SEPTEMBER 7, 2023

ARPA-H BAA SP4701-23-B-0002

# THE HEALTH PORTAL TOKEN (HPT) PROJECT

UNIVERSITY OF NORTH TEXAS

# Volume I: Technical and Management Proposal

## Section I: Cover Page

| | |
|---|---|
| BAA number: | SP4701-23-B0002 |
| Technical area: | Healthcare Interoperability and Security |
| Proposal Title: | The Health Portal Token Project |
| Organization: | University of North Texas<br>Grants and Contracts Administration |
| Organization Type: | Other Educational |
| Date of Submission: | September 7, 2023 |
| Team Members: | Charles Kaplan MD, Principal Investigator<br>Ram Dantu, Technical and Administrative Consultant<br>Nathan Hatzfeld, Project Integrator<br>Nolan Adams, Contracting Officer Representative |
| Administrative POC: | Charles Kaplan MD<br>Principal Investigator, Chief Medical Information Officer<br>5880 N La Cholla Blvd #180<br>Tucson AZ 85741<br>520-370-6743<br>csk9000@gmail.com |
| Technical POC: | Ram Dantu<br>Professor, Department of Computer Science and Engineering<br>Director, Center for Information and Cyber Security<br>University of North Texas<br>1155 Union Circle #311070<br>Denton TX 76201<br>(214) 629-9450<br>Ram.Dantu@unt.edu |
| Total Proposal Budget: | $5,490,000 |

Controlled Unclassified Information (CUI) Statement: This proposal does not contain any proprietary claims, data, or markings. It is the intent of this project to provide solutions to ongoing healthcare interoperability, security, and cost concerns, without introducing an additional layer of cost or proprietary control to the system. It does provide for the introduction of a new standard that is based on existing open source software with an MIT license.

# Section II: Summary of Proposal

## A. Technical rationale

This proposal is a roadmap for the development and implementation of a specific innovative upgrade to the patient portal system, which is a key component of all electronic health record (EHR) systems in the US. It solves a critical and intractable problem of healthcare delivery in this country - inadequate interoperability. We currently have many patchwork systems in place that attempt to make health data transferable electronically from one system to another, however, all current solutions have deficiencies in timeliness and formatting. This proposal provides for a simple and elegant solution that allows for instantaneous access to the appropriate protected health information in real time, with a high degree of security and reliability. It is designed to be compatible with all relevant HIPAA regulations. It preserves the existing EHR infrastructure that is already in place and functioning well. It also provides a much needed positive redundancy to access to healthcare data, that will protect the public, and healthcare institutions, from the ongoing threat of ransomware attacks. In addition, it reduces the chances of hacked accounts and unauthorized access to protected health information (PHI).

## B. Innovative claims

What is unique regarding this proposal is the use of distributed ledger technology, also known as blockchain technology, to allow for highly secure authentication for access to protected health information (PHI). This allows for several major benefits over the existing system for authenticating users. Currently, patients using portals will log in to PHI using password-based, or OAuth2-based authentication, which generates an access token. In the current system, this does not allow for patients to simultaneously access multiple portals, if they have more than one, unless they log in to each one separately. In the current system, there is no provision for electronically aggregating and formatting data from multiple platforms together. Also, in the current system, patients do not have the ability to transfer their access token to another HIPAA-appropriate individual, such as a family caregiver, their medical power-of-attorney, or their healthcare providers. This is a particularly egregious deficiency in the event of urgent or emergency care across disparate EHR platforms. The centerpiece of this proposal is the creation of an authentication token standard called the Health Portal Token (HPT), which can

be easily and instantly transferred to appropriate individuals at will, and can be used to simultaneously access and aggregate PHI data across platforms in real time, at the point of care. This will create a much improved user experience for the patient during care episodes, also a much improved user experience for the health care providers and institutions. It will generate cost savings by reducing current man-hours working around gaps in the current interoperability systems, by reducing redundant medical testing caused by lack of timely information transfer, will benefit insurers and governmental agencies paying for healthcare services due to increased efficiency, and will provide above mentioned cybersecurity benefits.

