



DHS Science & Technology Directorate

SILICON VALLEY INNOVATION PROGRAM

ANIL JOHN | TECHNICAL DIRECTOR

Interoperability as a First Principle

Encouraging Innovation, Ensuring Diversity,
and Enabling a Global Ecosystem

16 June 2020





AGENDA

- What is the operational problem?
- An ecosystem approach to solving the problem
 - Fund, champion, require and utilize open standards
 - Conduct proof-of-concepts for implementation insights
 - Minimize risk in operational deployments
- Next steps

Problem Set: Preventing Forgery & Counterfeiting of Certificate and Licenses



U.S. Citizenship and
Immigration Services



U.S. Customs and
Border Protection



Transportation
Security
Administration

- DHS Operational Components (CBP, TSA, USCIS etc.) need to issue, validate and verify entitlements, attestations and certificates
 - Travel
 - Citizenship and Immigration Status
 - Employment Eligibility
 - Organizational Identity & Supply Chain Security
- DHS Operational Components are both Issuers of Credentials (USCIS) and Validators and Verifiers of Credentials (CBP, TSA)
- Current issuance processes are paper based, non-interoperable and susceptible to loss, destruction, forgery, and counterfeiting



Current State of Practice

Raw Material Import Tracking

U.S. Customs & Border Protection

- Origin documents of raw materials (i.e. Mill Test Reports, Crude Oil Assay, Lumber Export Authorization) are **paper-based**.
- **Proof of origin may be lost when there are multiple transfers/resales**, making it more difficult to validate good origination.
- Different supply chains are siloed, but global trade intersects at multiple points. Customs brokers and border control agencies have to gather data from different parties, **as the number of stakeholders and supply chains increase the problem with authentication intensifies**.

Digital Credential Issuance & Verification

U.S. Citizenship & Immigration Services
Transportation Security Administration

- USCIS administers the nation's lawful immigration system and is **responsible for the issuance of documentary evidence of citizenship, immigration, and employment authorization**.
- TSA has a responsibility to **confirm the identity of each passenger at the TSA security checkpoint** to ensure that the **identity presented** on the document **matches the identity associated with the confirmed travel reservation**.
- Current issuance processes are **paper based, non-interoperable and susceptible to loss, destruction, forgery, and counterfeiting**.
- Seeking **secure, privacy respecting and interoperable approaches to digital issuance and verification of credentials** we are authoritative for such as the US Permanent Resident Card.

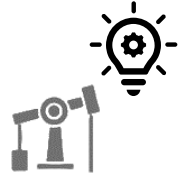


Raw Material Import Tracking



Technology
Platform
X

Oil



Oil Co
extracts crude oil and
generates a Verifiable
Credential (VC) for it with
Platform X's
implementation and
sends it to the Custom's
Broker

1



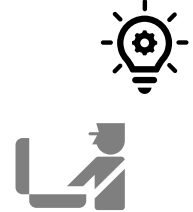
Customs Broker Co
uses Platform X's HTTP
Verifier API to ensure
that the **oil** VC
signatures are
acceptable

