CONTRACT #4
RFS # NA
Edison # NA

University of Tennessee
Health Science Center

VENDOR:
Deloitte Consulting, LLP

THE UNIVERSITY of TENNESSEE
HEALTH SCIENCE CENTER

Finance and Operations
62 South Dunlap Street
Memphis, TN 38163

March 16, 2015

Mr. Jeffrey Spalding
Executive Director
Fiscal Review Committee
320 Sixth Avenue, North-8th Floor
Nashville, TN 37243-0057

Dear Mr. Spalding,

The University of Tennessee Health Science Center has recently submitted a proposal to the National Institutes of Health for a Clinical and Translational Science Award. A requirement for the award is to create a mega-dataset of clinical data available to all clinical researchers. Further the dataset must follow standards that the data can be regularly updated and have the capability to respond to various inquiries from a standardized query system. Such standards would eliminate the constant need for specialized requests for data based on each researchers needs. The HSC has committed to create this important clinical research capability not only in support of the CTSA application, but we believe it is a critical next step in moving clinical research to the treatment of patients.

In building such a mechanism, it is important to have a strong clinical partner who will support this effort. Methodist Le Bonheur Healthcare is the HSC's primary academic partner and has agreed to join with the HSC in this effort. In order to maintain compliance with HIPAA and other regulations, all of this data will be maintained within the Methodist IT arena (i.e., behind their IT firewalls). This effort will require coordinating multiple data sources within the hospital. It is important to note that health information currently is maintained in multiple systems and databases according to their use or functions – e.g., pharmacy, inpatient care, outpatient visits, radiology, etc. The challenge for academic researchers is to bring all of this data together in a consolidated and consistent fashion to support multiple research initiatives over a very long period of time.

To accomplish this challenge takes a very unique set of skills and knowledge of clinical data systems. The research team charged with putting this system together (which included representatives of Methodist) reviewed capable contractors based on their extensive knowledge of existing CTSA's. Many of the universities that have been successful in this arena have the IT infrastructure to take on the challenge and excel – those are generally campuses that are larger and have a full undergraduate curriculum, unlike the

HSC. Smaller institutions, in our review, have hired consultants that are familiar with hospital systems as well as research.

Two such firms were identified – Oracle and Deloitte Consulting LLC. The research team met with both contractors to discuss goals and their capabilities for creating the database needed for our success. After those discussions, it was clear to them that Deloitte, who has already had major success at other institutions of similar character as the HSC, was the better choice for their success.

The service dates under this contract is from May 15, 2015 through November 15, 2016 at a cost of $600,000.

I hope this letter and the attached documents adequately present the justification for this Agreement. As always, please let me know if you have questions or need additional information.

Sincerely,

Anthony A. Ferrara
Vice Chancellor/Chief Financial Officer

FINANCE:VICECHANCELLOR GENERAL LETTERS -- DOCUMENTS:FY 2015:SPALDING DELOITTE CTSA CBMI.DOCX

Enclosures

cc: Leni Chick
Scott Grammar
Mark Paganelli
Sandra Pulliam
Blake Reagan

Supplemental Documentation Required for Fiscal Review Committee

*Contact Name:	Anthony A. Ferrara	*Contact Phone:	901-448-5523
*Presenter's name(s):	Anthony A. Ferrara		
Edison Contract Number: *(if applicable)*		RFS Number: *(if applicable)*	
*Original or Proposed Contract Begin Date:	05/15/15	*Current or Proposed End Date:	11/15/16
Current Request Amendment Number: *(if applicable)*			
Proposed Amendment Effective Date: *(if applicable)*		05/15/15	
*Department Submitting:		University of Tennessee	
*Division:		Health Science Center	
*Date Submitted:			
*Submitted Within Sixty (60) days:			
If not, explain:			
*Contract Vendor Name:		Deloitte Consulting LLP	
*Current or Proposed Maximum Liability:		$600,000	
*Estimated Total Spend for Commodities:			

*Current or Proposed Contract Allocation by Fiscal Year:
(as Shown on Most Current Fully Executed Contract Summary Sheet)

FY: 2015	FY: 2015	FY:	FY:	FY	FY
$400,000	$200,000		$	$	$

*Current Total Expenditures by Fiscal Year of Contract:
(attach backup documentation from Edison)

FY:	FY:	FY:	FY:	FY	FY
			$	$	$

IF Contract Allocation has been greater than Contract Expenditures, please give the reasons and explain where surplus funds were spent:	
IF surplus funds have been carried forward, please give the reasons and provide the authority for the carry forward provision:	
IF Contract Expenditures exceeded Contract Allocation, please give the reasons and explain how funding was acquired to pay the overage:	

Supplemental Documentation Required for Fiscal Review Committee

*Contract Funding Source/Amount:			
State:		Federal:	
Interdepartmental:		*Other*:	$600,000
If "*other*" please define:			
If "*interdepartmental*" please define:			

Dates of All Previous Amendments or Revisions: (*if applicable*)	Brief Description of Actions in Previous Amendments or Revisions: (*if applicable*)

Method of Original Award: (*if applicable*)	
*What were the projected costs of the service for the entire term of the contract prior to contract award? How was this cost determined?	
*List number of other potential vendors who could provide this good or service; efforts to identify other competitive procurement alternatives; and the reason(s) a sole-source contract is in the best interest of the State.	

THE UNIVERSITY OF TENNESSEE
REQUEST: NON-COMPETITIVE JUSTIFICATION FORMS
CONTRACT

1) NCJ Number:	9000018470	**Fund Number:**	R079089246
2) Campus/Institute Name:	Memphis	Admin-College of Medicine	
3) Short Description:	DELOITTE CONSULTING LLP WILL PROIDE CERNER DATA TRANSFER TO UT DATA WAREHO		
4) Proposed Vendor:	**Name:** DELOITTE SERVICES LP **Vendor Number:** 1092988 **Vendor ID:**		
5) Contract Start Date:		05/15/2015	
6) Contract End Date IF all Options to Extend the Contract are Exercised:		11/15/2016	
7) Total Maximum Cost IF all Options to Extend the Contract are Exercised:		$ 600,000.00	
8) Approval Criteria:	Non-Competitive Negotiation is in Universitys Best Interest		

9) Detailed Description of Service to be Acquired:

MLH Cerner production database▲ (meaning the databases holding electronic medical care data collected by MLH) are housed at Cerner Corp. in Kansas City. For our purposes, a subset of this data will be copied into a Landing Zone (which is another name for an encrypted database) which will sit at all times behind the MLH firewall. The preparation of the data and its movement into the Landing Zone will be done at low-usage times so as to not interfere with any business production needs at either Cerner or MLH.

All of the data that is placed into the Landing Zone will be transformed from its crude form into a research-data-warehouse data model and moved into the research Enterprise Data Warehouse (rEDW). The rEDW will reside behind the MLH firewall at all times. After quality assessment and consistency checks are performed on the rEDW, the crude data in the Landing Zone will be deleted.

Because of the size and complexity of healthcare data, searching the rEDW will require the effort of SQL specialists. To facilitate efficient yet secure access to data for preparatory-to-research queries (e.g. for grant proposals) we will use an NIH/CTSA validated data-model and interface (API) known as i2b. In addition, in order to facilitate research processes, data managers employed by CBMI and assigned to work with the rEDW will de-identify data and move extract▲ into disease-specific datamart▲ which are more commonly used subsets of the rEDW data copied into independent database schemas (e.g. a cancer datamar▼, a diabetes datamar▼ etc.). Because they are smaller and less complex, these datamarts are more easily used by non-technical users. All datamarts will be constructed and managed by CBMI staff; access will be granted through UTSHC/IRB approval.

The webservers and database servers for the Landing Zone, the research Enterprise Data Warehouse, and the respective datamarts will be purchased by CBMI and housed at MLH. Data warehouse software and all CCL scripts will be provided by Deloitte. (CC☆ Cerner Command Languag❋ is the computer language used by Cerner to communicate with their databases.) In addition initial data extractions from Cerner (in Kansas City) and data transformation will be performed by Deloitte. Deloitte will provide training to CBMI staff for future updates of the rEDW. The rEDW will be supported by two experienced data architects from UTHSC and the CBMI will provide salary support for them to work behind MLH firewall as needed.