## C. Deliverables

The implementation of this project will include five components: 1. The development and approval of the new Health Portal Token (HPT) standard, which will be a collaboration between the contracted team and ARPA-H. 2. The funding of selected pilot commercial EHR vendors for the adoption of the new standard as an option in their existing patient portal invite systems. 3. The development of applications containing browser extensions that will be able to handle the receiving, storing, and sending of HPTs. 4. The funding of third-party health application vendors to use existing FHIR technology to aggregate and organize healthcare data for users. 5. Independent technical and legal analysis of the system to ensure that it is secure and HIPPA-compliant. It is anticipated that the subcontracted vendors may decide to develop proprietary claims to the prototypes, intellectual property or systems supporting the HPT project.

## D. Research and development

Previous research and development related to this project can be grouped into two categories: those that focused on other health interoperability solutions, and those that focused on making distributed ledger technology scalable and inexpensive. Regarding interoperability, there have been some initiatives that have only partially delivered results in terms of adoption and usability: Health Information Exchanges (HIEs), and Continuity of Care Documents (CCDs), the FHIR data standard, and existing patient health portals have all been widely adopted by commercial EHR vendors, based on government mandates to attempt to achieve interoperability goals. Regarding distributed ledger technology, there are many projects ongoing to improve security, speed, scalability and reliability. Examples of these technologies include EVM chains and layer-two ZK proofs. One of our team members, the Project Integrator, is associated with an EVM / ZK proof project called Rollux. He is in a position to coordinate programmers with specialized expertise in EVM / ZK proofs, as well as in Solidity, the standard programming language for smart contracts on EVM chains. In the technical and legal analysis mentioned above, a comparison of implementation of the HPT standard on various distributed

ledgers will be done, to determine which ledger will provide the most security, speed, scalability, reliability, and lowest cost. Also this analysis will determine if it will be necessary to use a permissioned (private) ledger, or a permissionless (public) ledger to achieve the goals of the project.

