Executive Brief

VistA Application Analytics

Comprehensive cloud-based streaming analytics of VHA clinical workflow

Hines Informatics Steering Committee
December 10, 2024

Scott Pawlikowski MD
Director, Improvement and Innovation
VHA Office of Primary Care

Rafael Richards MD MS FAMIA
Director, VistA Application Analytics
VHA Digital Health Office

Executive Summary

Objective

- *Comprehensive analytics of the real-world workflows of VHA clinicians*
- *Year One: Intra-facilty workflows*
- *Year Two: Inter-facilty workflows (including Telehealth, Community care)*

Background

- *All VistA systems have been migrated to the VA Cloud ("Cloud VistA").*
- *Cloud VistA provides real-time cloud-based streaming traffic capture and analytics of the real-world use of VistA applications (CPRS and 40+ others)*
- *All user interactions (mouse clicks, menu items, orders, tasks, or sub-tasks) of any Vista Applications can be captured to the millisecond and analyzed*

Benefits

- *Data-driven approach for clinical workflow analysis and optimization*
- *Enterprise Standardization of clinical workflow*
- *Clinical workflow optimization and efficiency*
- *Benchmark workflows of different systems (VistA-EHRM-Other)*
- *Strategic, targeted investment in health IT products and services*

Sponsor *VHA Digital Health Office / FY24-25*

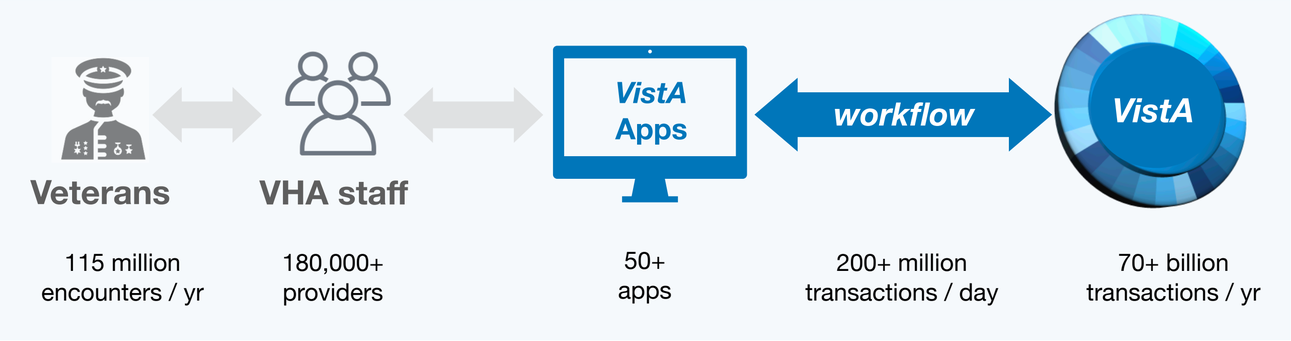
Status *Two VAMCs (Texas, Omaha) in full operation with VAA 9/24.*

Ask *Participation of Hines VAMC as third medical center for VAA*

VistA Application Analytics

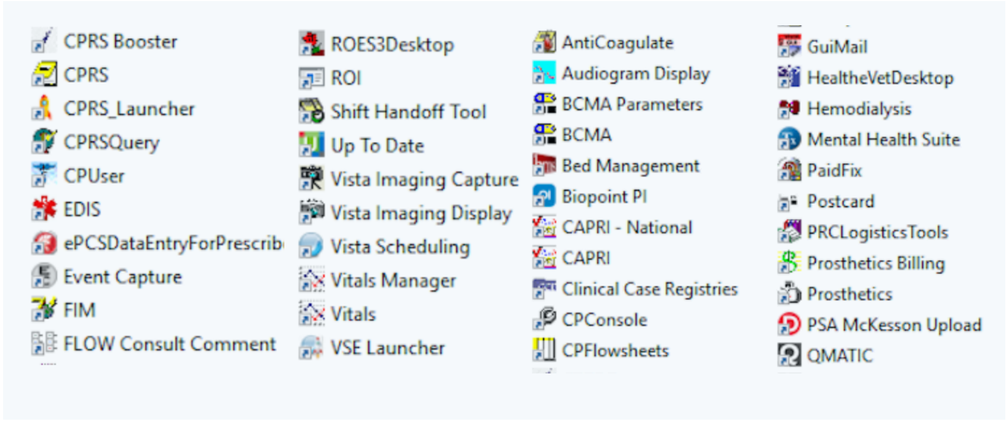
VHA Clinical Workflow

Each day in VA, over 180,000 VHA staff at 1150+ medical facilities use VistA Applications to create, store, and process over 4 million new documents, images, lab, and pharmacy orders in VistA. In FY22, VHA provided over 115 million veteran care encounters using VistA Applications. The clinical workflow of VistA Applications, however, remains unmeasured and unknown.



VistA Server

- Contains 500+ million veteran-years of data, knowledge, and workflows.
- Adds 4 million new documents, lab, imaging, and pharmacy orders each day
- Supports 200+ million transactions each day with six sigma reliability.

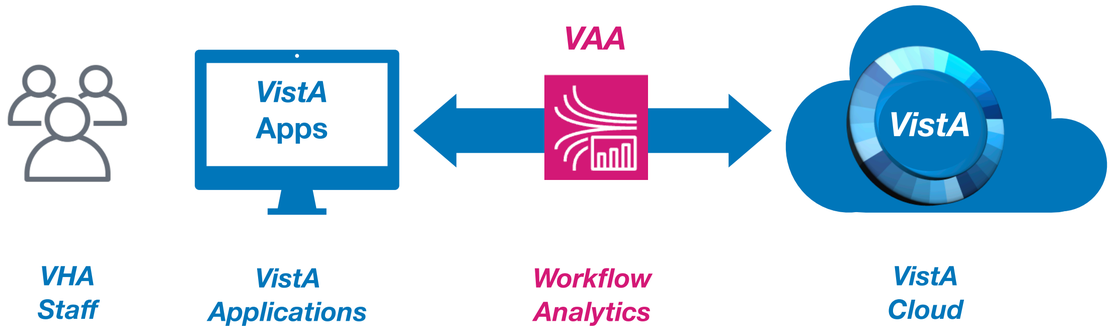


VistA Applications

- A suite of Windows desktop applications that use the VistA database for all healthcare transactions.
- Includes CPRS, VistA Imaging, and 40+ other applications
- ***Workflows are currently unmonitored and unknown***

VAA Overview

Comprehensive cloud-based streaming analytics of VHA clinical workflow



VA Cloud VistA

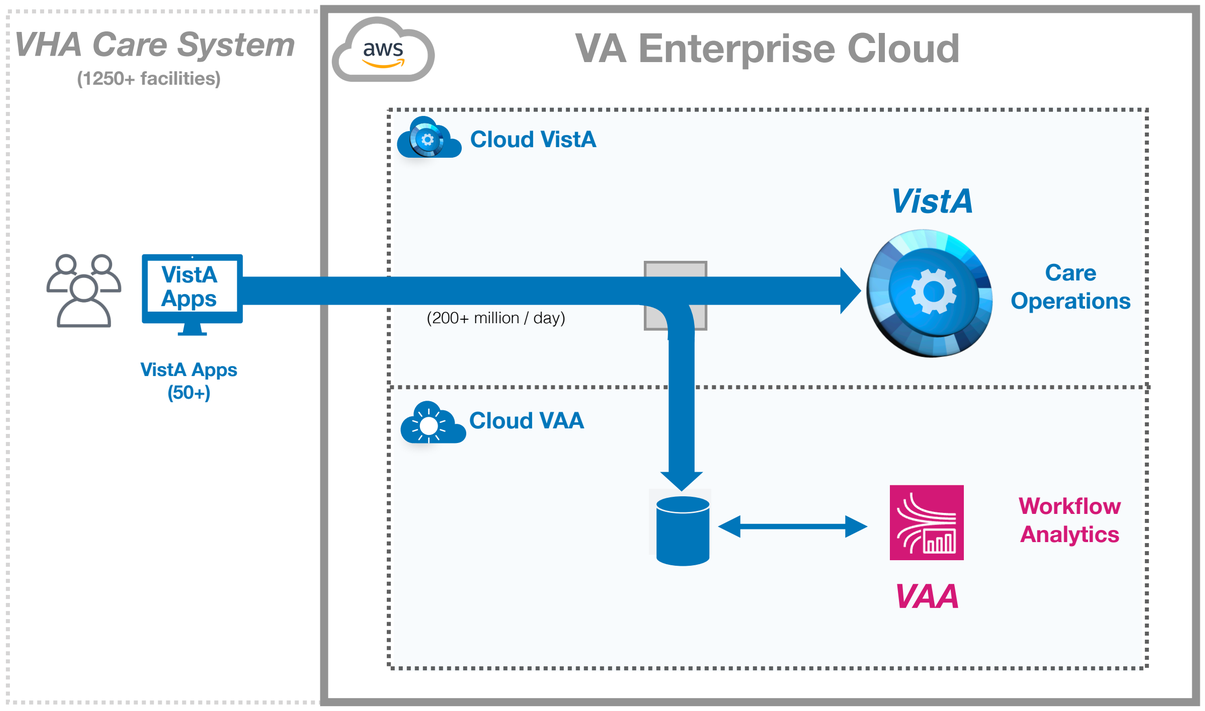
- All VistA systems have been migrated and modernized in the VA Enterprise Cloud (VAEC), a federally certified commercial cloud managed by Amazon Web Services (AWS).
- Cloud VistA acquires hundreds of new features and capabilities from its new VAEC environment, including security, scalability, and streaming traffic capture and analytics.

