

# *Blockchain Innovation Efforts at the U.S. Department of Veteran's Affairs*

Session #46, August 10, 2021

**Gil Alterovitz, PhD, FACMI**

Director,  
VA National Artificial Intelligence Institute

**Bob Calco**

Chief Architect & Lead Developer,  
Apex Data Solutions

**Joseph Ronzio, DHSc, FHIMSS, CPHIMS**

Deputy Chief Health Technology Officer,  
U.S. Department of Veteran's Affairs

**HIMSS** **21**

DISCLAIMER: The views and opinions expressed in this presentation are solely those of the author/presenter and do not necessarily represent any policy or position of HIMSS.

# *Conflict of Interest*

Gil Alterovitz, PhD, FACMI, FAMIA

Bob Calco

Joseph L. Ronzio, DHSc, FHIMSS, CPHIMS

Has no real or apparent conflicts of interest to report.

# *Agenda*

- Developing new AI approaches at the country's largest integrated health care system - Dr. Gil Alterovitz
- VA's National Artificial Intelligence Institute's 2020-2021 AI Tech Sprint: Provider Directory Interoperability Use Case - Bob, Calco, Apex Data Solutions
- Supporting Emerging Technologies in VA - Dr. Joseph L. Ronzio

# *Learning Objectives*

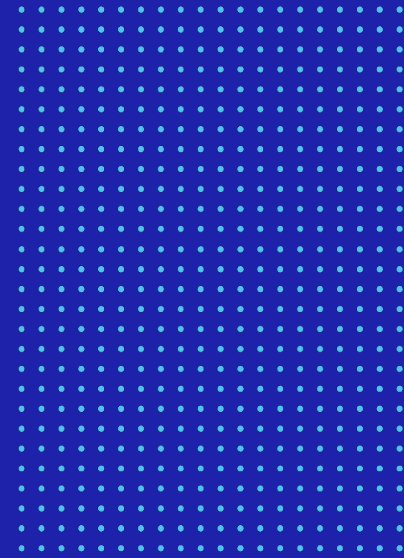
- Demonstrate an understanding of interoperability and blockchain architectures when developing use case driven pilots to solve real-world problems
- Explore recent technical sprints and discover lessons learned from the extensive work at the VA developing use cases
- Discuss the ongoing federal efforts that intersect with those facilitated by public-private partners
- Describe potential implications of extending these efforts to other core interoperability challenges (e.g. Prior Authorization/Consent, sharing clinical data across organizational boundaries)

New AI  
approaches for  
the country's  
largest  
integrated health  
care system



Gil Alterovitz

*Director, VA NAIH*



# *Bringing AI to the U.S. Department of Veteran's Affairs*

## National AI Policies

- Executive Orders on Maintaining American Leadership in Artificial Intelligence and Promoting the Use of Trustworthy AI in the Federal Government
- National Defense Authorization Act



# The Mission

Based in Policy



## *National AI Initiative Act of 2020*

“Ensure continued U.S. leadership in AI research and development, lead the world in the development and use of trustworthy AI in the public and private sectors, and prepare the present and future U.S. workforce for the integration of AI systems across all sectors of the economy and society.”



## *U.S. Department of Veteran's Affairs*

“The Department of Veterans Affairs will build robust capacity and capabilities in Artificial Intelligence in order to develop and apply innovative AI solutions and transform the VA by facilitating a learning environment that supports the delivery of world-class benefits and services to our Veterans. “



## *VA National Artificial Intelligence Institute*

The NAII seeks to establish the Department of Veterans Affairs as the preeminent organization for research, development, and training of Artificial Intelligence with impact on a global scale, ensuring the health and well-being of our Veterans.



*VA National  
Artificial  
Intelligence  
Institute*

*Pilots*

Facilitate the discovery of new practices and provide opportunities for researchers at all levels to upskill and educate themselves.

*Processes*

Process improvements pave the way for future researchers to do work more effectively

*Partnerships*

Create an ecosystem of ideas for collaborative research and an arena for sharing expertise and mutual learning.

*Policy*

Policy leadership operationalizes knowledge and concepts to create a feedback loop between research and practice – ensuring research is relevant and impactful.



# *U.S. Department of Veterans Affairs (VA) Request for Information (RFI)*

Blockchain, Immersive Technologies, Edge Computing

- Blockchain in healthcare is emerging as a novel methodology that can enable the VA to implement both fine grained supply chain tracking and data sharing systems.
- Blockchain can improve business processes by providing tracking of both physical and digital assets internal and external to the VA.

