



Million Veteran Program

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Nesting Population Research in the VA Healthcare System

- VA ideal setting for nested large-scale population research
 - Stable and willing veteran population of 8 million using the system each year
 - Outstanding electronic medical record; fully integrated; data reaching back as far as 20 years; access to CMS and NDI data
 - Research infrastructure with diverse expertise
 - Prototypes for health system based research:
 - Pragmatic trial of HCTZ vs Chlorthalidone
 - Million Veteran Program

DHCP Automated Clinical Record in use by: Michael Johnson

Patient Edit Chart Tools CoverSheet Help

Doe, John P
321-95-4567 22 Apr 08 1A 1204-A

Problems:	Status	Active Meds:	Labs Resulted in Past:
Pneumonia	A	Endapril Tab 10mg po q12h	CBC w/Diff 12/13/93 9:00:00 AM
COPD	A	Cimetidine Tab 800mg po qhs	Chem 20 12/13/93 9:00:00 AM
Essential Hypertension	A	Acetaminophen Capsule 650mg po q6h prn headache, fever	Chem 7 12/12/93 2:00:00 PM
Peptic Ulcer	A	Milk of Magnesia Liquid 30cc po prn constipation	CBC w/Diff 12/12/93 10:30:00 AM
Tobacco Abuse	A	Theophylline Time Release Tab 300mg po q12h	Chem 20 12/10/93 2:00:00 PM
Appendicitis	I	Maalox Liquid 30cc po prn heartburn	CBC 6/6/93 2:00:00 PM
		Metaproterenol Sulfate Aerosol 650mcg/inhalation ih q6h	Chem 7 6/6/93 2:00:00 PM
			UA 6/6/93 2:00:00 PM
			CBC 12/15/92 10:20:00 AM
			Chem 7 12/15/92 10:20:00 AM

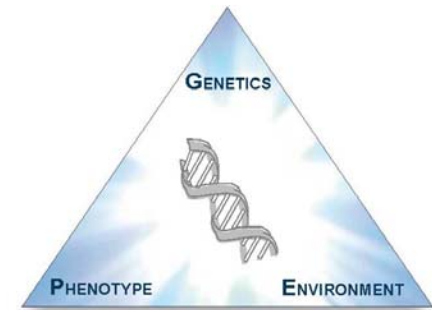
Visits:	Location	Notifications/Alerts:
12/12/93 10:30:00 AM	1A	New lab results available. Critical Lab Result: GLUCOSE 480 mg/dL Order released-requires chart signature. Admitted on Dec 12, 1993@10:30
12/10/93 2:00:00 PM	Gen Medicine	
6/6/93 2:00:00 PM	Gen Medicine	
12/15/92 10:20:00 AM	Gen Medicine	
8/1/92 1:30:00 PM	Cardiology	
9/18/89 10:45:00 AM	1A	
9/17/89 3:30:00 PM	Hematology	
2/27/89 11:00:00 AM	Gen Medicine	

Crises/Warnings/Directives:	Next of Kin:	Allergies:	Symptoms
Environmental	Jane Doe	Cephalexin Dairy Products Strawberries	Thrombocytopenia Diarrhea, Urticaria Urticaria

Cover Problems Meds Orders H & P Notes Consults Labs X-ray Specials Summ.

Large-Scale Biobanks

- Europe
 - Icelandic Biobank and deCODE
 - UK Biobank
 - Banco Nacional de ADN [Spain]
 - GenomEUtwin
 - Finnish biobank
 - Swedish biobank
 - German biobank, KORA
 - UK DNA Banking Network & British biobank
 - Estonian biobank:
 - Family-based collections [Nordic]
 - Generation Scotland
 - HUNT (cardiovascular)& Biohealth [Norway]
 - EPIC, European (cancer)
 - Danubian Biobank Consortium
 - GATiB Genome Austria Tissue Bank
 - Biobank Hungary
- North America
 - Vanderbilt University BioVU
 - Canadian Consortium [Canada]
 - dbGaP, NIH [US]
 - National Children's Study [US]
 - Marshfield Clinic [US]
 - National Health and Nutrition Examinations Surveys [US]
 - Kaiser Permanente Northern CA [US]
 - Howard University African Diaspora [US]
 - Mayo Clinic
 - ACS



Million Veteran Program (MVP)

- Enroll up to one million users of the VHA into an observational mega-cohort
 - Blood collection for storage in biorepository for future research
 - Collect self-reported health and lifestyle information
 - Access to electronic medical record
 - Ability to recontact participants