Cloud VistA App Analytics

VistA App Analytics

VAA Implementation and Certification

All VistA systems are hosted in the VA Enterprise Cloud, a federally-certified commercial cloud provided by Amazon Web Services (AWS). VAA leverages VistA's new cloud-based platform and technology to provide secure cloud-based streaming capture and analytics of VistA Application workflows.



Amazon Web Services is a leading commercial cloud services provider

AWS cloud-based VistA inherits hundreds of new features, functionality, and services within the AWS cloud, including security, scalability, and real-time streaming traffic capture and analytics.

VAA is implemented in the same secure AWS cloud as VistA, which enables streaming analytics of VistA traffic and applications.

Cloud VistA

VistA: VHA Information Systems Technology Architecture
Care Apps: CPRS, Brillians, BCMA (and 50+ others)
VAEC: VA Enterprise Cloud
RPC: Remote Procedure Call (transaction)
AWS: Amazon Web Services
VPC: Virtual Private Cloud

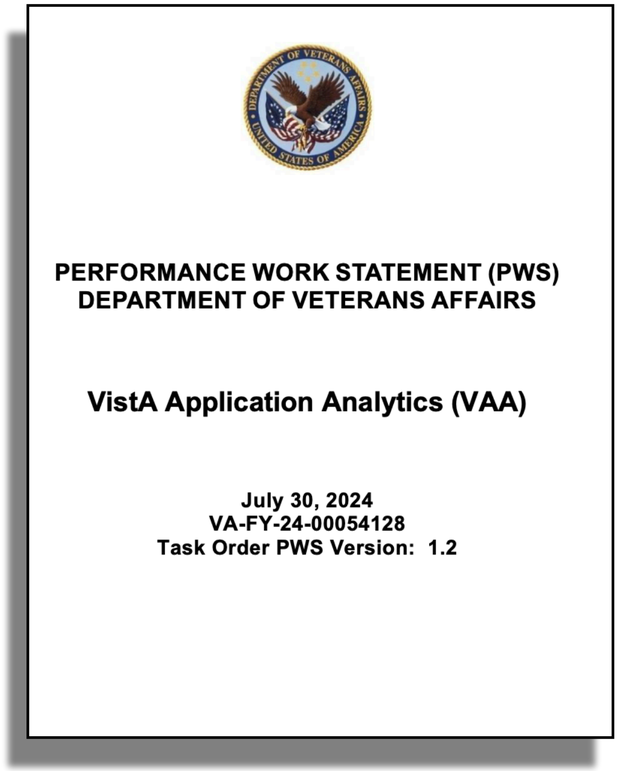
U.S. GovCloud Certified

Examples of VAA Workflow Analytics

- **Clinician types and volume of use**
  - Physicians, nurses, administration (100+ other)
- **Time spent on different care tasks**
  - Ordering tests, documentation, reviewing labs
- **Clinical Task analysis**
  - Time spent on care sub-tasks
  - Example: reading a consult; ordering an image; writing a progress note
- **Data used by each clinician type**
  - Document types, Note types, Images
- **Applications use by clinician types**
  - Frequency and type of VistA applications clinicians use
  - CPRS, JLV, Brillians, BCMA (50+ other)
- **Enterprise standardization of workflows**
  - Comparative analysis of applications/workflows between facilities
- **Comparative analysis of systems of care**
  - Example: comparison of workflow timings / efficiency of VistA apps (measured with VAA) and EHRM apps (measured with Lights On)

VistA Application Analytics

VISTA App Analytics



PERFORMANCE WORK STATEMENT (PWS)
DEPARTMENT OF VETERANS AFFAIRS

VistA Application Analytics (VAA)

July 30, 2024
VA-FY-24-00054128
Task Order PWS Version: 1.2

Status

- VHA Digital Health Office sponsored: 9/23
- Contract award: 8/24
- Implementation at Texas and Omaha VAMCs 9/24

Coming Soon

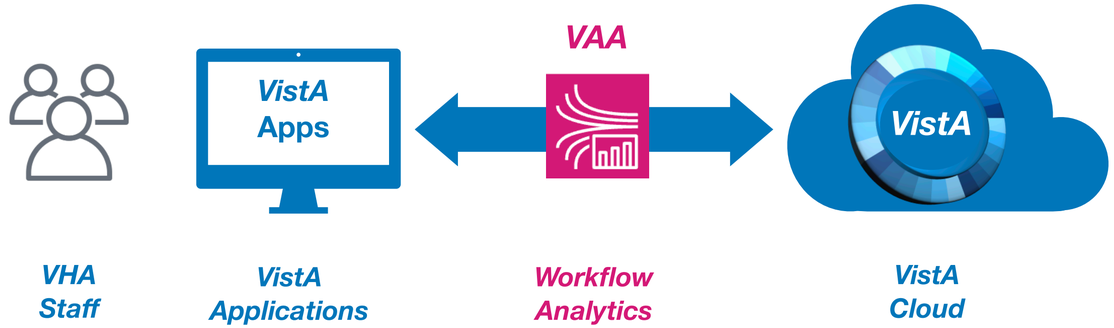
- Initial report on baseline VistA application usage
- Quarterly reports thereafter based on VHA input
- Dashboard on VAA clinical workflows

Outcome

- Real-time online dashboard on VAA clinical workflows

VistA Application Analytics

VAA Information / Follow-up



- **Contact** rafael.richards@va.gov
- **Website** https://cloudvista.github.io
- **Github** https://github.com/cloudvista/vaa

VistA Application Analytics

Comprehensive cloud-based streaming analytics of Vista's point-of-care applications

Rafael Richards MD MS FAMIA
Data Management and Analytics
Digital Health Office | VHA
Update: October 3, 2024

VHA Clinical Workflow

Each day 180,000 staff at 1250 VA medical facilities use VistA Applications to create, store, and process over 4 million new documents, images, lab, and pharmacy orders in VistA. In FY22, VHA provided over 115 million veteran care encounters using VistA Applications.

VistA Apps

- Suite point-of-care applications on all desktop computers at all VA medical centers
- Includes CPRS, JLV, and 40+ others
- Process all their transactions on VistA via remote procedure calls (RPCs)

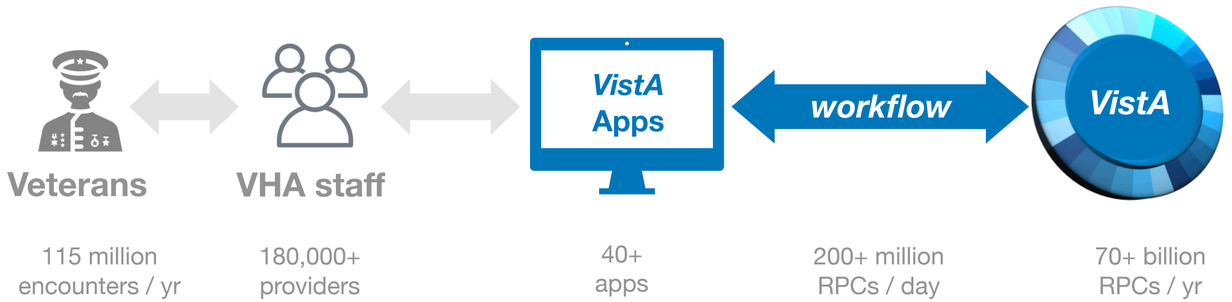
VistA

Transactional database for veteran care
- 200+ million transactions each day, processing
- 4 million new documents, orders, and images

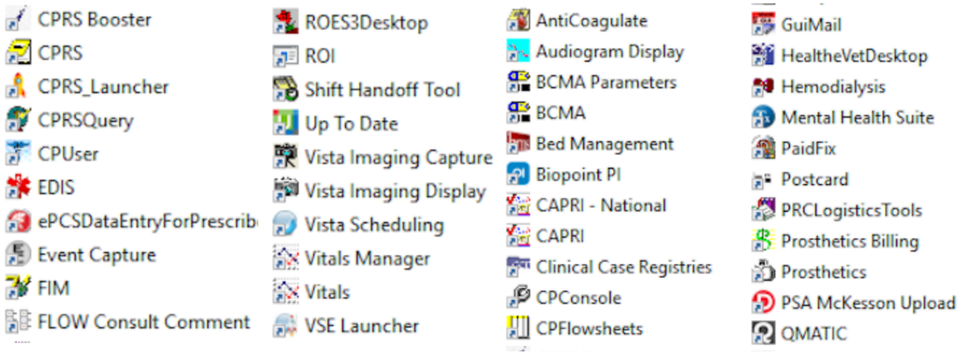
Lifelong health record of all veterans
- 400+ million veteran-years of data, comprising
- 18+ Petabytes of data and images

VHA Clinical Workflow

Each day in VA 180,000 clinical staff at 1250 facilities use VistA Applications (windows desktop applications) to remotely create, store, and process over 4 million new documents, images, lab, pharmacy orders in VistA. In FY22, VHA provided over 115 million veteran care encounters using VistA Applications.



- Stores 400+ million patient-years of veteran healthcare data, knowledge, and workflows
- Processes 200+ million transactions each day with six sigma reliability.
- Adds 4 million new documents, lab orders, pharmacy orders, and imaging studies each day.

