VA HEALTH CARE | Defining EXCELLENCE in the 21st Century

*VA Community Care*
*June 8, 2017*

# *Continuity of Veteran Care during EHR Migration and beyond:*

# *VISTA Data Project*


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## *A Joint Interagency Project with the U.S. Department of Defense, Defense Health Agency*

- VA-DoD Interagency Project
- Leverages DoD-developed EHR migration technology and approach
- Provides security, audit, analysis, and migration for all veteran data
- Creates Master Veteran Data Model for all veteran data
- Enables Master Veteran Data Repository for all veteran data
- Execution 2016-2018
- http://vistadataproject.info

# History of VHA/DHA Health Management Systems

## DHCP is the common base system

VHA: 151 hospitals; 820 clinics; 300 vet centers; + other (total 1700 care sites)
DHA: 57 hospitals; 350 clinics + other

VHA: 131 VISTA systems operational (since 1981)
DHA: 101 CHCS systems operational (since 1985)
Total: 232 DHCP-based systems across VHA-DHA

DHCP-based systems
Common technology projects
VHA-specific interface and workflow
DHA-specific interface and workflow

*Veterans Health Administration (VHA)*

**VHA**

operational client

operational database and workflow

**CPRS**

**VISTA (x131)**

*VISTA Data: 3000+ files; 55,000+ fields*

**Common Base System**

**DHCP**

**joint technology projects**

TAPS
**VDP** *
**Janus (JLV)**
iEHR

*Defense Health Administration (DHA)*

**DHA**

operational database(s) and workflow

operational client

**CHCS (x101)**

*CHCS Data: 1000 files; <20,000 fields*

**CDR / MDR**
**AHLTA**
Genisys

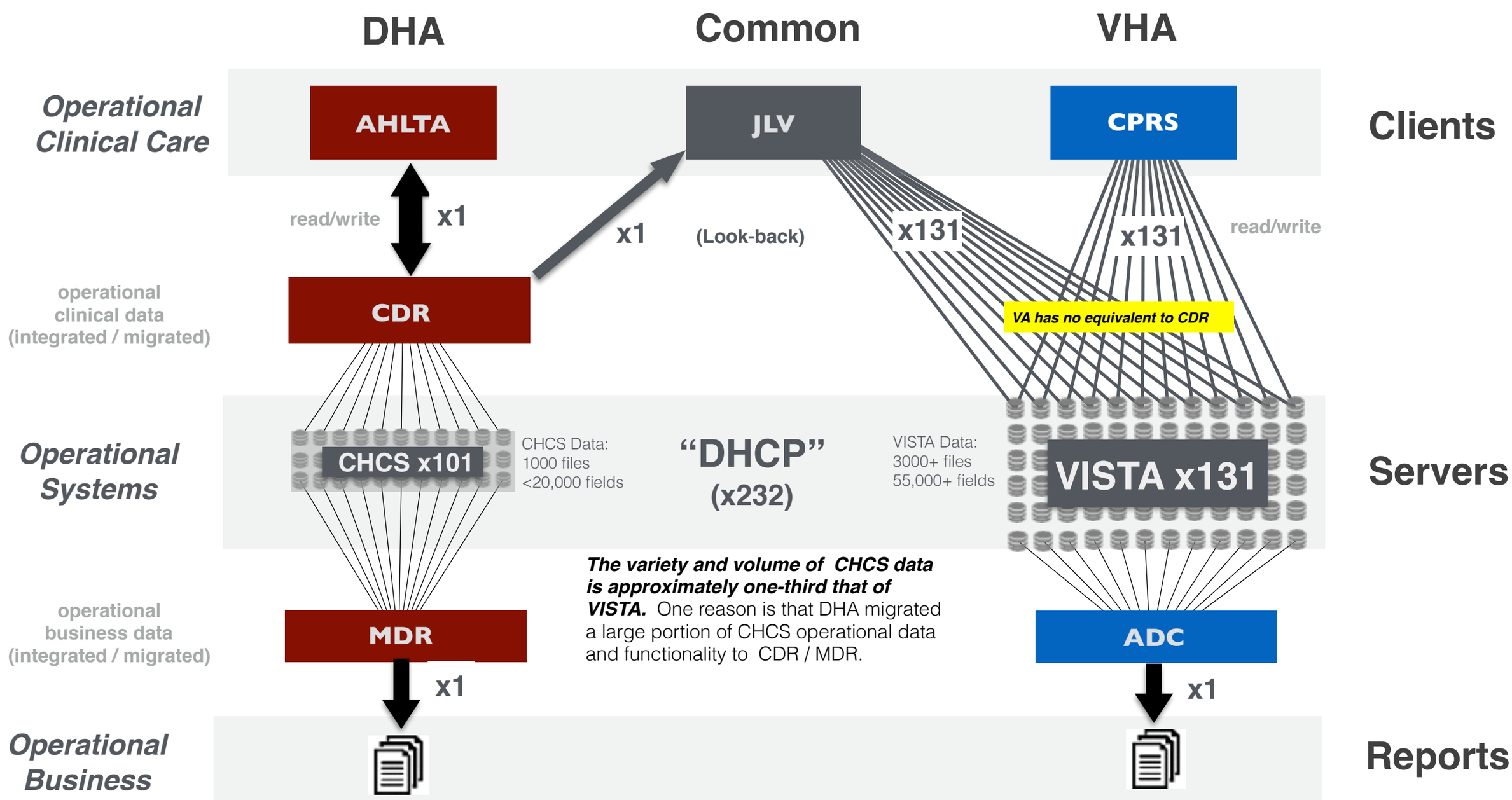
While DHCP was initially the same in VHA and DHA, it has diverged over time. The most significant fork occurred in 2004 when DHA standardized and migrated a large portion of operational data and functions from CHCS to CDR and MDR databases. Currently the variety, volume, and function of CHCS data is approximately one-third that of VISTA.

| | 1980 | 1990 | 2000 | 2010 | 2017 |
|---|---|---|---|---|---|
| VHA-specific | | **VISTA** | CPRS | | |
| Common | **DHCP** | | JLV | iEHR TAPS | VDP |
| DHA-specific | | **CHCS** | AHLTA / CDR | | Genesis |

Note: Time scale simplified for clarity

1981 - DHCP - Decentralized Hospital Care Program - VA Fileman database and applications [VHA]
1985 - CHCS - (DHCP renamed to) Composite Health Care System; modified for DHA use [Leidos (SAIC)]
1994 - VISTA - (DHCP renamed to) Veterans Information Systems Technology Architecture [VHA]
1997 - CPRS - Computerized Patient Record System - graphical interface and workflow [VHA]
2004 - AHLTA/ CDR/ MDR - Armed Forces Health Longitudinal Technology Application [Northrup Grumman]
2003 - Janus - Interagency viewer (renamed to JLV in 2011) [DHA-VHA]
2011 - iEHR - Integrated Electronic Health Record [ SMS ]
2013 - TAPS - Transition Application Plan Support [DHA-VHA]
2016 - MHS Genisys (COTS EHR - Cerner)
* **2016 - VDP - VISTA Data Project [DHA-VHA]**

# Current State of VHA/DHA Systems




***The variety and volume of CHCS data is approximately one-third that of VISTA.*** One reason is that DHA migrated a large portion of CHCS operational data and functionality to CDR / MDR.

***DHA has standardized and migrated much its operational clinical and business data from CHCS into CDR, allowing read-write access to longitudinal health data while retiring CHCS, without loss of continuity of care.***

***VHA has not yet decided on its long-term strategy for migration of longitudinal Veteran operational business and clinical data. There is no equivalent of a CDR in VHA. VA remains fully dependent on VISTA for all clinical and business operations.***

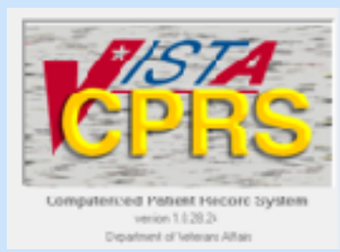
AHLTA - User Interface
CHCS - Composite Healthcare System (All operational data)
MDR - Military Data Repository (Operational business data)
CDR - Clinical Data Repository (Operational clinical data

CPRS - User Interface
VISTA - VA Information Systems Architecture (All operational data)
ADC - Austin Data Center (Operational business data)

# VA workflow: Captured in VISTA Server

**CLIENTS**
**(User Interfaces)**

**Terminal Interface**
(integrated in VISTA server)




**Graphical Interface**
(remote from VISTA server)

**1981** **1997** **2017**

**INTEGRATED SERVER:**

**Database + Applications + Workflow Engine + Integration Engine + Terminal Interface**

ScreenMan

**RPCs (workflow)**

**VISTA Server (x131)**

1980 1990 2000 2010 present

***Because the VISTA server's remote procedure call (RPC) interfaces captures all the clinical and business operational workflow of the CPRS client, migrating VISTA "server-first" captures and ensures VA continuity of care and business processes.***

VISTA Data Project
https://vistadataproject.info

# VISTA Data Project

## Phase I: Stepwise Server Migration while maintaining Continuity of Care

**Key Features - Phase I (FY16-17)**

- Proven, stepwise VISTA Server migration
- Provides seamless continuity of care (CPRS/JLV)
- Formalizes and preserves Veteran Care Model
- Formalizes and preserves Veteran Business Model
- Allows retirement of legacy MUMPS VISTA [spaghetti]
- Provides COTS / EHR migration foundation

## Current VISTAs

CPRS / JLV ….

