Broadsword SOW Response for NHCCR

February 29, 2020

Dear Katerina,

Thank you for providing us the opportunity to submit a SOW response to the HMS for NHCCR. We hope to engage with the HMS to create an NHCCR solution for caregiver medical information.

An NHCCR engagement would continue our journey with the HMS to transform the way the HMS develops, deploys, operates, and maintains software, as well as, increase the speed & effectiveness of application delivery, reduce the number of personnel required to operate & maintain mission systems, and radically enhance the tactical & strategic responsiveness of the agency. We will accomplish these outcomes together by leveraging the HMS's existing IT Platform.

Our proven methodology becomes a powerful platform for "continuous innovation" and cultural transformation, which the HMS can translate to their primary mission of ensuring the safest, most efficient caregiver system in the world.

Sincerely,

Igor Stravinsky
HMS Account Manager

Executive Summary

The HMS provides the safest, most efficient Medical Caregiver system in the world. To further this mission in a rapidly changing environment, the HMS has expressed a desire to achieve greater velocity and agility in the development and operations of National Home Health Caregiver Certification and Registry (NHCCR). Broadsword Ventures (referred to as "Broadsword" throughout the document) would like to partner with the HMS on this important initiative.

This SOW response outlines our approach to collaborate with the HMS National Institute of Medical Caregiving (NIMC) and the HMS to deliver an NHCCR application. The system will: Improve the processes for comprehensive access to data, improving timeliness and accuracy (such as e-authentication) while reducing paper-based correspondence. • Enable more effective collaboration within the aviation community and among properly authorized personnel, designees, and applicants. • Provide improved automated handling and analysis of Emotional Health studies information for distribution to incident investigators and medical researchers. We understand that Release 2 is planned for start of development in CY 2021 with completion early in CY 2022.

In 2020, we partnered with NIMC to stand up our software development platform for HMS apps to be developed quickly & securely and in a cost effective manner. This platform has an Authority to Operate from Broadsword on the Mission side. IT platforms provide significant improvements to developer productivity, automation, and security as well as seamless cloud deployment, scalability and real time patching.

This combination of this accredited IT platform, a contract vehicle in place, and a great working partnership will accelerate NHCCR development and operational efficiency. On Day 1, the tech stack is in place and we focus immediately on current user requirements to build the most important thing first and get real time user feedback. We call that a Minimal Viable Product (MVP). Then we iterate on the next most important thing, continually get user feedback and continually get functionality to the users.

Our Agile software development approach of Lean Product Management, User Centered Design (UCD), and Extreme Programming (XP) enables the HMS to get into production fast and get quantifiable mission outcomes & application development velocity. To accomplish this, we work on small teams that include a Product Manager, a Designer and a few developers equally staffed by the client and Broadsword Labs. Another tenant of our approach is "pairing". We work together with our client all day every day during an engagement. We train the client to be self-sufficient so they can operate independent of us long term.

As an example of quantifiable outcomes using our methodologies, some of our DoD customers' metrics demonstrating their outcomes for mission critical apps in production at scale include:

- Time from program launch to deployment of simplest useful functionality in < 6 months

- Time to field high priority function/fix newly found security hole in <3 months / <1 week
- Time from code committed to code in use in < 1 day
- Time required for full regression test (automated) in < 1 day
- Time required for cybersecurity audit/penetration testing in < 1 month
- Automated test coverage of code in > 90%
- % code avail to DoD for inspection/rebuild 100%
- Time to scale application < 2 minutes

Our Agile approach is very different from a typical waterfall development approach such as that outlined in the SOW. We would not develop *software based off of the*2700 requirements from March of 2017. Instead, we would focus on understanding current user needs, build an MVP that provides the most important capability, and deliver that feature into production.

This approach is enabled by the HMS IT platform that abstracts away the underlying infrastructure, and allows the product team to focus solely on the software product, or application. It is the software product that provides value to the HMS and further enables its mission.

We would be challenged by an Earned Value Management System (EVMS), providing lifetime maintenance of software, and its required documentation, not to mention the PHI certifications. We could mitigate many of those items by partnering with a trusted HMS Systems Integrator.