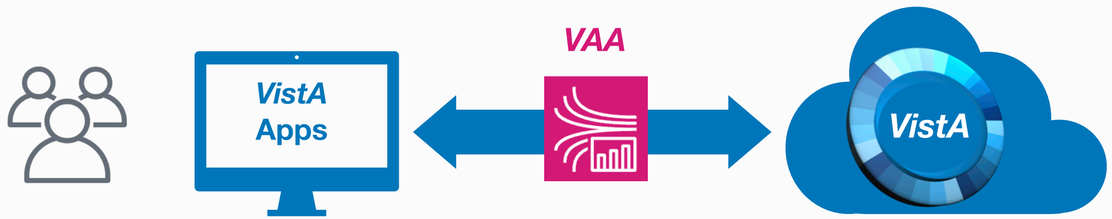


VistA Apps

- A suite of Windows desktop applications that use the VistA database for all healthcare transactions.
- Includes CPRS, VistA Imaging, and 40+ other applications
- ***Workflows are currently unmonitored and unknown***

VistA Application Analytics

Comprehensive cloud-based streaming analytics of VHA clinical workflow



270,000+
VHA staff

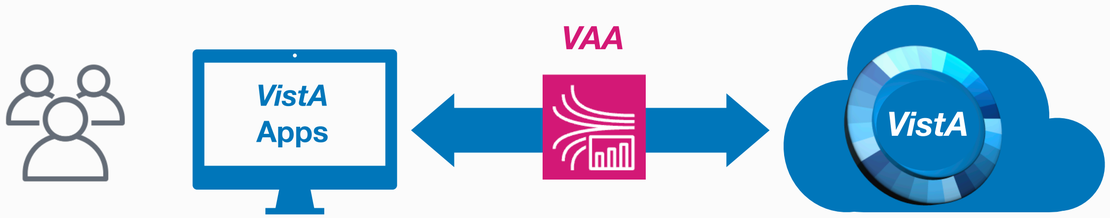
50+
apps

200+ million
transactions / day

Cloud VistA

VistA Application Analytics

Comprehensive cloud-based streaming analytics of VHA clinical workflow



VHA Staff

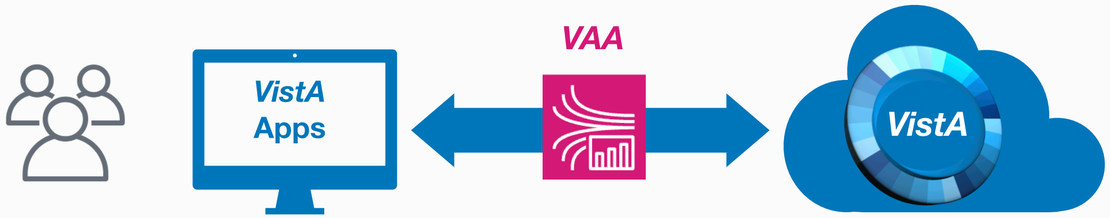
VistA Applications

Workflow Analytics

Cloud VistA

VistA Application Analytics

Comprehensive cloud-based streaming analytics of VHA clinical workflow



VHA Staff

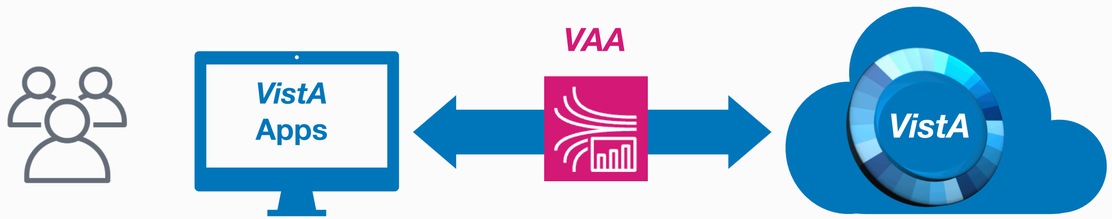
VistA Applications

Workflow Analytics

VistA Cloud

VistA Application Analytics

Comprehensive cloud-based streaming analytics of VHA clinical workflow



270,000+
staff

50+
apps

200+ million
transactions / day

70 billion
transactions/year

VistA Application Analytics (VAA)

VISTA App Analytics

Summary

Background

Veteran care is provided using VistA's Applications (CPRS, Imaging, and others). In FY22, VHA provided over 115 million veteran care encounters using VISTA point of care applications. The workflow of all of this care remains, however, unmeasured and unknown.

In June 2024, VA completed the four-year migration of all VistA systems to the VA Enterprise Cloud (VAEC), a federally-certified commercial cloud managed by Amazon Web Services (AWS). In its new cloud platform, VISTA can access and leverage a wide range of new commercial cloud-based capabilities.

Objective

Leverage the AWS cloud capability to capture and analyze all end-user traffic flows between cloud-based VISTA and all of VISTA's point of care applications. This ability to capture and analyze clinical workflows is analogous to the EHRM "Lights on Network."

Clinical Focus

A first-ever capability to provide real-world clinical workflow analytics, and provide a data-driven approach for improvement and standardization of clinical workflow

Benefits

Enterprise Standardization of clinical workflow
Clinical workflow optimization and efficiency
Data-driven approach for clinical workflow improvement

Support

CIDMO / FY24-25

VISTA Point of Care Application Analytics (VPA2)

Summary

Objective

- ***First-ever analysis of VHA's real-world clinical workflows***
- *Year One: Intra-facilty workflows*
- *Year Two: Inter-facilty workflows (including Telehealth, Community care)*

Background

- ***All VistA systems have been migrated to the VA Enterprise Cloud (VAEC).***
- *VAEC enables real-time cloud-based streaming traffic capture and analytics of the real-world use of VistA applications (CPRS and others)*
- *Every interaction with a Vista App (mouse click, menu item, and task) can be captured down to the millisecond and analyzed*
- *Analogous to EHRM "Lights on Network"*

Benefits

- ***Accurate detailed description of VHA's actual clinical workflows***
- *Enterprise Standardization of clinical workflow*
- *Clinical workflow optimization and efficiency*
- *Data-driven approach for clinical workflow improvement*

Sponsor *VHA Digital Health Office / FY24-25*

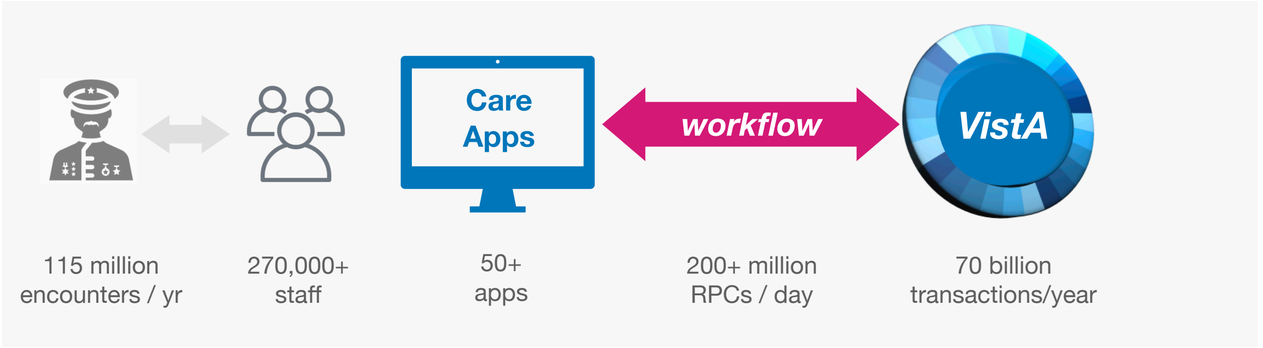
VISTA Point of Care Application Analytics (VPA2)

VISTA Cloud Care Analytics

Veteran Care Workflow

Each day in VA, over 270,000 staff at 1250 VA medical facilities use VistA Point-of-Care Applications (Care Apps) to create, store, and process over 4 million new documents, images, lab, and pharmacy orders in VistA. In FY22, VHA provided over 115 million veteran care encounters using VistA Care Applications.

Veteran Care



Veteran care workflows are currently unmeasured and unknown

Care Apps

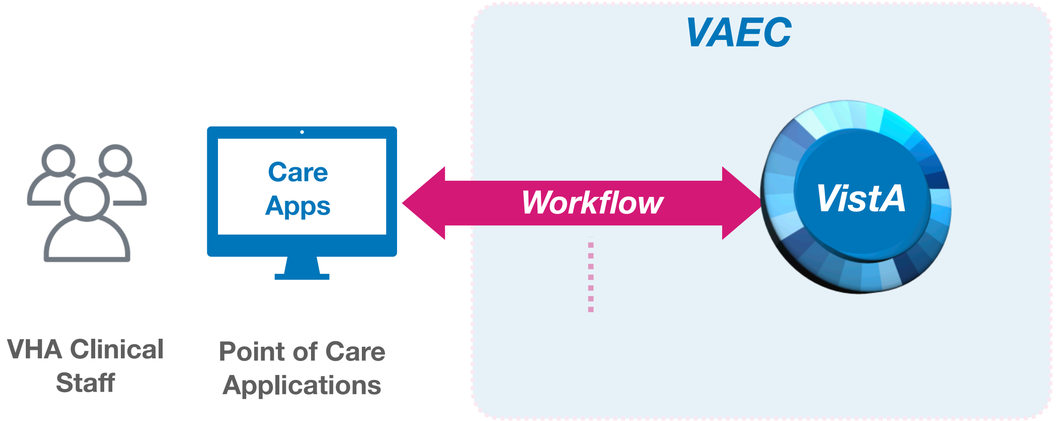
- VistA Point of Care Apps are a suite of 50+ Windows desktop applications installed on all VHA clinical staff workstations at all VAMCs. (Examples: CPRS, Vista Imaging)
- VHA staff using Care Apps interact with VistA for all transactions and workflows using a remote procedure call (RPC) protocol.