10) Explanation of the Need for or Requirement Placed on the Procuring Agency to Acquire the Service:

Creation of a research Enterprise Data Warehouses (rEDW) is now standard practice at most major academic research universities in the United States. rEDWs give these universities the ability to respond to high demand and efficiently provide high quality, standardized

clinical data for research purposes. In addition, the creation of an rEDW using these common, standardized approaches is a requirement for participation in the NIH CTSA program, and UTHSC just recently submitted an application (led by Jon McCullers, PI) to the CTSA program.

11) Explanation of Whether the Procuring Agency Bought the Service in the Past, and if so, What Procurement Method It Used:

I am not aware of UT buying this type of consulting services in the past, however UT has done business with Deloitte Consulting in the past.

12) Name & Address of the Proposed Vendor/Contractor(s): (not required if proposed contractor is a state education institution)

DELOITTE SERVICES LP

4022 SELLS DRIVE

HERMITAGE TN 37076

US USA

13) Evidence of the Proposed Vendor/Contractor's Experience and Length of Experience Providing the Service:

Deloitte Consulting LLP has provide this same service to other hospitals and Institutions needing to convert Cerner data into a Research Enterprise Data Warehouse.

14) Documentation of Office for Information Resources Endorsement: **N/A**

(required only if the subject service involves information technology)

15) Documentation of Department of Personnel Endorsement: **N/A**

(required only if the subject service involves training for state employees)

16) Documentation of State Architect Endorsement: **N/A**

(required only if the subject service involves construction or real property related services)

17) Description of Procuring Agency Efforts to Identify Reasonable, Competitive, Procurement Alternatives :

In April 2014, Oracle contacted the Center for Biomedical Informatics after Dr. Brooks registered online for access to Oracl❄ s Big Data resources and Data Warehousing resources (http://www.oracle.com/us/technologies/big-data/index.html; http://www.oracle.com/us/products/database/datawarehousing/overview/index.html)

Oracle inquired about UTHSC plans for big data and data warehousing and offered to visit and discuss solutions they could offer to the CBMI. This visit occurred on April 29th, 2014, and included (from Oracle): Dr. Rick Maguire (Academic Medical Center & Research Specialist), Mr. Jeffrey Stewart (at the time the Technology Sales Manager), and Mr. Joseph Marnell (Regional Middleware Account Manager). From the UTHSC side the attendees were Drs. Pfeffer (Interim-VC Research), Davis (Governo❒ s Chair, Biomedical Informatics), Williams (Governo❒ s Chair, Genomics), and Brooks (Associate Director, CBMI)

On May 29th , we were visited at UTHSC by Daniel Housman, Chief Technology Officer, CovergeHEALTH by Deloitte. Mr. Housman visited UTHSC at the invitation of the CBMI to meet with relevant faculty invested in CBMI projects. He also presented to the campus at the monthly Biomedical Informatics Group Meeting (BIG Meeting), hosted by Dr. Teresa Waters (Chair, Preventive Medicine). (Mr. Housma■ s initial contact with UTHSC came via a chance meeting with Dr. Brooks at the HIMSS Conference (http://www.himss.org) in Orlando, FL in February 2014.) Mr. Housman outlined the solutions to big data and warehousing offered through ConvergeHEALTH and demonstrated the TranSMAR✳ database system. Mr. Housman emphasized his experience working with CTS✡ s and prospective CTSAs around the US, as well as his compan| s long history of working with customers to rapidly deploy necessary hardware and software (+ training) in environments without prior big data experience.

Both groups offered benefits. Both appeared enthusiastic about, and experienced in, development and deployment of big data solutions in academic environments. Both employed large numbers of experts who would descend on the UTHSC campus (or work off-site with remote access) in order to accomplish a great deal of work in the minimal amount of time possible. Specifically, with regards to Oracle, UTHSC is an Oracle Enterprise Campus with long experience working with Oracle/Oracle systems. However, this likely mattered only little due to the fact that UTHSC was looking primarily for expertise in data transformation rather than databasing licenses. Oracle seemed fairly intent on selling system▲ (AKA licenses) to UTHSC with anticipated ongoing costs or upgrades, whereas we want to maintain ultimate flexibility (without being wed to any specific system) and want to minimize recurring costs. The Oracle Group professed experience with CTSAs (writing grants & equipping AMCs), but this did■ t seem as extensive as Deloitte experience. Although circumspect and always professional, the Oracle approach was to downsell Deloitte rather than upsell Oracle.

With regards to Deloitte, they are global business leaders in big data consulting for a variety of industries. The software provided by Deloitt❋ Data Trust (rEDW),TranSMART (datamarts) & Precision Miner (analytic interfaces▭ offers powerful, pre-built and validated interfaces for combining omics and healthcare data. Their lead scientist, Housman, is very experienced in mixed data methods and big data science, and has prior successes in writing and aiding successful CTSAs. He also has extensive experience with common data models and was able to discuss pluses and minuses of various approaches with Dr. Davis. Housman seemed better able to understand our immediate and long term need▲ specifically that we were looking for a consultant group able to accomplish two critical goals: 1) to stand up a research data enterprise based upon Methodist University Hospital data, and 2) to leave CBMI in position (via training; installing software; writing algorithms) so as to be able to perform weekly updates to that data in an efficient manner.

18) Justification of Why the University Should Use Non-Competitive Negotiation Rather Than a Competitive Process:

(Being the "only known" or "best" service provider to perform the service as desired will not be deemed adequate justification.)

There are a limited number of contracting organizations that are able to provide the complex and highly technical services needed to create a research EDW. A demonstrated ability to successfully carry out these transformations in other CTSAs is critical. In addition, because we will be working with identifiable healthcare data it is paramount that we establish trust-based relationships with the vendor. Cerner has worked with Deloitte previously thus we can be assured that they are able to successfully carry out the required tasks in a highly secure fashion while ensuring the protection of patient and hospital information.

CONTRACT SUMMARY SHEET

021406

RFS #	Contract #
N/A	N/A
State Agency	**State Agency Division**
University of Tennessee	Health Science Center
Contractor Name	**Contractor ID # (FEIN or SSN)**
Deloitte Consulting LLP	[ ] C- or [x] V- 06-1454513

Service Description

Provision of Cerner Data Transfer to UT Bioinformatics Enterprise Research Data Warehouse

Contract BEGIN Date	Contract END Date	Subrecipient or Vendor?	CFDA #
5/15/2015	11/15/2016	Vendor	

Mark Each TRUE Statement

[n/a] Contractor is on STARS [x] Contractor's Form W-9 is on file in Accounts

Allotment Code	Cost Center	Object Code	Fund	Funding Grant Code	Funding Subgrant Code
332.3	N/A	N/A	N/A	N/A	N/a

FY	State	Federal	Interdepartmental	Other	TOTAL Contract Amount
2015				$ 400,000.00	$ 400,000.00
2016				$ 200,000.00	$ 200,000.00
					$ -
					$ -
					$ -
					$ -
TOTAL:	$ -	$ -	$ -	$ 600,000.00	**$ 600,000.00**

— COMPLETE FOR AMENDMENTS ONLY —

FY	Base Contract & Prior Amendments	THIS Amendment ONLY
15	$400,000.00	
16	$200,000.00	
TOTAL:	$ 600,000.00	$ -
End Date	11/15/2016	

State Agency Fiscal Contact & Telephone #

Anthony A. Ferrara 901-448-5523

State Agency Budget Officer Approval

Charles M. Peccolo

Funding Certification (certification, required by T.C.A., § 9-4-5113, that there is a balance in the appropriation from which the obligated expenditure is required to be paid that is not otherwise encumbered to pay obligations previously incurred)

7

[ ] African American [ ] Person w/ Disability [ ] Hispanic [ ] Small Business [ ] NOT disadvantaged
[ ] Asian [ ] Female [ ] Native American [ ] OTHER minority/disadvantaged—

Contractor Selection Method (complete for ALL base contracts— N/A to amendments or delegated authorities)

[ ] RFP [ ] Competitive Negotiation [ ] Alternative Competitive Method
[ ] Non-Competitive Negotiation [ ] Negotiation w/ Government(eg,ID,GG,GU) [ ] Other

Procurement Process Summary (complete for Alternative Method, Competitive Negotiation, Non-Competitive Negotiation, OR Other)

This contract is to amendment the contract with ECG Management Consultants, Inc. to implement of specific recommendations that were a result of ECG's assessment with The University of Tennessee Graduate School of Medicine located in Knoxville, TN. These recommendations include the implementation of faculty deployment tracking and management, design and implementation of Dashboard Reporting System, and the development of a formal faculty compensation plan.