## E. Organizational Chart

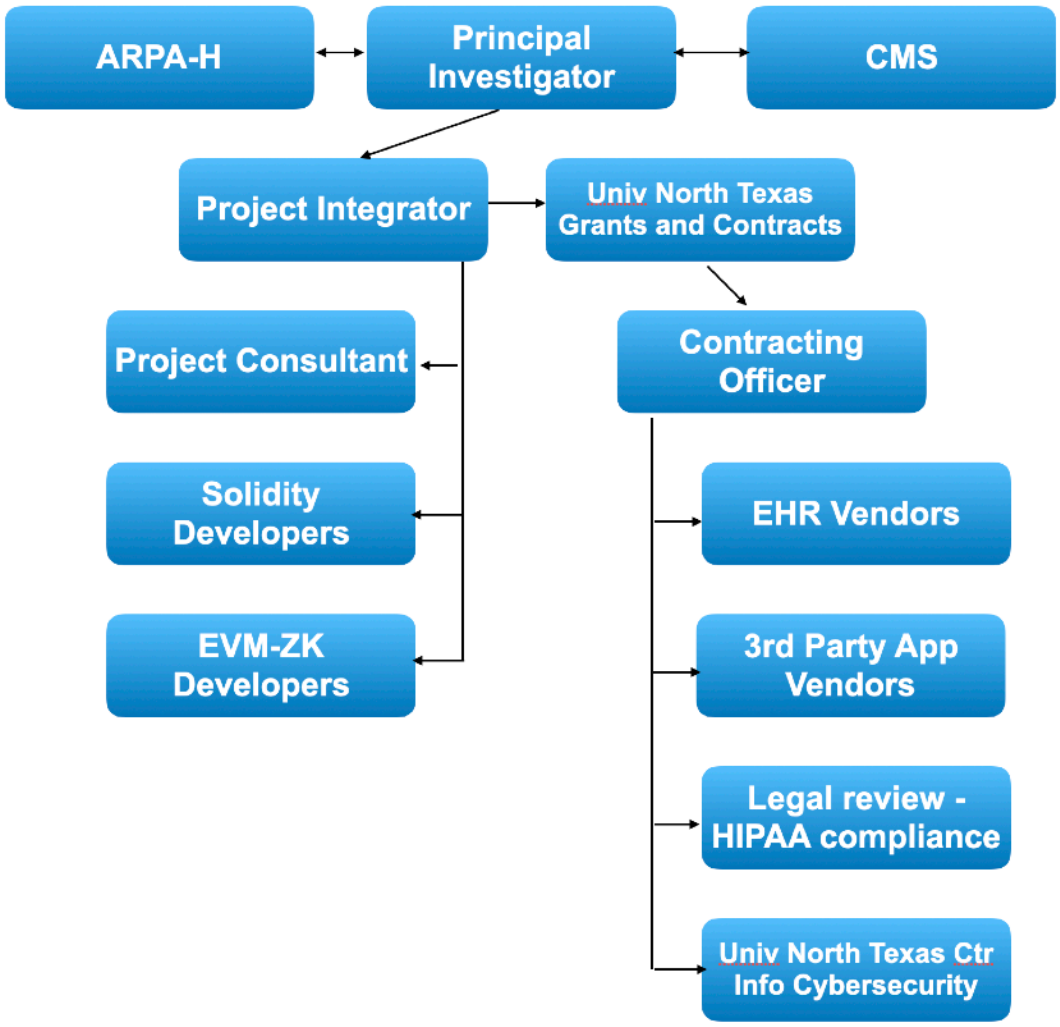


Figure 1

The Principal Investigator will integrate with both ARPA-H and with CMS (Centers for Medicare and Medicaid Services), as the project has a direct bearing on the implementation of CMS mandates on EHR meaningful use and interoperabillity, and will oversee the Project Integrator, who will in turn oversee the project consultant, the distributed ledger developers, and the University of North Texas (UNT) Grants and Contracts Administration.The UNT contracting officer will in turn oversee all of the additional subcontractors listed In figure 1.

# Section III: Detailed Proposal Information

## A. Executive Summary

The proposed work will introduce and establish the Health Portal Token (HPT) standard to the US healthcare industry. The HPT standard will finally allow for a unified and standardized way for patients to access their own Protected Health Information (PHI), across all EHR platforms, simultaneously and in real time. The HPT standard will also allow caregivers and healthcare providers to finally be able to access up-to-date PHI across all EHR platforms simultaneously and the point of care, with no delays. This will lead to improved health outcomes immediately, because one of the main barriers to effective delivery of healthcare is the current lack of access to up-to-date personal health data. Improvement in health outcomes will be measurable across all demographics and populations, particularly in emergency care and urgent care settings, and particularly among the geriatric populations, physically and emotionally disabled populations, and the socially and economically disadvantaged populations that utilize healthcare services frequently and across disparate platforms.

The key innovation is the development of an HPT standard that is decentralized, and not dependent on any one individual party for custody, and yet is secure enough to meet HIPAA guidelines. Distributed Ledger technology has demonstrated when used responsibly and when independently audited by qualified entities, is capable of providing the infrastructure for a fully decentralized, cryptographically secure standard.

In addition to improving healthcare outcomes, this innovation also adds a layer of positive redundancy to PHI access, which protects against cybersecurity attacks against healthcare entities. Currently, large institution such as hospitals and integrated healthcare systems access PHI via their own servers and their own portals to EHR vendors. This leads to a vulnerability and and single point of failure during cybersecurity attacks and during disruptions of energy infrastructure, even though the data is actually physically stored outside of the point of failure.

Utilizing decentralized HPT access to the same data allows health work to continue in real time, mitigating against the impact of these negative events.

The key technical challenge is to drive adoption of the new standard in the industry. EHR vendors need to be convinced of the major benefits to the entire healthcare system and not be concerned that the new standard will harm their business models. Also patients and providers will need to slightly adjust their workflow to include custody of HPT tokens to fully realize the benefits of unified PHI access. In section D Technical Factors below, we will expand on how this can be done in detail, and show that workflow will be minimally impacted, and in most cases, enhanced.

All stakeholders stand to benefit from the HPT standard. Patients will see faster and more streamlined office visits, particular in emergency care. Physicians, Nurse Practitioners, and other providers of healthcare services will be able to work more efficiently and use less of their strained manpower in the tasks of casing down and hunting for missing critical information. Medical errors, a serious cause of excess morbidity and mortality in hospitals, will be reduced. EHR vendors will be able to more easily achieve mandated interoperability metrics. Insurance carriers and government payers will achieve cost savings.

Surprisingly, the cost to implement the HPT standard is minimal in contrast to the major cost and quality benefits. The EHR industry in the US is currently $28B per year, and 75% of the market is controlled by only 5 companies. Currently, all EHR vendors are mandated to contain a data field for patient email address, in order to send health portal invites to patients. The only change necessary is to add one more date field for HPT address, so that invites can also be sent via the distributed ledger as well. The cost to implement this will be $5.49M over 3 years, as outlined in Volume II of the proposal, which is equivalent to 0.004% of national EHR expenditures over 3 years.