*RPC Interfaces (x 1000s)* or *Insecure Asymmetric Opaque Legacy MUMPS Code-driven Interfaces*

**VISTA Server**

RPC Interfaces (x1000's)

VISTA Applications (x180)

VA Fileman Database

**MUMPS-driven VISTA Server**
***(maintenance and growth issues)***

### Key Features

- *Measurable, Stepwise Migration from Legacy VISTA server*
- *Leverages DoD-funded migration tooling for VA systems*
- *Migrates to model-driven server, based on CPRS blueprint*
- *Executable Master Data Model, regression tested*
- ***Maintains continuity of care:***
  - *CPRS continues to run without change*
  - *JLV continues to run without change*
- *Provides new National Veteran Care Services interface*
- *Enables new, mobile and web clients*

***Stepwise, Measurable Server Migration***

Time

Pass Thru

Pass Thru | Emul

Pass Thru | Emulate

Pass | Emulate

Emulate / REST

## VISTA Data Project

CPRS / JLV (current continue)

Web/Mobile Cloud/COTS (new enabled)

or

***Single Secure Symmetric Modern Model-driven Interface***

RPC Emulator | REST

Clinical Domain Services

Master VISTA Data Model

VISTA Data Model

VA Fileman Database

Node

**New Server**

**Structured VISTA Server**
***(mainstream, extensible technology)***

M Legacy VISTA (MUMPS)

Master Data Model - Node.js Driven VISTA (no MUMPS)

### Strategic Benefits

- ***New, maintainable veteran care server*** *based on* ***mainstream technology***
- *New web and mobile clients enabled with mainstream technology*
- *Current clients (CPRS/JLV) supported and enforce continuity of VA Care coverage*
- ***May now safely incrementally retire legacy MUMPS VISTA*** *[spaghetti]*
- *(Some) Clinical Domain Services may be implemented over COTS* ***(EHR Migration)***

**VISTA Data Project**
*https://vistadataproject.info*

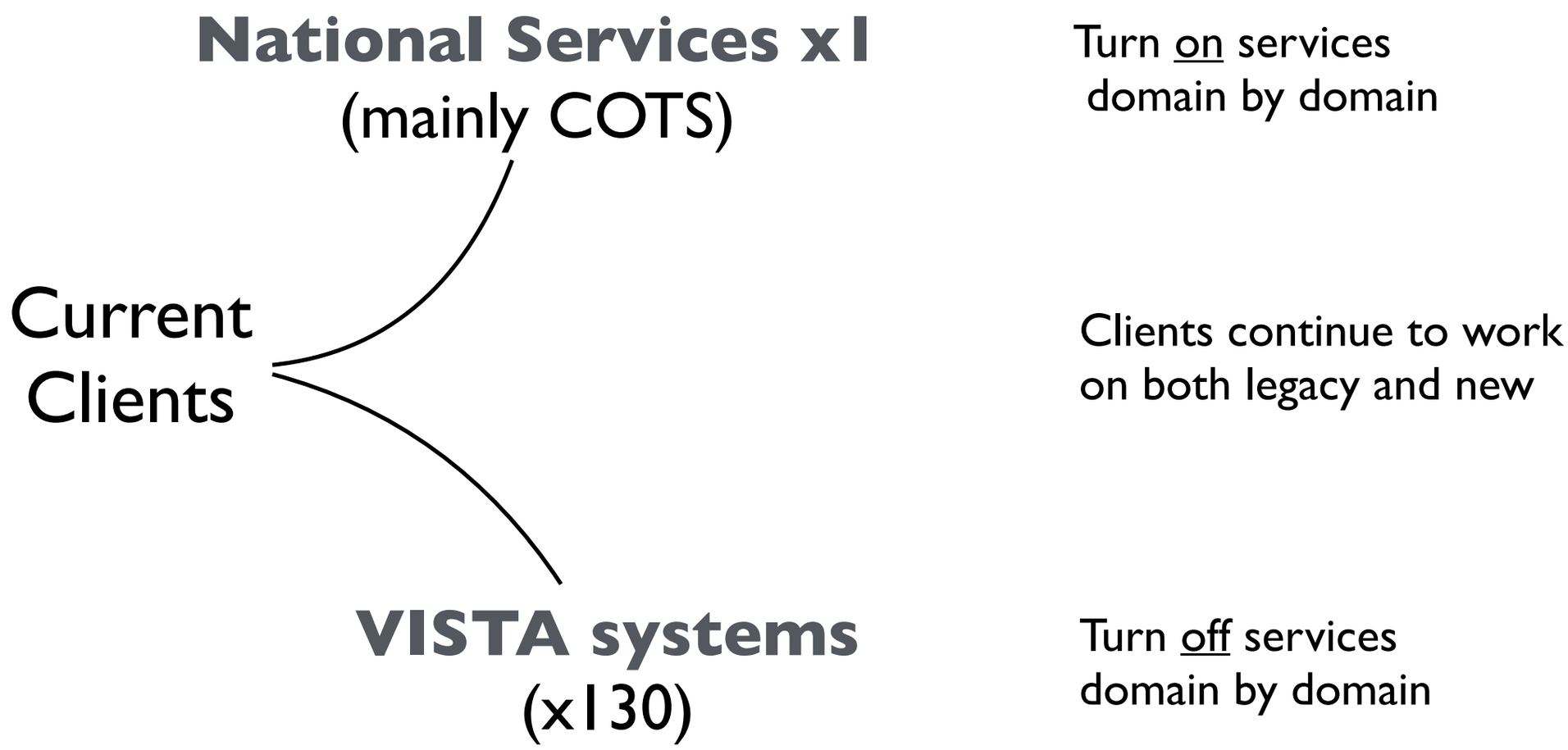
# VISTA Data Project

***Phase II: National services migration to Centralized Cloud-based Services***

**Key Features - Phase II (FY18-19)**

- Leverage proven stepwise VISTA Server migration
- Provides seamless continuity of care (CPRS/JLV)
- Formalizes and preserves Veteran Care Model
- Formalizes and preserves Veteran Business Model
- Allows retirement of legacy MUMPS VISTA application
- Provides national COTS / EHR migration

*VISTA Server and Services Migration: Allow clients to continue to work while services are migrated from decentralized VISTA systems to a centralized national service, domain by domain.*



VISTA Data Project
https://vistadataproject.info

# VISTA Data Project

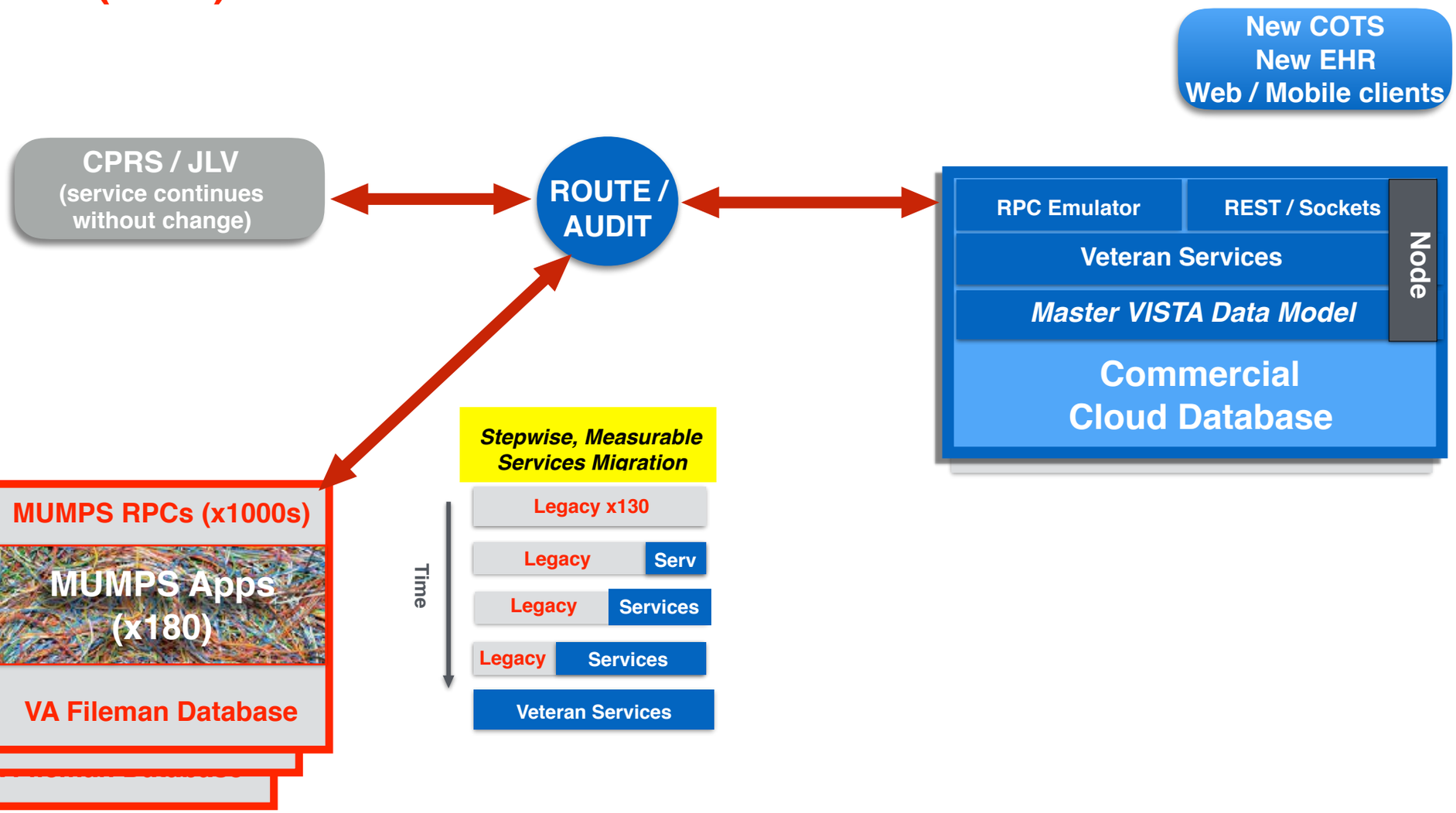
*Stepwise Server Migration*
*to single Centralized Services*