THE UNIVERSITY OF TENNESSEE
CONTRACT

This Contract, made and entered into on **15-May-2015**, documents the agreement between the **University of Tennessee** (hereafter UNIVERSITY) and **Deloitte Consulting LLP** (hereafter CONTRACTOR).

This Contract consists of this cover page, the University's Standard Terms and Conditions and 17 additional pages. Terms contained on this cover page and the University's Standard Terms and Conditions shall prevail over those of any attachment unless otherwise stated below.

By mutual agreement, the UNIVERSITY and CONTRACTOR agree to the following:

1. The University of Tennessee through its Health Science Center will procure the consulting services of Deloitte Consulting LLP to provide Cerner Data Transfer to UTHSC Bioinformatics Enterprise Warehouse Platform and Tools as outlined in the Attached Scope of Work.

The Period of Performance under this Contract is from **05/15/2015** through **11/15/2016**. However, the University may terminate this Contract by giving the Contractor at least thirty (30) days written notice before the effective termination date, in which event the Contractor shall be entitled to receive equitable compensation for satisfactory authorized work completed as of the termination date.

The UNIVERSITY will compensate CONTRACTOR **as outlined in the attached statement of work**.

Other payment terms (Put N/A if none):

The UNIVERSITY's maximum liability under this Contract is $**600,000.00**.

In witness of their acceptance of the terms of this agreement, the parties have had this Contract executed by their duly authorized representatives.

FOR CONTRACTOR:

ADDRESS:

PHONE:

FEDERAL ID #: 06-1454513

_____

Nitin Mittal
Principal, Deloitte Consulting LLP

_____

Date

FOR UNIVERSITY:

DEPARTMENT NAME:
Biomedical Informatics
UT College Of Medicine

RESPONSIBLE ACCOUNT:
R079089246

_____

Charles M. Peccolo
Treasurer / Chief Financial Officer

_____

Date

UNIVERSITY'S STANDARD TERMS AND CONDITIONS

1. The University is not bound by this Contract until it is approved and signed by appropriate University authorized official(s). A list of the University's authorized officials is located here: http://treasurer.tennessee.edu/contracts/contractsignature.html
2. This Contract may be modified only by a written amendment which has been executed and approved by the authorized officials of both parties. A list of the University's authorized officials is located here: http://treasurer.tennessee.edu/contracts/contractsignature.html
3. The Contractor shall not assign this Contract or enter into a subcontract for any of the services performed under this Contract without obtaining the prior written approval of the University.
4. Unless otherwise indicated on the reverse, if this Contract provides for reimbursement for travel, meals or lodging, such reimbursement must be made in accordance with University travel policies.
5. The Contractor warrants that no part of the total Contract amount shall be paid directly or indirectly to an employee or official of the State of Tennessee as wages, compensation, or gifts in exchange for acting as officer, agent, employee, subcontractor, or consultant to Contractor in connection with any work contemplated or performed relative to this Contract, and that no employee or official of the State of Tennessee holds a controlling interest in the Contractor. If the Contractor is an individual, the Contractor certifies that he/she is not presently employed by the University or any other agency or institution of the State of Tennessee; that he/she has not retired from or terminated such employment within the past six months; and that he/she will not be so employed during the term of this Contract.
6. The Contractor shall maintain documentation for all charges against the University under this Contract. The books, records and documents of the Contractor, insofar as they relate to work performed or money received under this Contract, shall be maintained for a period of three (3) full years from the date of the final payment, and shall be subject to audit, at any reasonable time and upon reasonable notice, by the University or the Comptroller of the Treasury, or their duly appointed representatives. These records shall be maintained in accordance with generally accepted accounting principles.
7. No person on the grounds of disability, age, race, color, religion, sex, national origin, veteran status or any other classification protected by Federal and/or Tennessee State constitutional and/or statutory law shall be excluded from participation in, or be denied benefits of, or be otherwise subjected to discrimination in the performance of this Contract. The Contractor shall, upon request, show proof of such nondiscrimination, and shall post in conspicuous places, available to all employees and applicants, notice of nondiscrimination.
8. The Contractor shall comply with all applicable Federal and State laws and regulations in the performance of this Contract.
9. This Contract shall be governed by the laws of the State of Tennessee, which provide that the University has liability coverage solely under the terms and limits of the Tennessee Claims Commission Act.
10. The Contractor shall avoid at all times any conflict of interests between his/her duties and responsibilities as a Contractor and his/her interests outside the scope of any current or future Contracts. The following principles define the general parameters of a conflict of interests prohibited by the University:
a. Contractor's outside interests shall not interfere with or compromise his/her judgment and objectivity with respect to his/her duties and responsibilities to the University.
b. A Contractor shall not make or influence University decisions or use University resources in a manner that results in:
Financial gain outside any current or future Contracts for either the Contractor or his/her relatives or
Unfair advantage to or favored treatment for a third party outside the University.
c. A Contractor's outside financial interests shall not affect the design, conduct, or reporting of research.
The Contractor certifies that he/she has no conflicts of interests and has disclosed in writing the following:
a. Any partners or employees of the Contractor who are also employees of the University.
b. Any relatives of the Contractor's partners or employees who work for the University.
c. Any outside interest that may interfere with or compromise his/her judgment and objectivity with respect to his/her responsibilities to the University.
11. If the Contractor fails to perform properly its obligations under this Contract or violates any term of this Contract, the University shall have the right to terminate this Contract immediately and withhold payments in excess of fair compensation for completed services. The Contractor shall not be relieved of liability to the University for damages sustained by breach of this Contract by the Contractor.
12. It is understood by the Contractor that the University will possess all rights to any creations, inventions, other intellectual property, and materials, including copyright or patents in the same, which arise out of, are prepared by, or are developed in the course of the Contractor's performance under this Contract. The Contractor and the University acknowledge and agree that the Contractor's work under this Contract shall belong to the University as "work-made-for-hire" (as such term is defined in U.S. Copyright Law). To the extent Contractor's work is not deemed to constitute "work-made-for-hire," Contractor hereby assigns and transfers to the University all of Contractor's right, title and interest in and to any creations, inventions, other intellectual property, and materials, including copyright or patents in the same, which arise out of, are prepared by, or are developed in the course of the Contractor's performance under this Contract.
13. For personal, professional, and consultant services, the Contractor shall submit brief, periodic progress reports to the University as requested.
14. In compliance with the requirements of Tenn. Code Ann. § 12-4-124, for any contract for goods or services purchased by the University, the Contractor hereby attests that the Contractor shall not knowingly utilize the services of an illegal immigrant in the performances of this Contract and shall not knowingly utilize the services of any subcontractor who will utilize the services of an illegal immigrant in the United States in the performance of the Contract.
15. Any activities performed within the University of Tennessee facilities in support of this contract shall be executed in accordance with all applicable safety and environmental standards. Covered activities include but are not limited to the installation, servicing and maintenance of devices or equipment. Requisite safety standards include those promulgated by the Tennessee Occupational Safety and Health Administration (TOSHA), the Tennessee Department of Environment and Conservation (TDEC), Tennessee Division of Radiological Health, and any other regulation or related consensus standards which may apply to the device, equipment, or services covered under this contract. All hazardous substances and materials, including waste, under the control of the contractor shall be managed in accordance with applicable EPA and TDEC regulations. *Failure to abide by regulatory requirements may result in termination of the contract by the university. Any fines imposed against the University as the result of a contractor's failure to abide by regulations shall be the contractor's responsibility.*
16. This Contract is the entire agreement between the University (including University employees and other end users) and Contractor. In the event Contractor enters into terms of use, end user agreements, or other agreements or understandings, whether electronic, click-through, or shrink-wrap, and whether verbal or written, with University employees or other end users, such agreements shall be null, void, and without effect, and the terms of this Contract shall apply.
17. In compliance with the requirements of Tenn. Code Ann. § 12-4-120, the Contractor hereby attests that the Contractor has registered with the State of Tennessee's Department of Revenue for the collection of Tennessee sales and use tax. This registration requirement is a material requirement of this Contract.