VistA

- Contains 500 million veteran-years of cumulative veteran care data and institutional knowledge
- Adds 4 million new documents, lab, imaging, and pharmacy orders each day
- Supports over 200 million transactions each day, all with six sigma reliability.

Veteran Care Workflow Analytics

First-ever VHA clinical workflow analysis based on real-world activity



VPA2 leverages VAEC-based VistA clinical workflow traffic logs, enabling for the first time the analysis of the actual (not notional) clinical workflows of VHA Clinical Staff.

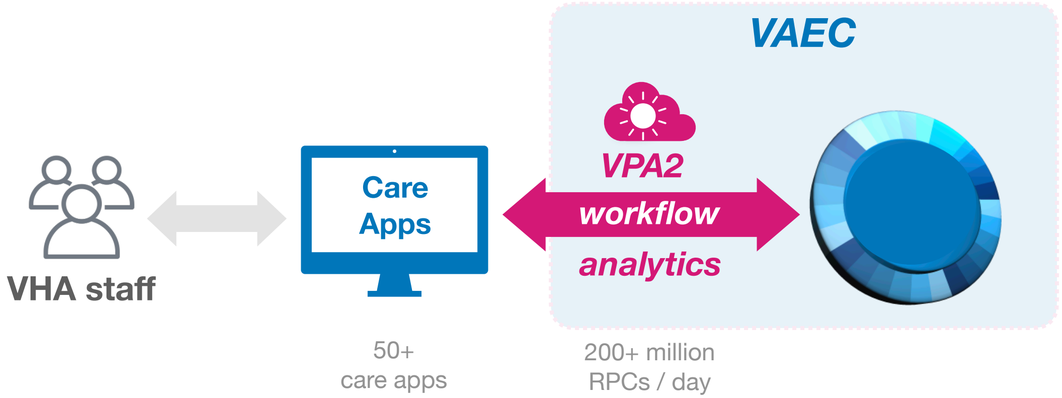
Veteran Care Workflow Analytics

Examples of the first ever real-practice based, Clinical Workflow Analysis in VA

- **Caregiver types and volume of use**
  - Physicians, nurses, administration (100+ other)
- **Time spent on different Care Tasks**
  - Ordering tests, documentation, reviewing labs
- **Clinical Task analysis**
  - Traffic grouped in transactions related to care tasks
  - Example: reading a consult; ordering an image; writing a progress note
- **Scope of clinical data used by Caregiver type**
  - Document types, standard vs VA codings
- **Scope of client use by Caregivers**
  - CPRS, Imaging, (50+ other)

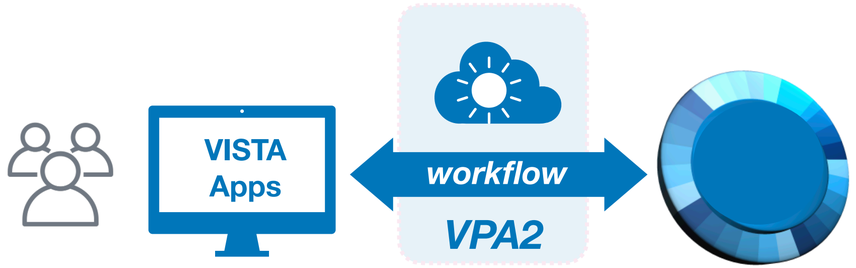
Veteran Care Workflow Analytics

VistA Point-of-Care Application Analytics (VPA2) leverages VAEC traffic logging of VAEC-based VistA to analyze the workflows of Vista Point-of-Care Applications (Care Apps)



Clinical Workflow Analytics

VistA Point-of-Care Application Analytics (VPA2) provides cloud-native traffic monitoring and analytics of all transactions and workflows between VistA Apps and cloud-based VistA systems.



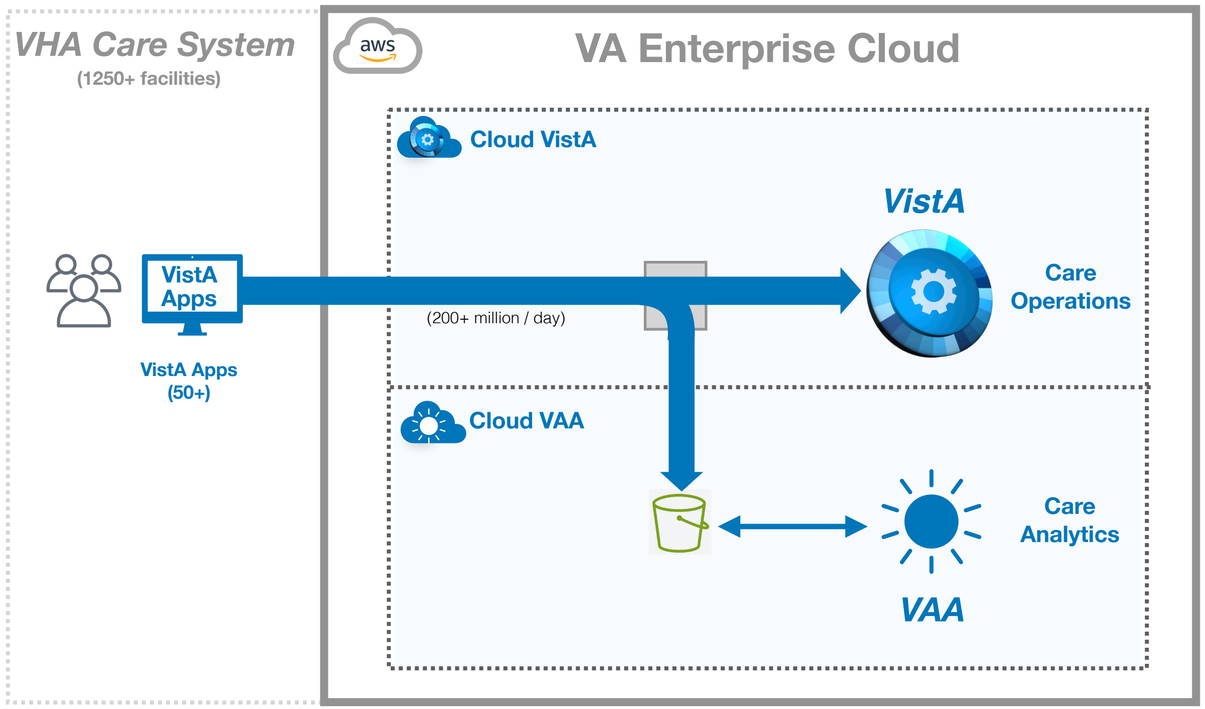
50+
care apps

200+ million
transactions / day

70+ billion
transactions / yr

Clinical Workflow Analytics - Implementation

All VistA systems are hosted in the VA Enterprise Cloud, a federally-certified commercial cloud provided by Amazon Web Services (AWS). VAA leverages VistA's new cloud-based platform and technology to provide secure cloud-based streaming capture and analytics of VistA Application workflows.



Amazon Web Services is a leading commercial cloud services provider

AWS cloud-based VistA inherits hundreds of new features, functionality, and services within the AWS cloud, including security, scalability, and real-time streaming traffic capture and analytics.

VAA is implemented in the same secure AWS cloud as VistA, which enables streaming analytics of VistA traffic and applications.

Cloud VistA

VistA: VHA Information Systems Technology Architecture
Care Apps: CPRS, Brillians, BCMA (and 50+ others)
VAEC: VA Enterprise Cloud
RPC: Remote Procedure Call (transaction)
AWS: Amazon Web Services
VPC: Virtual Private Cloud

U.S. GovCloud Certified

VISTA Application Analytics Benefits

VISTA App Analytics enables improvement in the following areas by providing real-world data on the use of point of care applications

User Experience:

- *Real-world usage of VistA Point-of-Care Applications (CPRS, Vista Imaging, BCMA, and over fifty others)*
- *Real-world timings for all user interactions with all menus, options, and actions such as login time, time to open large complex documents, time to access and open images, etc.*

Strategic Investment:

- *Identification of high-use features, functions, and applications where investment should be focused*
- *Identification of little-used features and applications, which may be consolidated, reducing cost of maintenance*

Enterprise Standardization:

- *Identification of variations of use of applications and workflows across different VA medical centers*

Workflow:

- *Identification of 'hotspots' of application inefficiency (redundant workflow, workarounds, latency) to target simplification and acceleration*