# B. Goals and Impact

The goal of the HPT project is to make logging in to a patient health portal simple and seamless. Even though patient health portals have been mandated for decades, they are underutilized by the public. Also, they are not utilized at all by healthcare providers, because they do not have access to them. This is something that the general public, and even health industry experts, do not realize.

As an example, one of the project authors has experienced the following as a primary care physician. In this example, a patient who is an aerospace engineer, sees a rheumatologist, and oncologist, and primary care. All three providers are on different EHR platforms and have

different patient portals. If the patient sees primary care at least two weeks after he visits with the specialists, the records and labs are visible in the primary care EHR, because the results were faxed and scanned in. But if he is seen only 2 days after the visits, the records are absent. The patient solves this by bringing in two mobile phones and showing the results on his two portals, which primary care can then view next a third device. Obviously, most patients are not engineers and carry two phones. With the HPT standard, both patients and their healthcare providers can instantly view all three portals on a single device, in real time, with HIPAA-compliant permissions, and more patients and more providers will benefit from the information.

There are commercial opportunities that become available with the HPT standard. For decades, Health and Human Resources (HHS), and the Centers for Medicare and Medicaid Services (CMS), have mandated the development of the HLA7/FHIR health data structures, in order to promote the ability of third party vendors to develop health applications across platforms. The HPT standard will allow for the commercial development of more effective and useful applications due to the ability to aggregate data across platforms in real time that have adopted the FHIR mandate already.

# C. Technical Plan

Utilization of HPT will also require deployment of a “health name service” (HNS). This is similar to DNS (domain name service) and to ENS (ethereum name service), which are in widespread use to resolve IP addresses, email addresses, smart contracts, and so on. For health portals, the EHR currently sends the invite to a DNS-resolvable name such as JohnDoe@example.com. Using the HPT standard, the EHR will send the invite to an HNS-resolvable address such as JohnDoe.HPT. HNS registration and resolving can be done directly on a distributed ledger just as ENS is done currently. The following technical and administrative milestones need to be achieved in order to implement the HPT standard:

Write HPT and HNS smart contracts
↓
Approval of HPT and HNS contracts by ARPA-H
↓
Deploy HPT and HNS onto EVM
↓
EHR includes HNS field in health record
↓
EHR links HNS invites and portal access to EVM
↓
Develop browser extension to receive, store, manage, and send HPT

↓

Develop app to aggregate data from FHIR APIs

↓

Testnet Phase with legal and security review

↓

Deploy HPT on mainnet EVM

## D. Technical Factors

An HPT set will be generated by the issuer using the HPT contract. This is equivalent to an issuer generating a set of non-fungible tokens (NFTs). In healthcare, the original owner and issuer is the EHR vendor. Currently, when patients log into their own portals, the EHR vendor is generating a temporary token, such as a javascript web token (JWT), to allow access.The token is specific to the owner (the issuer) and also specific to the holder (the patient). The advantage of the HPT token is that subsets of them can be transferred from the issuer to the patient, who can now own and hold them securely in the browser extension of their own device. Then it is a trivial transaction to secondarily transfer the token again, if needed, to a caregiver or a healthcare provider. HPTs can be written to expire after a given period of time, or be reissued. They can be written to be non-transferable, if desired, or revokable. They can be aggregated in the browser from multiple EHR vendors, when a patient has multiple healthcare providers.

HPT and HNS smart contracts are to be written in Solidity, the coding language that has become the industry standard for EVM-compatible chains. This gives the project the advantage to migrate to the most appropriate EVM system to provide for the maximum security, scalability, stability, and the lowest cost. Currently there are hundreds of EVM-compatible chains, for example Ethereum, Polygon, Rollux, Arbitrum, Avalanche, BSC. During the testnet phase it will be possible to evaluate for performance, cost, and security. It may be determined to be advantageous to utilize more than one chain in parallel during mainnet deployment to further mitigate against the risk of future failure of any one particular mainnet network.

It should be noted that the superior quality EVM chains are highly decentralized, such that potential for cyber attacks to slow them or take them off line are minimized. During the entire project it will be necessary to monitor the performance of selected chains to verify the robustness, reliability, and durability of the networks, prior to deployment.