Million Veteran Program

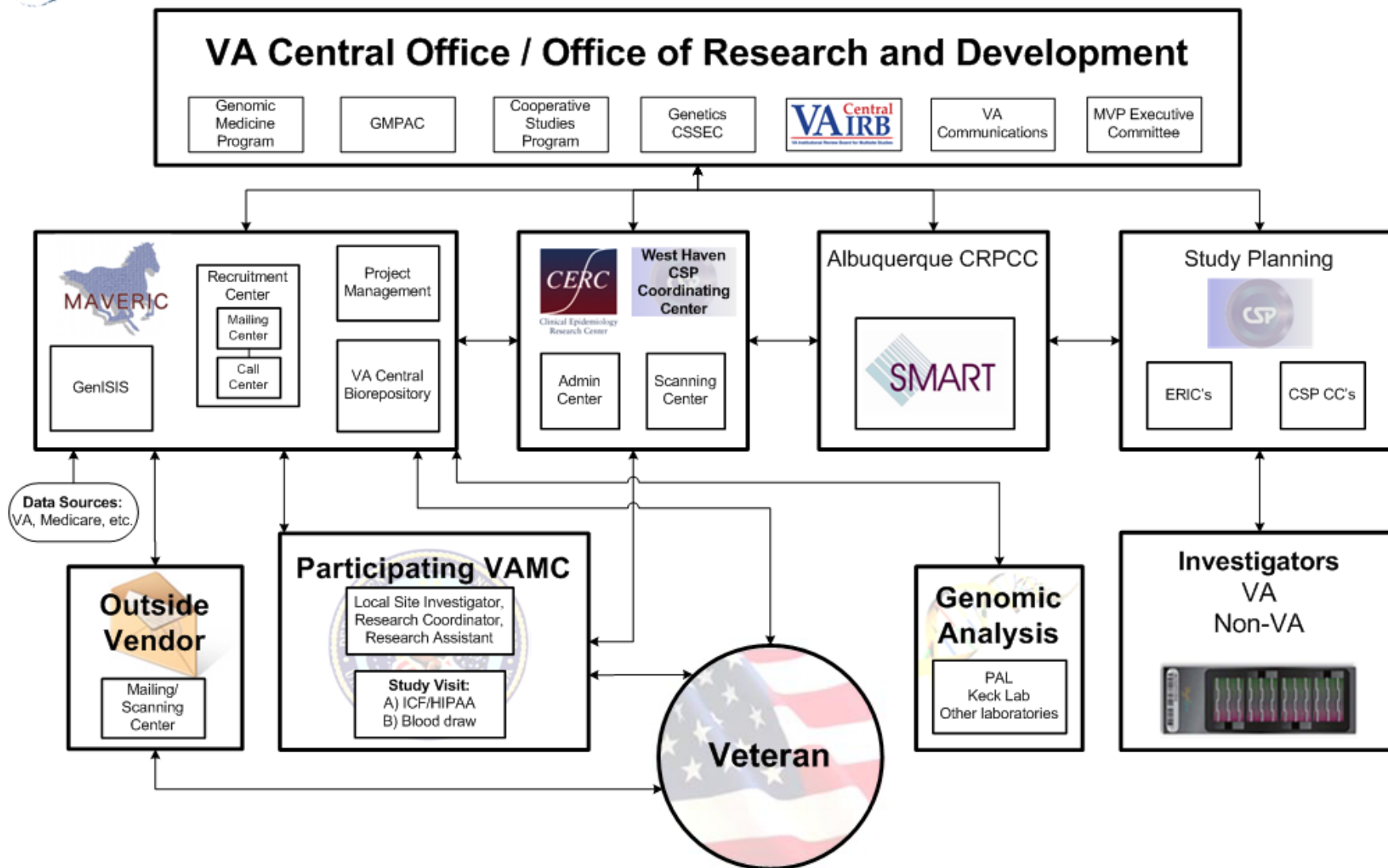
MVP Organizational Structure



Million Veteran Program (MVP): A Partnership with Veterans

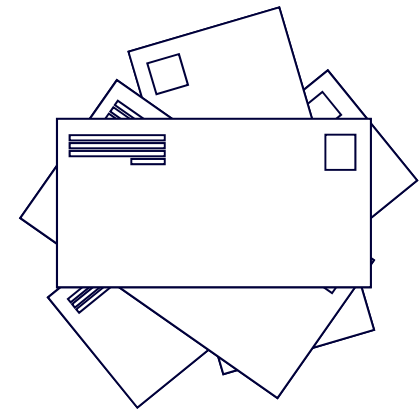
02/07/2011

Veterans Health
Administration
R&D
www.research.va.gov



MVP Recruitment and Enrollment

- Invitational Mailing/Appointment Mailing
 - Invitation letter, Baseline Survey, MVP Brochure
 - Appointment letter, Informed consent language
- Walk-in recruitment
- Study visit
 - Informed consent/HIPAA
 - Blood collection
- Thank You Mailing
 - Thank you letter, Lifestyle Survey
- Specimens sent daily