Many things from the SOW Attachment we don't understand and would need to learn about to are:

- The existing COTS product that NHCCR Phase 1 is built upon in section 2.3
- The 23 required HMS system interfaces in 4.2.1 and 17 non-HMS system interfaces in section 4.2.2
- The required data migration in section 8.1
- The decommission / deprecate plan for legacy medical systems in use today as it pertains to a new NHCCR

We typically learn about items such as these during our “planning” session with a cross-functional team from the client, as well as during our “Implementing” at the beginning of an engagement. The participants include the exec sponsor, users, security, AIT, CO, and other interested parties such Human Factors, finance, etc.

Also during the Implementing which includes dozens of user & stakeholder interviews, we jointly determine the MVP. In the case of NHCCR, it may be certification of caregivers or drug abatement, etc…..to be determined by the stakeholders at the Inception.

In reading the SOW, NHCCR is an important and complex system. We are very good at delivering outcomes fast for systems such as these. Here are some Past Performance we recently shared with a DOD client that may be relevant to HMS stakeholders who are not currently familiar with Broadsword Labs:

- ***Increased development and delivery speed:*** *USAF developers, working in partnership with Broadsword Labs in an UNCLASS environment, were able to deliver a functional software application, fully accredited, on classified networks in the Qatar CAOC in under 120 days. Within JSOC, teams working in partnership with Broadsword Labs created and fielded continuously accredited capability to address critical operations priorities within 68 days of project kickoff. Within Kobayashi Maru, Broadsword Labs delivered a Space Asset Tracking system that deprecated a legacy product in 57 days calendar days and that is continuously delivered with a Continuous ATO.*
- ***Global software delivery platform:*** *Capabilities within Broadsword Platform provided a globally consistent application runtime that enabled flawless code promotion from the UNCLASS development environment in a commercial cloud environment, to a CLASSIFIED production environment with no modification to code or configuration.*
    - ***Mission Impact:*** *Capabilities developed with Broadsword Labs have replaced legacy programs of record and become new standards across a selection of diverse mission areas including Tactical Operations, Business & Logistics Systems, Mission Planning & Reporting, Space, Readiness & Resource Allocation. These rapidly created capabilities have had effects at multiple echelons and in some cases, fundamentally changed how USAF or JSOC achieves their mission.*
- ***Cost Savings:*** *Capabilities delivered have automated previously manual processes, creating efficiencies that were previously unachievable. USAF leadership publicly discussed the efficiencies created in one effort alone aimed at refueling operations which produced cost savings in fuel consumption of more than $1,000,000 per week, and had a "Cost of Delay" savings of $391M.*
- ***Application ATO acceleration:*** *The traditional cycle to certify and accredit new software applications is extremely slow within the DoD. Within JSOC and the Air Force, the highly structured and automated platform (Broadsword Application Service), combined with the highly disciplined agile development methods taught by Broadsword Labs, have reduced the time to ATO from upwards of 24 months to 11 days on average.*

We have already proven these methodologies, practices, and technology to be viable within the confines of the HMS policy and infrastructure. HMS's experience partnering with us resulted in:

- ***Accredited, Consistent Application Runtime:*** *Within 7 months, capabilities from Broadsword Platform portfolio were running and fully accredited in the HMS's cloud*

hosting environment in AWS, and a Platform Operations Team was enabled in how to run, manage, and secure the cloud-native application platform known as IT.

- ***Limited Production Software in 7 months:*** *A balanced team delivered a fully accredited Minimum Viable Product (MVP) software application that addresses pain points and inefficiencies.*
    - ***Enabled Platform and Product Team:*** *Within the first four months of engagement, Broadsword Labs enabled an MVP Team of Platform Operators, a Product Manager,* User-Centered Designer, and two Developers who can continue to iterate on the Platform and Application to rapidly deliver the next most important feature to users.

Our Typical Approach

Broadsword Labs would partner with the HMS to:

- Find the best solution to the most acute problem through research, discovery, and framing.
- Teach the principles needed to grow a high-performing product development team while delivering features and releasing software to production.
- Utilize a balanced team practicing pair-programming and test-driven development to establish patterns of collaboration and with short iteration and feedback loops that provide frequent value to the end user.