VISTA Application Analytics Examples

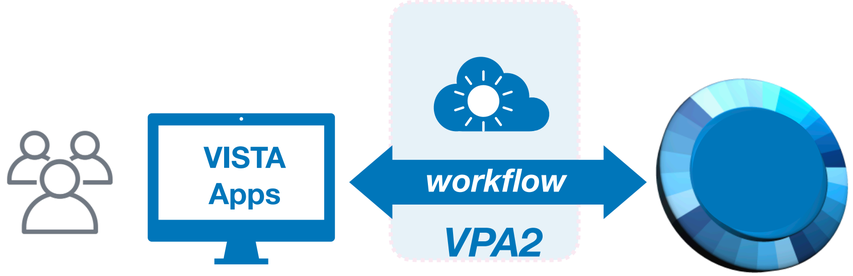
- **User types and volume of use**
  physicians, nurses, administration (100+ other)
- **Application types and volume of use**
  CPRS, Imaging, BCMA (50+ other)
- **Connection volumes, frequency, and duration**
  Where, when, and how long are applications connecting?
- **Types of user authentication and relative use**
  PIV? User/pass? Remote / local?
- **Performance and timing**
  Execution times of transactions determines end-user workflow experience
- **Enterprise standard vs Local workflows**
  Local VistA RPCs vs cross-VistA RPCs

Field Implementation (FY24-25)

Field implementation of VISTA Point-of-Care Application Analytics will be at three representative VAMCs of varying size and complexity in FY24

Call for participation of clinical informaticists to:

- *Be a clinical champion for workflow analytics at their facility*
- *Assist with identifying application 'hotspots' of inefficiency*
- *Offer input on other areas of focus for application analytics*

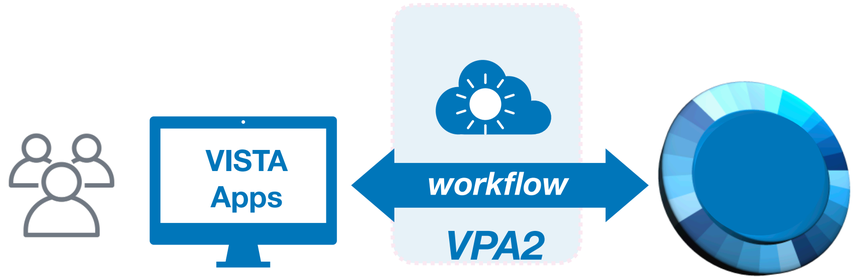


VISTA Point of Care Application Analytics (VPA2)

Questions/ Follow-up

Contact *rafael.richards@va.gov*

Information *cloudvista.github.io/app-analytics*



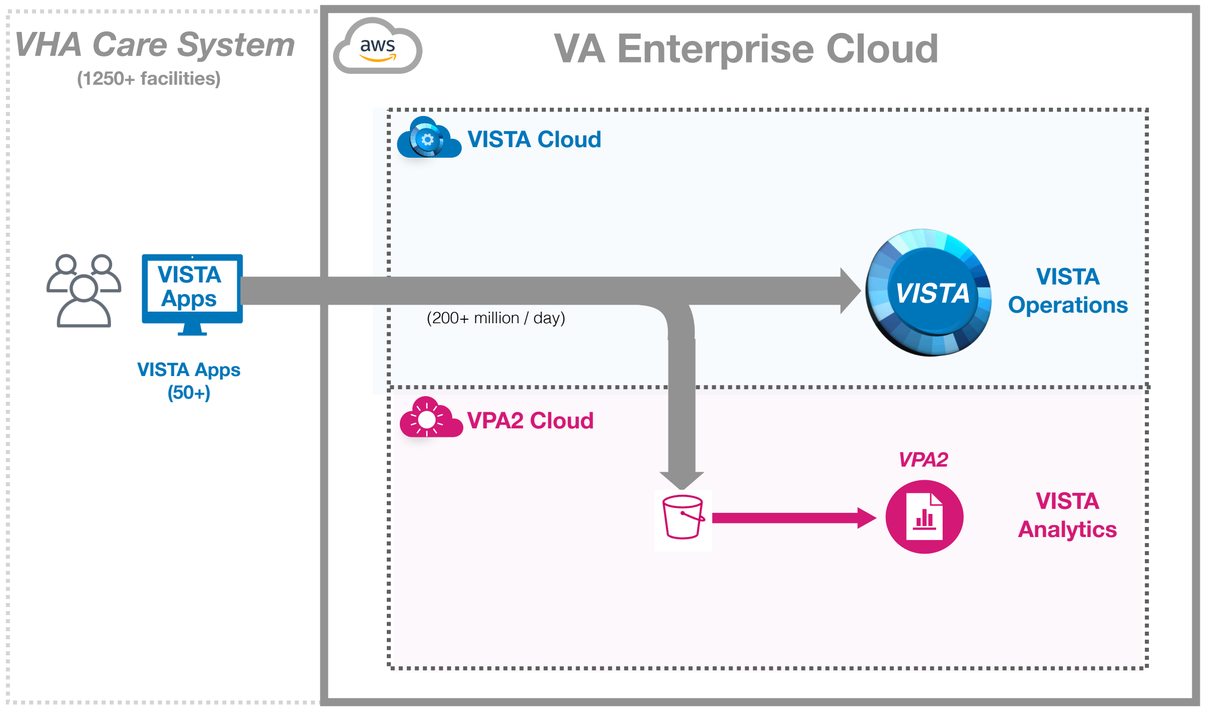
END

VISTA Point of Care Application Analytics (VPA2)

VISTA Cloud App Analytics

Cloud Implementation and Certification

All VISTA systems have been migrated to the VA Enterprise Cloud (VAEC), a federally-certified commercial cloud provided by Amazon Web Services (AWS). VPA2 leverages VISTA's new AWS-based platform and technology to provide secure streaming capture and analytics of the workflows of VISTA Apps.



AWS is a leading commercial cloud services provider

VAEC-based VISTA inherits hundreds of new features, functionality, and services in the AWS cloud, including security, scalability, and application traffic monitoring and analytics.

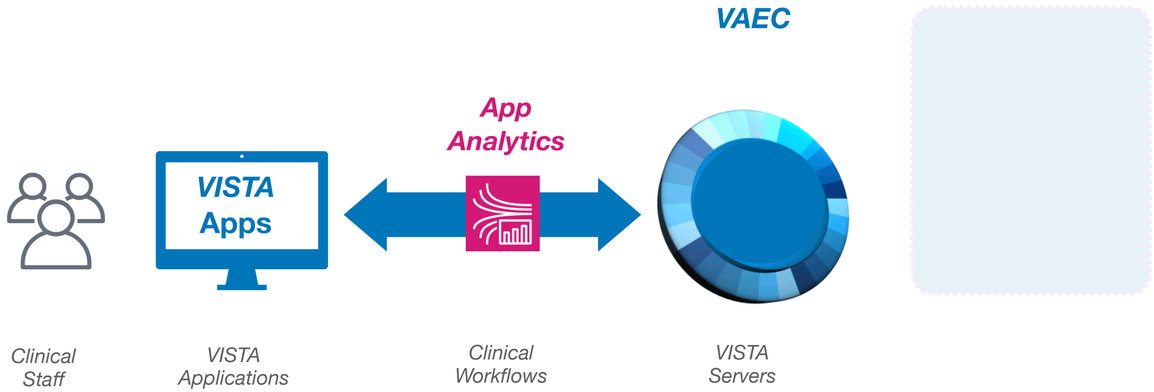
VPA2 is implemented in the same secure cloud infrastructure as VISTA, which enables mirroring the VISTA application traffic and workflows for analytics.

VISTA Cloud

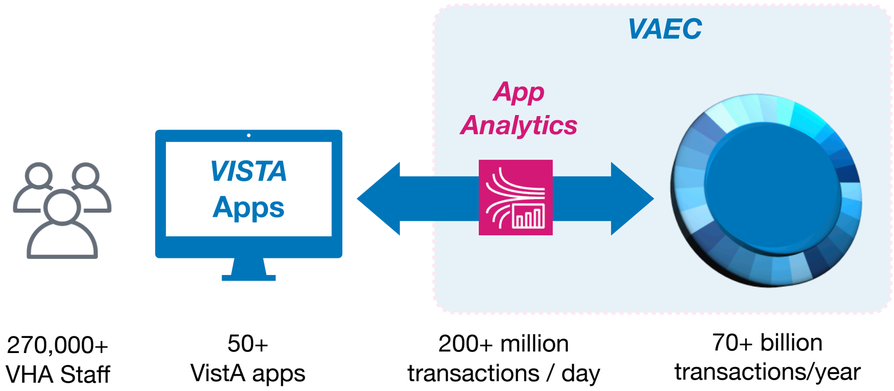
VISTA: VHA Information Systems Technology Architecture
VISTA Apps: CPRS, Imaging, BCMA (50+ others)
VAEC: VA Enterprise Cloud
RPC: Remote Procedure Call (transaction)
AWS: Amazon Web Services
VPC: Virtual Private Cloud