Automated Specimen Processing



VETERANS HEALTH ADMINISTRATION

VA Central Biorepository



Distribution of MVP Sites



MVP Recruitment to Date

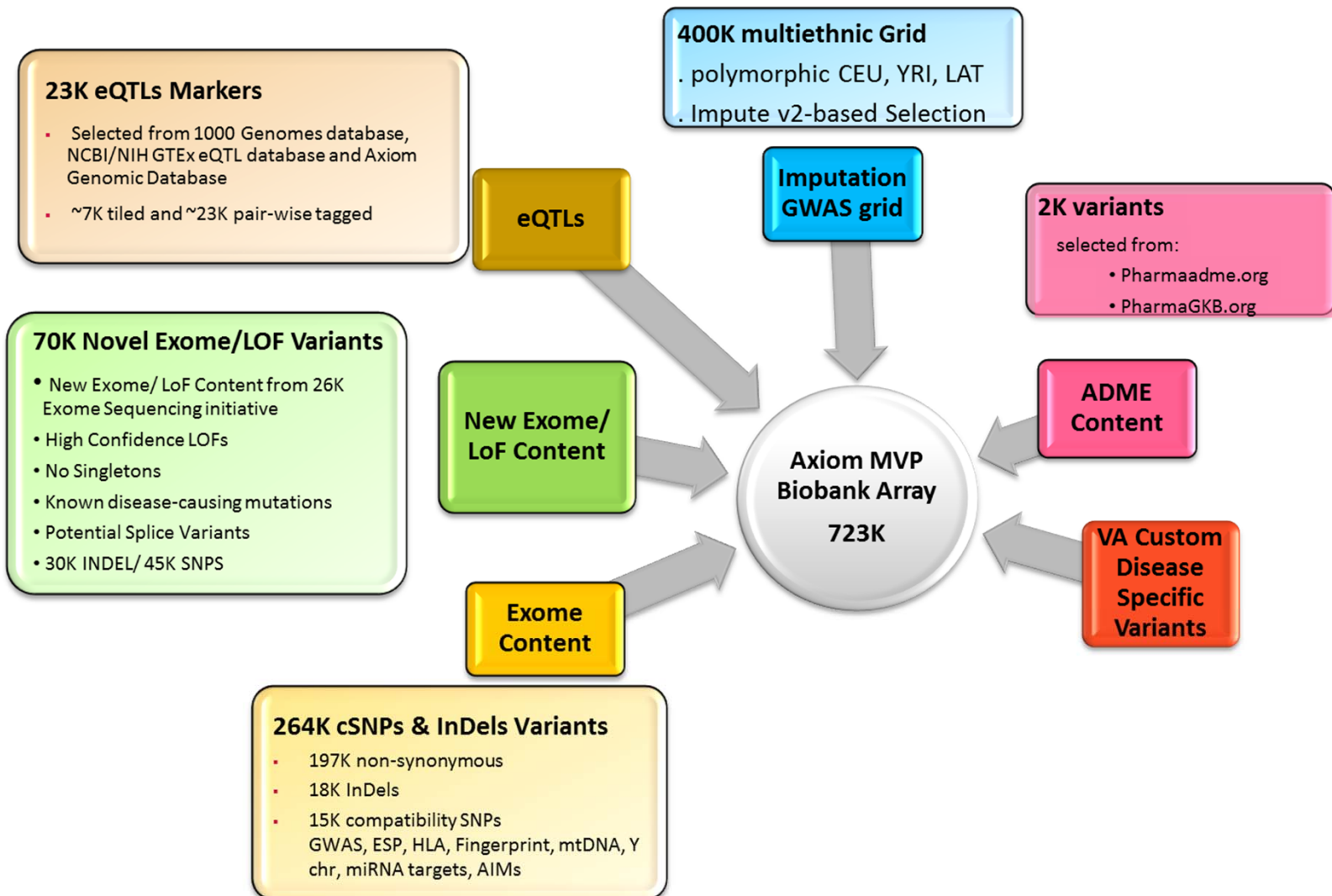
Invitation mailings sent	2.9 Million
Expressed interest by mail	19.4% (11.2%/8.2%)
Optout	13%
Completed Baseline Surveys	456,000
Consented Veterans	349,000
Specimens in Lab	345,000
Unscheduled (proportion)	40%
Upcoming appointments	5,000
Call volume	Over 500,000