To achieve these goals, Broadsword Labs typically recommends breaking up the scope into three phases. Each phase will drive out business value and provide opportunity to gather feedback and alter the direction of subsequent phases, if needed. The below phases are based on the research and documentation provided to us during our planning, and prioritized to focus on an outcome of a minimum viable product (MVP) into users' hands for feedback. Phases and product roadmaps can be changed by the HMS as priorities are explored and technical constraints emerge.

Phase 1: Planning & Implementing (P&I)—x weeks (TBD)

Following the Kick-off, the Broadsword Labs team will begin two tracks of work:

- A system Planning designed to explore the existing NHCCR Phase 1 app, and its surrounding systems to review code, integrations, data, and messaging.

- An Implementing effort designed to learn as much about the users, stakeholders, problems, pains, goals, and risks as possible.

These work streams will come together after 4 weeks, followed by a 2 week framing period to shape the remainder of the engagement. We will determine how to work with existing NHCCR Phase 1 work by Broadsword, can be utilized in the new application and create a holistic plan for the NHCCR product.

Phase 2: Feature Build and MVP— xx weeks (TBD)

After project inception, the Broadsword Labs team will continue to pair with their HMS counterparts to de-risk the necessary data integrations. The team will also prioritize the feature work based on the findings from the prior phase, which may include, providing the most impactful reporting needs. Any product direction will be validated with users. The team will work with the HMS platform team, accreditation office, and HMS stakeholders to plan and deploy their MVP and execute the roll out plan.

Phase 3: Post MVP and Authority to Operate—xx weeks (TBD)

During this phase the team will work to solidify the appropriate allocation of delay causal factors and provide detailed reporting based on user needs and mission value. During this time, the Broadsword Labs team will be communicating closely with the HMS stakeholders on team health and enablement progress to ensure a smooth transition from Broadsword Labs support, to sustained HMS ownership.

A Sample Joint HMS / Broadsword team

Broadsword Labs	**HMS**
• (1) Product Manager • (1) Product Designer • (3)) Developers • (1) Data Architect • (1) Security Engineer	• (1) Product Manager • (1) Product Designer • (3) Developers • (1) Data Architect • (1) Security Engineer

Our Proven Disciplined Methodologies

This section should give you some insight into the approach we take and what to expect during the course of the engagement.

Planning Overview

We will perform a comprehensive assessment of the existing NHCCR Phase 1, its surrounding systems and data sources. These facilitated deep-dive sessions will include event storming activities and other research to generate recommendations on how to best proceed. The event storm is a cross functional facilitation technique for revealing the bounded contexts, microservices, vertical Slices, trouble spots and starting points for a system or business process. We will use the results from the event storm to inform our next steps of the Navigator research.

We will use our learnings to create an outcomes-based roadmap that may include outcomes, actions, dependencies, and risks, aligned with a lean governance structure to help support delivery. This process will run in conjunction with our larger Discovery and Framing (IMPLEMENTING EFFORT) process.

Implementing Overview

At the start of this project we will begin with an**Implementing effort** to help understand the problem. This is a collaborative process in which Broadsword Labs will work with your team to better define product ideas by exploring and validating with users, stakeholders, and

technical teams. We will begin by learning about the deep user research that you have already conducted and helping the shared team focus on an initial problem or two to start solving. Once an initial solution is identified, prototyped, and validated, the team will immediately scale for development and begin developing the prioritized stories, with a focus on empowering your team to operate independently.

What problem are we solving first?

We facilitate prioritization workshops with stakeholders, review existing data sets, and pair on technical research with developers, to answer the question, "Of all the business problems that you have identified, where should we focus our efforts to deliver the most value the fastest?

Objectives:

- Discern what problems the product will solve
- Understand users, customers, and domain
- Identify opportunities and constraints
- Ensure we solve the right problems

Example Activities:

- Conducting market research
- Competitive/market analysis
- Defining user personas
- Synthesizing insights
- Exploring the product proposition

How are we solving the first problem?

We synthesize discovery research into prompts that will help spur creative ideas and quickly generate rapid prototypes to test hypotheses with target users. This phase of the process is asking the question, "How are we solving the problem through this product?"