*VA's RFI supports the requirement for the following tasks:*

1

*Emerging Technology to Transform Clinical Care Delivery and Service*

2

*Advanced Clinical Decision Support and Data-Driven Decision Making in Healthcare*

3

*Clinical Simulation Training*

4

*Clinical Simulation and Training to Enhance Adoption of Emerging Technology in Clinical Care Delivery*

5

*Simulation for Clinical and Systems Optimization*

6

*Next Generation Clinical Education, Training and Simulation Immersive Training*

7

*Clinical Care Delivery and Service Transformation through Design Thinking*

# Use Cases: AI Blockchain

The VA, like many entities, has begun to evaluate the use of blockchain technology

Currently, the VA is evaluating three Use Cases utilizing blockchain technology as part of the 2021 NAII AI Tech Sprint



*Provider Directory*



*Digital Health Passport*



*Taxpayers' Data in a Federal Blockchain Network*

VA is also conducting a small pilot evaluating AI and Virtual Reality technology utilizing a DL-based blockchain in the areas of:

1

*Secure Data Sharing*

3

*Identity Access Management  
(internal and external users)*

2

*Asset Management  
(device registration and management)*

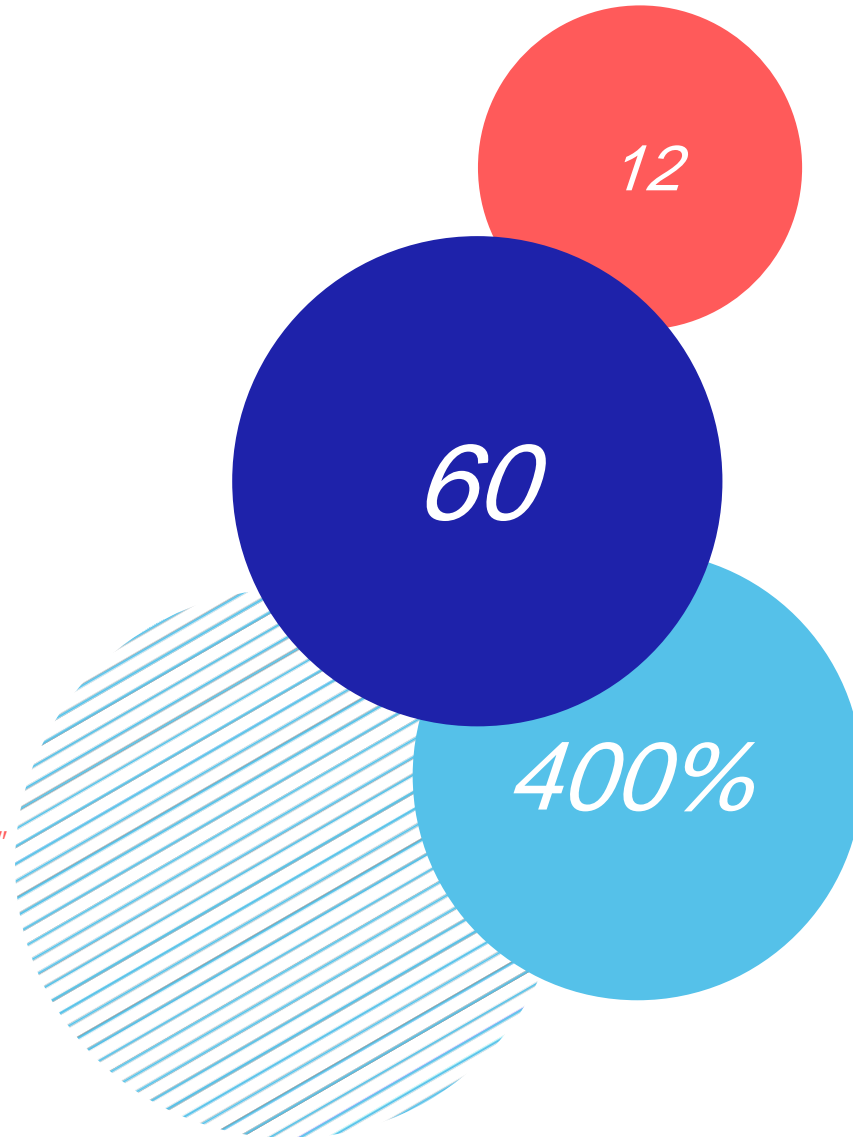
4

*Auditability of Data Sharing and Credentialing*

# *NAI AI Tech Sprint 2020-2021*

*“Veterans Not Currently Served by the VA”*

AI Tech Sprint teams have submitted demonstrations to date with topics ranging from oncology, suicide prevention, brain health, and more.



## *12-Week Sprint*

Focused on delivering solutions to our Veterans in a timely manner.

## *60 Teams*

Applied for the 2020-2021 iteration of the AI Tech Sprint.

## *400% Increase in Participation*

The 2020-2021 AI Tech Sprint saw an exceptional increase in participation, meaning more teams developing solutions for Veterans.

# Five Pillars of a Tech Sprint

- **The incentive framework** – create short and long run incentives to engage with the private sector in ways that simultaneously advance their goals
- **The track partner** – understand the type of partner and the incentives that are likely to be more effective at encouraging their participation and performance
- **Consensus-based data use agreements (DUAs)** – design data sharing agreements that facilitate the flow of information without jeopardizing security
- **A cooperative ecosystem** – allow for iterative and agile flows of communication between the federal agency and private sector counterpart
- **Iterative data release** – designate several waves of output that satisfy short run goals and provide enough content for meaningful feedback