2



Customs Broker Co
presents the
verified products
with the VCs to the
CBP

3



CBP
uses Platform X's
verifier to verify oil

4

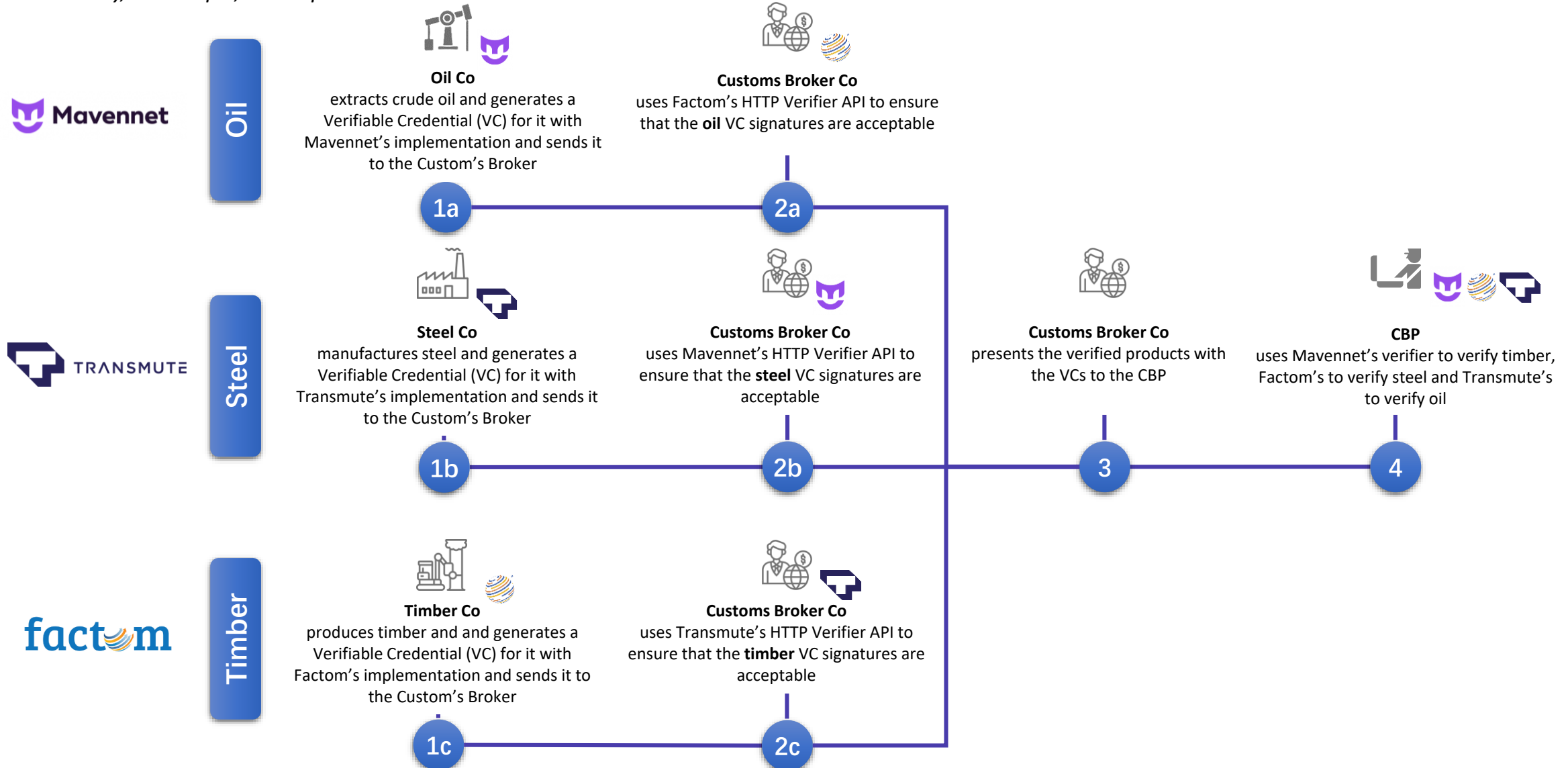


Interoperable Raw Material Import Tracking

Raw material producers (oil, steel and timber) are using different vendors (Mavennet, Transmute, and Factom) to generate VCs specific to the materials they are producing, i.e. Crude Oil Assay, Mill Test Report, Lumber Export Authorization.

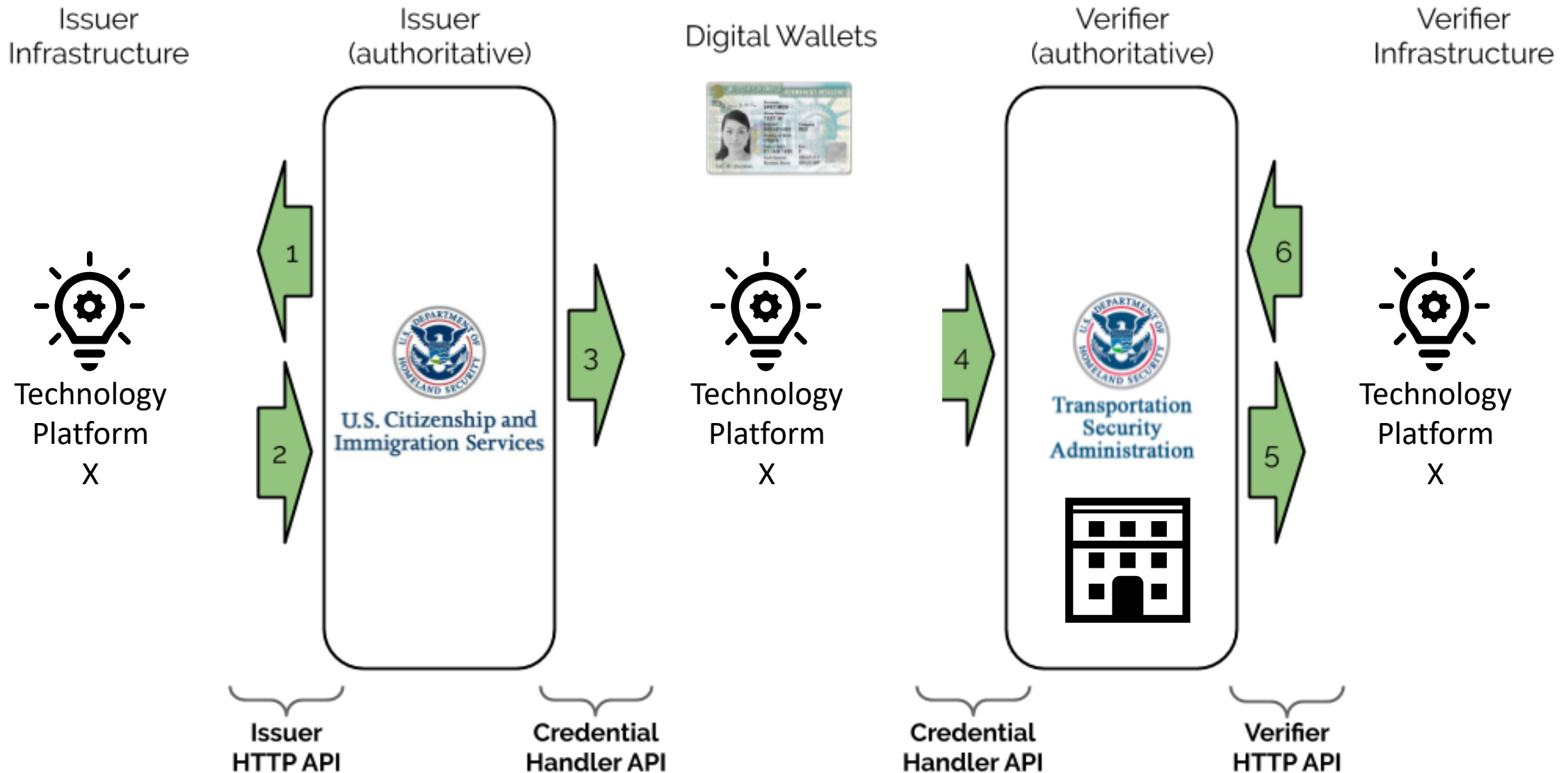
Custom Broker uses different vendors to verify VCs presented by each producer