**Key Features - Phase II (FY18-19)**

- Leverage proven stepwise VISTA Server migration
- Provides COTS / EHR migration foundation

## Decentralized VISTA Systems (x130)

## Centralized Veteran Care Services




**130 x Local Legacy VISTA Servers**
***(insecure and due for retirement)***

**Model-backed Cloud Service**
***(mainstream, modular, extensible)***

**VISTA Data Project**
*https://vistadataproject.info*

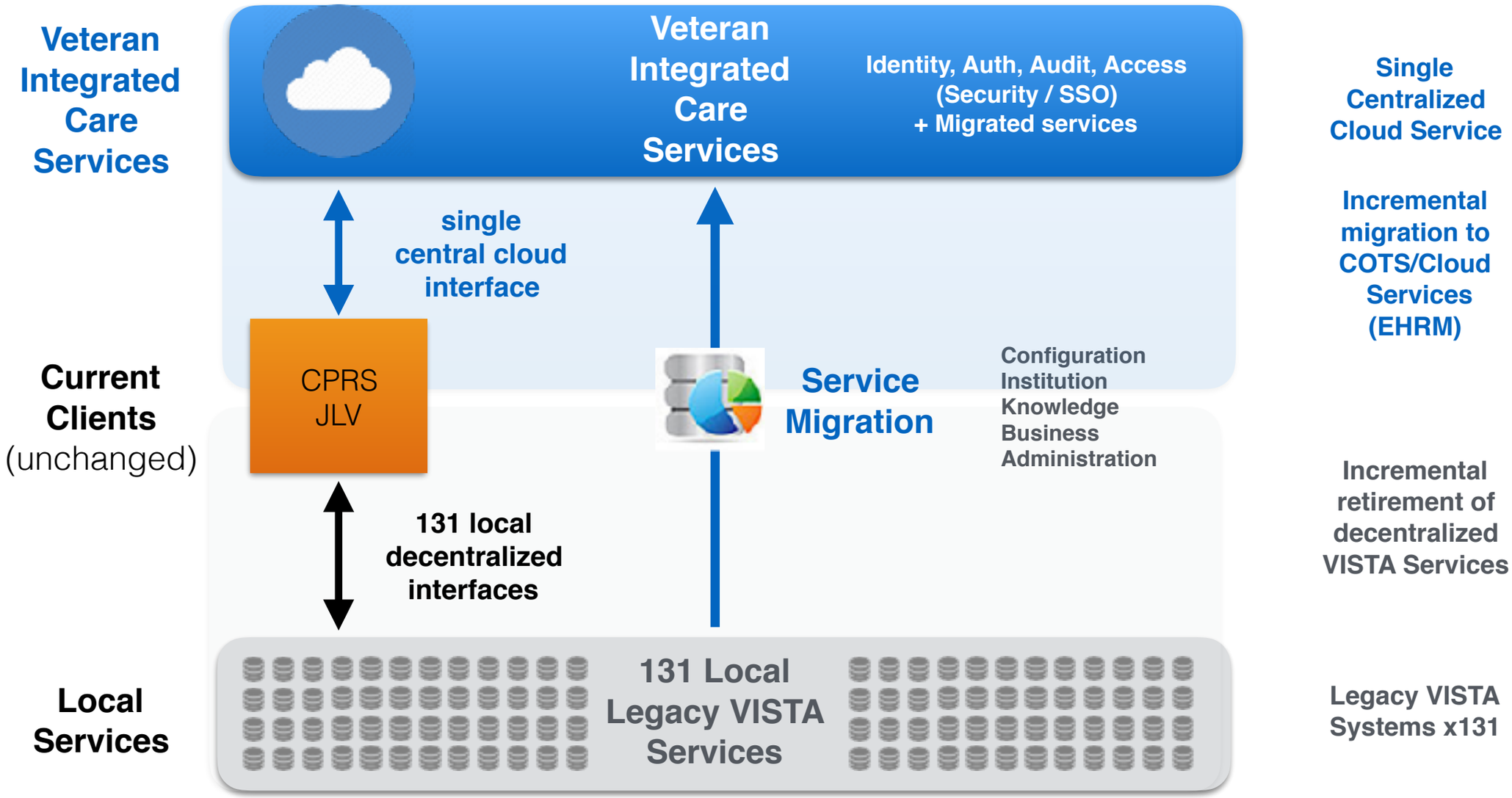
# VISTA Data Project

## *Phase II: National services migration to Centralized Cloud-based Services*

**Key Features - Phase II (FY18-19)**

- Leverage proven stepwise VISTA Server migration
- Provides seamless continuity of care (CPRS/JLV)
- Formalizes and preserves Veteran Care Model
- Formalizes and preserves Veteran Business Model
- Allows retirement of legacy MUMPS VISTA application
- Provides national COTS / EHR migration

Approach: Incrementally deconstruct and **migrate VistA services to Best-of-Breed *national cloud services which are backwards-compatible to existing VistA clients*;** then re-route VistA clients to these new national services instead of any local VistA. SAFE: Non-disruptive. Incremental migration to Best of Breed COTS / services with no impact on current end-users. The clients remain unchanged; only the back-end services change, invisible to the end-user.



# VA EHR Migration

PROPOSED

*Migrate to COTS/Cloud-based National EHR following the proven VISTA Data Project strategy*

## Current System

### Local Legacy VISTA Servers

**Clients**
(care specifics)

**CPRS / JLV**

*RPC Interfaces (x 1000s)*

or

*Insecure Asymmetric Opaque Legacy MUMPS Code-driven Interfaces*

**Local Servers (x131)**

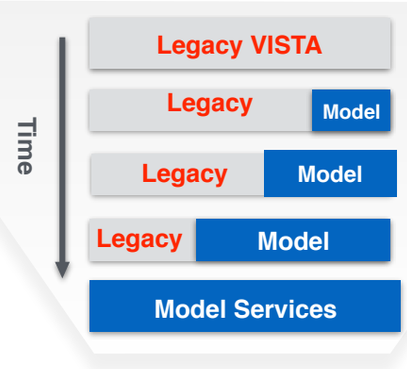
- RPC Interfaces
- VISTA Applications
- VISTA Database

**VA Proprietary**

## Key Features

- *VISTA Data Project's Proven Migration Strategy*
- *Move to Single Veteran Integrated Care System*
- *Integrate best-of-breed COTS*
- ***Incrementally retire 131 VISTAs***
- ***Maintains Continuity of Care***
  - *CPRS continues to run without change*
  - *JLV continues to run without change*
- *Enable new mobile and web clients*

***Proven Migration Strategy of VDP***




## OneVA Care System

### National Veteran Care Services

**CPRS / JLV (continue)**

**New web/mobile (enabled)**

**Clients**
(current + new)

*Secure Symmetric Modern Node.js Model-driven Interface*

*x1*

**MVDM Services Interface**

**Cloud EHR Server (x 1)**

- Emulator
- REST
- Node
- *MVDM Services*
- VA-specific applications
- Commercial EHR

**Specialized Veteran Care Services with integrated COTS EHR**

M Legacy VISTA (MUMPS)