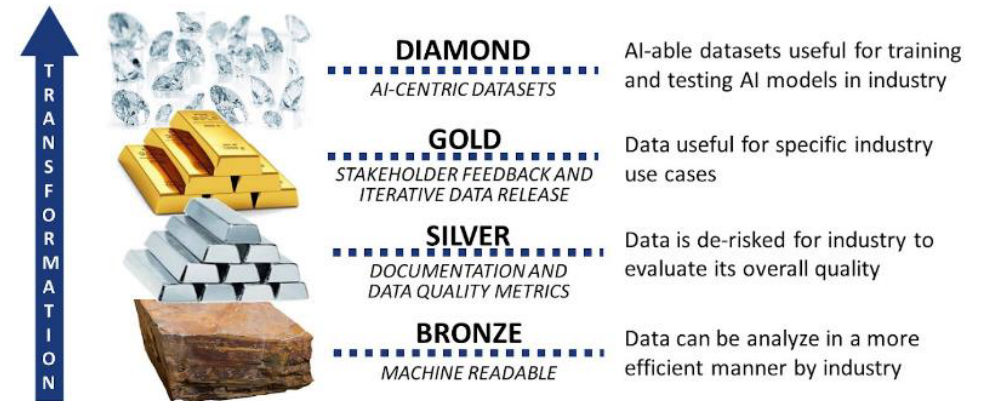


# Evaluating Usefulness

Rapid prototyping and the provision of feedback are essential for product innovation

- The different tiers of usefulness associated with tech sprint contributions are from the perspectives of a data steward and an AI/ML researcher.
- Bronze tier: machine readable data is a necessary, but not sufficient, condition for usefulness. If the data is not accessible or readable, the NAll cannot use the data for subsequent work.
- Diamond tier: in contrast, contains AI-able data that can be mined and tested.

**DATA'S CHOICE:** What makes (e.g. federal) data also useful to non-federal entities to build tools, and how can this be potentially measured and incentivized?



**AI's CHOICE:** What makes AI/data results usable by others (from federal to non-federal), and how could this be potentially measured and incentivized?





# *Three Phases of the AI Tech Sprint*



## *Research*

Participants finalize their group development, complete the dataset access requirements, interact with the organization's subject matter experts (SMEs), engage in weekly meetings with other participants, and solicit feedback from stakeholders.