Current Lab Activities

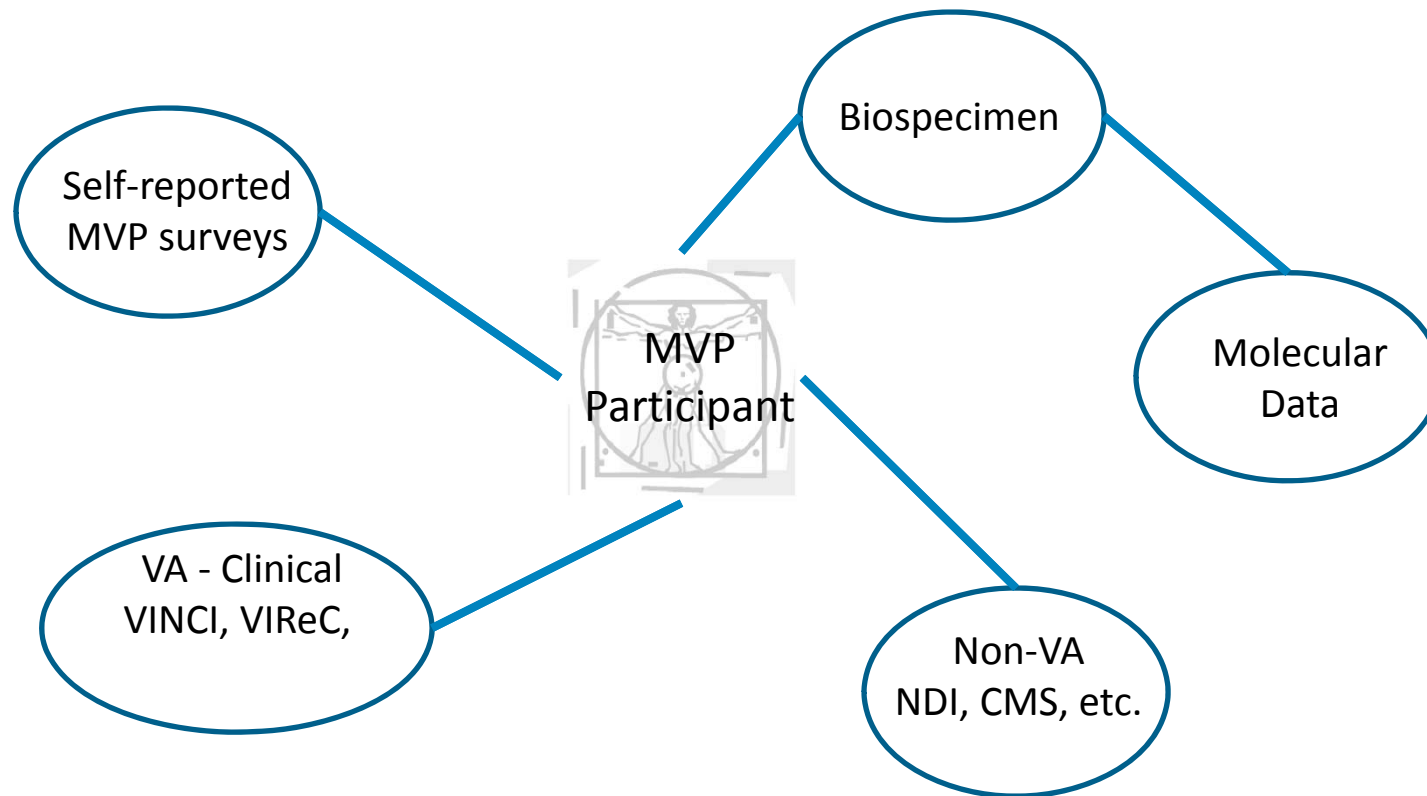
- Receiving and Processing - 400-600 per day
- Shipping Samples for Sequencing and Genotyping:

Assay Type	Shipments to-date	Targeted Shipments
Whole Genome sequencing	1886	1370 + 516
Whole Exome sequencing	24260	24126
SNP Genotyping	206,603	~200,000