CBP uses yet another vendor to validate the VCs presented by the Customs Broker



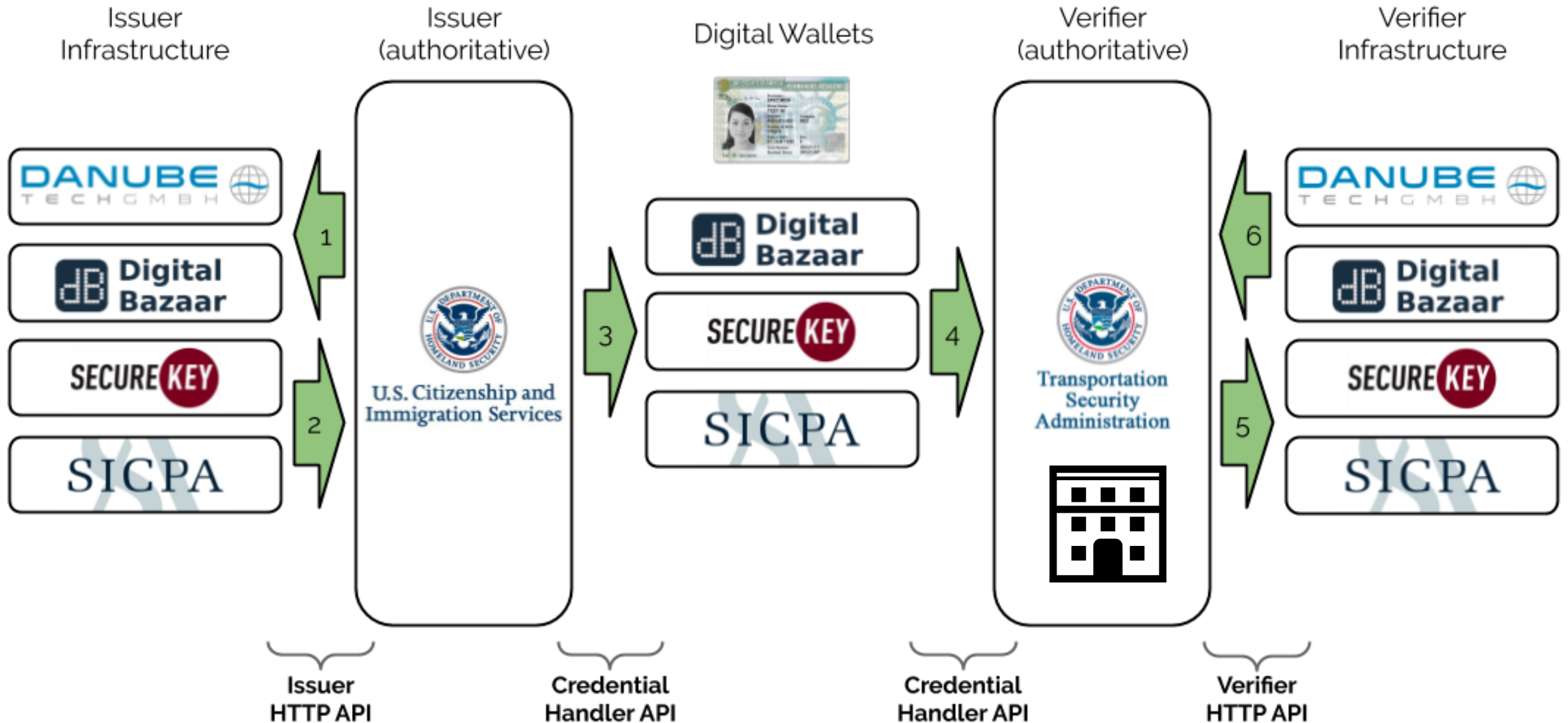


Digital Credential Issuance & Verification





Interoperable Digital Credentials



Strategic Approach to Ensure a Competitive, Interoperable Marketplace of Solution Providers



1 Help develop and champion interoperability standards and specifications that are patent free, royalty free and free to implement

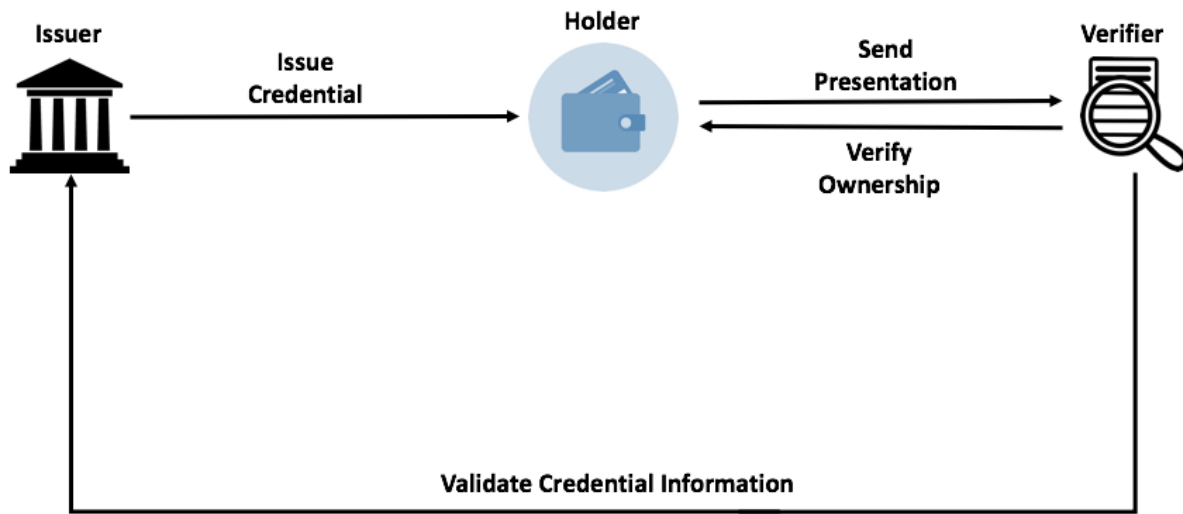
2 Invest in business driven proof-of-concepts to identify scalable integration architectures and determine adoption Gain/Pain ratio

3 Motivate and shape innovative and potentially risky product development via the S&T Silicon Valley Innovation Program (SVIP) to meet mission challenges