It should also be noted that when EVM chains were initially deployed in 2015, and then utilized heavily for enterprise purposes, transactions became very expensive and slow. Fortunately,

over the past few years, technical solutions have been found that are reducing the cost and increasing the speed of transactions. These technical solutions include layer-2 chains combined with zero-knowledge proof rollups (zk-rollups), which now have brought metrics such as transaction speed, transactions-per-second throughput, finality, and cost into ranges that are compatible for health applications such as the HPT project. In addition, the degree of decentralization of chains has been increasing, which improves security and durability.

If it is determined by ARPA-H that a private permissioned EVM chain will be used, this can be accomplished on top of an existing EVM chain by using private sequencer nodes. However, this introduces centralization to the system. If this route is taken, reintroducing decentralization by increasing the number of sequencer nodes will mitigate against this vulnerability.

If a public permissionless EVM chain is used, privacy of the users of HPT must be maintained. There are mitigating strategies for this. The issuer may generate a unique sending address for each HPT, to obscure the identity of the EHR vendor. The patient may choose an obscure username to associate with the on-chain naming service (HNS). It should be noted that there is absolutely no permissioned health information (PHI), or health data, or demographic information in an HPT, it is only the token for access, and it can only be used by its owner in real time with an on-chain verification of ownership. Thus, no amount of on-chain analysis will ever be capable of revealing any private health data to anyone. The data is still housed off-chain in existing EHRs with the current secure firewalls and protections provided.

# E. Management Plan and Qualifications

The implementation of this project requires a high degree of expertise from the HPT Project team. The expertise regarding EVM distributed ledger networks, layer-2 chains, zk-rollups, and solidity smart contracts will come from the Project Integrator, Nathan Hatzfeld, and from Jagdeep Sidhu, Project Consultant. Nathan Hatzfeld is the Chief Business Developer for the Rollux EVM project. Jagdeep Sidhu is a leading and highly recognized blockchain developer, is head of the Syscoin Foundation, Syscoin's lead developer, and author of several publications and white papers in the industry. Ram Dantu, Director of the University of North Texas Center for Information and Cybersecurity, will serve as cyber security consultant. The University of North Texas Center for Information and Cybersecurity is an interdisciplinary group of researchers that has received several grants from the National Security Agency (NSA) on cybersecurity and blockchain related projects. Nolan Adams, Contracting Officer, will serve as liaison between the University of North Texas Grants and Contracts Administration and the teams with blockchain and cybersecurity expertise. Nolan Adams is a nonprofit development expert and has a background with the Nonprofit Leaderships Studies programs at the

University of North Texas, and experience with grant and contract management. The Principal Investigator be Charles Kaplan MD, who will coordinate the activities of the Project Integrator and Contracting Officer. Charles Kaplan MD has served as chair of the Electronic Medical Records Committee at a large multi specialty practice, was awarded a patent by USPTO for a system for wirelessly printing medical labels, received research grants from the NIAID for community based clinical research on AIDS treatments, and has 34 years of experience as an Internal Medicine primary care physician.

# F. Facilities and Biosafety

This project will not require the use of any specialized facilities, nor will it involve the use of any biological material that would require containment, biosafety measures, or additional certification.

# G. Statement of Work (SOW)

**Summary:**

Phase I - Solidity Smart Contracts (HPT and HNS software packages)

- HPT Contract
- HNS Contracts
  - HashRegistrar
  - PublicResolver
  - HNSMain
  - Registrar
  - PublicResolver
  - ENSConfiguration
- Contract approval
- Contract deployment

Phase II - EHR vendor subcontracting (EHR software upgrades)

- Update Demographics to add a data field for Health Name Service (HNS) address
- Update Portal Invite function to have both HNS and email invite options
- Install extension software to enable connection to EVM chain
- Update Portal Login function to have both HPT and regular password based auth options

Phase III - Third party application subcontracting (FHIR App software packages)

Develop application for the viewing, sorting, searching, and organizing of healthcare data
Enable application to connect to EVM chain with extension software
Enable application to view, organize, send, or modify HPTs
Enable to Login in to one or multiple portals using one instance of application

Phase IV - Training and Driving Adoption
Submission of articles to peer-reviewed journals for publication
Medical Journals
Health IT Journals
Publication of Written and VideoTutorials
Geared for patients
Geared for healthcare providers
Publication of Video educational materials
Geared for EHR vendors and third party health application vendors
Meetings and Conference presentations
To discuss existing rulesets and mandates with ONC / CMS
Continuing Medical Education for health professionals

**Project Scope:**
The project scope includes the development, customization, testing, and integration of the phase 1, 2, and 3 software packages listed above: HPT and HNS packages, EHR upgrades, and FHIR app packages, along with additional tasks related to training and driving adoption.