ConvergeHEALTH
by **Deloitte.**

University of Tennessee Health Science Center

Bioinformatics Enterprise Data Warehouse Platform and Tools

Statement of Work

January 13, 2014

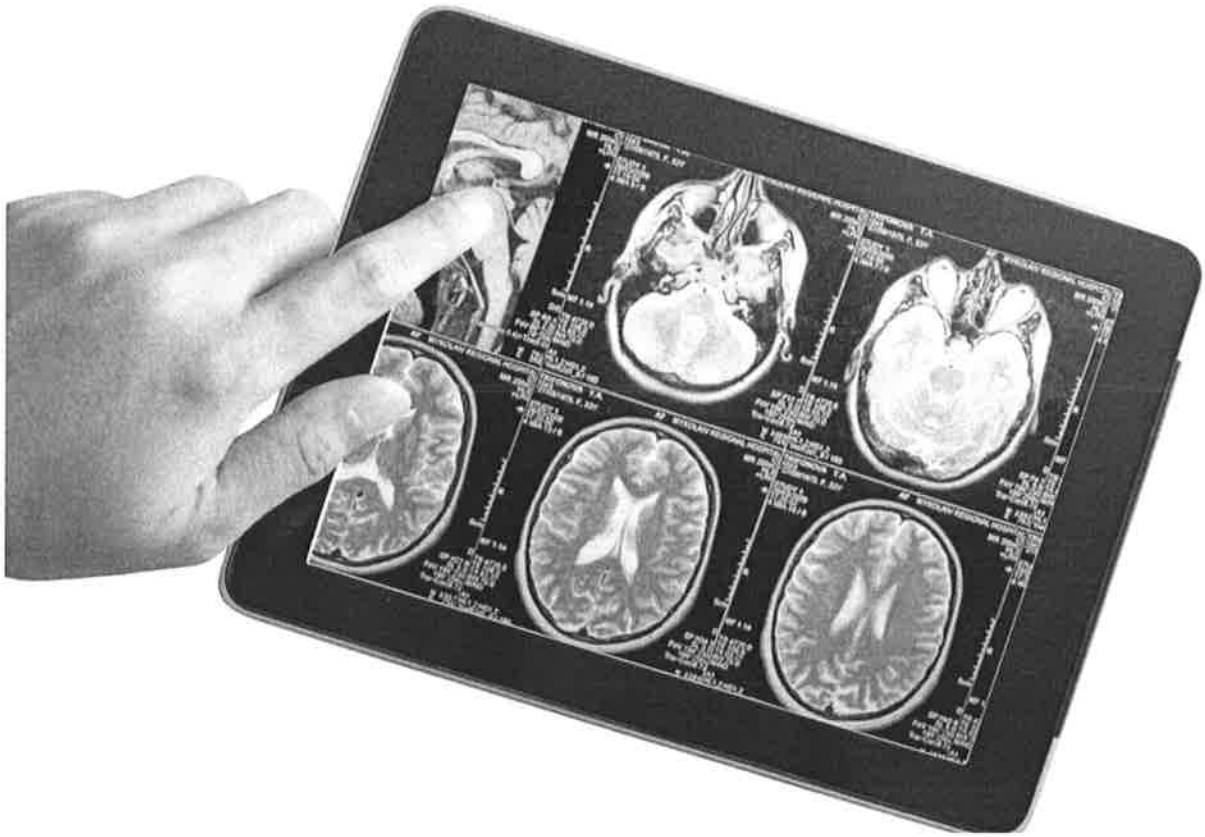


Table of Contents

Background 3
Solution Overview, Scope of Services and Approach 3
Deliverables 8
Engagement Timeline 9
Proposed Project Structure 10
Project Assumptions 12
Professional Fees 15

Statement of Work No.1 University of Tennessee Health Science Center (UTHSC) Biomedical Informatics Research Platform Solution

UTHSC contact:

Deloitte Consulting LLP contact: Dan Housman

Authorized start date: _____

Estimated completion date: _____

This Statement of Work ("SOW"), effective as of _____ ("SOW Effective Date"), confirms our agreement that Deloitte Consulting LLP ("ConvergeHealth by Deloitte", "ConvergeHealth", or "Deloitte Consulting" or "We") will provide the consulting services set forth herein (the "Services") to assist the University of Tennessee Health Science Center ("Client" or "UTHSC") with the Project (as defined below). This SOW is subject to the UTHSC DC LLP Master License and Services Agreement entered into by Client and Deloitte Consulting, dated _____ (the "Agreement"). For purposes of this SOW, the term "Parties" means Client and Deloitte Consulting.

Capitalized terms in this SOW that are not defined herein will have the same meaning as in the Agreement.

All terms, including scope, price and timing of this Statement of Work are valid for agreement and signature through February 28, 2015. Upon agreement and signature, Deloitte Consulting and Client will mutually determine start date based upon availability of resources and delivery of prerequisites to begin

Background

The University of Tennessee Health Science Center (UTHSC) has undertaken an initiative to implement a Bioinformatics Enterprise Research Data Warehouse Platform and Tools ("Project"). This Statement of Work sets forth the professional services that Deloitte Consulting LLP will provide as well as creating a mutual understanding of the nature of this strategic effort for UTHSC, the project timing, and the specific experienced resources to be provided by Deloitte Consulting.

Understanding of UTHSC Project Goals and Objectives

UTHSC has entered into strategic partnership with Methodist LeBonheur Healthcare (MLH), and the UTHSC Center for Biomedical Informatics (CBMI) has been commissioned to establish an infrastructure for aggregation and standardization of research data from multiple sources combined with a suite of analytics tools to facilitate access and analysis of research data. To this end UTHSC CBMI has requested assistance from ConvergeHEALTH to stand up an Enterprise Research Data Warehouse, that will be delivered via the Data Trust, as well as research analytics tools, Precision Miner, that enable new research and expand the impact of translational research efforts by providing centralized solutions to biomedical informatics that reduce barriers to generate, acquire, and analyze research data.

Solution Overview, Scope of Services and Approach

Solution Overview:

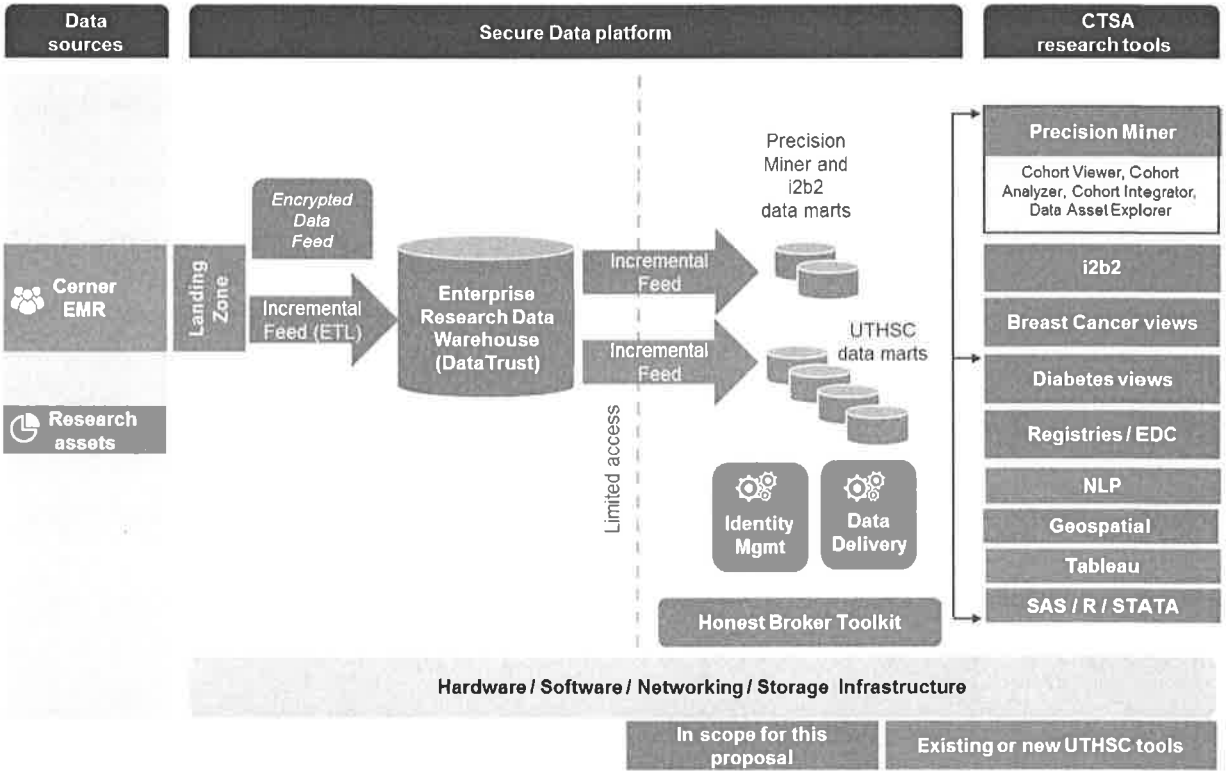
UTHSC CBMI has requested ConvergeHEALTH to implement the Data Trust, an Enterprise Research Data Warehouse solution, in incremental stages using patient data received through Cerner, the EMR provider of LeBonheur Methodist Hospital, and to install the Precision Miner suite, including i2b2, to help researchers build cohort queries, run packaged analysis pipelines, and manage data delivery processes for executing workflows such as clinical trial recruitment.

Technology Solutions in this SOW include:

- Data Trust and i2b2
- Precision Miner suite (includes Cohort Viewer, Cohort Analyzer, Cohort Integrator and Data Asset Explorer)

Solution Architecture:

The following is the high level overview of the solution architecture for this engagement:

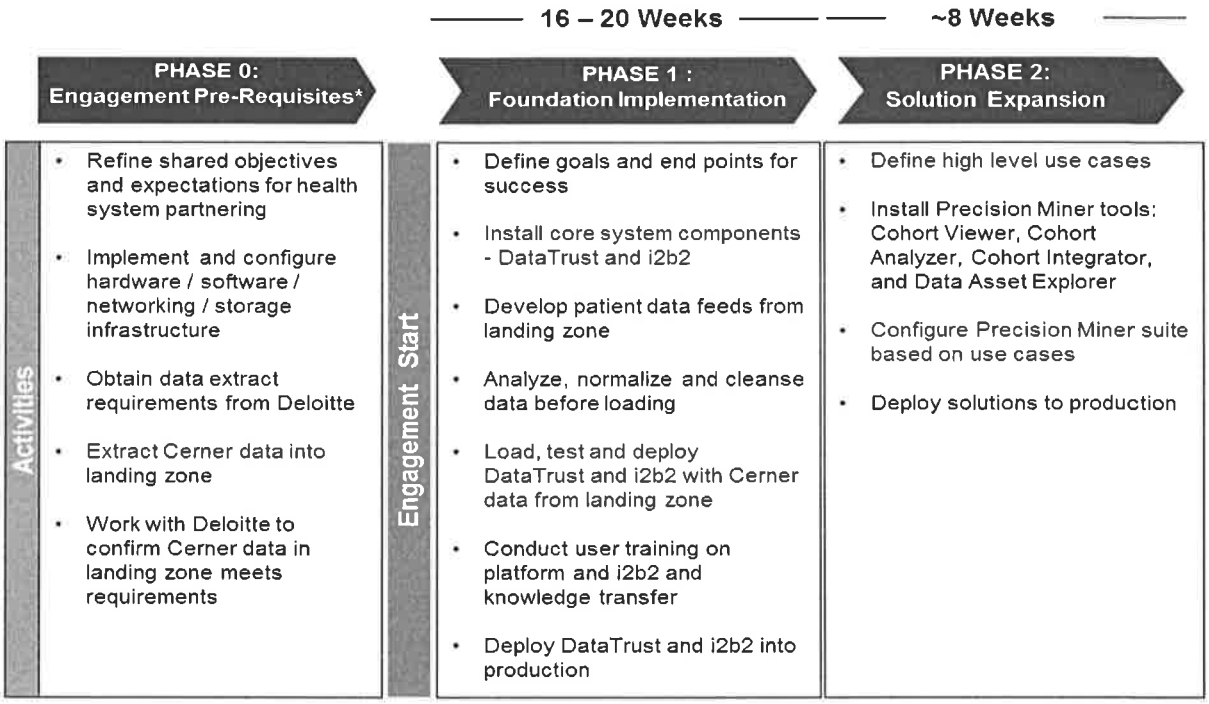


The proposed solution consists of 2 main components, an Enterprise Research Data Warehouse that is delivered via the Data Trust solution, and a set of research tools that include i2b2 and the Precision Miner suite, which will enable researchers to perform data analytics on data sets extracted from the Enterprise Research Data Warehouse. Data will be delivered to the Data Trust from the Cerner EMR solution via standard extracts developed by Cerner and the execution managed by UTHSC CBMI. Once the data is in the landing zone, Deloitte Consulting will develop extract, transform and load (ETL) scripts to pull patient data into the Data Trust Enterprise Research Data Warehouse via an incremental data feed. Those data will flow from the Data Trust into the Precision Miner and i2b2 data marts and into the research analytics tools.

UTHSC CBMI's existing tools include a number of data marts that will receive data extracts via incremental feeds from the Enterprise Research Data Warehouse and allow UTHSC CBMI to perform analytics using existing tools associated with the data marts. Deloitte Consulting will transfer knowledge and expertise to ensure UTHSC CBMI is enabled to set up the data feeds from the Enterprise Research Data Warehouse and use the data sets extracted.

Services Scope

UTHSC CBMI has requested services from Deloitte Consulting to execute the high level activities defined in Phase 1 and Phase 2 of the diagram below:



Prior to the engagement kick off, UTHSC CBMI will complete the engagement pre-requisites outlined in Phase 0 in order for Deloitte Consulting to begin the project work. During Phase 0 Deloitte Consulting will review and validate the Cerner data extracts to ensure they meet the requirements to begin Phase 1. The Phase 0 engagement pre-requisites are outlined in the activities section below.

Out of Scope Services:

Anything not specifically listed in this SOW as being within the scope of Services is out of the scope for this SOW. The following items are expressly agreed to be out of scope:

Item	Description
tranSMART	tranSMART implementation is not in scope for this project
Loading of genomic data	Extraction, transformation or loading of genomic data is not in scope for this project
Natural Language Processing (NLP)	Existing NLP tools will be able to leverage the data in the Data Trust data warehouse. Implementation of NLP tools is considered to fall under the responsibility for the UTHSC CBMI team.
Geospatial	Existing Geospatial tools will be able to leverage the data in the Data Trust data warehouse. Implementation of Geospatial tools is considered to fall under the responsibility for the UTHSC CBMI team.
Tableau	Existing Tableau tools will be able to leverage the data in the Data Trust data warehouse. Implementation of Tableau is considered to fall under the responsibility for the UTHSC CBMI team.

Item	Description
SAS, R or Stata	Existing analysis tools will be able to leverage the data in the Data Trust data warehouse. Implementation of additional data analysis tools like SAS, R or Stata is considered to fall under the responsibility for the UTHSC CBMI team.