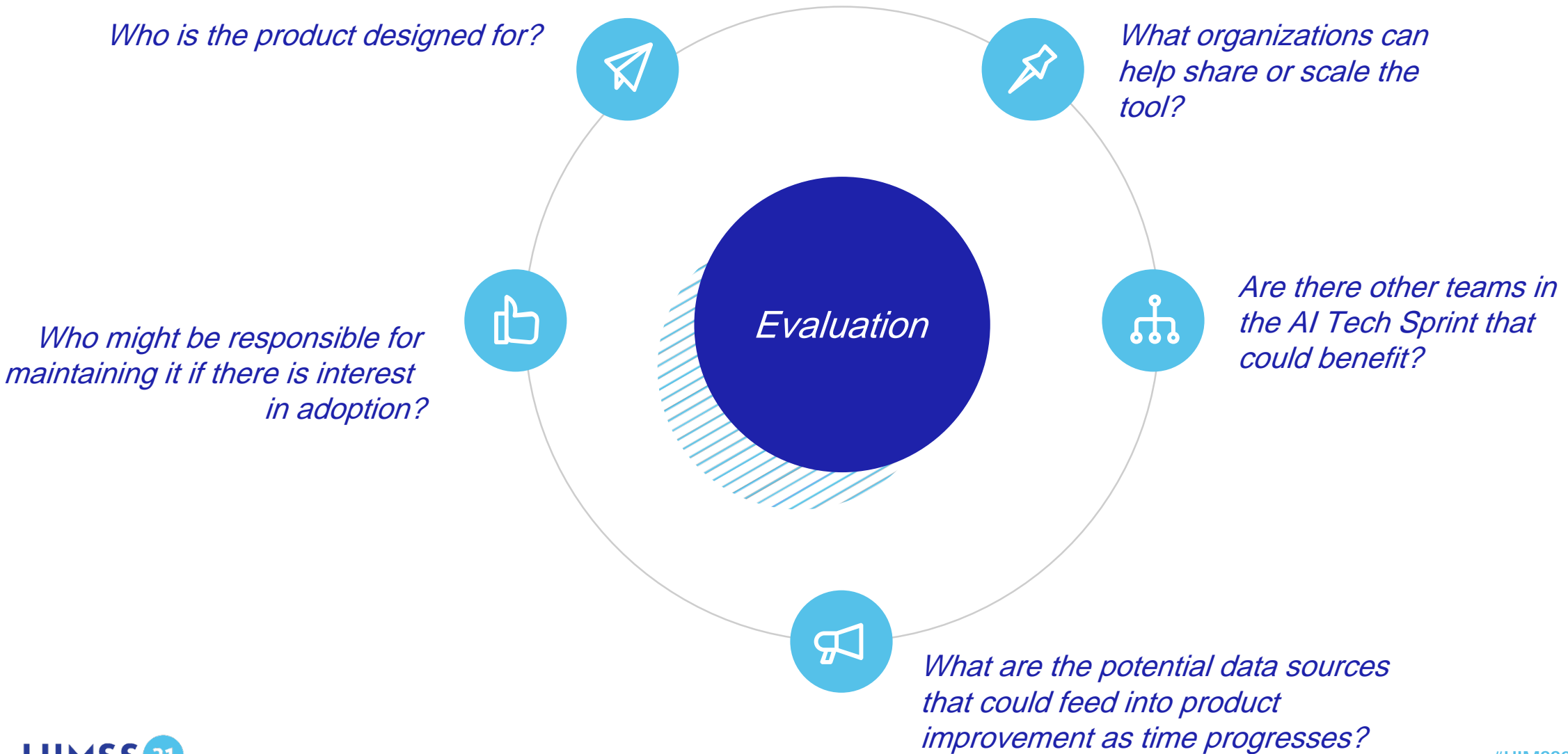
## *Prototype*

Teams begin to draft their product, preparing a concept pitch to obtain feedback, conducting interviews with their end-use customer, and gathering information from SMEs and other relevant sources.



## *Development*

Teams continue working towards their underlying product, incorporating feedback in the process and further exploring the data.

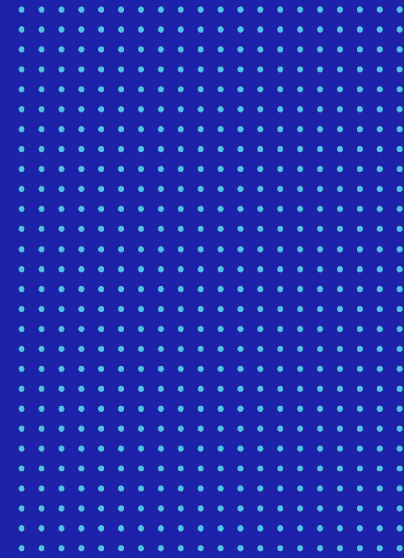


# *VA NAII's 2020-2021 AI Tech Sprint*



Bob Calco

Chief Architect & Lead Developer  
Apex Data Solutions, LLC



# *Provider Directory Interoperability Use Case*

Placing 10th out of 44 teams, and 1st in the Administrative Cohort, Apex demonstrates an architecturally based interoperability solution.

# *What is Interoperability?*

## **HIMSS Definition of Interoperability<sup>1</sup>:**

The ability of different information systems, devices and applications (systems) to access, exchange, integrate and cooperatively use data in a coordinated manner, within and across organizational, regional and national boundaries, to provide timely and seamless portability of information and optimize the health of individuals and populations globally.

Health data exchange architectures, application interfaces and standards enable data to be accessed and shared appropriately and securely across the complete spectrum of care, within all applicable settings and with relevant stakeholders, including the individual.

## **Four Levels of Interoperability:**

**Foundational (Level 1):** Establishes the inter-connectivity requirements needed for one system or application to securely communicate data to and receive data from another

**Structural (Level 2):** Defines the format, syntax and organization of data exchange including at the data field level for interpretation

**Semantic (Level 3):** Provides for common underlying models and codification of the data including the use of data elements with standardized definitions from publicly available value sets and coding vocabularies, providing shared understanding and meaning to the user

**Organizational (Level 4):** Includes governance, policy, social, legal and organizational considerations to facilitate the secure, seamless and timely communication and use of data both within and between organizations, entities and individuals. These components enable shared consent, trust and integrated end-user processes and workflows

# *Why Provider Directory to Illustrate Interoperability?*

- Provider Directory drives fundamental processes in the healthcare system.<sup>2</sup>
  - Critical business processes - such as payment processing, monitoring fraud and abuse, credential validation, clinical information exchange - rely on accurate provider data.
- Patients rely on accurate provider data to select health plan products, seek care and avoid surprise billing occurrences<sup>3</sup>.
  - Mental Health Patients who encountered inaccuracies were more likely to be treated by an out-of-network provider and four times more likely to receive a surprise outpatient out-of-network bill because they did not initially know that a provider was out of network.<sup>4</sup>
- The cost of inaccurate Provider Directory data is borne by Patients, Providers, and Payers
  - Patients incur higher out-of-pocket costs and surprise billings for care.
  - Provider practices spend \$63,004 annually on directory maintenance; extrapolated, that is \$2.67 billion annually.<sup>5</sup>
  - Payers incur high administrative costs associated with collecting and verifying data, which are passed on to consumers in the form of tighter reimbursement rates for covered care.
- By 2022, The No Surprises Act requires both Providers and Payers to take steps to enhance Provider Directory accuracy rates, which should be sufficiently capable of supporting any outside audits.<sup>6</sup>