U.S. GovCloud Certified

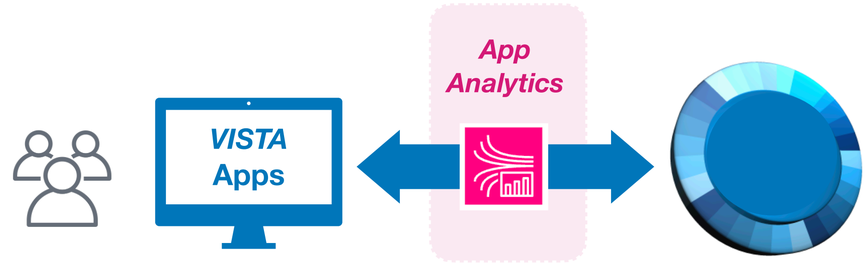
VISTA App Analytics



VISTA App Analytics



VISTA Application Analytics



270,000+ VHA Staff

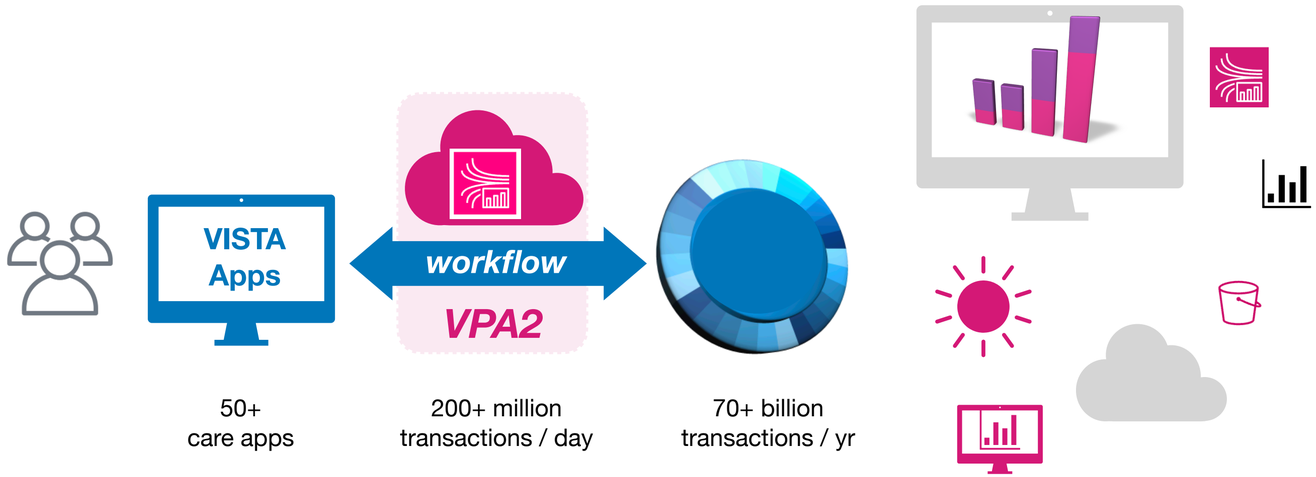
50+ care apps

200+ million transactions / day

70+ billion transactions / yr

VPA2 Framework

The VistA Point-of-Care Application Analytics (VPA2) framework provides cloud-based streaming traffic monitoring and analytics of all workflows between VistA Apps and the VistA database.



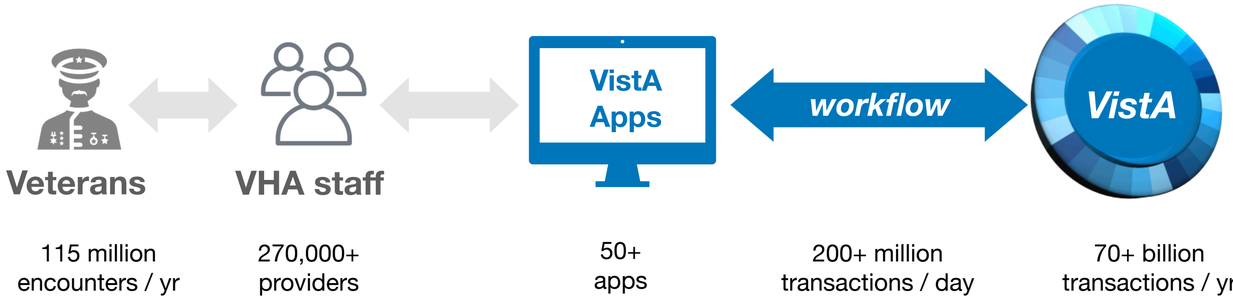
VistA Point of Care Application Analytics (VPA2)

VA HEALTH CARE Defining EXCELLENCE in the 21st Century

VISTA Cloud App Analytics

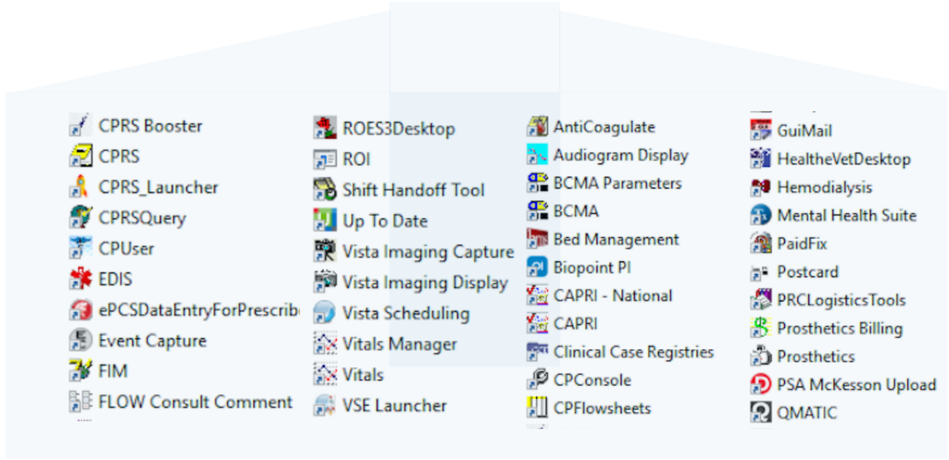
VHA Care Workflow

VHA staff provide veteran care using a suite of VistA Point-of-Care Applications (CPRS, Imaging, and over fifty others). Each day in VA over 270,000 staff at 1250 facilities use VistA Applications to create, store, and process over 4 million new documents, images, lab, and pharmacy orders in VISTA. In FY22, VHA provided over 115 million veteran care encounters using VistA Point of Care Applications (VistA Apps).



VISTA Database

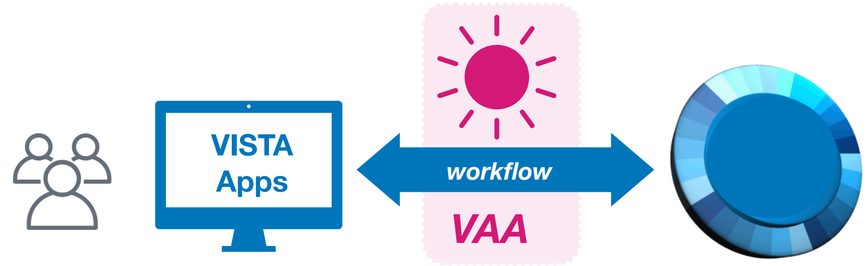
- Contains 500 million veteran-years of cumulative data and knowledge
- Adds 4 million new documents, lab, imaging, and pharmacy orders each day



VISTA Applications

- VISTA Apps are a suite of 50+ Windows desktop applications installed on 400,000 computers across all VAMCs
- VISTA Apps use the VISTA database for all transactions and storage
- VISTA Apps include CPRS, Vista Imaging, and BCMA

VISTA App Analytics



270,000+ VHA Staff	50+ care apps	200+ million transactions / day	70+ billion transactions / yr

VISTA "Lights on Network"

Workforce Experience

Providers are the front line of patient care, and should have an EHR that meets their needs in an efficient manner. Lights On Network® has the power to transform the EHR experience by pinpointing providers needing assistance, enabling them to spend more time with their patients.

Optimized Solutions and Systems

No health care organization is immune to system slowness or inadequate solution configuration. Lights On Network® strengthens the foundation of your EHR experience by identifying system bottlenecks and deviations from recommended best practices.

Organizational Value

Your investment in an EHR should yield optimal financial, workforce, and value outcomes. Lights On Network® provides key performance indicators that help you target the right value or opportunity at the right time.

https://www.cerner.com/gb/solutions/lights-on-network

VISTA "Lights On Network"

Testimonial

"We used tools like Lights On Network® data to be able to see what their current usage time was, what their current CPOE was, how much time they were spending documenting." Amanda Logue, CMIO Lafayette General Health

Lafayette General Health

Lafayette General Health saves 65 seconds per patient visit using adoption coaches, data analytics

Physicians at Lafayette General Health's (LGH) 41 ambulatory clinics saved an average of 65 seconds per patient by leveraging Cerner's adoption coaches and data analytics. That extra time allows providers to see more patients a day, giving the communities across central Louisiana easier access to care. With this new level of efficiency, LGH has an opportunity for an additional $10 million in annual revenue.