Phase 0: Pre - Engagement Pre-Requisites

In an effort to enable efficient delivery of the Phase 1 and 2, we have identified a list of activities that UTHSC CBMI will need to complete prior to initiating the engagement, including extracting research data from the Cerner electronic medical record (EMR) solution into a landing zone based on the pre-requisites identified below. When UTHSC CBMI has completed the Phase 0 activities and the data has been loaded into the landing zone, Deloitte Consulting will work with UTHSC CBMI to confirm the data extract meets the required specifications. When confirmed, Deloitte Consulting will commence the engagement and begin Phase 1.

UTHSC CBMI will conduct the following activities prior to the start of Phase 1:

- Generate data extracts from the Cerner electronic medical record system. The format of the extracts shall be mutually agreed to between UTHSC CBMI and Deloitte Consulting.
- UTHSC CBMI will obtain all necessary organizational IRB approvals before proceeding with the project.
- Install the requisite physical computational infrastructure (servers, databases, etc.) needed to support the CTSA research tools
- Identify pilot users that will be using the CTSA research tools. These users will contribute towards the platform qualification activities.
- Make available conventional operating system licenses (Windows and Linux) that meet enterprise standards
- Provision of security access to the platform infrastructure for the Deloitte Consulting team

Data Specification

The following specification defines the data UTHSC CBMI needs to extract from the current Cerner EMR solution into the landing zone, prior to the start of the engagement (Phase 1). The data defined below is at a patient level and there may be more than one record per patient. It is assumed that not all fields will be populated for a given admission or encounter.

Inpatient Data – for each admission	Encounter (Out-patient) Data – for each encounter	Inpatient Pharmacy Data (orders or fills)
• Patient ID • Admission ID • Patient age or Date of birth • Patient gender • Date of admission • Date of discharge • Facility ID • Admission diagnosis code • Admission type • Admission source • Diagnosis codes (ICD9-CM / ICD10-CM diagnosis codes) • Procedure codes (ICD9-CM / ICD10-CM / CPT procedure codes) • DRG code (if assigned) • Revenue / charge codes (if available) • Discharge status • Amount billed • Amount paid • Payer ID • Vital signs (time series) • Lab results (multiple values per admission may be present) Microbiology results • Anatomical pathology summary • Radiology summary	• Patient ID • Patient age or Date of birth • Patient gender • Date of encounter • Provider ID or Physician ID • Primary diagnosis code • Procedure code • Procedure modifier • Type of service code • Amount billed • Amount paid • Payer ID • Lab result (if lab)	• Patient ID • Patient age or Date of birth • Patient gender • Date of service • Dispensing pharmacy ID • Prescribing provider / physician ID • Prescription NDC or Prescription RxNorm • Quantity dispensed • Amount billed • Amount paid • Payer ID

Phase 1: Foundational Implementation

Phase 1 will focus on the installation of Data Trust and i2b2 and extracting, transforming and loading data from the Cerner landing zone into the Enterprise Research Data Warehouse. Before data are loaded into the Data Trust any data extracted will be analyzed, normalized and cleansed. In collaboration with UTHSC CBMI, we will prioritize the data sets loaded into the Data Trust based on engagement goals, relevance, level of effort, and availability.

Deployment and testing of the core system components will be in incremental releases. The Deloitte team will configure user training materials and provide hands-on user training on the Data Trust platform and i2b2. This will enable knowledge transfer prior to deployment of Data Trust and i2b2 into production.

Deloitte Consulting activities of this work stream include:

- Define goals and end points for success
- Install core system components - Data Trust and i2b2
- Develop patient data feeds from landing zone
- Analyze, normalize and cleanse Cerner patient data from landing zone
- Load, test and deploy Data Trust and i2b2 with Cerner data from landing zone

- Conduct 1 administrator and 1 end user training class on Data Trust and i2b2
- Deploy Data Trust and i2b2 into production

Phase 2: Solution Expansion

Phase 2 will focus on the installation of the Precision Miner suite of research analytics tools. Deloitte Consulting, in collaboration with UTHSC CBMI, will define the use cases to drive the installation of the Precision Miner suite of analytical tools. Once agreed upon, Deloitte will proceed to installing Precision Miner suite, including Cohort Viewer, Cohort Analyzer, Cohort Integrator and Data Asset Explorer.

Deloitte Consulting activities of this work stream include:

- Definition of high level use cases
- Installation of Precision Miner tools: Cohort Viewer, Cohort Analyzer, Cohort Integrator, and Data Asset Explorer
- Configuration of Precision Miner suite based on use cases
- Deployment of Cohort Viewer, Cohort Analyzer, Cohort Integrator, and Data Asset Explorer to production

UTHSC Engagement Responsibilities:

- Completion of Phase 0 activities as defined above
- Appointment of a dedicated UTHSC CBMI project manager working directly with the Deloitte Consulting team
- Clear and timely communication across leadership, management, and impacted staff
- Designate a Deloitte management level individual to be responsible and accountable for overseeing the project and reporting to UTHSC CBMI.
- Leadership availability to attend periodic reviews of initiative progress and offer guidance, direction, and resolution of escalated issues
- Leadership availability to participate in use case sessions, as required
- Responsive remediation of critical risks and issues
- Communication of project information, next steps, and updates to the appropriate audiences in a timely manner, after thoughtful review of communication material
- Provide necessary approval and leadership on project plan, status updates, deployment approach, and go-live decisions
- Enable super-users to be available for user acceptance testing throughout the engagement
- UTHSC CBMI Subject Matter Experts (SMEs) will provide guidance in the development of test scenarios, define success criteria for data mapping and testing activities, and make themselves available throughout the project stages including development and user acceptance testing
- Own administration and maintenance of the overall solution post go-live
- To facilitate knowledge transfer, UTHSC CBMI resources will be involved in the day to day activities in Phases 1 & 2

Deliverables

The following table lists the deliverables for the in-scope work streams for this engagement. Deloitte Consulting will work with UTHSC CBMI on the confirmed due dates for each of the deliverables as part of Phase 1.

Phase	Deliverables	Description	Due	Approval
Phase 1	Requirements Validation	Document that confirms the solution architecture, system components, and implementation plan for Phase 1.	End of week #2	UTHSC CBMI project manager will approve all deliverables
	Core Component Installation	Installation of the Data Trust and i2b2	End of week #4	
	Target Map Generation	Document that identifies the source to target map of Cerner data in landing zone to the Data Trust	End of week #6	
	ETL Coding and Creation of Data Feed	The ETL data feeds developed from landing zone into the Data Trust	End of week #14	
	Foundation Deployment	Deployment of Data Trust and i2b2 into a production environment	End of week #18	
Phase 2	High Level Use Cases	Document that defines the high level use cases for Precision Miner suite	End of week #20	
	Solution Expansion Installation	Installation of Cohort Viewer, Cohort Analyzer, Cohort Integrator, and Data Asset Explorer	End of week #28	

Acceptance Procedures

All Deliverables for which Deloitte Consulting has the primary responsibility to prepare as set forth in this project will be subject to the review and approval of the Client in accordance with the Approval of Deliverables section of this Statement of Work.

The engagement time-plan and our fees are based on the understanding that the review of a Deliverable will be completed in five (5) working days after delivery. It is important that all deficiencies (if any) be identified at the time of the initial review in order not to delay the engagement, as the engagement time-plan and our fees do not contemplate multiple review and correction cycles. Deliverables requiring only minor corrections, which Deloitte Consulting has agreed to undertake within specified times, will be deemed approved so that our services may continue as planned.

In order for Deloitte Consulting to carry on with the remainder of its Services, it must be able to rely upon approval of Deliverables, for purposes of all subsequent stages of the project In the event of a contradiction between the specifications for a Deliverable and the approved Deliverable, the contradiction shall be resolved by the approved Deliverable controlling.