# *How Does this Use Case Illustrate Interoperability?*

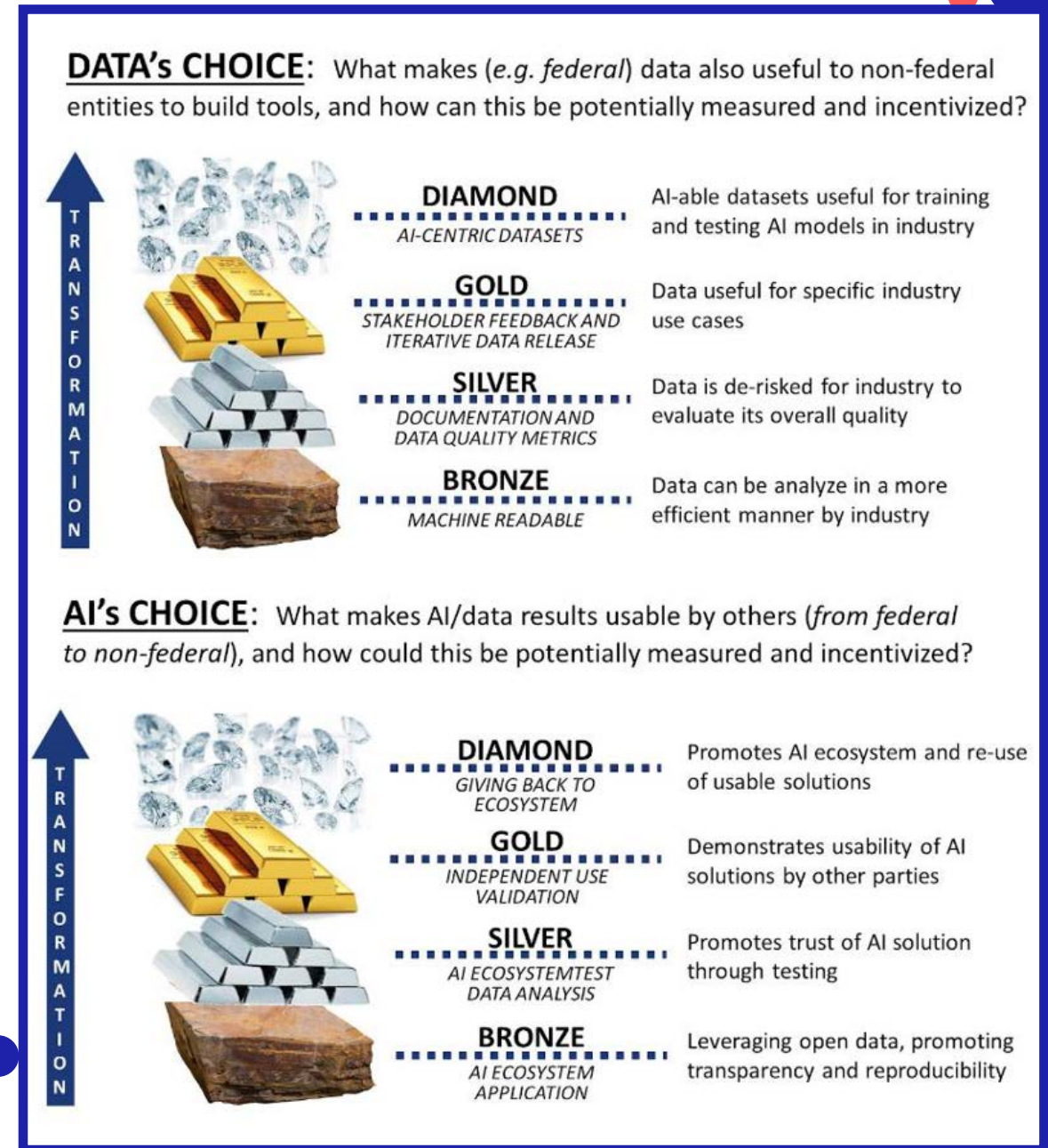
- Provider Directories provide an excellent example of the use of multiple, disparate systems and databases for common, yet slightly different, purposes.
- The current state in maintaining and updating these directories include manual data entry, API transactional batch updates, and manual verification/reconciliation.
- Provides a clean demonstration of how a novel use of blockchain other than that of the common “distributed ledger” metaphor is used to maintain a “single source of truth” while exchanging data across logical organizational boundaries.
- Shows that SORs do not need to “talk to each other” via API transactions – they do not need to know about the other SOR to share accurate information.