Axiom MVP Biobank Array



Million Veteran Program (MVP) Data Universe



Other Data Sources

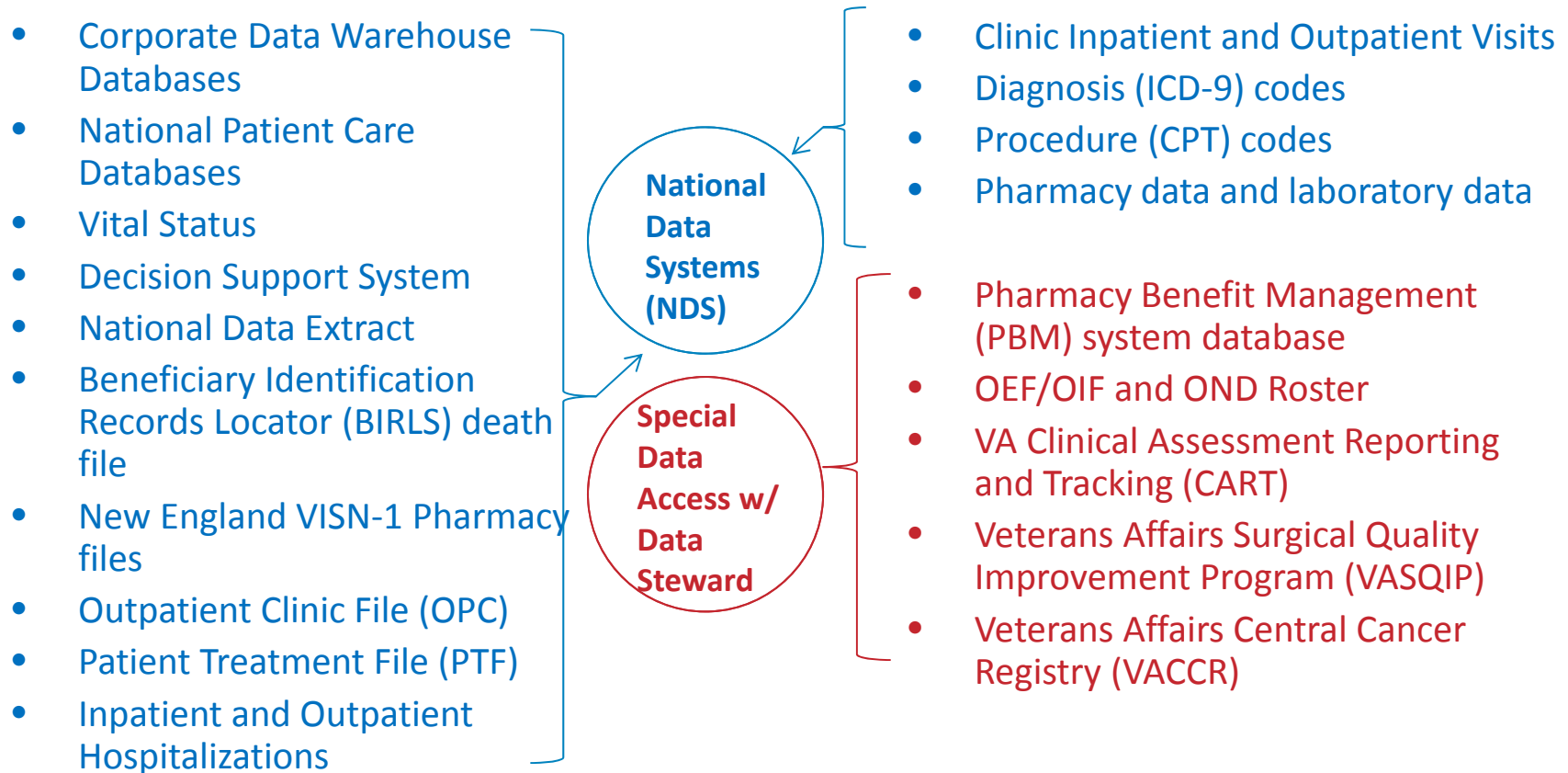
MVP Data

- Self-Reported Survey Data:
 - Lifestyle Survey Data (Personal Information, Well-Being, Activity, Health, Military Experience, Dietary Intake, Medication, Habits)
 - Baseline Survey (Health, Military Experiences, family medical history)
- Genetic Data
 - Genotype data
 - Sequence data