Master Veteran Data Model (MVDM) Services

Industry Standard Modules (NEW)

## Strategic Benefits

- *Single Integrated Veteran Care System*
- *Guarantees continuity of veteran care and services during migration*
- *VA stops maintaining features available in COTS / Cloud EHR*
- *Easily add new clients and services for providers and veterans*

# Resources

**Web:** vistadataproject.info

**Github:** github.com/vistadataproject

**Contact:** rafael.richards@va.gov

# VISTA Data Project

*Stepwise Server Migration while maintaining Continuity of Care*

***Enables Cloud-based, COTS-integrated***
***National Veteran Care Services***
***Preserving Continuity of Care***

**Clients**

***Supports the current…***



***CPRS*** ***JLV*** ***VPR***

***Enables the new…***

***web mobile commercial***

**Current and New Clients**

***Security Enhanced***

***Secure***
***Symmetric***
***Modern Node.js***
***Model-driven***
***Interface***

***Veteran Care Specifics maintained***

**Servers**

**RPC Emulator** **VPR Emulator** **REST**

**Clinical Domain Services**

**Master VISTA Data Model**

**VISTA Data Model**

**VA Fileman Database**

**Node**

**node VISTA**

**New, Structured VISTA Server**
***(mainstream, modular, extensible)***

# VA Community Care
## June 8, 2017

***A Joint Interagency Project with the***
***U.S. Department of Defense, Defense Health Agency***

# *VA EHR migration: A Big Data Problem*

**Objective**

***VA needs to migrate from VISTA to a new EHR, while***

- Providing continuity of all care and business processes
- Preserving all historical Veteran data - both clinical and business, and
- Making all historical data accessible and computable going forward

**Problem**

***VA has 30+ years of business and clinical data contained in 131 VISTA systems, each with a specialized, unique data model.***

**Solution**

**VISTA Data Project: "Data migration follows Model migration"**

- Phase I (2016-17): Make all Veteran data in all VISTA systems securely accessible, usable, and computable using a single, standardized, national Master Veteran Data Model (MVDM)
- Phase 2 (2017-18) Based on the MVDM, create a full fidelity copy of all data from all VISTA systems in a single, centralized, commercial cloud-based Master Veteran Data Repository (MVDR)

# VA EHR Modernization:
## A Big Data Problem

**Objective** ***VA needs to migrate from VISTA to a new EHR, while***

- Providing continuity of all care and business processes
- Preserving all historical Veteran data - both clinical and business, and
- Making all operational data accessible and usable going forward

**Problem**

- ***VA has 30+ years of business and clinical data contained in 131 VISTA systems, each with a specialized, unique data model, BUT***
- ***VA has no master operational data repository (like DHA's CDR) to preserve and make available all clinical and business operational data to enable continuity of services during migration and beyond.***

**Solution** Following DHA's risk mitigation strategy: Create a full fidelity copy of all data from all current VA VISTA systems in a single, centralized, commercial, cloud-based, operational data repository - the Veterans Data Repository (VDR) - to provide continuity of care and services during EHR migration and beyond.

# VISTA Data Project

***Stepwise measurable migration of current VISTA data and applications to the Master Veteran Data Model (MVDM) while maintaining Continuity of Care***

***The MVDM is derived from the native as-is Veteran Data Model of all 131 VISTA Systems and describes with full fidelity all operational clinical and business data***

**MUMPS VISTA Interfacing**

***MUMPS Interfaces (x 1000s)***

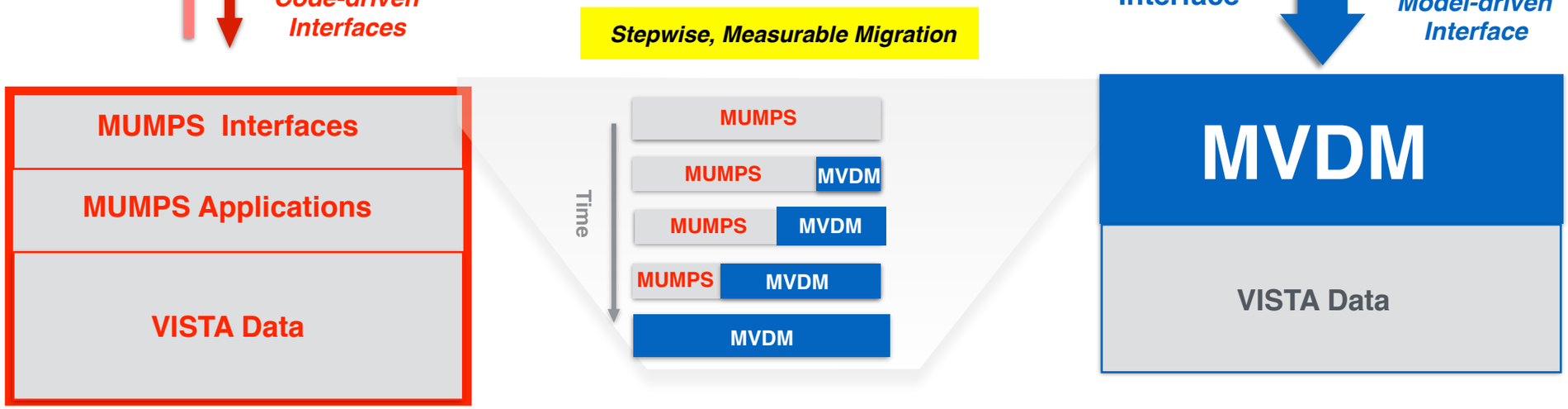
or

***Insecure Asymmetric Opaque Legacy MUMPS Code-driven Interfaces***

**Modern, Web-standard Veterans Service Interface**

**Single Services Interface**

***Secure Symmetric Documented Modern Node.js Model-driven Interface***



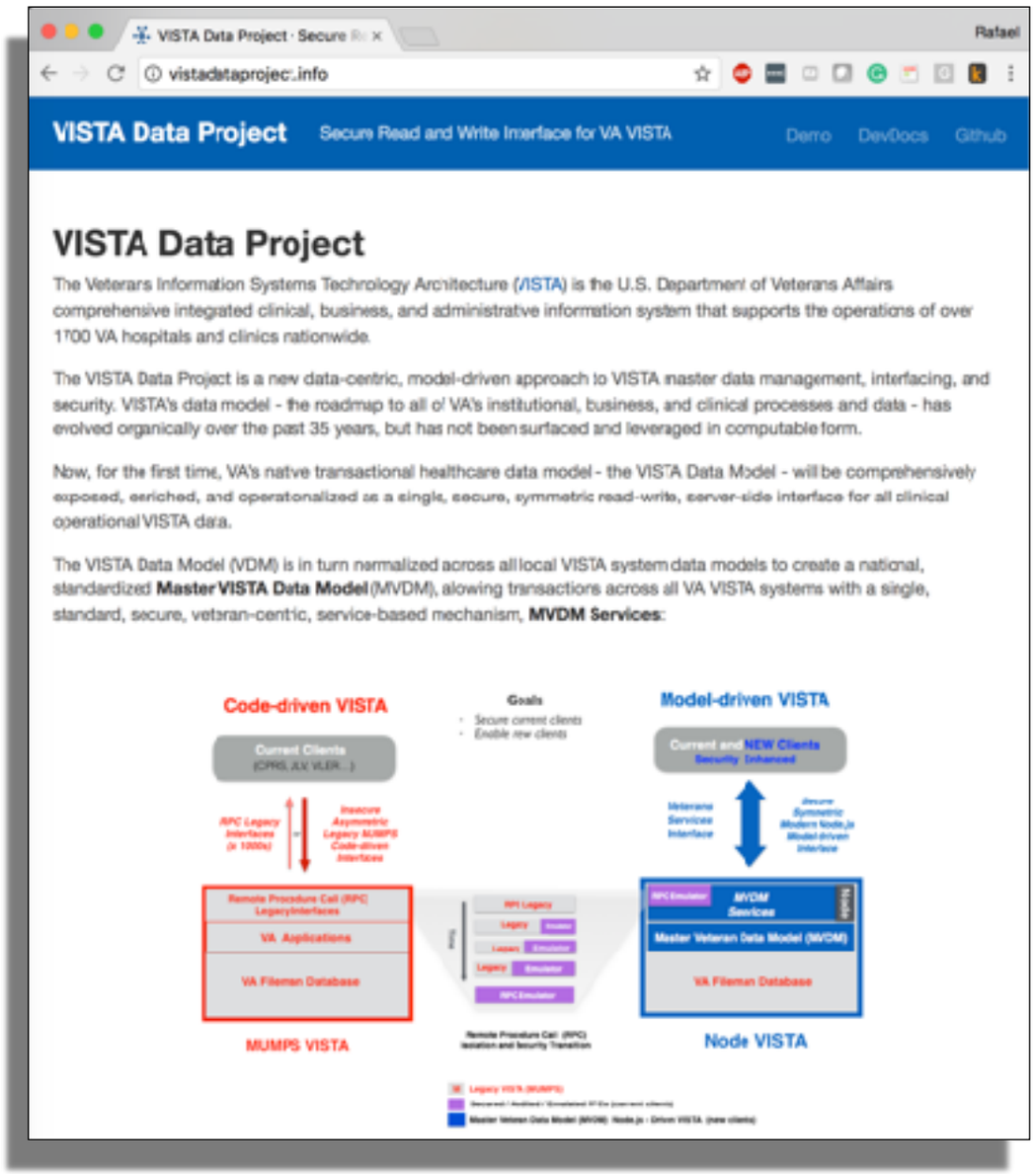

**MUMPS-driven Server *(maintenance, growth, and usability issues)***

- *Measurable, Stepwise Migration from Legacy VISTA server*
- *Leverages DoD funded EHR migration tooling for VA EHR*
- *Migrates to modern, model-driven server*
- ***Maintains continuity of care***
  - *CPRS and JLV continue to run without change*
- *Enables new National Veteran Care and Business Services*
- *Enables creation of comprehensive Veteran Data Repository*