**Objectives:**
Objectives: The primary objectives of this extended project are as follows:

1. Develop and customize each software package to meet specific functional and technical requirements.
2. Integrate the software packages into a unified solution that facilitates seamless data flow and interaction.
3. Test the integrated solution comprehensively to ensure functionality, compatibility, and performance.
4. Provide documentation for the integrated solution, including user guides and technical specifications.
5. Facilitate training and adoption efforts through various dissemination methods.

**Deliverables:**
1. Customized and developed instances of Phase 1, 2, and 3 Software Packages, meeting specified requirements.

2. Integrated software solution demonstrating seamless communication and data exchange.
3. Comprehensive documentation, including user guides and technical specifications.
4. Peer-reviewed articles published in medical and health IT journals.
5. Written and video tutorials for patients and healthcare providers.
6. Video educational materials targeting EHR vendors and third-party health application vendors.
7. Meetings and conference presentations discussing rulesets and mandates with ONC / CMS.
8. Continuing Medical Education programs designed for health professionals.

**Responsibilities:**

Principal Investigator:

Supervise the work of the Project Integrator and the Contract Manager

Ensure that tasks are being completed and timelines are being met

Submission of articles to peer-reviewed journals for publication

Medical Journals

Health IT Journal

Publication of Written and VideoTutorials

Geared for patients

Geared for healthcare providers

Publication of Video educational materials

Geared for EHR vendors and third party health application vendors

Meetings and Conference presentations

To discuss existing rulesets and mandates with ONC / CMS

Continuing Medical Education for health professionals

Project Integrator:

Subcontract with software developers

HPT contracts

HNS contracts

Collaborate with ARPA-H regarding auditing and approval of the contracts

Deploy the HTP contracts for testing on multiple EVM chains

Contract Manager:

Oversee the UNT Grant and Contract Administration

Coordinate the activities of multiple subcontractors

Project Consultant:

Provide technical support to Project Integrator and Contract Manager

University of North Texas Grant and Contract Administration

Manage Subcontracts with EHR Vendors and supervise the associated deliverables

Manage Subcontracts with Third Party Health App vendors and supervise deliverables

Manage Subcontract with UNT Center for Information Cybersecurity and supervise deliverables regarding auditing of HPT and HNS security

Subcontract with legal personnel regarding auditing of HIPAA compliance

Accounting for the Project contract.

**Terms and Conditions**

- Changes to project scope or requirements require mutual agreement and may affect the timeline and budget.
- Open communication and quarterly scheduled meetings will address concerns, challenges, or updates throughout the project.
- By signing this Statement of Work, both parties acknowledge their understanding of the extended project scope, objectives, deliverables, and responsibilities.

# H. Schedule and Milestones

The timeline for completion of project milestones is summarized below. It should be noted that in some instances, some phase objective can be worked on in parallel, and others are dependent on completion of previous phases to begin. This project is designed to begin when approved by ARPA-H and have a 36 month duration.

| OBJECTIVE | START AND COMPLETION MONTHS |
|---|---|
| Phase I | |
| HPT | 1-6 |
| HNS | 1-6 |
| Contract approval | 6-9 |
| Contract deployment | 9-12 |
| Phase II | |
| EHR vendor subcontracting | 6-12 |
| EHR vendor upgrades | 12-24 |
| Phase III | |
| Third party app vendor subcontracts | 12-24 |
| App includes HPT extension | 24-36 |
| App enables single EHR login | 24-36 |

| | |
|---|---|
| App enables multiple EHR logins | 24-36 |
| FHIR API aggregation | 24-36 |
| | |
| Phase IV | |
| Publications | 1-12 |
| Written tutorials | 1-12 |
| Video tutorials | 12-36 |
| Educational videos | 12-36 |
| Conferences | 24-36 |

# I. Technology Transfer Plan

Each subcontracting partner that develops software for the integration of patient health portals utilizing the Health Portal Standard approved by ARPA-H will be engaging with ARPA-H in the development of potential technology transfer relationships. This may include established entities such as EHR vendors, vendors specializing in third party health applications, the University of North Texas Center for Information and Cybersecurity, and other subcontractors.