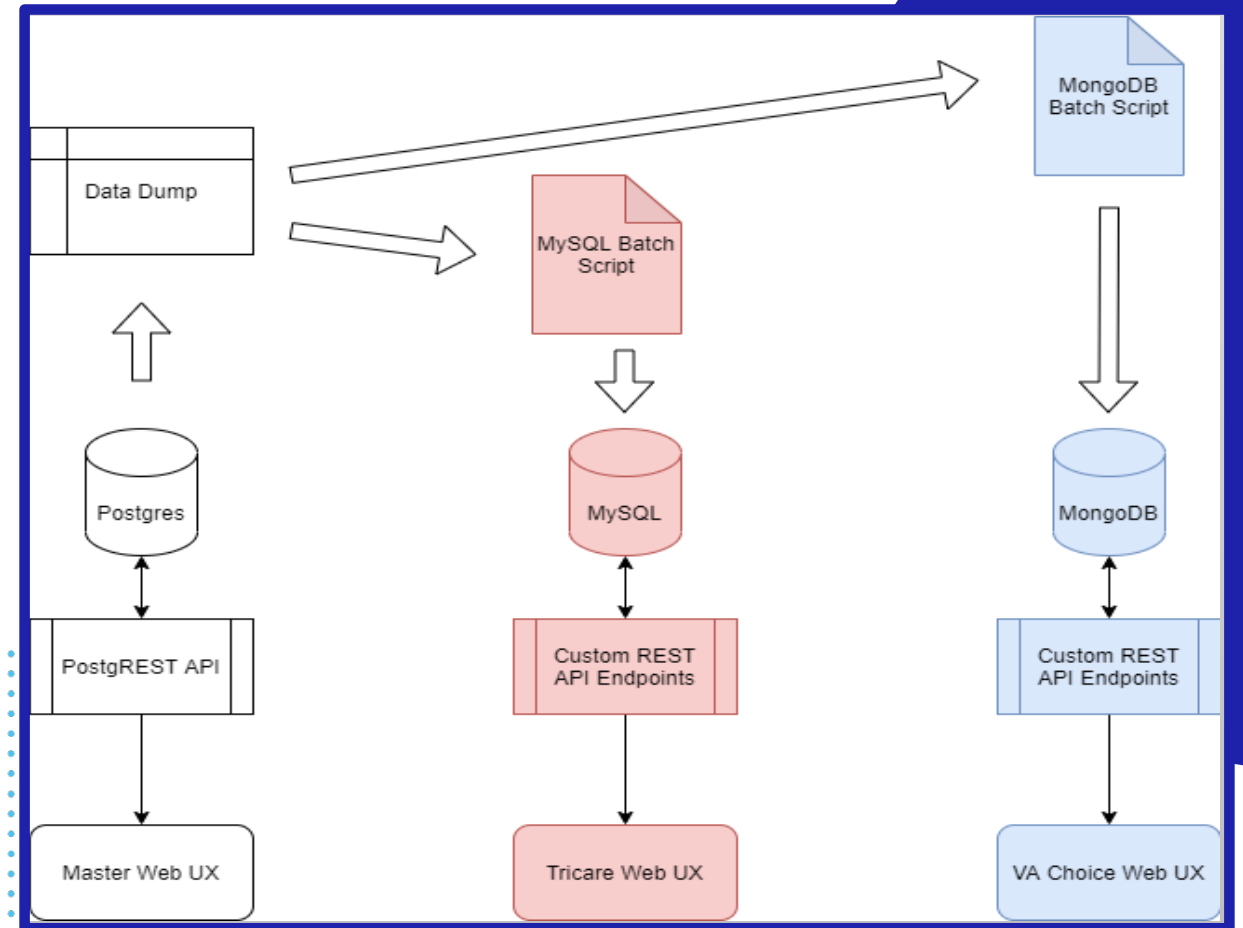
# Incorporating All 4 AI Choice Evaluation Tiers

- **Diamond:** AI integration hooks provided at each phase of the propagation process relate to standard big data and modern techniques
- **Gold and Bronze:** Intentional touch points at key stages in the identity state change/propagation process to create iterative feedback loops with modern AI tools, techniques and methods—including but not limited to neuroevolutionary networks/Deep Learning, classic big data techniques, and other emerging strategies for using AI to support higher quality information systems
- **Silver:** data was based on real published information openly available from a major healthcare insurer, using standard architectural patterns tuned to change propagation strategy.



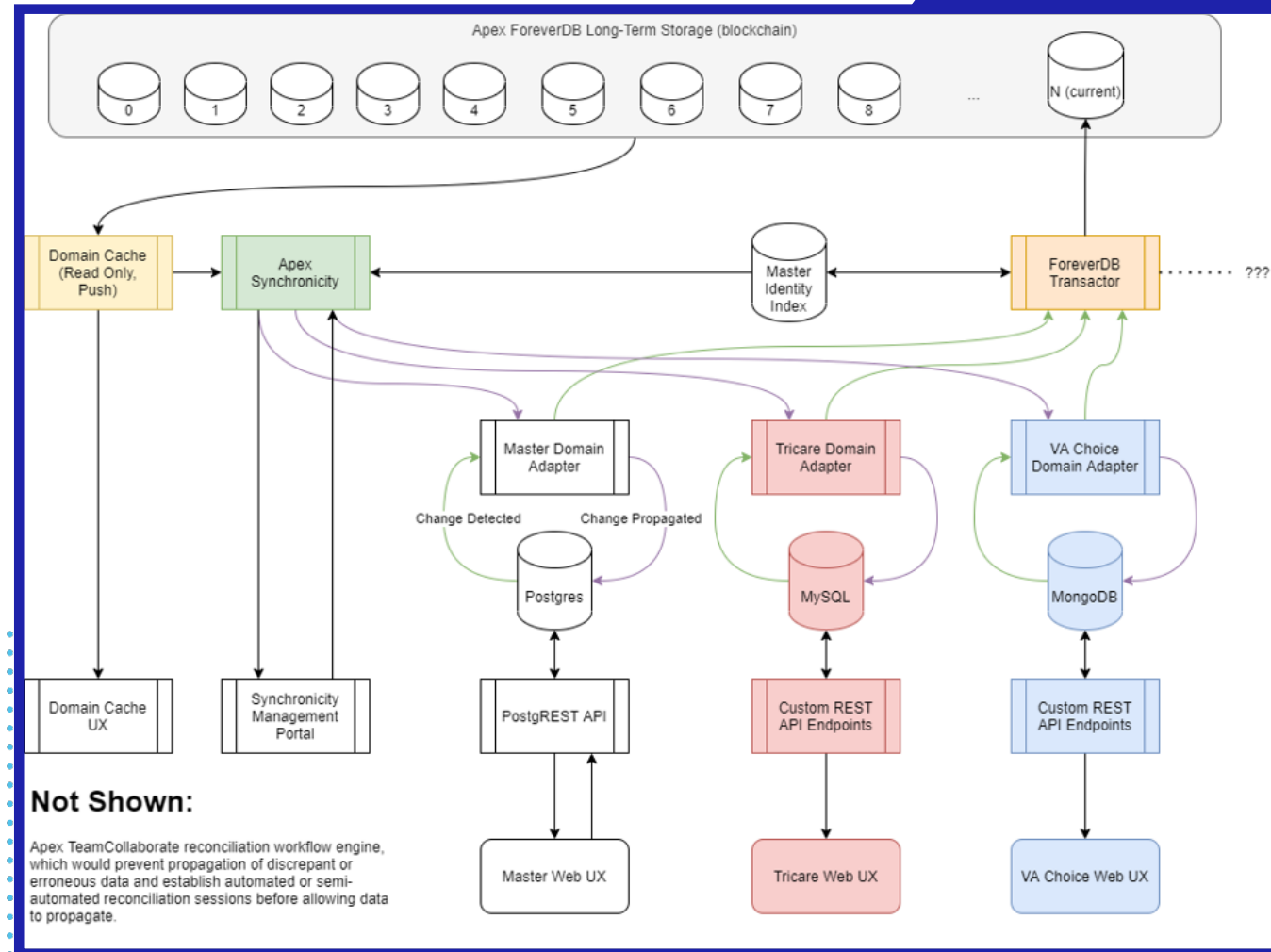
# Current State of Provider Directory Updates