**Structured Data Server *(mainstream, modular, modern, and extensible)***

# VISTA Data Project

***Stepwise measurable migration of current VISTA data and applications to the Master Veteran Data Model (MVDM) while maintaining Continuity of Care***




## Website

***http://vistadataproject.info***

## Demo

***http://vistadataproject.info/demo***

## Docs

***https://github.com/vistadataproject/documents***

## Contact

***rafael.richards@va.gov***

# Master VISTA Data Model

## Enables National Veteran Clinical and Business Services Migration

### More than 50% of VISTA data is VA Business function

### Content of largest 30 files in a VISTA system

| | # | File | Count |
|---|---|---|---|
| Clinical | P1 | IMAGE (2005) | 5,728,923 |
| Business | P2 | AR TRANSACTION (433) | 5,595,597 |
| Clinical | P3 | GMRV VITAL MEASUREMENT (120.5) | 5,582,099 |
| Clinical | P4 | V CPT (9000010.18) | 5,533,193 |
| Business | P5 | ENROLLMENT/ELIGIBILITY UPLOAD AUDIT | 5,525,976 |
| Clinical | P6 | ORDER (100) | 5,243,872 |
| Clinical | P7 | TIU DOCUMENT (8925) | 4,588,982 |
| Clinical | P8 | VISIT (9000010) | 4,465,018 |
| Clinical | P9 | OUTPATIENT ENCOUNTER (409.68) | 4,385,585 |
| Business | P10 | BCMA MEDICATION LOG (53.79) | 3,901,198 |
| Clinical | P11 | V POV (9000010.07) | 3,640,303 |
| Clinical | P12 | V PROVIDER (9000010.06) | 3,446,623 |
| Business | P13 | ACRP TRANSMISSION HISTORY (409.77) | 3,122,925 |
| Business | P14 | TRANSMITTED OUTPATIENT ENCOUNTER | 2,697,388 |
| Business | P15 | IMAGE ACCESS LOG (2006.95) | 2,524,259 |
| Business | P16 | PATIENT ENROLLMENT (27.11) | 2,386,762 |
| Business | P17 | IB COPAY TRANSACTIONS (354.71) | 2,291,380 |
| Business | P18 | BCMA REPORT REQUEST (53.69) | 2,119,037 |
| Business | P19 | INTEGRATED BILLING ACTION (350) | 2,065,742 |
| Business | P20 | CLAIMS TRACKING (356) | 1,989,049 |
| Business | P21 | ADT/HL7 PIVOT (391.71) | 1,987,001 |
| Clinical | P22 | PRESCRIPTION (52) | 1,863,696 |
| Business | P23 | ORDER CHECK INSTANCES (100.05) | 1,486,470 |
| Business | P24 | UNIT DOSE EXTRACT DATA (728.904) | 1,475,497 |
| Business | P25 | ACCOUNTS RECEIVABLE (430) | 1,466,346 |
| Clinical | P26 | V HEALTH FACTORS (9000010.23) | 1,462,325 |
| Business | P27 | IVM FINANCIAL QUERY LOG (301.62) | 1,439,880 |
| Business | P28 | IVM TRANSMISSION LOG (301.6) | 1,285,905 |
| Business | P29 | IB BILL/CLAIMS DIAGNOSIS (362.3) | 1,264,869 |
| Business | P30 | BCMA UNABLE TO SCAN LOG (53.77) | 1,239,098 |

| | |
|---|---|
| Total files | 91,804,998 |
| Clinical files | 40,211,696 |
| Business files | 51,593,302 |


VISTA Packages (total 180)


VISTA Files (largest 30)


VISTA Data (>90 million)

# Master VISTA Data Model

*Enables National Veteran Clinical and Business Services Migration*

*More than 50% of VISTA data is VA Business function*

*VISTA Packages (total 180)*


*VISTA Files (largest 30)*


*VISTA Data (>90 million)*

# Master Veteran Data Model

*Enables National Veteran Clinical and Business Services Migration*

## Master VISTA Data Model

**Veteran Business Services**

- Non-VA Care
- Outpatient orders
- Work credit
- Enrollment / Eligibility
- Billing / Payment


**Veteran Clinical Services**

- VA Care
- Current EHR interfaces
- EHR migration

*VISTA Packages (total 180)*


*VISTA Files (largest 30)*


*VISTA Data (>90 million)*

# nodeVISTA Stack

## Clean, Modular, Separation of Functionality

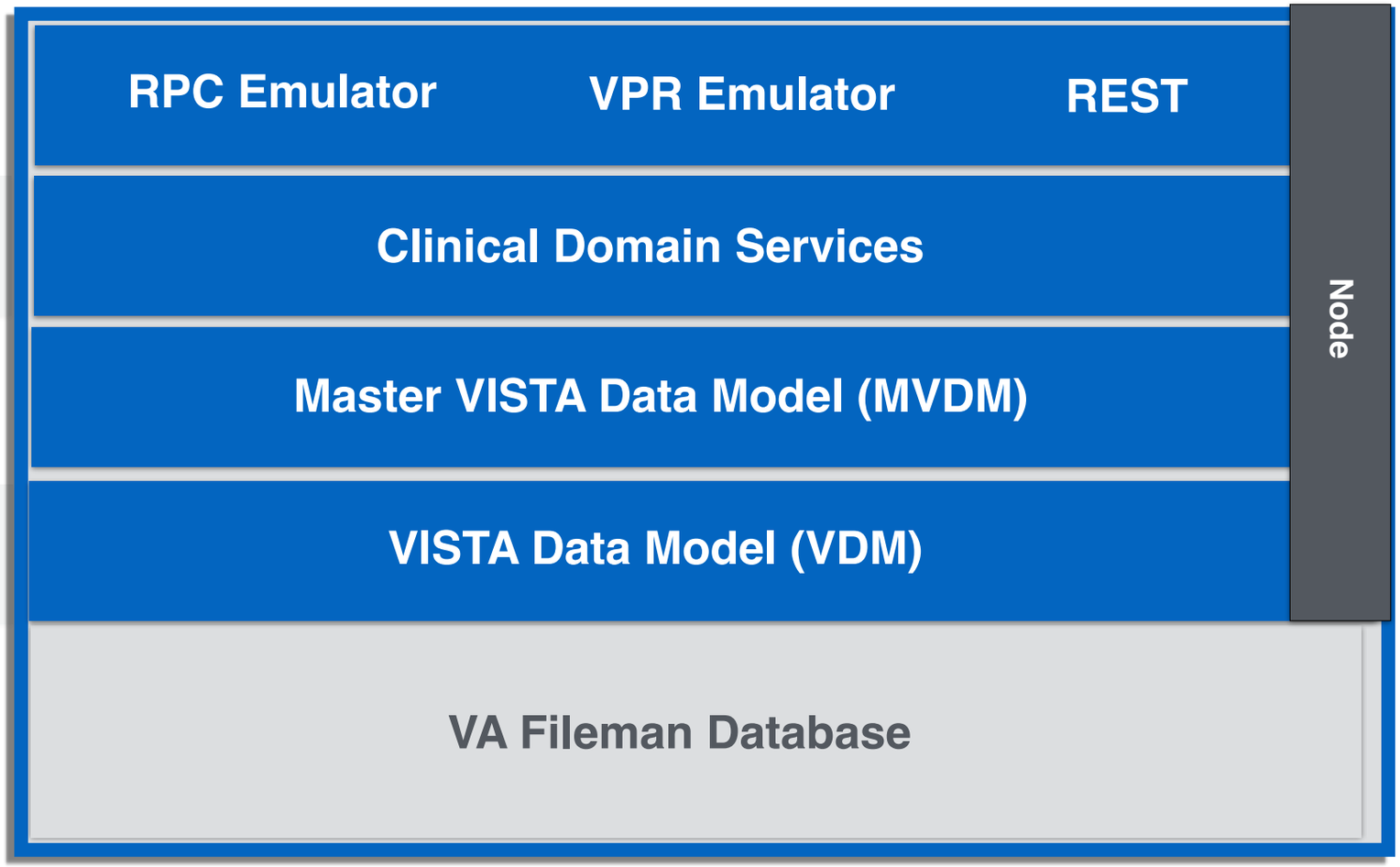
- Emulation and New Interfaces
- All reduce to same service interactions

