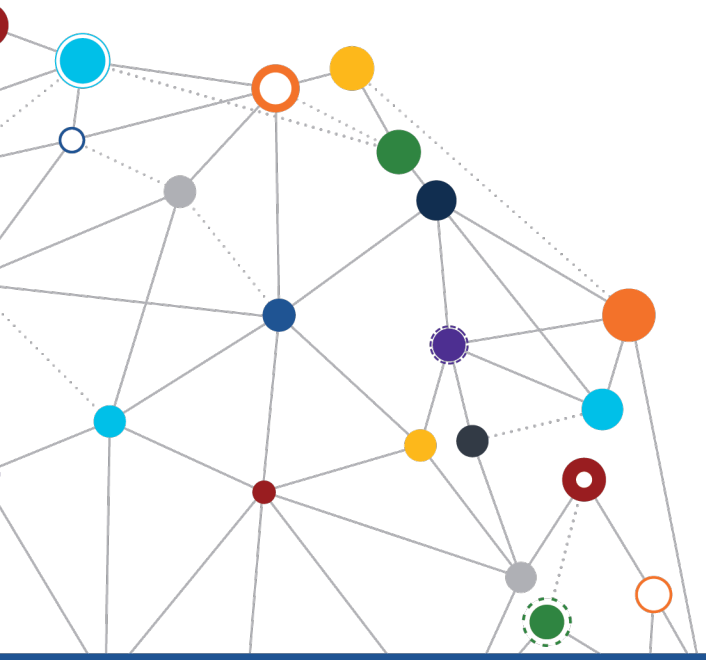
OFFICE OF
INFORMATION
AND TECHNOLOGY

CIO Whitepaper

Artificial Intelligence

January 7, 2019 | James P. Gfrerer, Assistant Secretary for Information and Technology, Chief Information Officer



VA is Harnessing Artificial Intelligence to Improve Veterans' Lives

Artificial Intelligence at the Department of Veterans Affairs

What do Summit—the World's most powerful supercomputer—special purpose Artificial Intelligence (AI) machines, and Quantum Computing have to do with improving the Veteran experience at the Department of Veterans Affairs (VA)? These are the technologies that VA will use as part of the VA Interagency Agreement (IAA) and partnership with the Department of Energy (DOE), Oak Ridge National Laboratory (ORNL), supporting leading edge analytics around suicide prevention and precision medicine. This partnership will drive improvements to natural language processing, image analytics, and next generation big data storage and retrieval of multimodal (e.g. structured, unstructured, image, and genomic) data.

Information Technology (IT) Modernization isn't just a buzz word at VA — it's a commitment to fundamentally changing the way we design, implement, and deliver innovative technology solutions. Accordingly, VA is exploring AI solutions that enable us to provide better care and services to Veterans.

VA's Office of Information and Technology (OIT) plays an integral role facilitating several of VA's AI initiatives by building cross-functional relationships and dedicating vital financial resources. VA is the largest integrated health care provider in the country, serving over nine million Veterans. As such, we are in a unique position to assemble, segment, analyze, and ultimately leverage over 80 terabytes of health-related data. Amassing this incredible amount of data is the simple part—effectively harnessing the data is the challenge. With AI, we have the power to amass, scan, and analyze data from hundreds—and even thousands—of separate sources. Many of our AI initiatives focus on just that—pulling conclusions and predictive analyses in more timely, secure, and efficient ways from our vast data stores.

Current AI Work

Recovery Engagement and Coordination for Health – Veterans Enhanced Treatment (REACH VET)

Recognizing the value of AI technology, VA has already used it to help health care providers with tools such as REACH VET. This reporting application uses predictive modeling to identify Veterans at high risk for adverse outcomes, such as suicide. By engaging at-risk Veterans early, REACH VET helps VA health care providers save lives. It securely consolidates and analyzes millions of health records, searching for risk indicators and estimating each Veteran's risk of suicide within the next month. Once identified, high-risk Veterans are quickly referred to VA clinicians for outreach.

REACH VET-based tools are now available to our Veterans Crisis Line staff, VA primary care providers, and mental health providers via their computer desktops. We have already seen

increased one-to-one staff engagement with Veterans who are at risk. This early identification allows VA to offer help to those who need it most, before it is too late.

OIT's Corporate Data Warehouse (CDW) Business Intelligence Service Line (BISL) team developed and maintains the data warehouse and reporting platform on which the REACH VET predictive model and clinical dashboards run. OIT continues to work closely with the Veterans Health Administration (VHA) and has devoted substantial effort and resources toward optimizing the environment in which the REACH VET (and other mental health and suicide prevention) products are hosted.