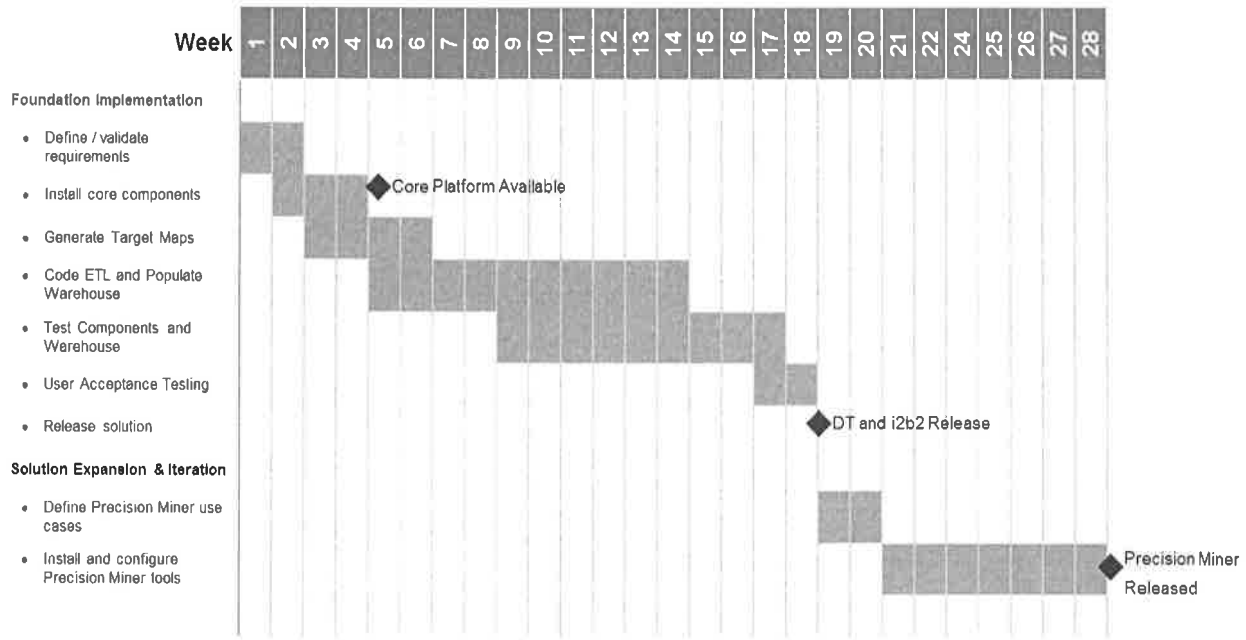
Acceptance of Deliverables

Client shall approve each Deliverable that conforms in all material respects to the requirements set forth in the Statement of Work. Approval of a Deliverable shall be deemed given if Client has not provided

Deloitte Consulting with written notice of such approval or with written notice that a Deliverable does not conform with the foregoing within five (5) days of delivery.

High Level Engagement Timeline

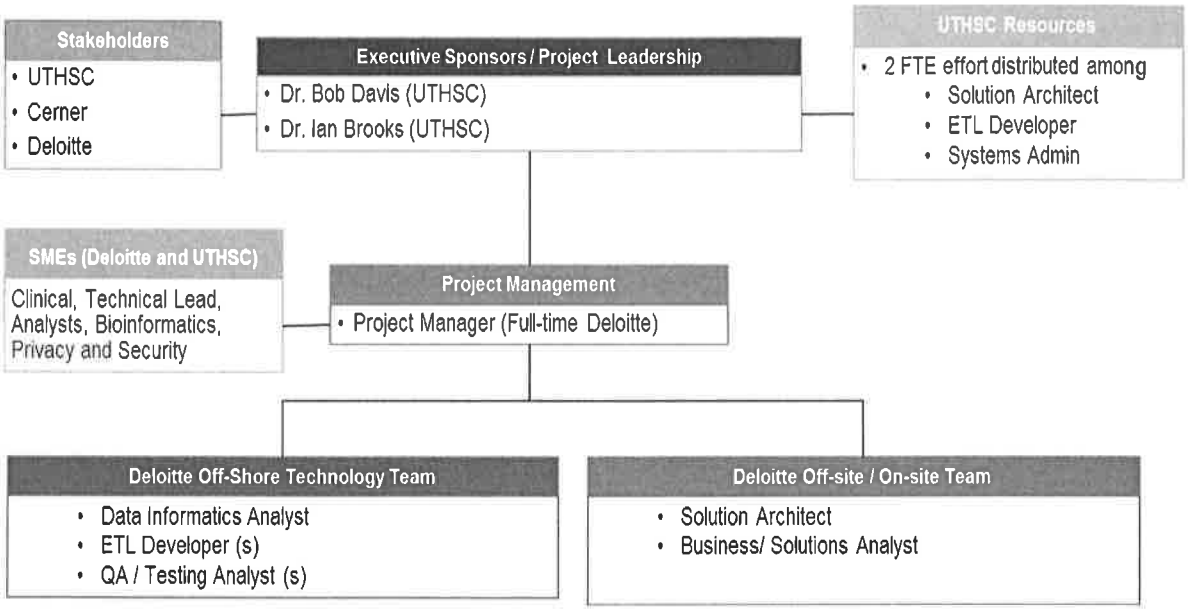
Following is the high level estimated timeline for this Project. As part of Phase 1, Deloitte Consulting will develop a project plan that provides more a more detailed description of the activities and milestones for Phase 1 and Phase 2.



It is understood and agreed by the parties that the work specific commencement and end dates contained herein are estimated performance dates. Material changes to the high level timeline will be governed via the Change Order process.

Proposed Project Structure

We have proposed the following team structure for the engagement and will work with you during the first few weeks of the Project kickoff to refine as required to enable an effective execution of the engagement:



The primary work location(s) will be at Deloitte Consulting and UTHSC offices. Deloitte Consulting will perform the Services work on-site or off-site as needed.

The following table provides a high level description of roles and responsibilities related to this engagement:

Role	Responsibilities	Organization
Stakeholders	Stakeholders are representatives from parties involved and are jointly accountable for defining implementation goals and objectives	UTHSC, Cerner, Deloitte Consulting
Executive Sponsors / Project Leadership	UTHSC Leadership who oversee the solution deployment.	UTHSC
Subject Matter Experts / Advisors (UTHSC and Deloitte)	Provide subject matter advice and project-specific guidance in the areas of Clinical, Technical Lead, Analysts, Bioinformatics, Privacy and Security as required and needed throughout the duration of the project.	UTHSC, Deloitte Consulting
UTHSC Resources	UTHSC staff supporting the project on an ongoing basis i.e. Solutions Architect, ETL Developer and Systems Administrator.	UTHSC
Project Management	Monitor Project progress and provides oversight to facilitate adherence to Project scope, budget, timeline, and structure. Oversees issue resolution and escalation. Manage Project risks and mitigation	Deloitte Consulting

Role	Responsibilities	Organization
Data Informatics Analyst	Supports identification and definition of pilot goal metrics along with mapping source to ETL	Deloitte Consulting
ETL Developer(s)	Create ETL data feeds to load Data Trust	Deloitte Consulting
QA / Testing Analyst	Create test plans, execute tests and report results	Deloitte Consulting
Business / Solutions Analyst	Involve in use case definition, data analysis, testing, training material development and training end users	Deloitte Consulting
Solution Architect	Defines overall solution architecture	Deloitte Consulting

Project Assumptions

The following is a list of some of the assumptions and expectations that together with the information provided to Deloitte Consulting as of the date of this Statement of Work, the nature and scope of the Services, the expected resource requirements and other commitments from the Client, and the anticipated duration of the Services, form the "Project Assumptions" for this Statement of Work and the basis of Deloitte Consulting's pricing. A deviation from the Project Assumptions may cause changes to Deloitte Consulting's schedule, fees, expenses, level of effort or otherwise impact Deloitte Consulting's performance of the Services, and the Parties will enter into a Change Order to reflect adjustments to the Services and/or pricing for such services as a result thereof.