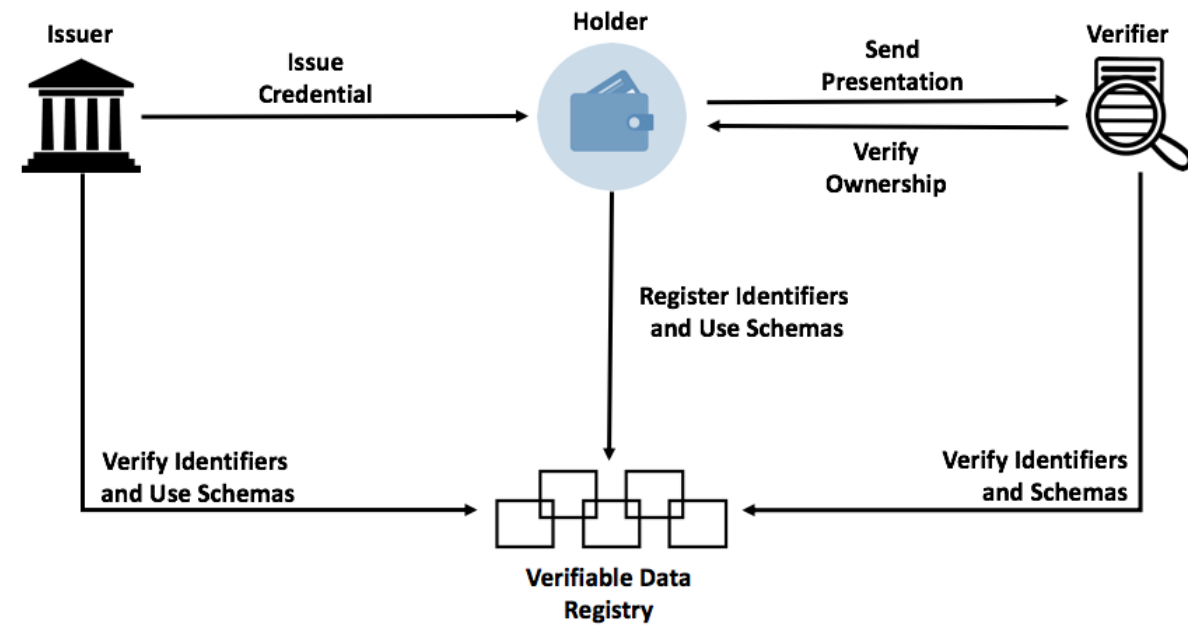


But First, Why?

Classic Identity Provider Model



W3C Verifiable Credential Model



Develop and Champion Globally Interoperable Standards and Specifications



Verifiable Credentials

- A set of claims made by an issuer about a subject in a manner that is:
 - Tamper evident
 - Cryptographically verifiable
- Digital version of physical credentials/attestations
 - Driver's Licenses
 - Permanent Resident Cards
 - Certificates of Origin
 - ...

Verifiable Credentials Data Model 1.0
Expressing verifiable information on the Web



W3C Recommendation 19 November 2019

Decentralized Identifiers

- Globally Unique Identifier without the need for a central registration authority
 - Immutable over time
 - Globally resolvable
 - Privacy respecting
 - Cryptographically verifiable

Decentralized Identifiers (DIDs) v1.0
Core Data Model and Syntaxes



W3C First Public Working Draft 27 November 2019

Multi-Party Distributed Key Management

- Tackling the hard challenge of distributed key management
 - Provisioning
 - Revocation
 - Re-Issuance
- Emerging W3C Specifications
 - Secure Data Stores
 - WebKMS
 - Revocation List 2020
- Path to Standardization – W3C

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Proof of Concepts to understand Gain/Pain



Authenticity and Integrity of IoT Device, Camera and Sensor Data

Enhancing the Entry Submission Process to Streamline International Trade Facilitation

Enhancing the Registration and Verification of Intellectual Property Assertions of Imported Products



CBP Adoption of S&T Funded & Championed Blockchain Interoperability Specifications as a US Customs Standard



U.S. Customs and
Border Protection

AUG 08 2018

MEMORANDUM FOR: John P. Sanders
Chief Operating Officer

FROM: Brenda B. Smith *Brenda B Smith*
Executive Assistant Commissioner
Office of Trade

Kathryn Kolbe *K Kolbe*
Executive Assistant Commissioner
Enterprise Services

Phil Landfried *Phil Landfried*
Assistant Commissioner
Office of Information and Technology

SUBJECT: Setting Standards for Blockchain/Distributed Ledger
Technology

DHS S&T has invested over three years of time, money, and effort into researching the specifications necessary to allow multiple blockchains to interact with each other. Interoperability allows the government to remain impartial toward which blockchain software is utilized by our trade partners and removes the need for CBP to continuously build customized Application Program Interfaces to communicate with users of other technology.

Proposed Path Forward:

The Office of Trade (OT) and the Office of Information and Technology (OIT) jointly recommend that:

1. CBP adopt the specifications developed and championed by DHS S&T as a CBP standard.
2. OT and OIT jointly engage other U.S. Government stakeholders, such as the DHS Chief Information Officer (CIO), the White House CIO Council, and others, to push for broader adoption of these standards and to develop an effective “whole of government” approach towards this use-case of blockchain technology.