- (Problem, Pharmacy …) Services over MVDM
- Patient level selection and security

- Normalizes VDM
- Distinguishes Veteran and Patient/Clinical specifics
- A Clean “CRUD+R”/Events paradigm

- Transparent JSON of the native model
- Read for 100% data in FileMan
- Write Tested for MVDM covered classes

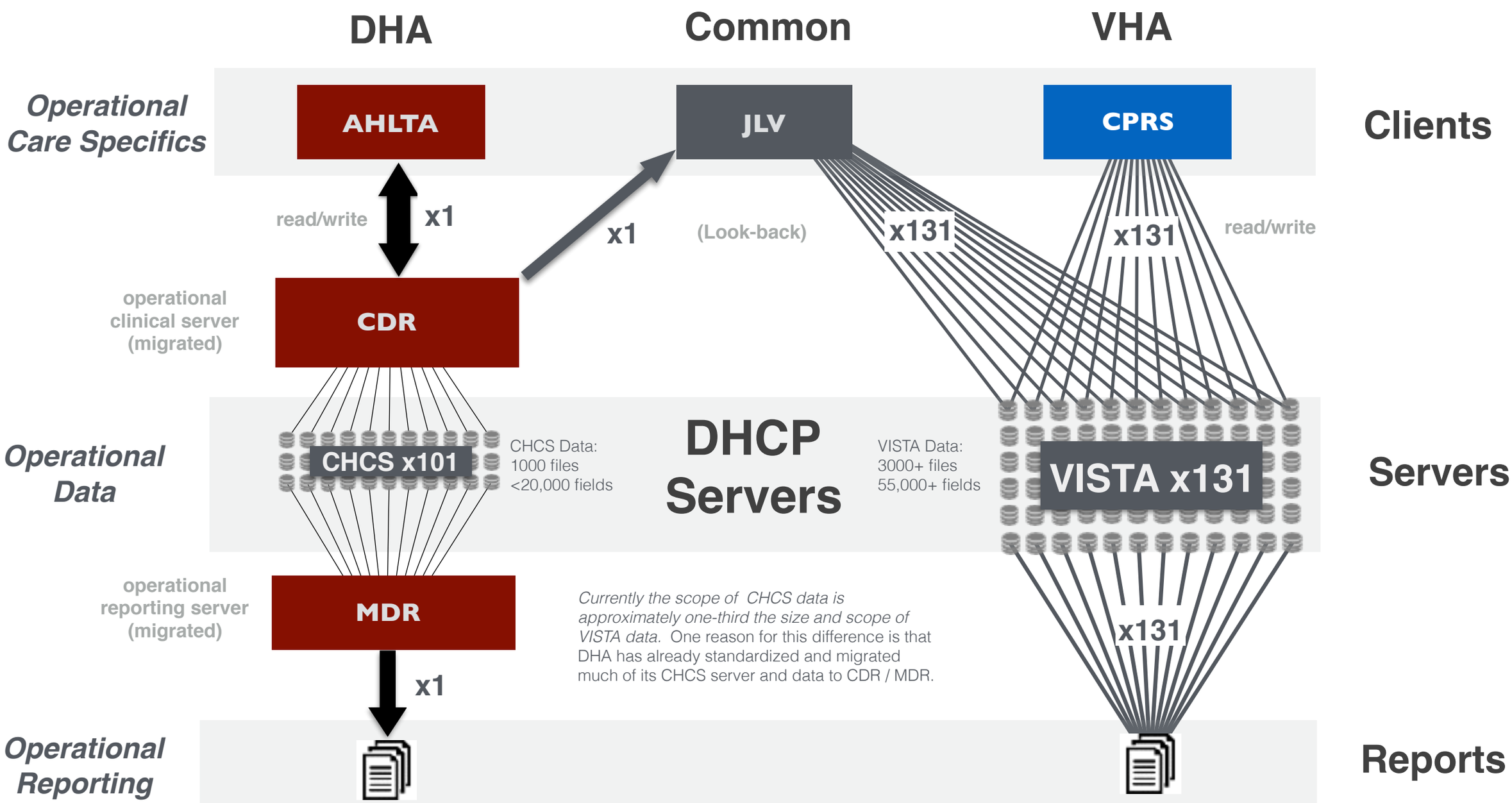
- All interaction through formal FileMan API
- Only FileMan changes fix Data Dictionary (DD)




**Structured VISTA Server**
**(mainstream, modular, extensible)**

Javascript/Node.js

# Continuity of Care Risks in migrating from DHCP Servers (CHCS/VISTA)




DHA migrated its operational server and data to MDR / CDR in 2004.

| DHA | Source | Migration | Risk |
|---|---|---|---|
| Military-specific care | AHLTA | ? | ? |
| DoD Custom Reports | CHCS x101 | **MDR** (read-only) | MEDIUM |
| Longitudinal Care (Look-back) | CHCS x101 | **CDR** (read-only) | LOW |

VHA has not migrated its operational server or data.

| VHA | Source | Migration | Risk |
|---|---|---|---|
| Veteran-specific care | VISTA x131 | **NONE** | HIGH |
| VA Custom Reports | VISTA x131 | **NONE** | HIGH |
| Longitudinal Care (Look-back) | VISTA x131 | **NONE** | HIGH |

# CPRS: Blueprint for VA Longitudinal Care

## *CPRS is VISTA to Physicians, and Embodies Veteran Care specifics*

### Veteran-specific

**Built specifically around veteran care policies and practice**

**Department of Veterans Affairs** **Memorandum**

Date: OCT 17 2012

From: Deputy Under Secretary for Health for Operations and Management (10N)

Subj: National Patient Record Flag for High Risk for Suicide

To: Network Director (10N1-23)
Chief Medical Officer (10N1-23)
Network Mental Health Liaisons

1. The purpose of this memo is to provide guidance for the implementation of a new Category I Patient Record Flag (PRF) for High Risk for Suicide.

***Agent Orange***

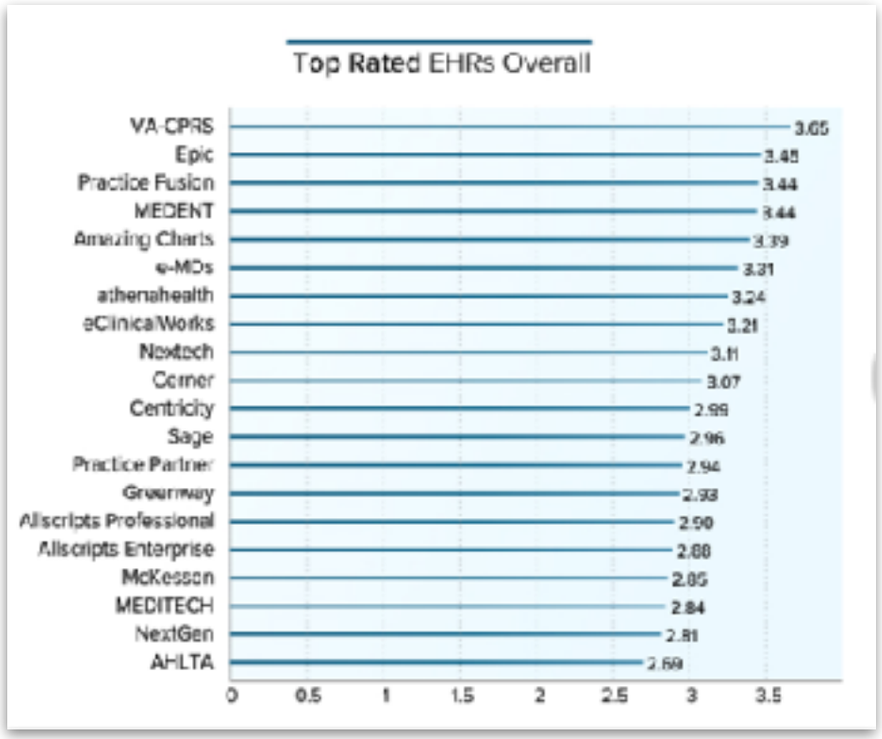
Agent Orange (AO) is an herbicide that was used in Vietnam between 1962 and 1971 to remove unwanted plant life that provided cover for enemy forces. The VA has recognized the following conditions as associated with but not necessarily caused by exposure to Agent Orange:

- AL Amyloidosis
- Diabetes (type 2)


### Physicians favorite

**Medscape EHR Report 2016: Physicians Rate Top EHRs**

Carol Peckham, Author; Leslie Kane, Sr. Director, Medscape Business of Medicine; Susanna Rosensteel, Editor | *August 25, 2016*