Objectives:

- Validate the riskiest assumptions early
- Establish models and frame solutions
- Remove enough uncertainty so we can begin development and be confident we
- are heading in the right direction Reduce risk through constant user validation

Activities include:

- Scenario collaboration: Writing product use cases
- Low fidelity wireframing: A rough outline of a screen, outlining the key activities
- Usability testing: One-on-one interviews with end users, testing product ideas via wireframes and scenarios
- Application scaffolding development
- Leveraging regulatory and Compliance pipeline tools to set up a team for fast approval

What to expect from Implementing

- A prioritized list of features for development

- A low fidelity user experience (UX) Framework, often in the form of wireframes and core use case scenarios
- A shared understanding among the team of the problem we are solving and why it is important to the business and users
- Basic app scaffolding
- An understanding of potential regulatory and compliance hurdles
- A strategy for how we can deploy this app to production multiple times throughout the engagement

Towards the end of the Implementing effort, we will prioritize epics and validate designs for the development stage. Throughout the engagement, the balanced team will continue testing and iterating on each workflow. We will regularly test concepts with users to ensure that proposed features align with user needs and business goals.

Ongoing Development

Directly after the Implementing effort we will hold an inception, turning Implementing effort findings into a backlog of how the team will get started.

The team will be leveraging technical and business groundwork that the HMS has prepared prior to the launch of Implementing effort. The development team will work in a continuous-delivery fashion. They will complete stories in the backlog and regularly deploy new software to a staging environment for story acceptance.

By monitoring the staging environment, the team will have constant visibility into the state of the project and the progress that is being made. When the HMS product owner chooses, they can ask that the product in staging be pushed to a production environment for a production release.

By building with this agile process, the project team will be able to release a production-ready MVP very quickly. It will be the HMS product owner's responsibility to determine the MVP and prioritize the stories in the backlog to reflect business and customer needs.

Product development includes:

- Daily paired programming from 8:30AM - 5:30PM virtually using Zoom
- Delivering user stories
- Learning about and leveraging continuous deployment practices and Test-Driven Development
- Continued Usability Testing and User interviews
- Iterating on the product based on user feedback

Our Practices

Agile software development is a way to build software in the face of changing requirements. It drives the evolution of a product through an iterative development cycle based on ongoing end-user feedback. Rather than a "big-bang" approach, releasing every few months, Agile proposes

that software is built and deployed much more frequently (perhaps even every few hours) in order to get immediate feedback as a product takes shape.

Test-Driven Development (TDD)

As we begin to build a product, we write tests that assert the application can do what we want it to do. We do this before we build the functionality. A piece of code or functionality isn't done until it passes the test. Test-Driven Development allows developers to move rapidly through new features and deploy regularly with a high level of confidence that the product will work as designed. This method is essential to rapid development by reducing defect rates and risks of extended timelines and allowing us to quickly and efficiently scale the application's complexity.

Pair Programming

Pair programming is the practice of having two developers work together, at the same computer, to complete each task. At Broadsword Labs, we pair all of the time. This practice of focusing two minds on the same challenge leads to better decisions the first time around, fewer knowledge gaps, and continual implicit training and knowledge transfer. Pairing results in fewer defects, better code, and ultimately much more sustainably efficient development. As pairs rotate, knowledge is spread rapidly through the team, avoiding silos of knowledge and allowing for team growth.

Constant Enablement

Broadsword Labs believes that the best way to learn modern practices is by doing. To accomplish this, we pair our designers, product managers, and developers with our clients on an actual project where they do hands-on work each day. By working side-by-side with our team, immersing themselves into our techniques and, more importantly, our culture, clients are actually able to learn, internalize, and adapt to our processes quicker and more successfully.

Our teams are technical and skilled with communicating all aspects of the project with both technical and non-technical team members.

Post Engagement

Following a Broadsword Labs engagement you will: 1) Have a balanced team, including a business owner, that can serve as a centralized development enablement team, 2) Utilize disciplined practices (TDD, pairing, co-located, CI/CD), 3) Iteratively build software and be responsible for its quality, 4) Leverage evolutionary architecture, 5) Enjoy product alignment through the business owner hierarchy, and 6) Never be done, with the application side of the DevOps team owning the application long-term.

