Peds and Ancillary Areas
- Self Service Kiosk Expansion – Emergency Department
- Health Link Personal Health Record – Online Lab Results
- Health Link Physician Office Scheduling

2010-2014

- Converted in-house Patient Portal to Allscripts FollowMyHealth solution to meet Meaningful Use Requirements
- Converted from McKesson to Allscripts Sunrise Clinical Manager
- Implemented Bar Code Medication Administration across both hospital facilities 90+ % compliance
- Implemented CPOE across both hospital facilities – over 90+% physician compliance/use of CPOE
- Attested to Meaningful Use successfully
- Most Wired 2014
- HIMSS Stage 6 recognition

3. Integration – Historical Background: Our integration strategy initially focused on the development of an infrastructure and tools (Interface Engine) that would allow the capture and sharing of data between systems to reduce manual data entry. The first major integration effort was to feed our McKesson Decision Support System "DSS" to provide a single point of truth for enterprise financial decision making and analysis. In addition, efforts began on the capture and storage of key patient clinical and demographic data in our Clinical Data Repository for eventual use (presentation to physicians and clinicians) as our Electronic Health Record (EHR) evolved over time. As part of a joint venture initiative with Excela Health system, we have redesigned the Clinical Data Repository to allow for quicker turnaround time for implementation of new interface sources. The scope of the joint venture project included implementing the Transformative Clinical Data Repository and our M-CAP handheld solution for Excela Health System.

The project started in October 2007 and phase 1 which was completed in October 2008 allowed Excela Health physicians to receive their inpatient census, office appointments, laboratory results transcription documents and radiology results on a handheld. With the successful introduction of the iPhone, THS ported our M-CAP solution to the iPhone and then to the iPad to provide anytime and anywhere access for providers on an extremely user friendly and high performing mobile platform. The joint venture provided THS with extensive experience with integration across independent health systems as a precursor to health information exchanges (HIE) that are now critical infrastructure requirements to Accountable Care Organizations (ACOs). In July 2012 Transformative joined several other key health systems to create ClinicalConnect the first HIE in Western PA. Heritage played a key role in governance, technical design and execution and still leads in these areas as of July 2015.

Deliverables:

1997 – 2001
- Enterprise Interface Engine Implemented
- Focus - Registration and Ancillary Systems – Eliminate Duplicate Data Entry with 2nd focus on feeding the Clinical Data Repository

2001 – 2002
- Primarily focus shifts to results to Clinical Data Repository

2002 – 2003
- Care Cards - 10,000 (Employees Only)
- Continue focus on Clinical Data Repository/EHR - Content
- Support for other key initiatives – New Enterprise Lab and Filmless Cardiology

2003 – 2004
- Focus - Clinical Data Repository EHR and Physician Practice EHR
  - Video – Cardiology – Angiography, Scanned images – Insurance Cards
- Care Cards
  - 80,000 Cards Distributed - May 2004
  - Request a Care Card from Home Page
  - Integrated with New Practice Management System

2004-2005

- Clinical Data Repository EHR
  - Ambulatory Physician Office Labs
  - Acute Care Orders
  - Sewickley Clinical Reports
- 150,000 Care Cards Distributed

2005 – 2006

- Evaluation of E-prescribing vendors – Allscripts Touchworks program was selected.
- 200,000 Care Cards Distributed
- M-CAP handheld solution was developed and distributed to 100 physicians

2006 – 2007

- E-Prescribing went live with 25 providers
- "Virtual Census" application was created which provided tools for the management of ad-hoc groups of patients
- Implemented new hardware platform for Web environment
- M-CAP handhelds implemented 200

2007 – 2008

- E-prescribing providers increased to 80
- Averaging 28,000 e-prescriptions written per month
- Excela joint Venture kicked off
- M-CAP handhelds implemented 250

2008-2009

- Completed E-prescribing for all employed physicians
- Average volume of prescriptions per month 60,000
- Release first versions of blackberry and iPhone Mobile CAP

2009-2010

- Developed and released CAP components within Allscripts Enterprise
- Completed first version of iPad Mobile CAP solution
- Expanded our kiosk solutions across our clinics and provided real time status