Strategic Approach to Ensure a Competitive, Interoperable Marketplace of Solution Providers



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What We Do



*We help develop and deliver technology that DHS needs
while promoting economic development through startup/small-business growth*

*We enable the global innovation community
to tackle the hardest problems faced by DHS's operational missions*



CULTIVATE

Educate the innovation
community on DHS's
mission and challenges



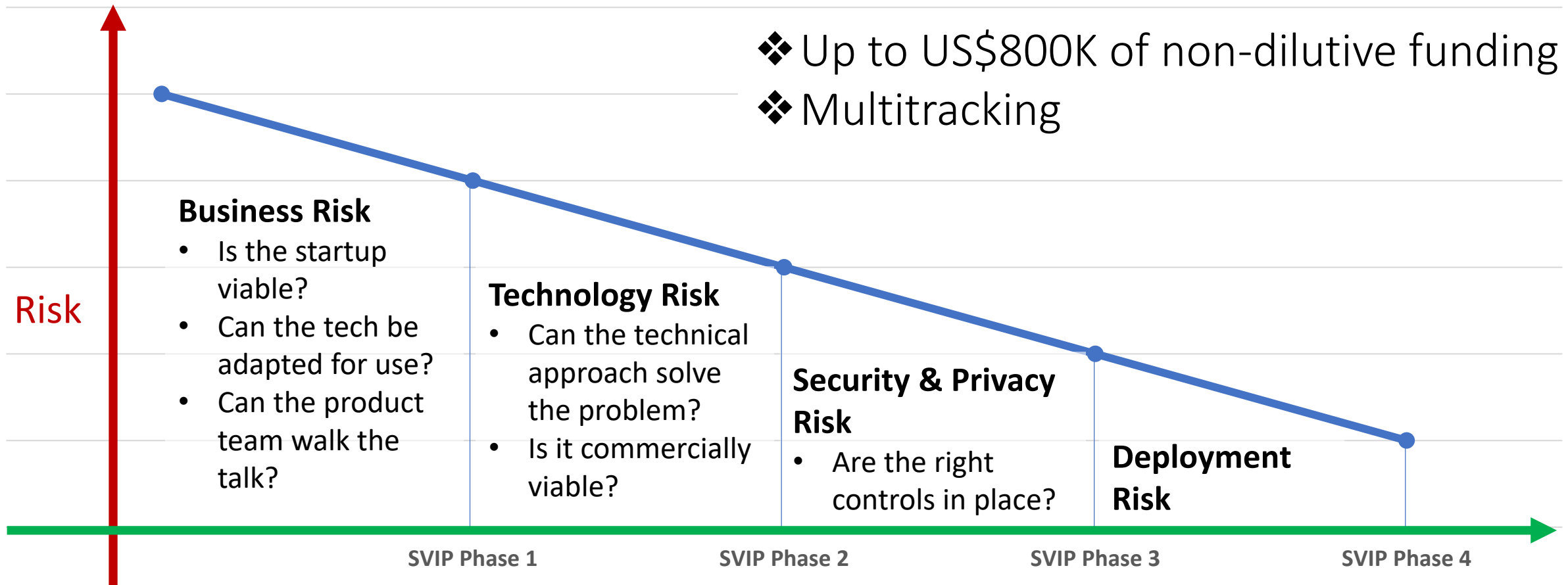
INNOVATE

Leverage commercial
investments & adapt to meet
government needs

We Mitigate Operational Transition Risks



- ❖ Up to US\$800K of non-dilutive funding
- ❖ Multitracking



Our Current Topic Portfolio



Internet of Things
Security



Big Data



Identity and
Anti-Spoofing



Fintech
Cybersecurity



Aviation Security



Seamless Travel



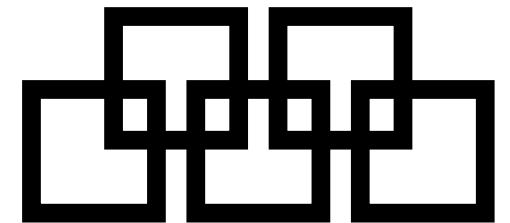
Drones/sUAS



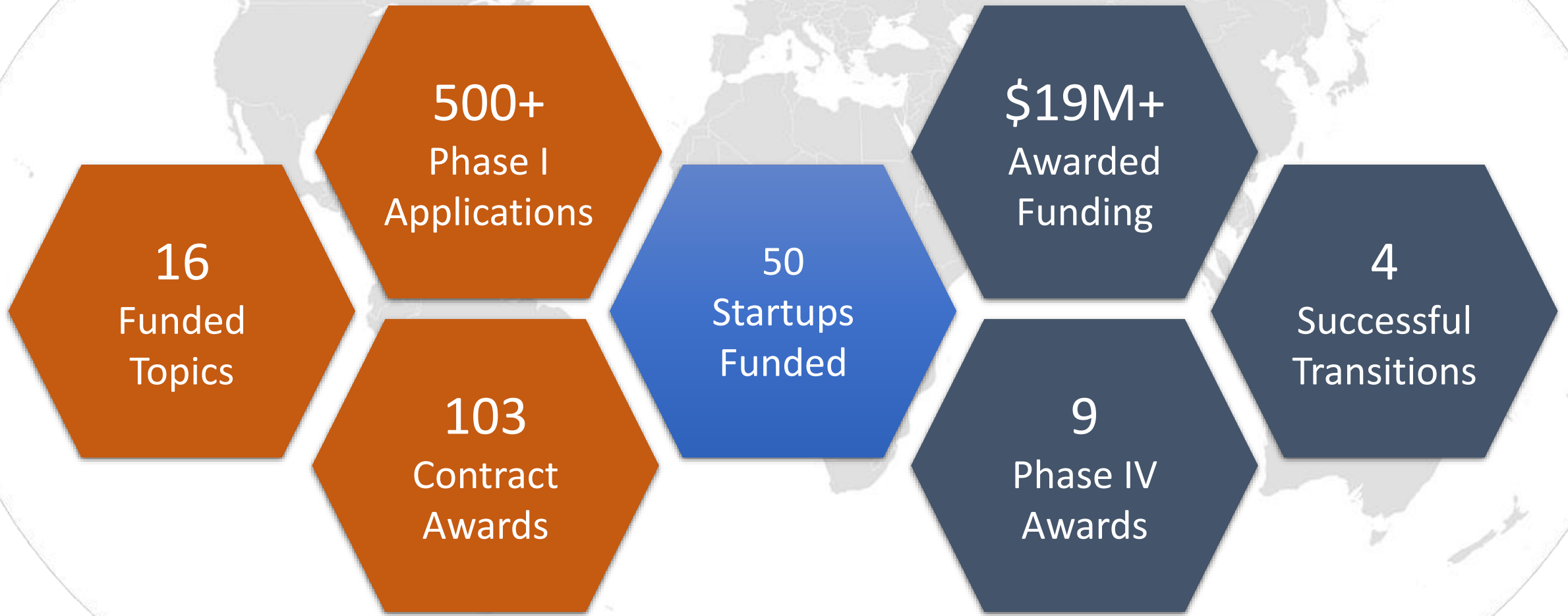
K9 Wearables



First Responder Tech



Blockchain



SVIP Call for Solutions: Preventing Forgery & Counterfeiting of Certificate and Licenses