- Batch updates are used to roll out changes from a master database to other lines of business databases.
- Requires API transaction points in each SOR
- Very inefficient and error prone.
- This is NOT interoperability!



# Interoperability as an Architectural Layer

- Apex's novel use of blockchain for data sharing across organizational boundaries, demonstrated in the AI tech sprint, does not employ a distributed ledger as a fundamental data structure.
- Instead, change is detected in multiple systems of record (SORs) unobtrusively and propagated according to a distributed, reactive platform.
- This means SORs can operate as designed—no “rip and replace.”

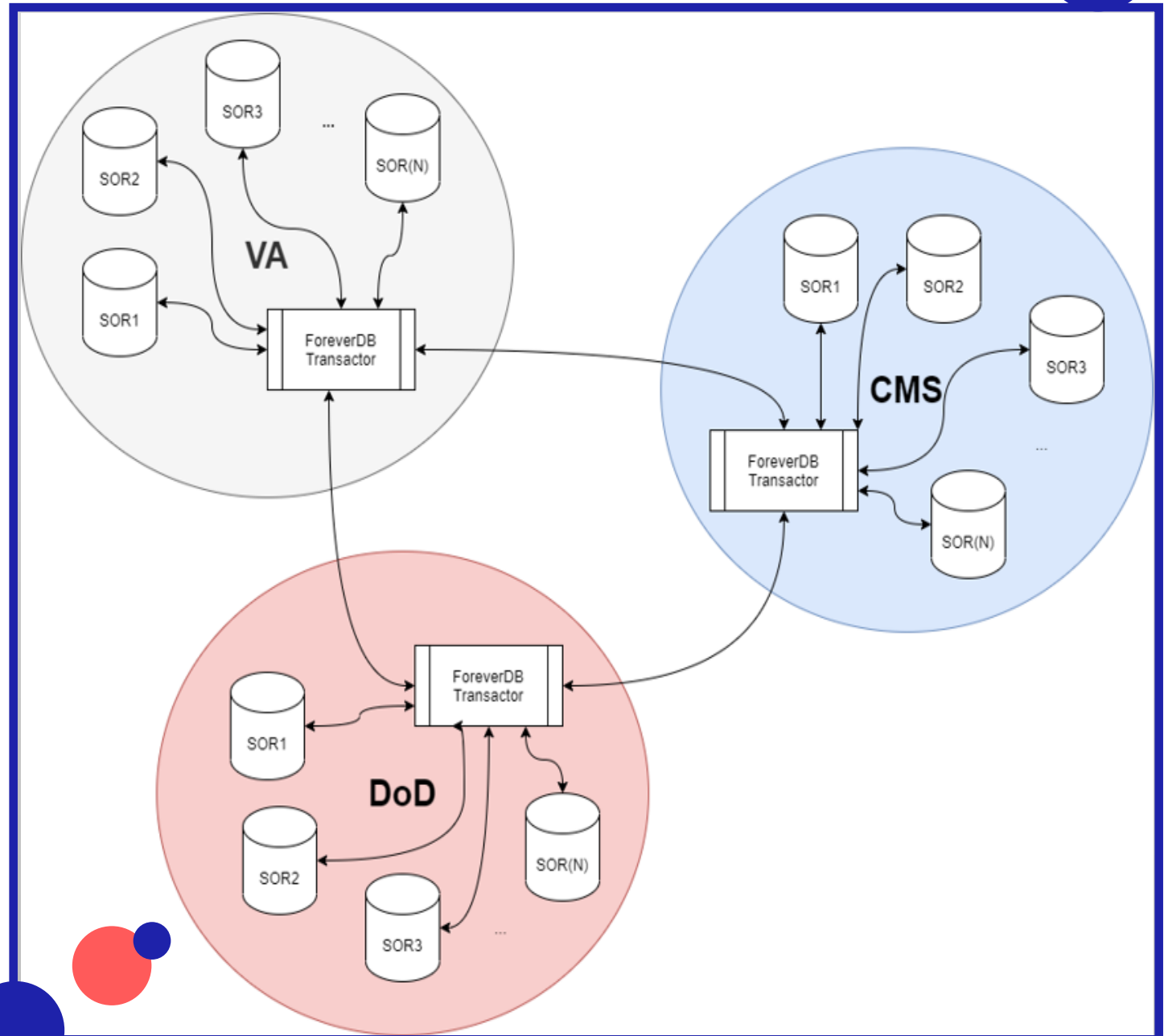


# Possible Future State

## True Interoperability with Blockchain

Architecturally based interoperability aligns clinical and administrative data from multiple SORs for the users' purpose, providing them with a consolidated, unified action list specific to their needs.

**Proof of Concepts:** Applying architectural based interoperability to prior authorization/consent and sharing clinical information across boundaries.



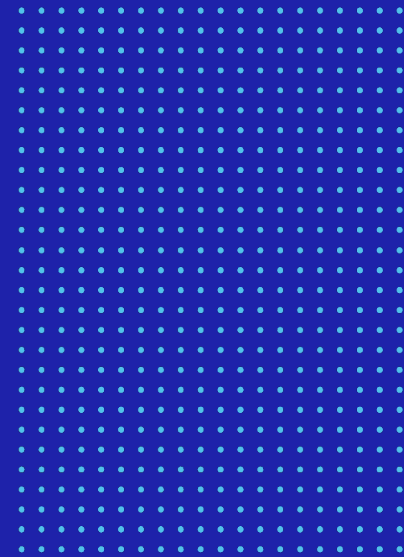
# Endnotes

1. “Interoperability in Healthcare,” Himss.org/resources/interoperability-healthcare.
2. “Defining the Provider Data Dilemma: Challenges, Challenges and Call for Industry Collaboration,” CAQH, 2016, p.1
3. “What Physicians are Saying About Directories” Powerpoint summary, American Medical Association, 2018.
4. “Incorrect Provider Directories Associated With Out-Of-Network Mental Health Care and Outpatient Surprise Bills”, Health Affairs, <https://www.healthaffairs.org/doi/10.1377/hlthaff.2019.01501>
5. “The Hidden Costs of Inaccurate Provider Directories,” CAQH, p.2, 2019.
6. ”AMA High-Level Summary of the No Surprises Act, American Medical Association”, 2020

*Supporting  
Emerging  
Technologies in  
VA*



Joseph L. Ronzio  
*Deputy Chief Health Technology Officer  
Veterans Health Administration*