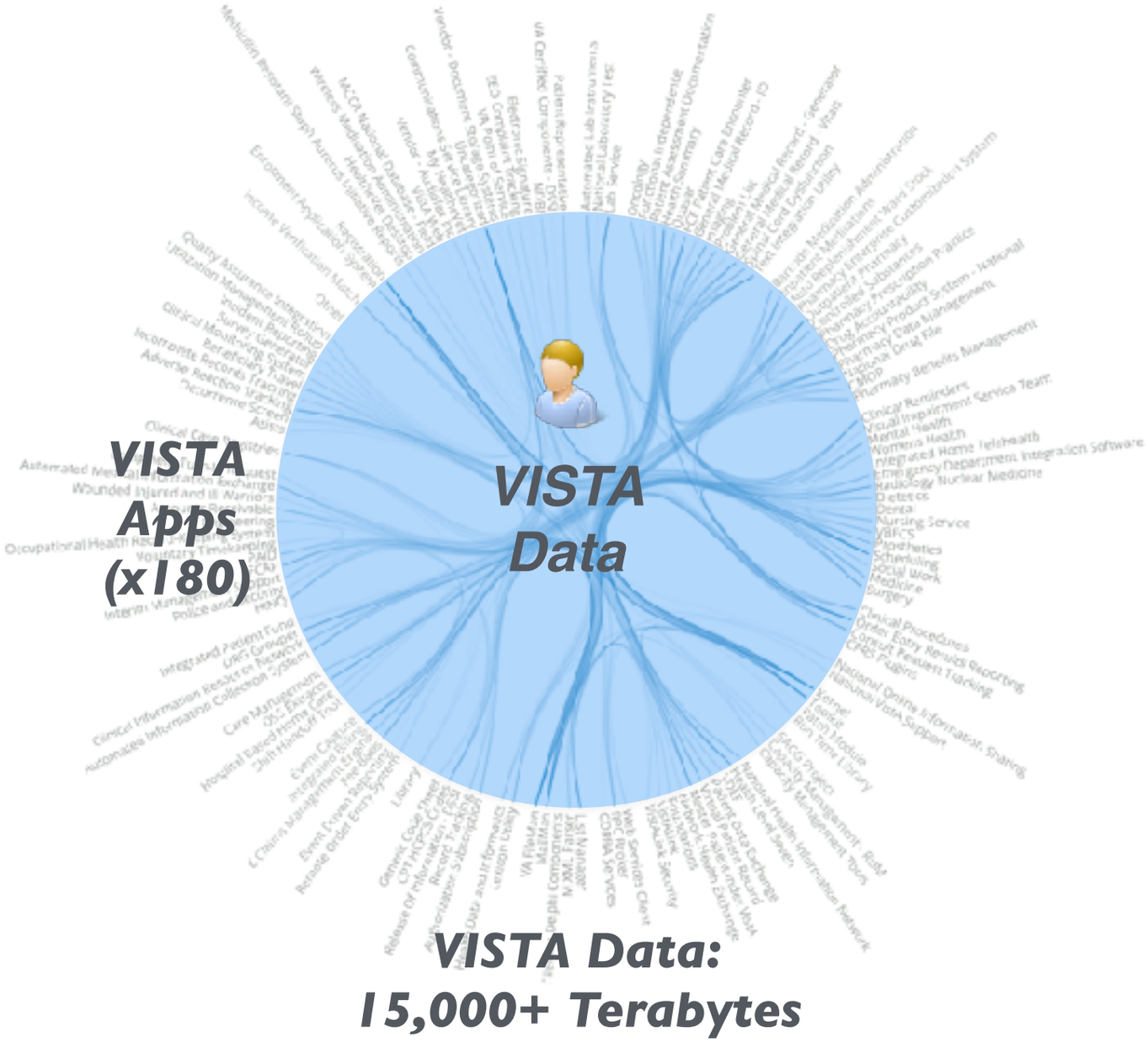

http://www.medscape.com/features/slideshow/public/ehr2016

***Opportunity:***
***Supporting CPRS (for a period) ensures continuity of Veteran and VA-specific care and practices as VA's EHR is migrated.***

# *Veterans Information Systems Technology Architecture (VISTA)*

## *Single, Integrated Inpatient/Outpatient Veteran-Centric Health Information Platform*

***All Apps. All Data. Integrated.***




### *Single Integrated Veteran-Centric Information Platform*

The data architecture of VISTA consists of over 180 applications for clinical care and administration integrated within a single common database.

Both business logic (Applications) and data (Database) are managed within the same data-application transaction engine. This provides the tight integration of applications to data, and to a single common integrated database.

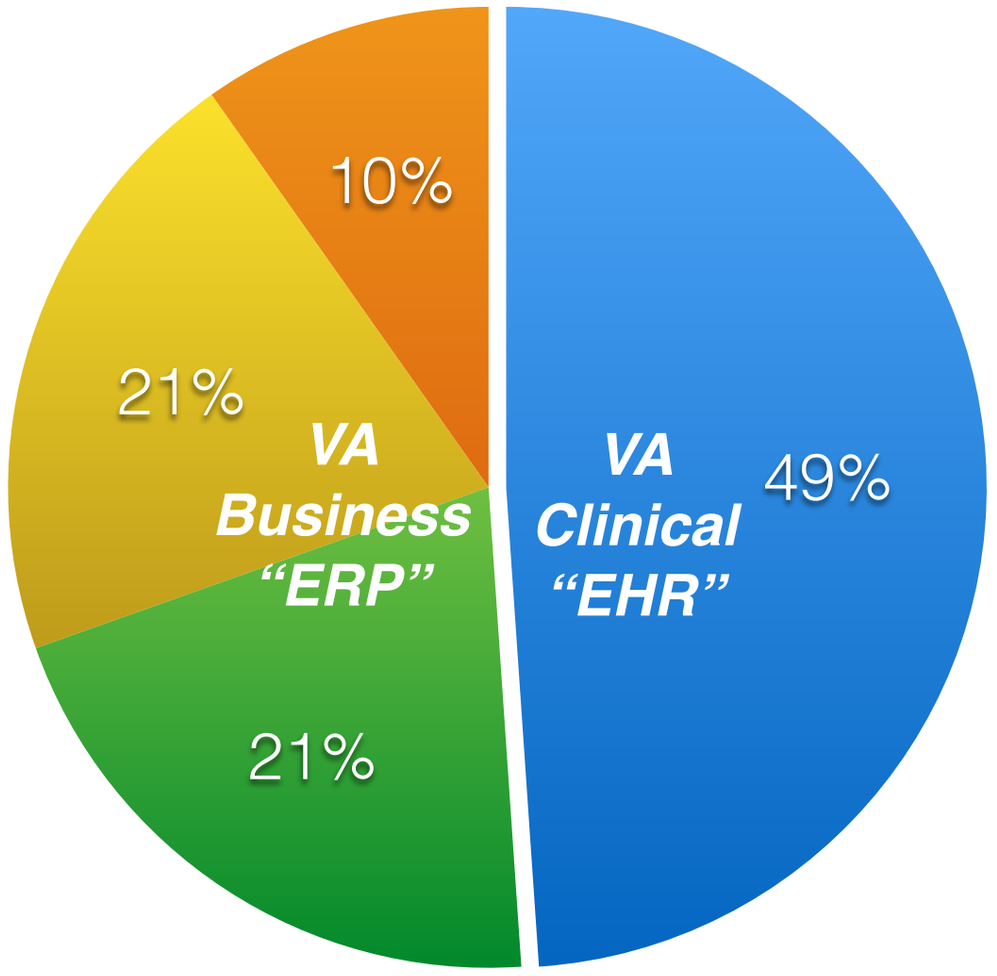
The integration between VISTA applications (outer ring) and VISTA data (inner circle) is visualized, showing the data flow between 180 applications and the shared, single, common patient data.

https://en.wikipedia.org/wiki/VistA

# VISTA Applications

***VISTA is comprised of 184 Applications. Approximately half are for VA Business functionality (administrative, financial, infrastructure, and regulatory compliance). The remaining half are VA Clinical functionality (enterprise, integrated inpatient/outpatient electronic health record).***

***Half of VISTA's functionality supports VA's Business, administrative, financial, infrastructure, and regulatory compliance.***




***Half of VISTA's functionality is clinical - providing the VA's enterprise integrated inpatient/outpatient electronic health record (EHR) system.***

***VA VISTA is comprised of 184 Applications in the following functional domains:***

- Clinical ("EHR")
- Financial/Admin ("ERP")
- Infrastructure
- Extensions

| | |
|---|---|
| Clinical (EHR) | 90 |
| Financial/Admin: | 38 |
| Infrastructure: | 38 |
| Extensions (HEV) | 18 |