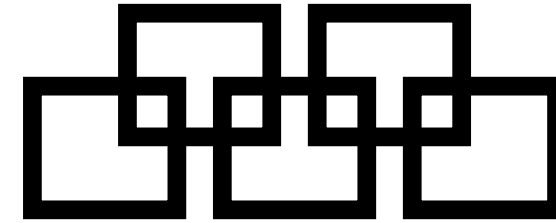
U.S. Citizenship and
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Preventing Forgery & Counterfeiting of Certificate and Licenses



Digital
Bazaar



Mavenet

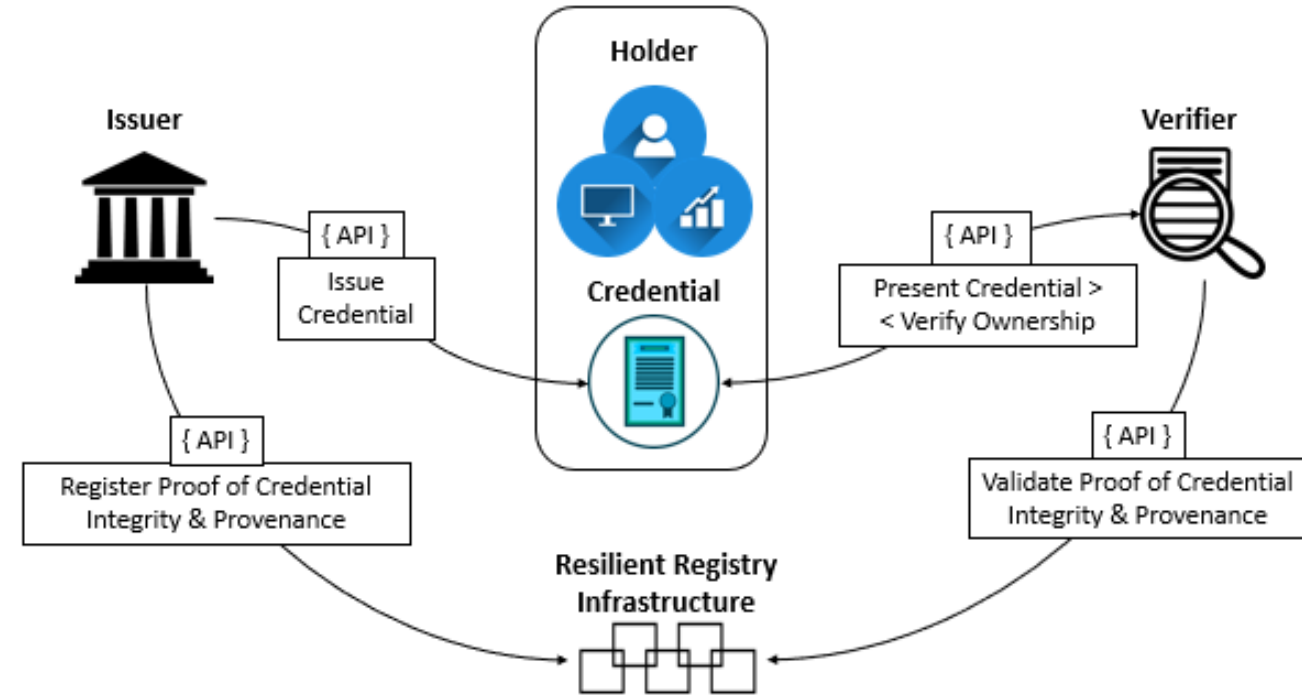




Scope of Work

DHS is applying technologies and solutions that address this need via one or more of the following Technical Topic Areas:

1. Issuance and Verification of Certificates, Licenses and Attestations
2. Storage and Management of Certificates, Licenses and Attestations



Ensuring Interoperability and Open APIs



- All APIs that are presented to the Issuer and the Verifier SHALL be publicly documented, patent free, royalty free, non-discriminatory, available to all, and free to implement using widely available and supported programming languages.
- The solution SHALL incorporate, if appropriate to the particular use case, the following emerging and/or mature specifications for interoperability that have been funded, tested and/or championed by DHS:
 - *Decentralized Identifiers (Standards Development Organization - World Wide Web Consortium / W3C)*
 - *Verifiable Credentials (Standards Development Organization - W3C)*
 - *JavaScript Object Notation for Linked Data / JSON-LD (Standards Development Organization - W3C)*

AND MORE ...