# Volume II: Cost/Price Proposal

## Part 1: Overview

### a. Cost Proposal Cover Sheet

BAA Number: SP4701-23-B-0002
NAICS Code: 621112

| | |
|---|---|
| BAA Areas of Interest: | Buttressing the Security of Digital Health Technology<br>Rapidly Developing Secure Digital Health Technology |
| Technical POC: | Ram Dantu<br>Professor, Department of Computer Science and Engineering<br>Director, Center for Information and Cyber Security<br>University of North Texas<br>1155 Union Circle #311070<br>Denton TX 76201<br>(214) 629-9450<br>Ram.Dantu@unt.edu |
| Administrative POC: | Charles Kaplan MD<br>Principal Investigator, Chief Medical Information Officer<br>5880 N La Cholla Blvd #180<br>Tucson AZ 85741<br>520-370-6743<br>csk9000@gmail.com |

Contractors business type: Other Educational
CAGE Code and UEI number: pending, documentation successfully submitted to GSA with reference number: INC-GSAFSD9254784
Subcontractors participating in research: Established EHR vendors selected by procurement, TBD
Small businesses participating in research: Established Health App vendors via procurement, TBD
Historically Black Colleges and Minority Institutions: not applicable
Contract type: cost-plus-fee
Research Title: The Health Portal Token Project

Brief Research Description: This project will coordinate and fund the integration of three separate Heath IT disciplines: Private EHR Vendor patient portals, distributed ledger technology, and health applications utilizing HLA7/FHIR API for data assimilation. This will provide for enhanced availability of critical health data at the point of care, which is particularly important for the quality of care and health outcomes for geriatric patients, and for any patient being evaluated in an emergency or urgent care situation. This will also introduce a positive redundancy into the health data infrastructure which will enhance health cybersecurity and reduce the impact of ransomware attacks on healthcare institutions

**b. Accounting System**

The accounting system utilized will be provided by the University of North Texas (UNT) Grants and Contracts Administration, which has an extensive track record of managing federal grants and contracts, including from the NSA, and provides accounting compliant with all regulations. The UNT Grants and Contracts Administration has accounting system approval from DCAA and a documentation is being forwarded in a separate attachment.

c. **Approved Rates and Forward Pricing Agreement**

This project will utilize the forward pricing agreement that has previously been established between the DCAA (Defense Contract Audit Agency) and the UNT (University of North Texas) Grants and Contracts Administration. This documentation is also being forwarded in a separate attachment.

# Part 2: Certified Cost or Pricing Data

The expenditures in this proposal are based on defined hourly wages in concert with the particular training and skills of the subcontractors. The FTE's listed are the best current estimate of the manpower that would be involved to perform the research, development, testing, and implementation of software upgrades in a critical industry with a limited set of existing vendors controlling the EHR marketplace. The specific manpower, wage, and timelines specified in this proposal are subject to rigorous review by ARPA-H and by UNT auditors, and modification and updating if necessary.

# Part 3: Work Breakdown Structure and overall budget summary

This overview shows salaries for project specific staff, followed by four categories of subcontractors. These include Solidity developer subcontractors, which is a very highly specialized category of software engineer, then EHR vendor subcontractors, third party health application developer subcontracts, and cybersecurity subcontractors to review and audit the work of the prior developers. Note that although the

HPT PROJECT DRAFT BUDGET - TOTAL DURATION 3 YRS

| | hrly rate | FTE (full time equivalent) | Duration (yrs) | Total Cost | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **Principle Investigator** | $115.00 | 0.3 | 3 | $215,000.00 | | |
| **Project Integrator** | $100.00 | 0.5 | 3 | $312,000.00 | | |
| **Contract Manager** | $100.00 | 0.5 | 3 | $312,000.00 | | |
| **EVM Consultant** | $150.00 | 0.1 | 3 | $94,000.00 | | |
| **Cybersecurity Consultant** | $150.00 | 0.1 | 3 | $94,000.00 | | |
| | | | | | | |
| **Solidity dev subcontracts** | | | | | | |
| **Subcontract 1** | $150.00 | 0.5 | 1 | $156,000.00 | | |
| **Subcontract 2** | $150.00 | 0.5 | 1 | $156,000.00 | | |
| | | | | | | |
| **EHR Vendor subcontracts *** | | | | | | |
| **EHR Vendor 1** | $100.00 | 2 | 1.5 | $624,000.00 | | |
| **EHR Vendor 2** | $100.00 | 2 | 1.5 | $624,000.00 | | |
| **EHR Vendor 3** | $100.00 | 2 | 1.5 | $624,000.00 | | |
| | | | | | | |
| **Third Party health app devs **** | | | | | | |
| **App Vendor 1** | $100.00 | 2 | 1.5 | $624,000.00 | | |
| **App Vendor 2** | $100.00 | 2 | 1.5 | $624,000.00 | | |
| | | | | | | |
| **Cybersecurity subcontractors** | | | | | | |
| **UNT Ctr for Information and Cybersec.** | $150.00 | 1 | 1 | $312,000.00 | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **Conferences** | | | | $72,000.00 | | |
| **Legal audits** | | | | $24,000.00 | | |
| **Materials: sequencer nodes** | | | | $24,000.00 | | |
| **Training material production costs** | | | | $12,000.00 | | |
| | | | | $4,903,000.00 | | |
| **Contracting office fee: UNT contracts and grants dept** | | Cost-plus-fee 12% | | $5,490,000.00 | | |