Stratification Tool for Opioid Risk Mitigation (STORM)

The misuse of and addiction to opioids (e.g. prescription pain relievers, heroin, and synthetic opioids such as fentanyl) is a serious national crisis. As part of VA's robust effort to combat opioid abuse, VA deployed the Stratification Tool for Opioid Risk Mitigation (STORM) nationally. STORM uses a predictive model to identify patients receiving opioid medication who are at elevated risk of overdose or suicide-related events. STORM encourages and monitors use of strategies recommended by the new VA/Department of Defense (DoD) Clinical Practice Guideline for Chronic Opioid Therapy to keep patients safe and to more effectively manage their pain and mental health needs while on opioid medication. STORM has been used to ensure that high-risk patients receive consistent interventions. Using this tool, VA has been able to rapidly implement state-of-the-art clinical practices to address the opioid epidemic (e.g. overdose education and naloxone, prescription drug monitoring program checks, safety planning, and medication assisted therapy for opioid use disorders), starting with those patients who are most vulnerable.

Million Veteran Program (MVP) – Computational Health Analytics for Medical Precision to Improve Outcomes Now (CHAMPION) Initiative

The Million Veteran Program (MVP) is a national, voluntary research program that studies Veterans in our health care system and investigates how genes affect health. MVP is building one of the world's largest medical databases that will examine blood samples and health information from one million Veteran volunteers and add genotype information to their electronic health record (EHR). Researchers will then use this to study diseases like diabetes, cancer, and military service-related illnesses, such as post-traumatic stress disorder (PTSD).

VA's MVP CHAMPION initiative leverages a strategic partnership between VHA and DOE. This alliance provides DOE's ORNL access to MVP data and enables them to perform advanced analytics on the collected data. The vision of this IAA is to harness the genomic and clinical data in VA's MVP and then through precision medicine, improve the health and well-being of our nation's Veterans and the general public by developing better approaches to early detection, treatment, and prevention of diseases.

Veterans Care Improvement via Computation and Outcomes-driven Research (VICTOR)

VICTOR, another partnership with DOE's ORNL, helps VA's three administrations—VHA, Veterans Benefits Administration (VBA), and National Cemetery Administration (NCA)—meet strategic mission needs related to advanced computing, advanced data science, and advanced analytics for a wide variety of research-to-capability projects.

By establishing operational and quality improvement projects such as clinical advanced analytics, hazards detection, an open source laboratory, and suicide prevention predictive analytics, this effort will advance the state-of-the-art computing and computational sciences to improve the lives and health care of our Nation's Veterans. VA will research, develop, and translate advanced analytical technologies and methods (including analytical workflows) from research programs through operations for VHA, VBA, and NCA. By doing so VA anticipates achieving acute and strategic-level outcomes to demonstrably improve benefits and services via access to high-performance computing infrastructure, data science, computer science, health science, and subject matter expertise. DOE also benefits as their cutting-edge computing architectures and algorithms push the frontiers of next-generation health care and benefits delivery via access to the most valuable health datasets in the world.

This VA and DOE partnership is expected to establish one of the world's most scalable systems for efficiently organizing and analyzing Veterans' health, benefits, and cemetery data. The system will use modern data and analytics architectures to support heterogeneous and multi-modal data in a manner amenable to scalable, state-of-the-art computing. DOE will help VA improve situational awareness and decision processes by leveraging multi-institutional computational and health expertise to co-design computing architectures, algorithms, and solutions targeted at VA's rich variety, volume, and velocity of processing workflows and dataflows.

The Future of AI at VA

There is no comparison to the rich clinical data VA collects. For example, the Million Veteran Program has collected genomic data from 690,000 Veterans as of August 2018. Combining this data with the power of AI, we have an opportunity to foster the next generation of health care. Access to DOE's computational and data science expertise is strategically important to VA due to the scale of our data. The increasing size and complexity of the emerging VA data landscape (structured, unstructured, image, genomic) will not only benefit from, but also requires, ORNL's capabilities and expertise.

VA envisions a future, not only where we collaborate with ORNL, but where additional federal agencies partner with ORNL and create a National Healthcare User Facility—a supercomputing environment dedicated to breakthrough health care research. Increasing the number of partnered federal health care entities would leverage the environment and allow them to conduct research specific to their agency or partner across agencies for special purpose research. It would create a collaborative operation where an agency owns the system and ORNL runs the system. This type of environment could become a place where researchers, both public and private, converge to seek new discoveries in a collaborative fashion.

In this vision, a National Healthcare User Facility would be hosted by the National Center for Computational Sciences (NCCS), which hosts and runs the world's largest supercomputing and AI systems (Titan, Summit, and the Frontier Exascale system in 2021). A presence at NCCS would provide VA direct access to top commercial and research leadership companies, organizations, and experts. Through this proposed model, VA imagines a future where it would be possible to share data with other federal agencies and potentially collaborate on resource allocation. NCCS could serve as an innovation laboratory to "try before you buy," therefore limiting risk, and to bring the expert community together to solve difficult challenges.

VA is proud to be a leader in the federal space when it comes to delivering innovative solutions. We remain committed to addressing current needs while investing in new technology to enable our organization to adapt to meet future needs of our Veterans.