Homeland
Security

DHS S&T Silicon Valley Innovation Program (SVIP)

Phase 1 Multi-Vendor Interoperability Plug Fest

6 -7 May, 2020

PREVENTING FORGERY & COUNTERFEITING OF CERTIFICATES AND LICENSES

Phase 1 Interoperability Plug Fest Test Plan
May 2020



<https://lists.w3.org/Archives/Public/public-credentials/2020Jun/0100.html>



DANUBE
TECH GMBH



db Digital
Bazaar

SICPA

Mavennet



factom

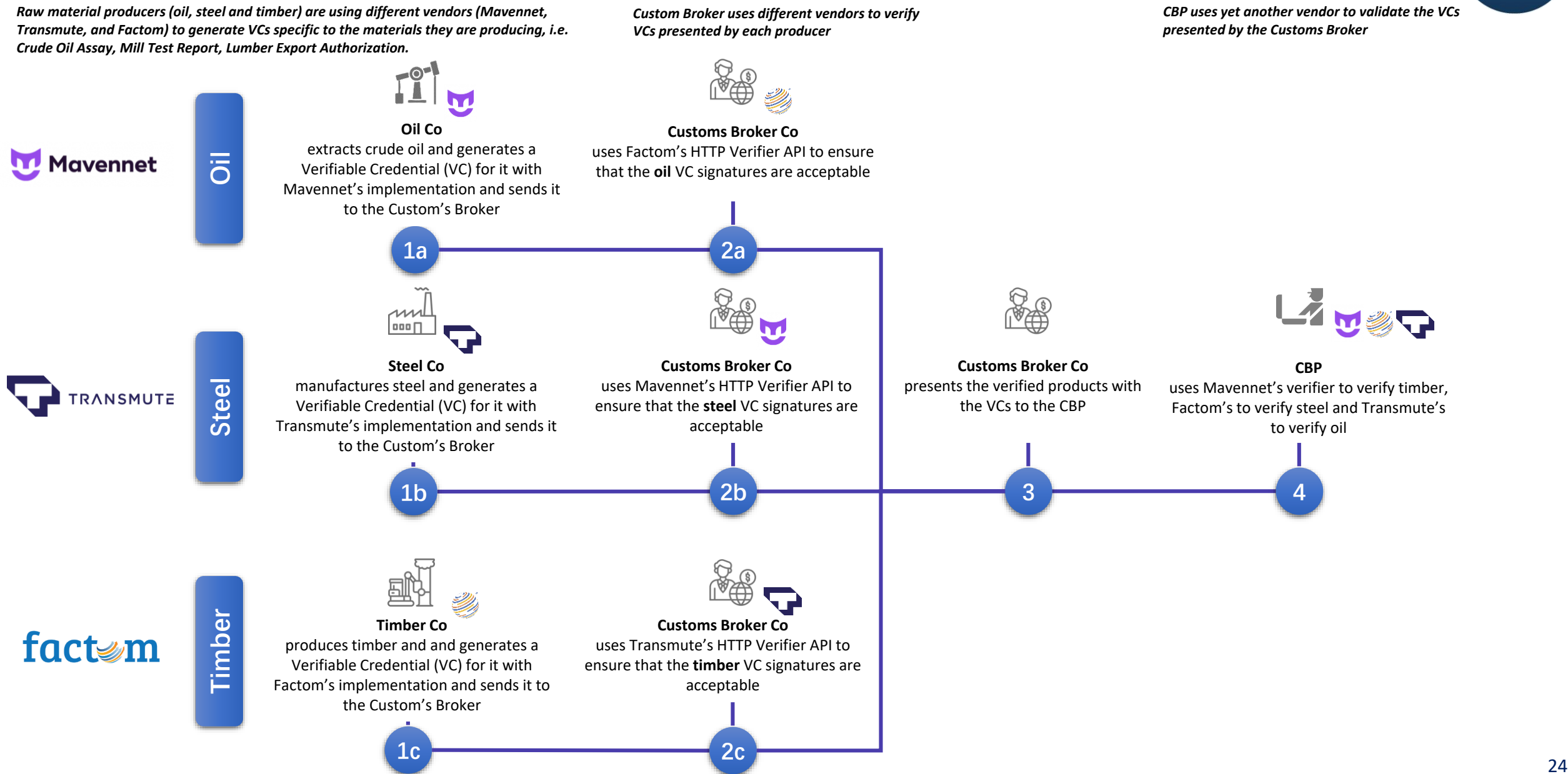
SECURE KEY

Registry Infrastructure Under Test

- Factom
- Hyperledger Fabric
- Hyperledger Indy
- Mavennet Neoflow
- Transmute for Trade
- Universal Issuer/Verifier
- Veres One