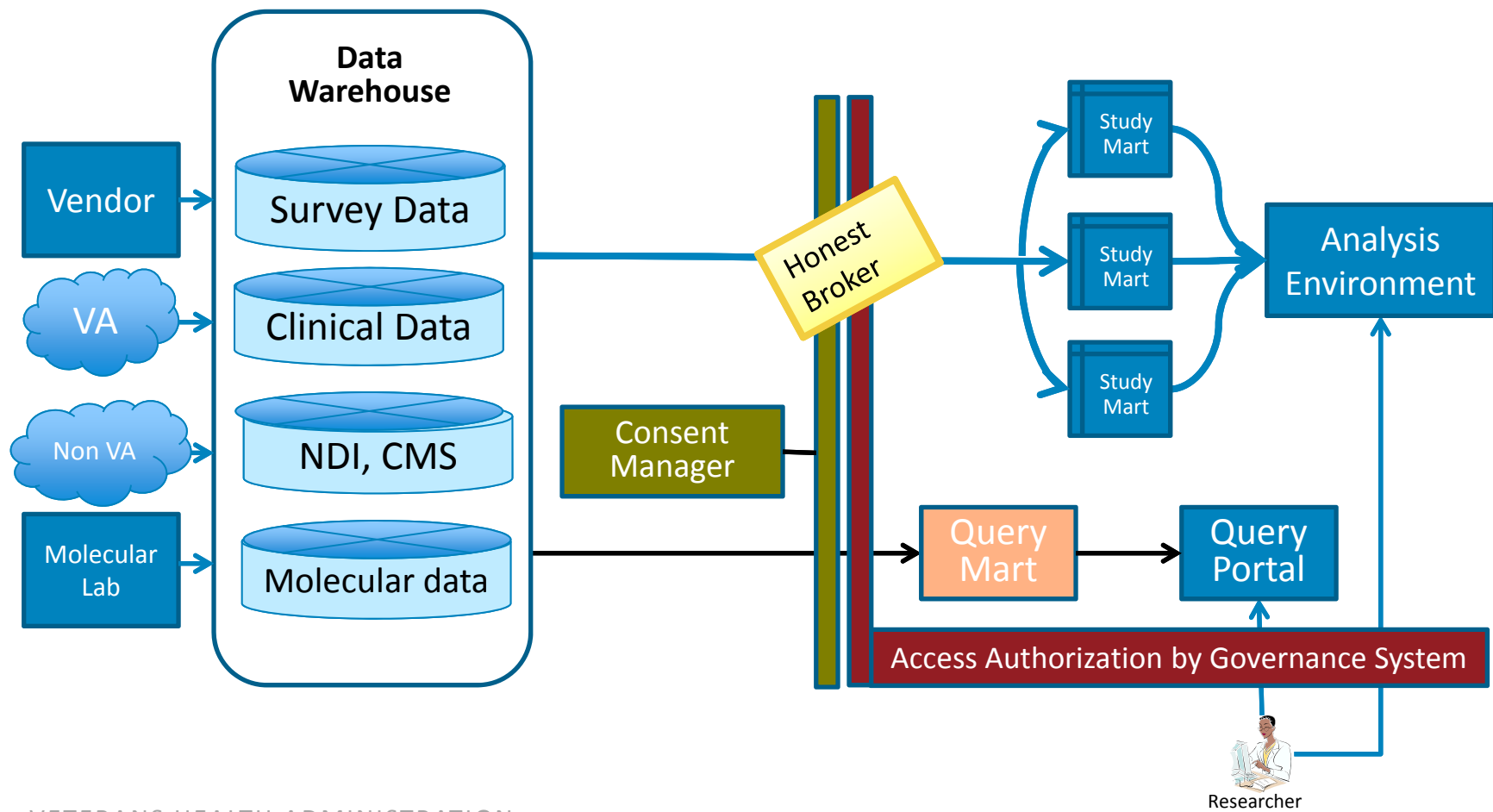
Other Data

- VA Healthcare System Data
- Other Data
 - National Death Index (NDI)
 - Centers for Medicare and Medicaid Services (CMS)
 - State Mortality Data