Capability Statement

Broadsword Labs has delivered hundreds of custom software products in highly regulated industries that handle very sensitive data from healthcare to insurance to finance. We design & develop the most complex systems that require precision and the highest security such as USAF's targeting systems for its air operations weapons system, as well as US Citizenship and Immigration Services Refugee & Asylum case management. We will learn to meet HMS's medical certification requirements for handling sensitive data.

Some of our healthcare customers include Humana, Cerner, Express Scripts, Cardinal Health, Health Care Service Corp, Shields Health Solutions, and Aridhiato. We are happy to facilitate introductions between them and the HMS.

Type of services provided by the firm (including teammates or subcontractors) that demonstrate the knowledge, capability, and experience described above.

Broadsword Labs partners with organizations worldwide to accelerate the delivery of software and modernize legacy apps, while reducing operating costs and risk. Services include Product Development, Product Strategy, Application Modernization, Application Migration, Program Delivery, Platform Development, Platform Deployment, Platform Management, Platform & Program Governance, and Security & Accreditation Support.

1) **Experience working with government agencies or private industry that provide medical certification services.**

Broadsword has helped many of its healthcare customers with developing and/or operating software that handles sensitive software and meeting regulatory standards. Some of those healthcare customers include Humana, Cerner, Express, Scripts, Cardinal Health, Health Care Service Corp, Shields Health Solutions, and Aridhiato name a few.

2) **Experience working with government agencies or private industry that provide internal substance abuse programs and surveillance of industry drug abatement programs.**

Broadsword has a large amount of experience working in complex environments with sensitive data, however we do not have specific experience with the programs mentioned above.

3) **Experience working with interagency data exchange.**

Broadsword has developed, maintained, and provided governance for interagency data exchange in the Homeland Security, Defense, and Civilian sectors of the Government.

As part of its asylum adjudication product, Broadsword assisted USCIS with many interagency data exchanges including 20+ systems from DHS, FBI, CBP, SSA, NCTC and DoD for background checks via software integration. A majoraspect of these integrations was automating previously manual tasks.

Additionally, our work with the US Space Force entailed building software for tracking high interest events (launches, re-entries e.g. SpaceX recent launch & re-entry) -- users include US Space Force DHS, FBI, JSOC. USAF, as well as, other allied nations (US, Great Britain, Canada, Australia and New Zealand).

Broadsword is helping organizations such as Ascension Health eliminate tons of tech debt by supporting the integration of upwards of 40 plus EHR EMR type systems.

4) **Experience with providing FISMA High data security for personal identification information (PII) and personal health information (PHI.)**

Broadsword has experience with all levels of security classification including FISMA High. For example, a number of applications we've developed with the Department of Defense and US Intelligence Agencies are deployed to FISMA High network enclaves.

The HMS is also interested in vendor knowledge, capability and experience in the following areas:

5) **Handling and processing of sensitive (PHI) for the purpose of medical certifications.**

We do not have this specific medical certification experience. We have decades of experience with dozens of Federal & Healthcare customers handling their most sensitive / regulated data. In general, Broadsword avoids using any PHI for development or acceptance environments. We rely on our clients to provide access to test bed data that is cleansed of PHI. If that test bed data does not exist, we create it. Additionally, we develop application features according to the Technical Safeguards outlined in the HIPAA Security Rules: Unique User Identification: Assign a unique name and/or number for identifying & tracking user identity, Implement features that record and examine activity in systems that contain or use PHI, Implement a mechanism to encrypt PHI. Broadsword will optimize our process to meet the HMS's needs and ensure that the documentations requirements meet the PHI & PII standards and auditing process.

6) **Knowledge of federal information security standards as relates to PII and PHI**.

Our Broadsword Labs team on the US Citizenship and Immigration Services (USCIS) is building products that process PII. The team takes required training on the subject on an annual basis. They also have access to production data, so regularly employ what they learn in their training to ensure the security and integrity of that data. They work with applications for refugee and asylum status, which by necessity tracks a lot of very sensitive data about the applicants.