For full list of applications and documentation, see VISTA Documentation Library:

http://www.va.gov/vdl

# *VISTA Data: Interfacing Challenges*

## *Code wrappers obfuscate VISTA Data.*

***Opaque.***
***Inconsistent..***
***Nonstandard.***
***Undocumented.***


### *Code-centric interfacing obfuscates VISTA data within a "Black Box"*

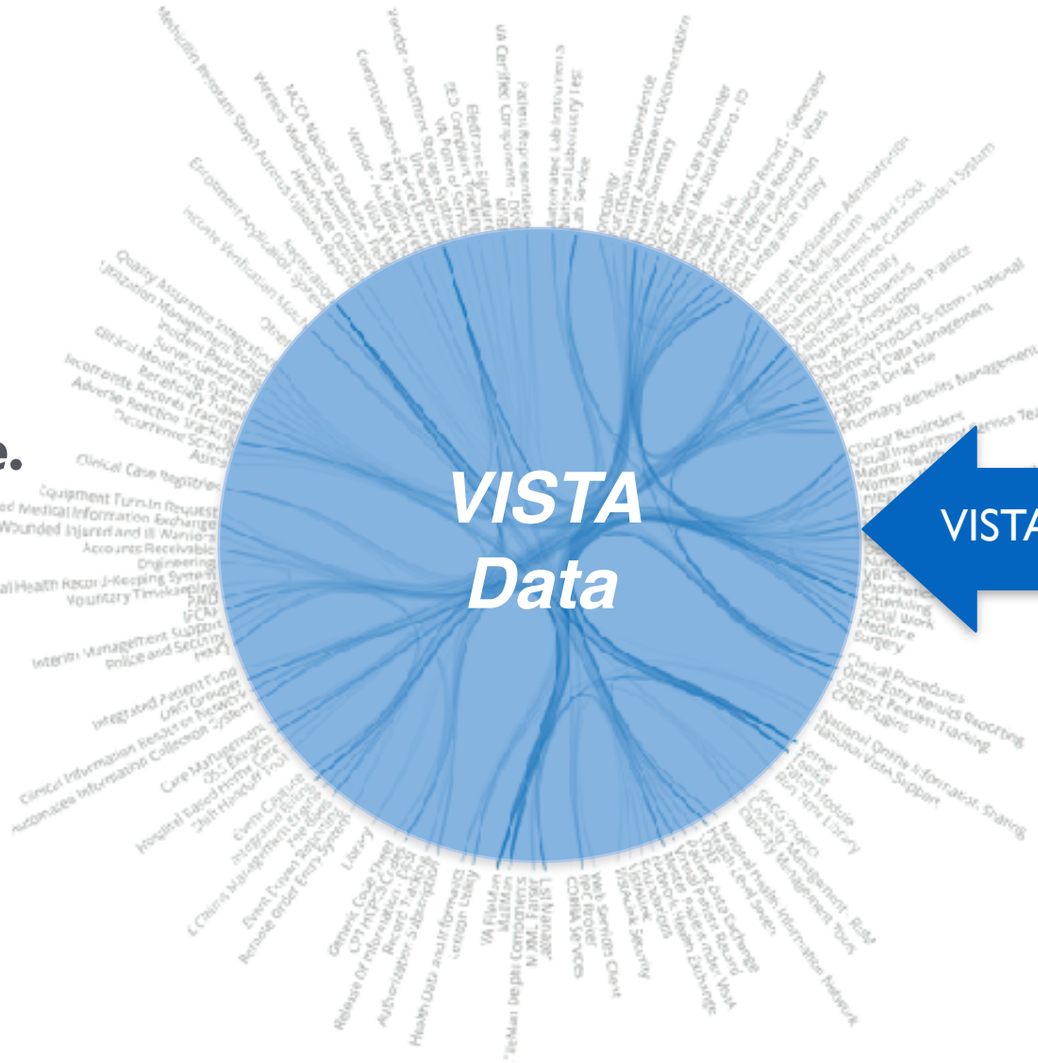
Code-centric interfacing has no logical connection to any of the internal structures, context, or definition of the data within VISTA. Code-centric interfacing lacks any uniform method to comprehensively or securely expose or interface to VISTA data. As a result, there are thousands of hard-coded opaque, unique MUMPS interfaces called RPCs (remote procedure calls).

These MUMPS RPC "wrappers" add an additional layer of obfuscation of the native data model and structures by "encapsulation" making the system even more opaque and difficult to maintain.

# *VISTA Data: Interfacing Modernization*

## *Exposing VISTA's Data Model makes data accessible*

***Comprehensive.***
***Web-Centric***
***Standard.***
***Secure.***




VISTA Data Model

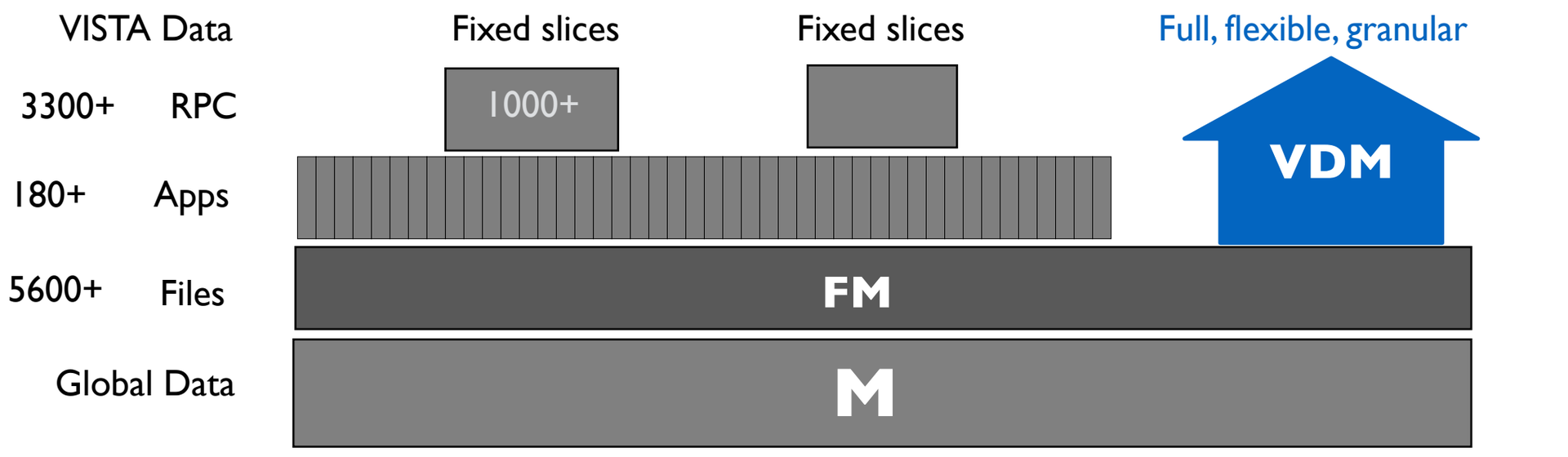
***Model-centric interfacing makes all VISTA data accessible.***

Surfacing all data, metadata, and structures ***internal*** to VISTA - its true, native, operational VISTA data model - allows secure read-write ***external*** to VISTA with a single common, industry-standard, web-centric Linked Data Model.

***Representing VISTA's internal data model as industry-standard, machine-processable Master VistA Data Model enables external interfacing and integration at web-scale.***

# *VISTA Interfacing Evolution*

| | CPRS | JLV | VDM |
|---|---|---|---|
| View | Delphi | HTML | HTML |
| Controller | Delphi | Java | Javascript |
| **Model** | Undefined | Undefined | **VISTA Data Model** |
| Read/Write | Asymmetric | Read-only | Symmetric |
| Format | proprietary | proprietary | JSON-LD |
| Method | MUMPS code | MUMPS code | Model-driven |




*VISTA Data Model (VDM) can access all data spanning 180+ applications with full granularity and definition because the fully exposed VISTA Data model logically bridges all applications through their native data dictionaries. No legacy APIs, HL7, RPCs, or MUMPS code. Just data. All of it. Defined. Structured. Secure.*

MUMPS technology

Web technology

# VISTA Interfaces:  Leveraging VISTA Data

**Terminal Inferfaces**

**Graphical Interfaces:**
Full client: CPRS (full read-write transactional interface)
Thin client:  JLV, VistAWeb, HMP (read-only)

**Data Interfaces**
RPCs - CPRS, MDWS, VPR (HMP, JLV), HEV

**System Interfaces**
HL7

**Data Analytics**
CDW, VINCI

For full list of VISTA interfaces, see:
http://www.va.gov/vdl

VA Migration Service:
Allow clients to continue to work while services are migrated from decentralized VistAs to centralized COTS services domain by domain

MVDM
MongoDB

centralized
COTS service x1

turn on services
domain by domain

Current
Clients

clients continue to work
on both legacy and new

RPCs
MUMPS

decentralized
VistA services x131

turn off services
domain by domain

3 data entry: vitals, allergies, problems
CPOE: pharmacy, lab