VA Data Sources



System Architecture



MVP Phenotyping Activities

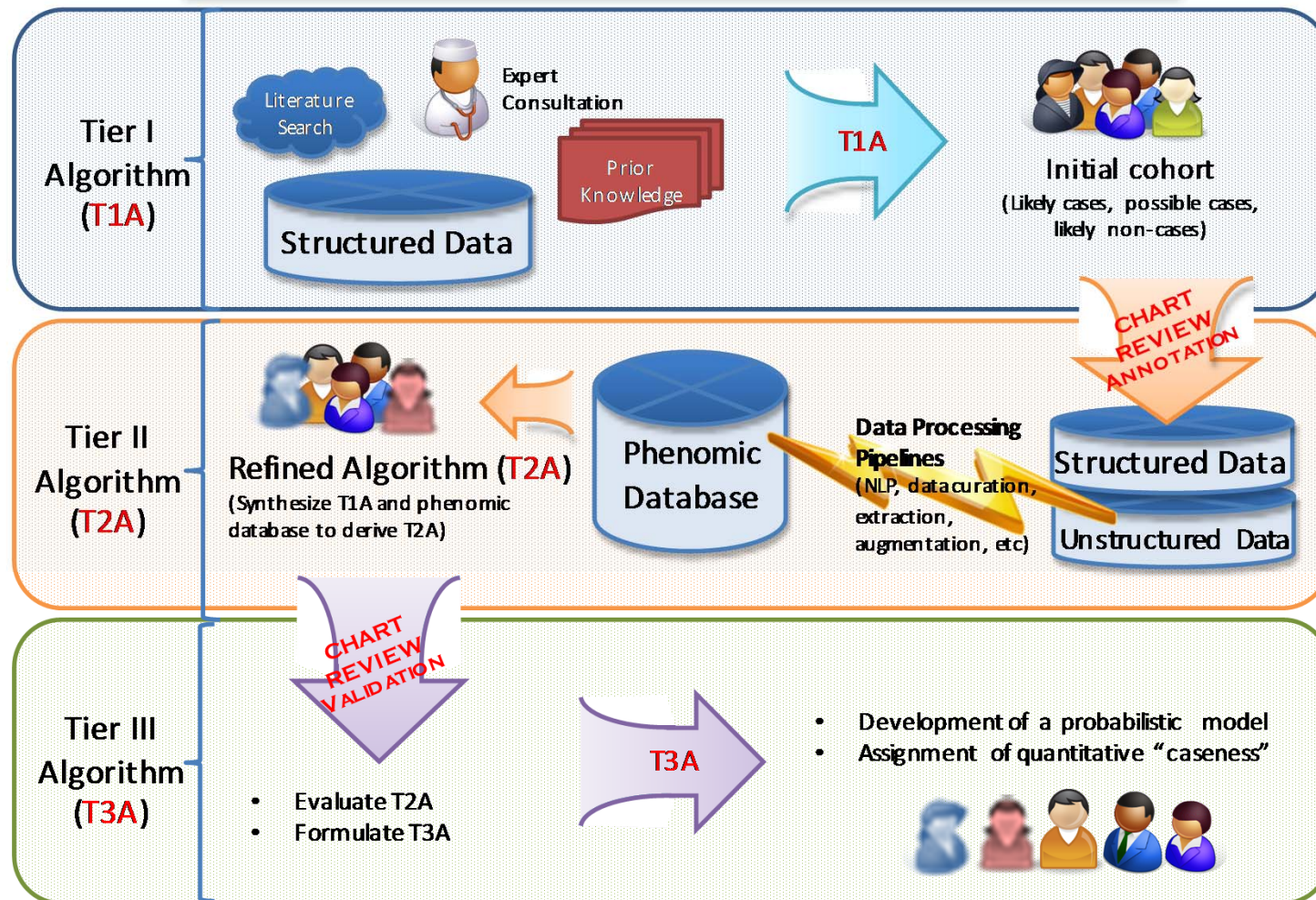
Core Variables

- Demographics
 - Age
 - Sex
 - Race
- Laboratory values
 - Total cholesterol
 - HDL, LDL
 - Albumin
 - Serum creatinine
 - Triglycerides
- Medications
- Other characteristics
 - Blood pressure
 - Height/weight/BMI
 - Smoking
 - Alcohol consumption
 - Combat exposure