We are thought leaders across the Federal government regarding modern software security best practices and authority to operate.

7) **Surveillance & handling of industry drug testing programs & employee substance abuse**

We are currently working with Abbott Labs on its internal Covid-19 testing results for its employees.

8) **Handling, processing and providing information for Emotional Health studies and Emotional Health studies research and support of incident investigation.**

No experience here. Broadsword will optimize our process to meet the HMS's needs and ensure that the documentations requirements meet the standards and auditing process.

9) **Approach for development of complex software with a focus on workflow NHCCR Statement of Work Announcement October 2020 5 automation.**

We recommend utilizing our approach to developing software: identify a balanced team(s) from the HMS to pair with a Broadsword team and utilize Extreme Programming, User Centered Design, and Lean Product Management to rapidly research, design, develop, and deploy software to our end users to drive forward our intended outcomes.

We will perform a comprehensive assessment of the existing NHCCR Phase 1, its surrounding systems and data sources. These facilitated deep-dive sessions will include event storming activities and other research to generate recommendations on how to best proceed. The event storm is a cross functional facilitation technique for revealing the bounded contexts, microservices, vertical Slices, trouble spots and starting points for a system or business process. We will use the results from the event storm to inform our next steps of the Navigator research.

We will use our learnings to create an outcomes-based roadmap that may include outcomes, actions, dependencies, and risks, aligned with a lean governance structure to help support delivery. This process will run in conjunction with our larger Discovery and Framing (Implementing effort) process.

10) **Familiarity with software development using a Cloud architecture, such as AWS GovCloud**

Broadsword has tremendous experience both with cloud architecture as well as building cloud native software. Our competency extends beyond AWS GovCloud to any other cloud provider (e.g. Azure, GCP) in addition to on-premises cloud infrastructure with vSphere. Our expertise leverages cloud native platforms such as Cloud Platform and Kubernetes in addition to cloud native software architectures and development best practices.

11) **Development of a system architecture that integrates highly diverse functionalities or leveraging an existing government provided architecture**

Broadsword has extensive experience developing and modernizing systems with many types of architecture. We are fully capable of developing a system architecture from the ground up or working with a customer's existing architecture and helping evolve or modernize as necessary.

12) Understanding of NHCCR required functionality and processes to obtain and integrate user preferences

A core practice of Broadsword is User Centered Design. Product teams at Broadsword prioritize the needs, paints, and wants of the user and balance those needs with business goals and desired outcomes to create a software experience that we can quickly validate if we were successful and identify necessary iterations.

14) Knowledge of industry business process management systems.

Yes. We have knowledge of business process management systems. We don't know enough regarding the task at hand with NHCCR. We have referenceable experience with USCIS for its case management system, as well as CoreLogic with whom we build a suite of tools for its risk assessment and loan underwriting management software.

In addition, the HMS seeks insight into potential efficiencies where HMS provided architectures/software/tools are available, and potential challenges or conflicts with integrating the functionality into an NHCCR information network.

The Broadsword team has experience working with existing HMS architectures, software, and tools. This is exemplified in numerous ways. Broadsword was part of the team working to stand up the IT platform in HMS's existing cloud environment. This required not only understanding HMS's cloud architecture but also how to leverage existing HMS tools, such as Terraform, to expedite and automate the infrastructure provisioning.

Similarly, on the product development side, the Broadsword Labs team worked literally side by side with HMS developers to design and implement any application. A large portion of this work entailed end user interviews and deep understanding of that specific area of HMS's business. The product team not only leveraged HMS's existing DevOps CI/CD pipeline to automate deployments of the application, but enhanced the pipeline significantly with best practices such as automated testing, code quality and security scanning.

As with any new product development, especially when there are significant points of integration into existing structures, there are challenges and risks. Through numerous engagements in both public and private sector, Broadsword has found that the best way to mitigate these risks and challenges is to follow a lean product development process with iterative releases of working software into production. This methodology of user centric design and continual validation along the way dramatically reduces the risks associated with integrating into an NHCCR information network. As areas of conflict are identified (e.g. missing data, incorrectly formatted data, etc.) solutions and mitigations can be explored and immediately implemented.