overall project is three years in duration, that the subcontractors have shorter contract lengths based on the timelines outline in Volume I of the proposal. Also note that each line item has varying FTE (full-time equivalent) determinations. If the FTE less than one, that indicates that the line is associated with a single individual working less than full time, and that if the FTE is more than one, in indicates multiple subcontracted employees working simultaneously.

# Part 4: Cost Realism Analysis

In this analysis, a calculation of the proportions of the funding devoted to General and Administrative (G&A) costs, Fringe benefits, Overhead, and the subcontractor pass-through rate are made.

1. **General and Administrative (G&A) Costs:**
    - G&A costs typically include expenses related to overall management, administration, and support for the project. These costs are often expressed as a percentage of total direct costs. This is estimated to be 10% of the total burdened subcontracted rate.
2. **Fringe Benefits:**
    - Fringe benefits include expenses related to employee benefits such as health insurance, retirement contributions, and other benefits provided to project personnel. This is estimated to be 15% of the total burdened costs
3. **Overhead:**
    - Overhead costs represent the expenses associated with the facilities, equipment, and other resources required to support the project. Overhead rates are often expressed as a percentage of total costs, which in this contract proposal is 15%
4. **Subcontractor Pass-Through Rate:**
    - The subcontractor pass-through rate represents the portion of the contract value allocated to subcontractors. After accounting for all of the indirect costs, this value is 60%

Please note that these percentages and values are based on the assumptions provided and can vary depending on the specific terms and conditions of the contract and the organization's rates and policies.

Labor Mix and Indirect Costs

| Labor Category | FTE x Years | Unburdened Labor Rate (60%) | G&A (15%) | Overhead (10%) | Fringe (15%) | Burdened Labor Rate (100%) |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Solidity Devs** | 1 FTE x 1 yr | $90.00 | $22.50 | $15.00 | $22.50 | $150.00 |
| | | | | | | |
| **EHR Devs** | 6 FTE x 1.5 yrs | $60.00 | $15.00 | $10.00 | $15.00 | $100.00 |
| | | | | | | |
| **Health App Devs** | 4 FTE x 1.5 yrs | $60.00 | $15.00 | $10.00 | $15.00 | $100.00 |
| | | | | | | |
| **Cybersecurity** | 1 FTE x 1 yr | $90.00 | $22.50 | $15.00 | $22.50 | $150.00 |
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Labor Mix and Indirect Costs expressed as hourly subcontracting costs

| Indirect Costs(%) | |
|---|---|
| | |
| 1. G&A | 10% |
| 2. Overhead | 15% |
| 3. Fringe | 15% |
| | |
| Total Subcontractor Burden Rate | 40% |

Indirect Costs by Percent (summary)

The line items in the budget for Conferences, Legal Audits, Materials (equipment) for sequencer nodes for zk-rollup deployment, and Training / Educational production costs are broken down and expanded, and will be provided in an appendix sent separately.

* The draft budget provides for the awarding of subcontracts to established EHR vendors. Currently, the EHR market contains several dozen candidate EHR vendors, and some of these vendors would benefit from the opportunity to participate in a new Health Portal standard and benefit from the interoperability as early adopters. Some examples of EHR vendors who carry a large market share include: Epic, Cerner, NextGen, AllScripts, eClinicalWorks, AthenaHealth, McKesson, and many others.

** The draft budget also provides for the awarding of subcontracts to established third party health application vendors, who again who benefit from the opportunity to participate in a new Health Portal standard and benefit from the interoperability as early adopters.