# *Historical Medical Technology Investments*

- Large Proprietary Systems
- Billing Focused technology improvements
- Captures limited data on a fraction of an individual's life
- Majority of information not easily computable (medical note)
- Medical staff use





# *Future Medical Technology Investments*

- In-House and Cloud systems
- Focus on productivity/ease of use for medical staff
- Captures vast amounts of varied data
- Computable information
- Data prompts required/recommended actions
- Customer access and use

# Emerging Technologies

- Telehealth Technologies
- Consumer Sensors
  - Health, Care and Research API's
- 3D Printing
- Virtual / Augmented Reality
- Medical Devices
- Robotics
- Many, many more!



# *Collaborating with Veterans Health Administration*

- VHA Innovation Sandbox
- Research
- Collaborate Research and Development (CRADA)
- Know the rules – Laws, Ethics, Policies
- Keep the agencies customers in mind not just the agency users
- Contracts

# *Information Security*

- Not a bolt on and must be fundamental to any technology used
- FISMA, FIPS, FEDRAMP – Know the NIST publications
- HIPAA is not the scale to evaluate GOV system security
- Future Threats are today's worries, hopefully not tomorrow's problems
  - **Be involved in NIST publication reviews to make them better**

Information Security is required to save lives!

# *Accessibility*

- American Disability Act
- Section 508 of the Rehabilitation Act
- White House – Executive Order on Diversity, Equity, Inclusion, and Accessibility in the Federal Workforce (June 25, 2021)

# *Questions*

Before we go, does anyone have any questions?





*Thank you!*

National Artificial Intelligence Institute  
Dr. Gil Alterovitz, [Gil.Alterovitz@va.gov](mailto:Gil.Alterovitz@va.gov)



Architecture-based Interoperability  
Mr. Bob Calco, [bob.calco@apexdatasolutions.com](mailto:bob.calco@apexdatasolutions.com)



Emerging Technologies at the VA  
Dr. Joseph Ronzio, [Joseph.Ronzio@va.gov](mailto:Joseph.Ronzio@va.gov)