Testimonial

"The Lights On Network® is very exciting because it gets us the data to see well, have we made a difference, so we can set goals, we can meet those goals and know that we really are impacting care." Cynthia Mensendick, RN; CNIO Genesis Health System

https://www.cerner.com/gb/solutions/lights-on-network

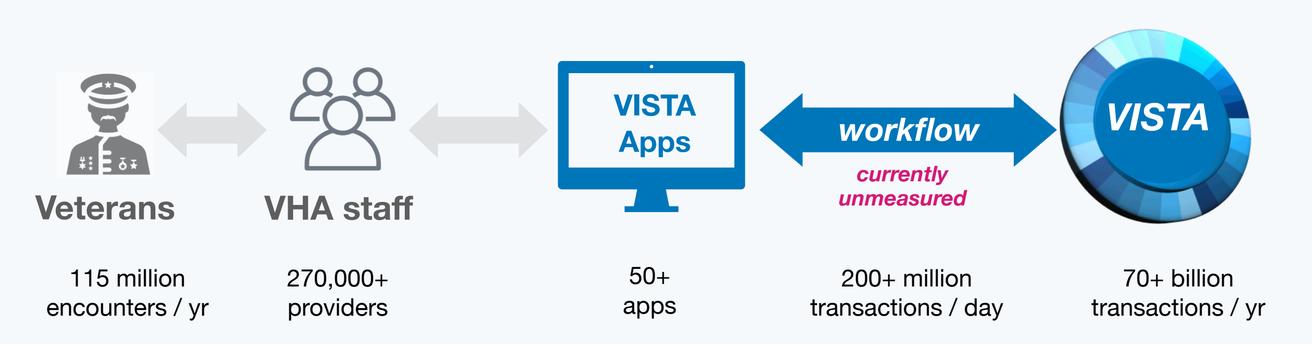
VISTA Point of Care Application Analytics (VPA2)

VA HEALTH CARE Defining EXCELLENCE in the 21st Century

VISTA Cloud App Analytics

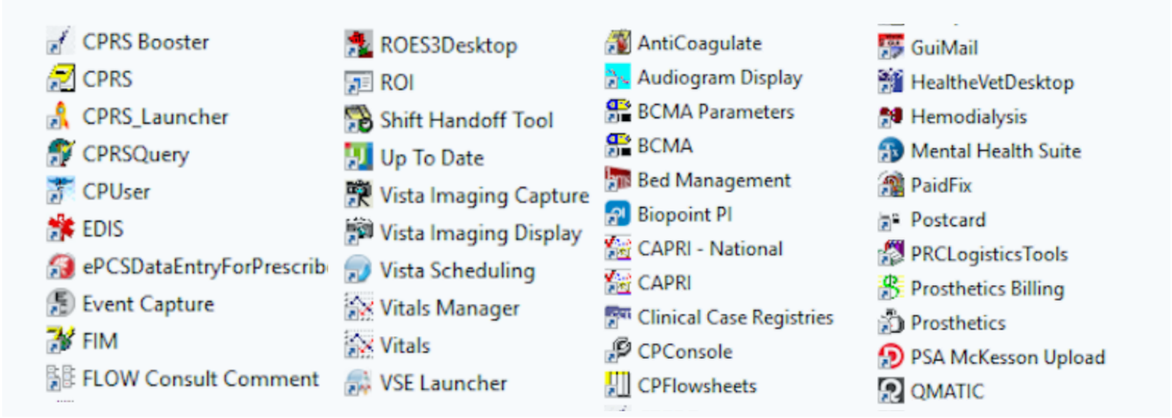
VHA Care Workflow

VHA staff provide veteran care using a suite of VISTA Point-of-Care Applications (VISTA Apps). Each day in VA over 270,000 staff at 1250 facilities use VISTA Apps to create, store, and process over 4 million new documents, images, lab, and pharmacy orders in VISTA. In FY22, VHA provided over 115 million veteran care encounters using VISTA Apps.



VISTA Database

- Contains 500 million veteran-years of cumulative data and knowledge
- Adds 4 million new documents, lab, imaging, and pharmacy orders each day



VISTA Apps

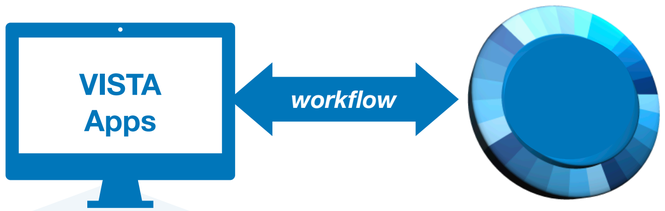
- VISTA Apps are a suite of 50+ Windows desktop applications installed on 400,000 computers across all VAMCs
- VISTA Apps use the VISTA database for all transactions and storage
- VISTA Apps include CPRS, Vista Imaging, and BCMA

VISTA Point of Care Application Analytics (VPA2)

Cloud VISTA App Analytics

Background

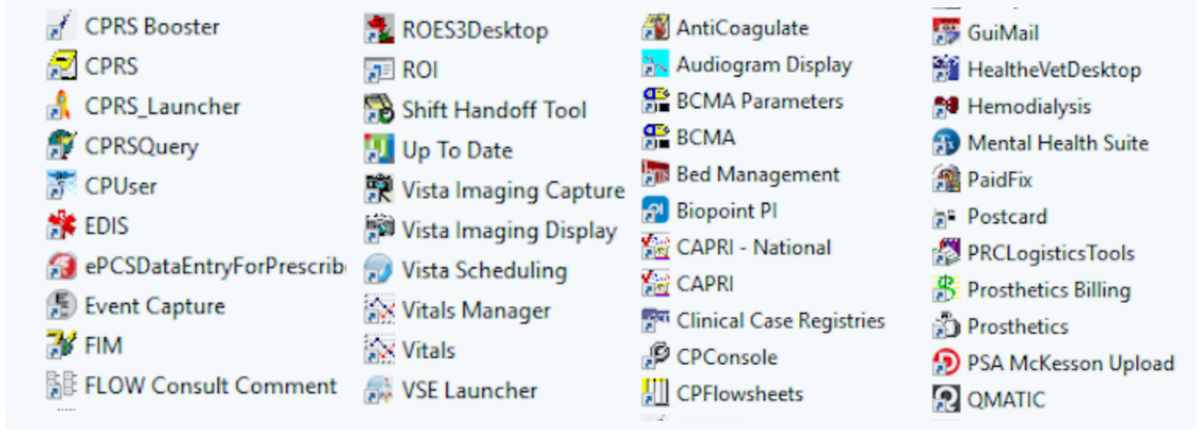
VHA clinical staff provide veteran care using a suite of VHA Information Systems Technology Architecture (VISTA) Point-of-Care Applications. Each day in VA over 270,000 staff at 1250 facilities use VISTA Point-of-Care Applications to create, store, and process over 4 million new documents, images, lab, and pharmacy orders in VISTA. In FY22, VHA provided over 115 million veteran care encounters using VISTA Point of Care Applications.



VISTA Database

- 4 million new documents, lab, imaging, and pharmacy orders each day
- 500 million veteran-years of cumulative data and knowledge

VISTA Apps (50+)



VISTA Apps

- VISTA Point of Care Apps are a suite of 50+ applications installed on 400,000 desktop computers at all VAMCs
- Use the VISTA database for all their transactions and data management
- VISTA Care Apps include CPRS, Brillians, Vista Imaging, and BCMA

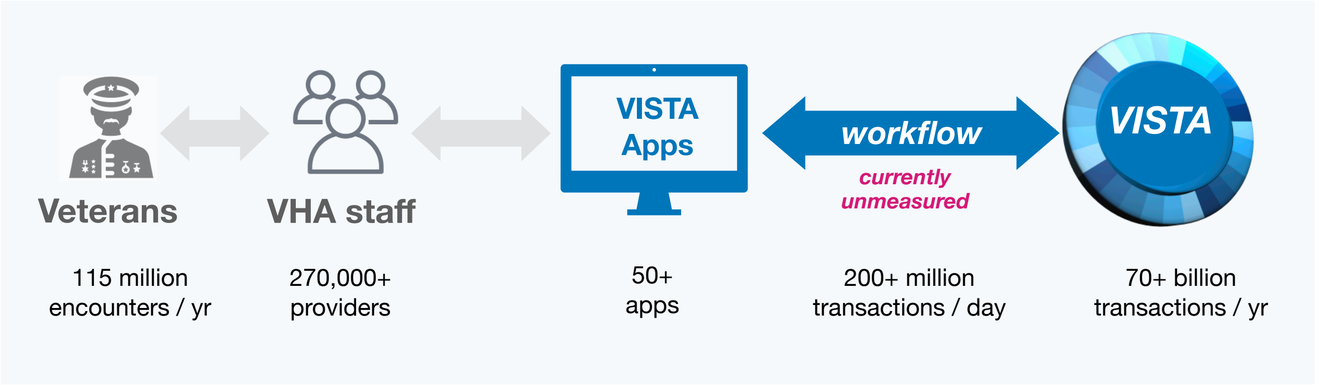
VISTA Point of Care Application Analytics (VPA2)

VA HEALTH CARE Defining EXCELLENCE in the 21st Century

VISTA Cloud App Analytics

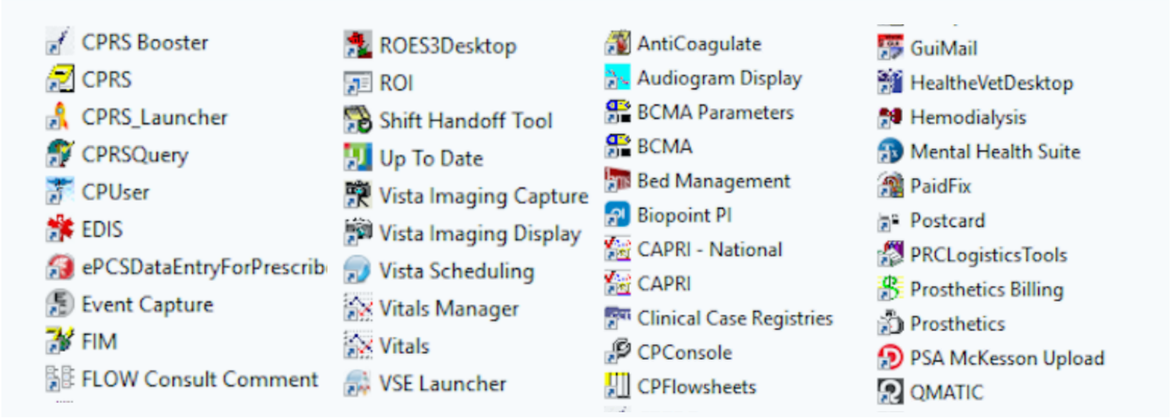
VHA Care Workflow

VHA staff provide veteran care using a suite of VISTA Point-of-Care Applications (VISTA Apps). Each day in VA over 270,000 staff at 1250 facilities use VISTA Apps to create, store, and process over 4 million new documents, images, lab, and pharmacy orders in VISTA. In FY22, VHA provided over 115 million veteran care encounters using VISTA Apps.