Complex Phenotypes

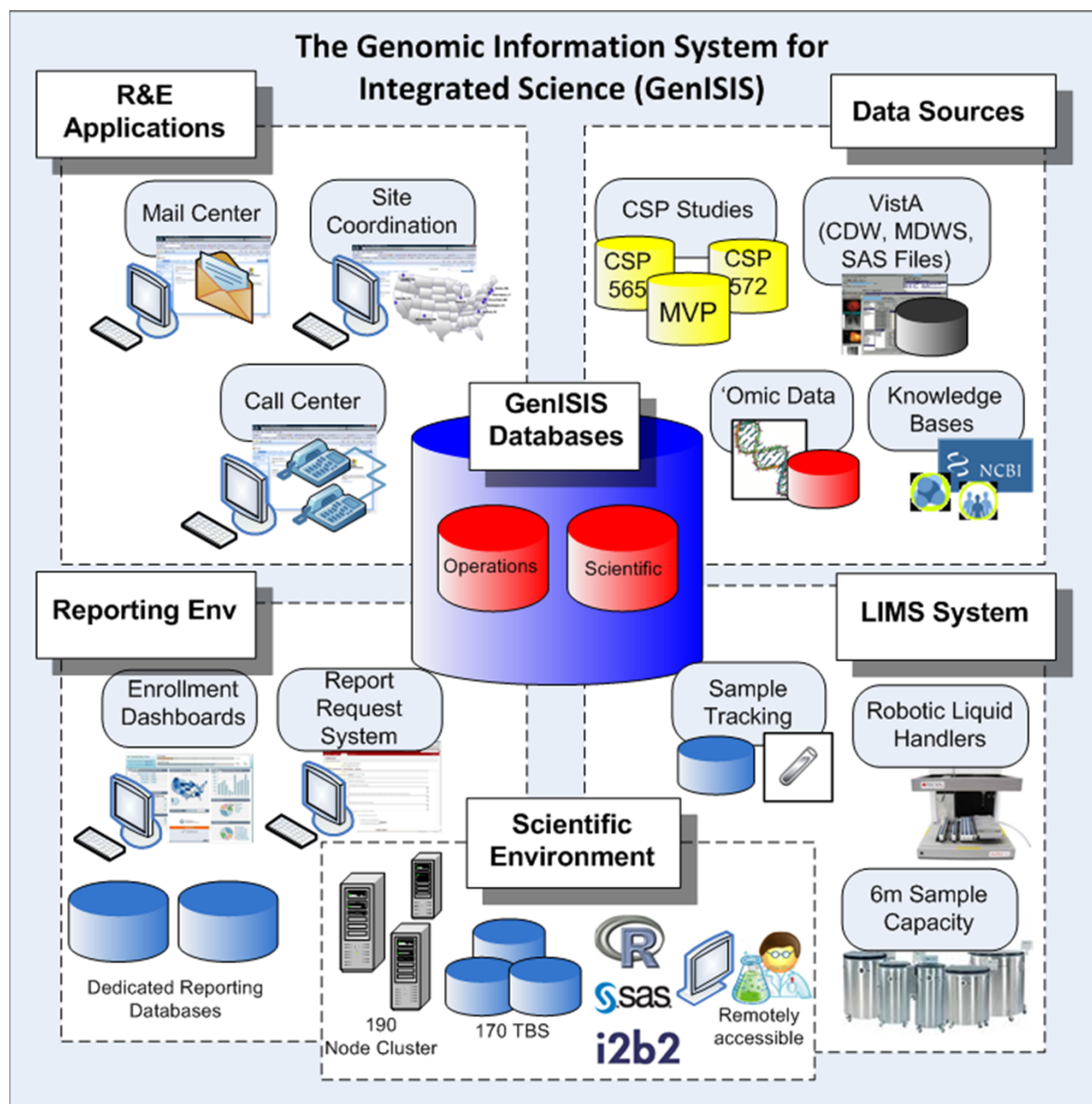
- Disease
 - Myocardial infarction (MI)
 - Stroke
 - Unstable angina with revascularization
 - Acute congestive heart failure
 - Death from cardiovascular disease
 - Vascular procedure
 - Posttraumatic stress disorder (PTSD)
 - Schizophrenia
 - Bipolar disorder
 - Traumatic brain injury
 - Depression
 - Vascular dementia
 - Cognitive impairment
 - Type 2 diabetes mellitus
- Other
 - Creatinine trajectory
 - Glucose trajectory

3-Tier 7-Step Phenotyping Process



Step 1: Define initial working algorithm (T1A)	Step 5: Derive T2A
Step 2: Create study cohort and apply T1A	Step 6: Evaluate T2A to formulate T3A
Step 3: Create Annotation Data Set	Step 7: Develop probabilistic model and assign caseness
Step 4: Create Phenomic Database through Data Processing Pipelines	Deposit resulting algorithms to a central Phenotype Library

The Genomic Information System for Integrated Science (GenISIS)



Ongoing alpha and beta test projects

- Core MVP descriptive projects
 - Characterization of the cohort
 - Race: EHR v. self report v. genes
- Alpha Test projects
 - Schizophrenia/bipolar: Cases collected separately; controls from MVP
 - PTSD
- Beta test RFA
 - LOIs
 - Full proposals due in March
- Projects in planning

Acknowledgments

VA Central Office

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Building the Plane as You Fly It





Thank You!