Data

- UTHSC CBMI will work with Cerner to produce extracts from the source database by authoring CCL scripts or using existing Cerner CCL scripts to extract certain subject areas. The scripts should be usable and available to Methodist and UTHSC CBMI for generating ongoing extracts for incremental loading and potentially to execute a reload/full refresh if needed from the initial bulk load. They should also be available for inspection to understand the data available.
- Landing zone: A Methodist IT server is assumed as the initial landing zone of data pushed from Cerner. Via SFTP the UTHSC CBMI will receive data for data marts hosted at UTHSC. All identified data will reside behind the Methodist firewall.
- Maintenance of the landing zone within the Methodist environment is outside of the scope of this engagement
- The UTHSC CBMI team will be responsible for automation to execute scripts on a periodic basis or to monitor initial execution and quality of the data extract that provides the historical data.
- Initial data to be extracted will include 2 years of history.
- The data will be extracted against an existing reporting database used for PowerInsight Business Objects queries. The extracts will be contained and tested in the non-production environment on smaller data scales prior to use in the load and operate at off-peak times (overnight) when running extract jobs.

- Extracts once produced will reside in a temporary directory within the hosted Cerner environment. The initial large extracts will be deleted remotely after they have been transferred into the research data environment.
- Data extracts will be transmitted through a 'pull' by the UTHSC CBMI team at Methodist using SFTP either manually or through an automated process. An encryption process may be placed on extracts prior to transfer that will be managed by the team generating the SFTP transmission.
- Extracted data will not be de-identified prior to transmission. De-identification will occur within the research repository environment.
- The data extracts will include entire subject areas and not pieces or subsets of patients (e.g. all diagnoses, not just diabetes diagnoses).
- UTHSC CBMI in conjunction with Cerner will perform required extraction and normalization of raw data delivered into the landing zone at Methodist. The Deloitte Consulting team will support the ETL of data from the landing zone into the Enterprise Research Data Warehouse.
- Cerner will provide access and training on CCL scripts written and methods to modify or extend those scripts to one designated UTHSC employee who will be able to interact with data via VPN within the Cerner hosted environment
- The system will be loaded through a one-time initial load by subject area followed by incremental updates

Solution

- UTHSC CBMI will make available a development and test environment which will be used to build and test the extract scripts prior to use in the data extraction environment.
- Infrastructure (hardware as well as software) recommended for the project implementation should be procured and deployed by the Client prior to project start
- UTHSC CBMI will maintain the associated environments, including data loading, processing and auditing and will resolve issues in a timely manner
- UTHSC CBMI will install and maintain the Pentaho Data Integration ("Kettle") software system prior to the start of Phase 1

Project Management

- Client Project sponsor will have overall responsibility and authority for driving engagement decisions, reviewing and approving deliverables, facilitating discussion and communication among the parties as needed, and securing required client or third-party resources
- Deloitte Consulting is not responsible for project delays or additional scope that results from other initiatives Client may have in progress
- When working on-site at Client location, a standard work week of 45 hours is assumed for all full-time Client and Deloitte Consulting resources. Deloitte Consulting center-based, remote delivery resources are not included in this assumption.

Client Staff

- UTHSC will provide resources during the engagement that will be engaged as part of the delivery team to facilitate training and knowledge transfer activities

- Client will provide qualified and knowledgeable members to the project team at the staffing levels and according to the timeline, with the business and technical skills required as defined by the project roles
- Client subject matter experts (SMEs) and super-users will be available when needed to attend meetings, workshops and other activities
- Client SMEs will provide guidance in the development of test scenarios, define success criteria on data mapping and testing, and make themselves available during different project stages including development, unit testing and user acceptance testing. Identified super users (administrators, end users and trainers) should be available for training sessions
- Client executive management will provide full sponsorship and support for the project, including approval of budget, resources, and timing
- Deloitte Consulting team members will have appropriate access to Client's corporate executives, project leadership, managers, and employees
- Client shall provide required approval and leadership on project plan, testing strategy, testing status and go-live decisions
- Project Leadership and the Project Management Office (PMO) will make decisions in a fashion and manner consistent with Project timelines and Deliverables. The Steering Committee will empower the Client Project Manager and his/her direct reports to make as many Project decisions as possible, reserving only items of a strategic nature for the Steering Committee

Deloitte Consulting Personnel

- Deloitte Consulting will perform some of the services work identified herein primarily from our offices
- When working on-site at a UTHSC location, Deloitte Consulting staff typically perform the Services Monday through Thursday and work remotely on Friday

Security and Controls

- Client agrees that it shall: (i) not disclose Personally Identifiable Information or other information to Deloitte Consulting, if such disclosure could violate Applicable Law; (ii) not request Deloitte Consulting to use or disclose Personally Identifiable Information or other information in a manner that could not be permissible under any applicable law, rule or regulation, if such use or disclosure were done by Client; (iii) disclose to Deloitte Consulting only the minimum amount of Personally Identifiable Information (if any) reasonably required for Deloitte Consulting to perform its Services under the Agreement; and (iv) where practicable and commercially reasonable, de-identify such Personally Identifiable Information before making it available to Deloitte Consulting
- Client will provide existing internal controls and security documentation to be leveraged and will provide an understanding of the as-is internal control environment
- Hardware, software, and networking infrastructure required for the Project will be procured by the Client. Primary environment setup, hardware installation and configuration, server software installation and configuration will be performed by the Client. Installation will meet security and compliance requirements for PHI protection and management outlined by an appropriate designated governance group within the Client leadership team.

Infrastructure

- Client is responsible for providing facilities for the Project Team, including sufficient work space, system and network, and telephone access.
- Client will provide the system infrastructure (i.e. hardware and network) at an appropriate capacity level to support the contemplated nonproduction and production environments as appropriately configured and implemented hereunder. This includes CPU, disk, memory, backup and disaster recovery. System infrastructure will be sized to support the Project Team and business operations to reduce downtime and performance issues, according to applicable timelines and milestones
- Client will provide required capabilities for third party/bolt-on applications not included in the scope of the Services.
- Client will allow remote connections for Deloitte Consulting personnel, including those working off site, as required to meet Project requirements.

Professional Fees

Based on the current understanding of the Project scope, and assumptions set forth herein, Deloitte Consulting will perform the Services on a time and materials basis at the hourly rates set forth herein.

Deloitte Consulting estimates that the fees for the Services will be approximately $ 470,000 not including Travel and Living expenses and applicable taxes .This fee estimate is based on our discussions and on the information provided to Deloitte Consulting as of the date of this SOW, the nature and scope of the services and deliverables, the expected resource requirements of Deloitte Consulting, the resource commitments from Client, the anticipated timeline of the Services, and the assumptions made in connection with this SOW, each as described in this SOW.

Client will also reimburse Deloitte Consulting for all reasonable expenses incurred in performing the Services, including travel and lodging expenses, communication charges and supplies, estimated at 10% of the total fees, or approximately $47,000.

Deloitte Consulting will invoice Client on a monthly basis for the fees referred to above, along with applicable taxes. Additional services requested by Client and agreed to by Deloitte Consulting will be provided subject to the execution of a separate mutually agreed upon statement of work describing such additional services.

Licensing & Related Support & Maintenance

As a part of this engagement, Deloitte Consulting will be installing the following ConvergeHealth products:

Licensed Software:

- Data Trust Platform v3.1
- Precision Miner v1.0

This SOW assumes and requires that the Client has also accepted the Licensing for and Support and Maintenance of the above products. The license terms, pricing, and payment terms are included in a separate Software License Agreement.

Change Orders

Either party may request changes to the Services, Deliverables, and/or other aspect of this SOW through a written change request ("Change Request"). Promptly thereafter, the Parties will discuss what impact the Change Request will have on the Services and Deliverables and on pricing, timing, and other terms of this SOW. Changes to this SOW agreed upon by the Parties will be set forth in a change order signed by the Parties ("Change Order"). Once a Change Order is signed, it will amend, and become part of, this SOW. Neither Party is obligated to change the Services, Deliverables, or other aspect of an SOW unless a Change Order for such change has been signed by the Parties.

In the event that Client fails to meet its obligations under this SOW, or an assumption proves to be invalid, and such event adversely impacts Deloitte Consulting, the Parties will agree on a Change Order to equitably adjust this SOW to exclude such adverse impact.