VISTA Database

- Contains 500 million veteran-years of cumulative data and knowledge
- Adds 4 million new documents, lab, imaging, and pharmacy orders each day



VISTA Apps

- VISTA Apps are a suite of 50+ Windows desktop applications installed on 400,000 computers across all VAMCs
- VISTA Apps use the VISTA database for all transactions and storage
- VISTA Apps include CPRS, Vista Imaging, and BCMA

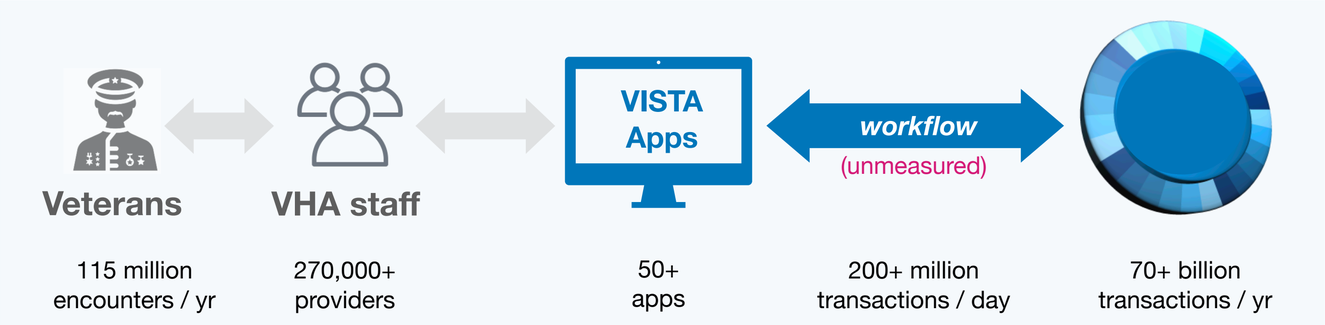
VISTA Point of Care Application Analytics (VPA2)

VISTA Cloud App Analytics

VHA Care Workflow

VHA staff provide veteran care using a suite of VHA Information Systems Technology Architecture (VISTA) Point-of-Care Applications. Each day in VA over 270,000 staff at 1250 facilities use VISTA Point-of-Care Applications to create, store, and process over 4 million new documents, images, lab, and pharmacy orders in VISTA. In FY22, VHA provided over 115 million veteran care encounters using VISTA Point of Care Applications.

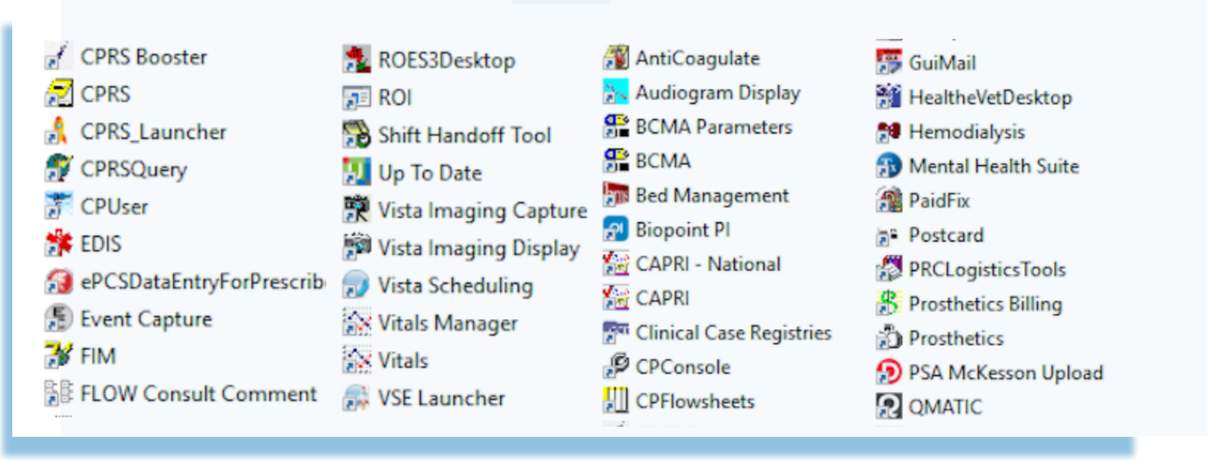
VHA Care Workflow



VISTA Database

- Contains 500 million veteran-years of cumulative data and knowledge
- Adds 4 million new documents, lab, imaging, and pharmacy orders each day

VISTA Apps



VISTA Apps

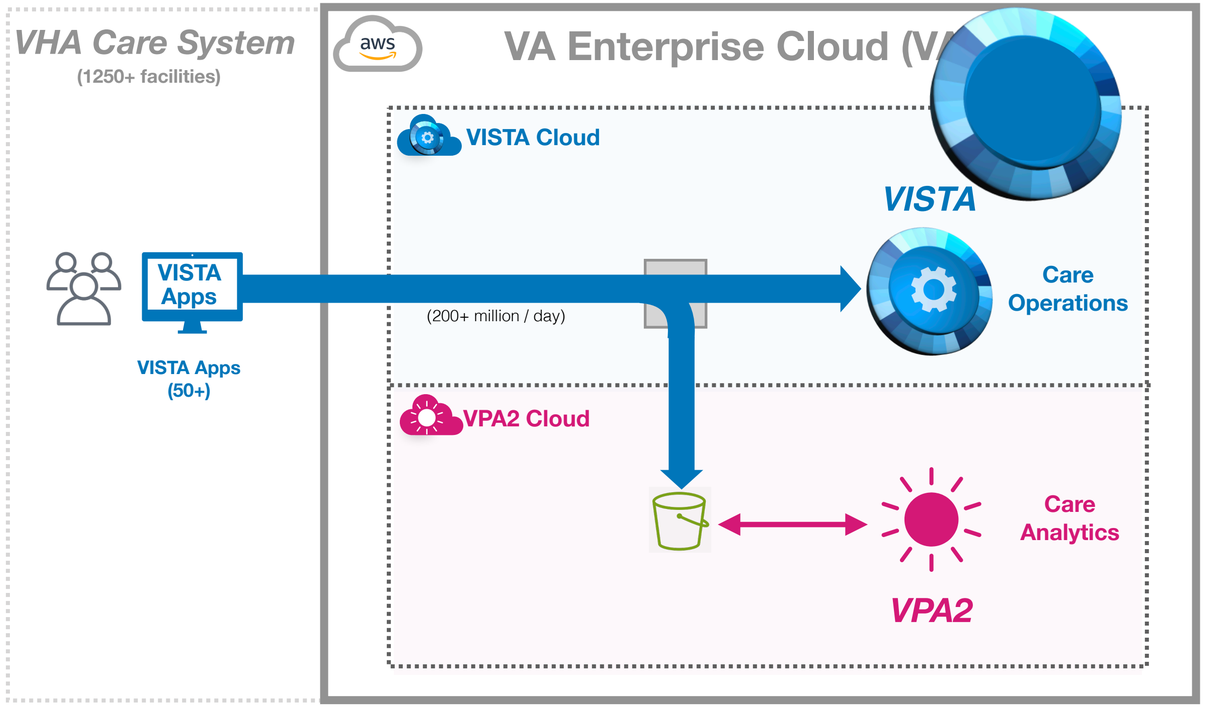
- VISTA Apps are a suite of 50+ applications installed on 400,000 desktop computers across all VAMCs
- VISTA Apps use the VISTA database for all transactions and storage
- VISTA Apps include CPRS, Brillians, Vista Imaging, and BCMA

VISTA Point of Care Application Analytics (VPA2)

VISTA Cloud App Analytics

VISTA App Analytics Implementation

All VISTA systems have been migrated to the VA Enterprise Cloud (VAEC), a federally-certified commercial cloud provided by Amazon Web Services (AWS). VPA2 leverages VISTA's new AWS-based platform and technology to provide secure cloud-native streaming capture and analytics of the use of VISTA Apps.



AWS is a leading commercial cloud services provider

VAEC-based VISTA inherits hundreds of new features, functionality, and services in the AWS cloud, including security, scalability, and traffic monitoring.

VPA2 is implemented in the same secure cloud infrastructure as VISTA, which enables streaming analytics of VISTA traffic and applications without limitations.

VISTA Cloud

VISTA: VHA Information Systems Technology Architecture
Care Apps: CPRS, Brillians, BCMA (and 50+ others)
VAEC: VA Enterprise Cloud
RPC: Remote Procedure Call (transaction)
AWS: Amazon Web Services
VPC: Virtual Private Cloud

U.S. GovCloud Certified