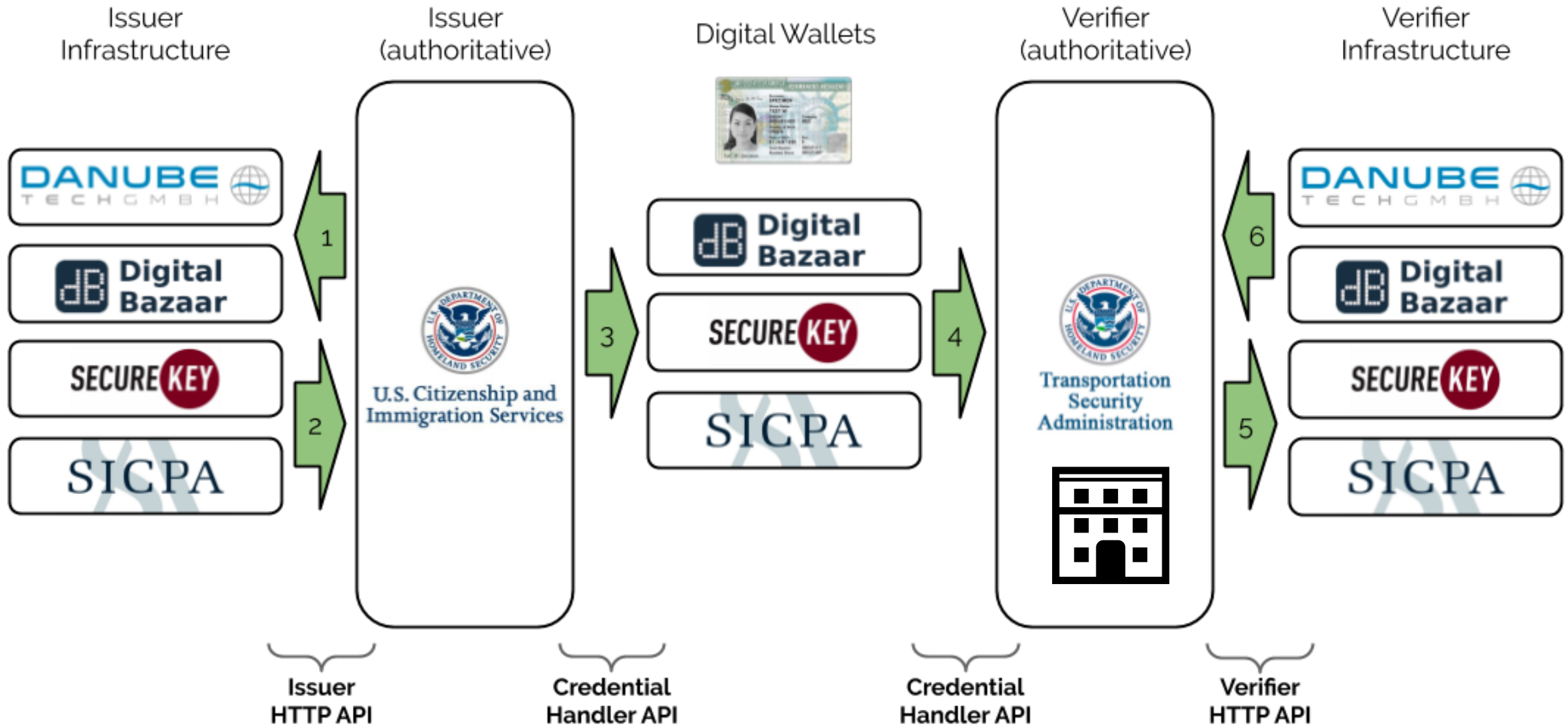


Raw Material Imports Interoperability Test





Digital PRC Interoperability Test



Real Interoperability Matters – No excuses!



- Potential for the development of “walled gardens” or closed technology platforms that do not support common standards for security, privacy, and data exchange. Scalable deployments need solution diversity to prevent vendor tech lock-in
- Data privacy and data segregation continues to be critical components of any distributed solution, and needs to be addressed up front in the solution architecture and design
- Rip-n-Replace is NOT a successful path to enterprise integration, so interoperability is critically important. Interoperability requires addressing the architecture, protocol, payload and policy aspects of any solution.
- Government has a role in ensuring a competitive, diverse and interoperable Blockchain and DLT eco-system by:
 - Conducting R&D to understand the promise, perils, and the gain-to-pain ratio of technology adoption
 - Conducting realistic POCs, Pilots and Implementations that encourage and demonstrate multi-party interoperability and solution diversity
 - Supporting innovative companies building and using emerging interoperability specifications and mature standards to enable a competitive, diverse marketplace of potential solutions

And now, this ...



NEW SOLICITATION RELEASE

**SILICON VALLEY
INNOVATION PROGRAM**

Preventing Forgery & Counterfeiting of Certificates and Licenses (Release 2)

APPLICATION DEADLINE • JULY 10, 2020 • 12PM PST



 **Homeland
Security**
Science and Technology

DHS COMPONENT & PROGRAM PARTNERS:
U.S. Customs and Border Protection
U.S. Citizenship and Immigration Services
Privacy Office

SVIP Call for Solutions:

- Alternative Identifier to the Social Security Number
- Food Supply Chain Safety and Visibility
- Supply Chain Traceability of Natural Gas Import
- Supply Chain Traceability of Direct-to-Consumer E-Commerce Shipments
- Privacy Respecting Essential Work and/or Task License
- Call Details & Application Form
 - <https://go.usa.gov/xw9G2>
(Documents w/ the posting date of June 9, 2020 or later)
- DHS S&T SVIP Info & Eligibility Criteria
 - <https://www.dhs.gov/science-and-technology/svip>
- Register for the Virtual Industry Day
 - On June 23, 2020
 - <https://sri-csl.regfox.com/dhs-svip-blockchain-call-2-industry-day>



... and because it matters!



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Homeland Security

Science and Technology

Silicon Valley Innovation Program

DHS-Silicon-Valley@hq.dhs.gov

<https://www.dhs.gov/science-and-technology/svip>

*Thank
You*

Future SVIP Funding Opportunities?



Learn About Future SVIP Calls (Funding Opportunities)

Request to be Added to our low-volume Notification List by emailing
DHS-Silicon-Valley@hq.dhs.gov

Our Application Process



TOPIC CALL

DHS operational
agency describes need

APPLICATION

Startup submits 10
page application laying
out how their
commercial product
can be adapted to
meet DHS need

PITCH

Select startups invited
to provide 15 minute
virtual pitch; Courtesy
decision provided
within 48 hours

AWARD

Other Transaction
Agreement (OTA)
awarded on average
within 45 days



How We Fund

Up to \$800K over 24 months

3-4 tranches of non-dilutive funding ❖ Multitracking

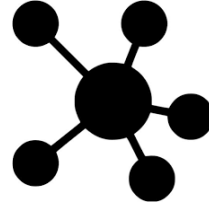
Performance-based funding steps			
Phase 1	\$50-200K	3-6 months	Technology adaptation to address DHS challenge
Phase 2	\$50-200K	3-9 months	Full capability build out to demonstrate viability
Phase 3	\$50-200K	3-9 months	Capability demonstrations & functional and red team testing
Phase 4	\$50-200K	3-9 months	Operational test and evaluation in multiple user scenarios

Benefits to Our Portfolio Companies



Equity-Free

This is a performance-based award. Up to \$800K available for every company.



Network

Instant access to DHS public private partnerships and the greater homeland security enterprise, a \$544B marketplace.



Mentorship

Learn from the best. We have a deep bench of government and private sector partners who can offer guidance and introductions.



Market Validation

Find market fit through prototype testing and pilot opportunities.



Amplify Your Reach

Demo your product to government, industry and investors from across the world.



Follow-On Funding

Our alumni have received follow-on funding by venture capital investors.