2010-2014

- Enhanced iCAP solution – all medical staff physicians provided with iPad and iCAP as a standard means of access to clinical data at all points of care
- Developed Continuum of Care Tab in Sunrise Clinical Manager (SCM) – providing a complete view of a patient's clinical information from Touchworks and other systems including diagnostic images.
- Developed customer focused iTHS/aTHS mobile apps for iPhone and Android providing location services, activity levels, and other functionality to customers.
- July 2012 – Founding Member - ClinicalConnect Health Information Exchange

4. Information Management – Historical Background: The strategy for information management was to consolidate the critical financial and clinical data of the organization and present it as meaningful information to the desktop of every leader. The goal was to make information visible and accessible to management, thus providing an environment of accountability and open information in order to produce proactive and well-planned action. The primary financial and statistical database and analysis tools implemented were/are based on the McKesson Decision Support System or DSS. The Clinical Data Repository was developed to consolidate critical clinical data to address direct patient care with patient specific clinical information from all points of care delivery, serving as the EHR repository for all clinical content. As the volume of information available increased and technology evolved, the use of web-based portals served as a single reference point to access data from DSS and other sources of key data within our organization. The suite of products has grown over the last several years to now include: the Clinical Access Portal (CAP), which was developed as the primary front-end (single point of access) for viewing the EHR content stored in the Clinical Data Repository, the Emergency Department Patient Tracking, which was implemented to facilitate the unique workflow needs of the ED by presenting the extensive clinical content available in the Clinical Data Repository, and in 2006 the Mobile Clinical Access Portal (M-CAP) product, which was developed on a handheld platform to provide true EHR mobility for physicians. The M-CAP solution placed in the top 3 in the Microsoft Healthcare Users Group (MS-HUG) awards for clinical inpatient systems in 2008. The M-CAP product was judged with other products internationally to become a finalist. Transformative won the 2009 MS-HUG award for clinical inpatient systems for the M-CAP solution. We also won Pennsylvania HAP award for innovation in 2009 for our kiosk solution and again in 2010 for the RFID M-CAP solution. The M-CAP solution was converted to the iPad in 2012 and continues to be a critical component of physician workflow and information access. The Board dashboard was converted to the iPad platform in 2012 and the Management dashboard was provided on the iPad in 2013. Several new quality reporting tools were implemented to support the quality team and payer incentive initiatives.

Deliverables:

1997 – 2001

- Decision Support HBO&C DSS – TrendStar
- Financial – Budget – Trend Reporting
- Physician Office Activity
- Transformative View – Clinical Viewer – Precursor to Clinical Access Portal - CAP

2001 – 2002

- Management Dashboard – Live
- Board Dashboard – Beta
- Clinical Access Portal – Beta CAP Deployment – Physician Offices

2002 – 2003

- Board Dashboard – Live January 2002
- Management Dashboard - Decision Support Upgraded to Pathfinder
- CAP Full Deployment Begins - Physician Offices/Hospitals/Homes

2003 – 2004

- Management Dashboard - Continue to Enhance Content – Operational Focus
- Board Dashboard - Continue to enhance Content -Demonstrations to Potential Beta Sites
- Employee Portal - May 2004 - On-line Policy/Procedures – Meet JACHO Requirements
- Review of Community Portal options – Vendor Solutions – McKesson, NextGen

2004 – 2005

- Initial Design Community Portal – Self Registration
- Enhanced Employee Portal – Self Scheduling for Nursing

2005 – 2006

- Developed application to provide Life Beaver County access to EHR information on their patients
- Developed disease management prototype for Quality Insights of Pennsylvania
- Developed Mobile Clinical Access Portal (M-CAP)

2006 – 2007

- Upgrade to NextGen Physician Practice Management system
- Developed "Virtual Census" for Long Term Care Facilities such as Friendship Ridge to access CAP to create a custom bed board of their patients

2007 – 2008

- Developed Dictation Capture on the handhelds allowing a physician to dictate and wirelessly send the information to be transcribed
- Upgraded Board Dashboard to provide Apple Mac compatibility and other enhancements

2008-2009

- Enhanced ED tracking board to track 30 day re-admits
- Enhanced Management Dashboard Budgeting Tools

2009-2010

- Implemented RFID integration with Emergency Department Computers
- Converted Board Dashboard to an iPad compatible solution

2010-2014

- Converted Management Dashboard to iPad
- Provided real time patient activity level monitoring to multiple customer solutions and management portals
- Supported the implementation of several Quality Analytic tools and solutions including a leading-edge collaboration with the UPMC Health Plan to mine data from documents to enhance payments