

DIGITAL IDENTITY 101

from basics to nextgen solutions

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WHY DO WE NEED BETTER IDENTITY?

3.5 billion

people are underbanked or unbanked globally

World Bank; First Access estimate

600 million

new jobs needed due to 15-year population growth forecast

World Bank Estimate, 2015

(c) 2017 Distilled Analytics, Inc.

4 of 5 new jobs are created by
small & medium enterprises
(SME)...

...but 95% of world's SME's
are underbanked
= **US\$ 2.6 trillion**

We've lost control of our personal data



facebook

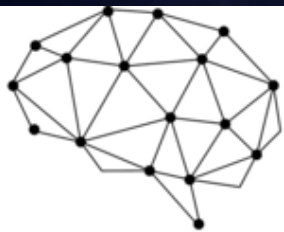
LinkedIn®



HACKED!

QUIFAX

Weaponization of Identity Information



Cambridge
Analytica

facebook®

2016 “fake news”
impressions?

1bn impressions to
150+m U.S. voters

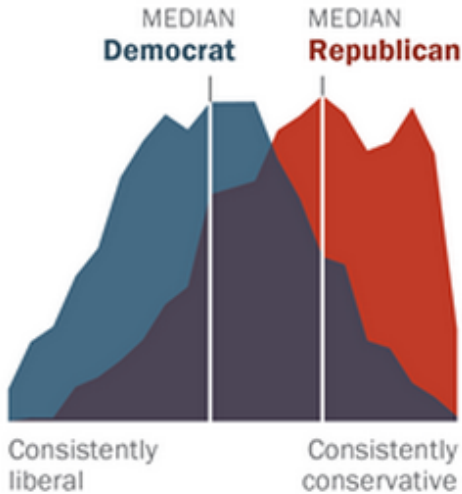
Source: The Verge

Polarization of the Electorate

Distribution of Democrats and Republicans on a 10-item scale of political values, by level of political engagement

Among the politically engaged

1994



Source: Pew Research

facebook.



We can't handle crisis



**OUR EXISTING SYSTEMS
ARE BROKEN**

Identity Papers



Artaxerxes I of Persia, 450 BCE



How do we get i.d.?



What identities do we have?



persona

Mens et Manus: Identity Exercise

Pick one of your personae

**How do you describe your persona?
(e.g., how do you present yourself in
a given context)**

What are the dimensions?

**Take 5 minutes with
your neighbor**

How do we identify?



Characteristics

Centralized

Forgeable / Hackable

Analog / Static



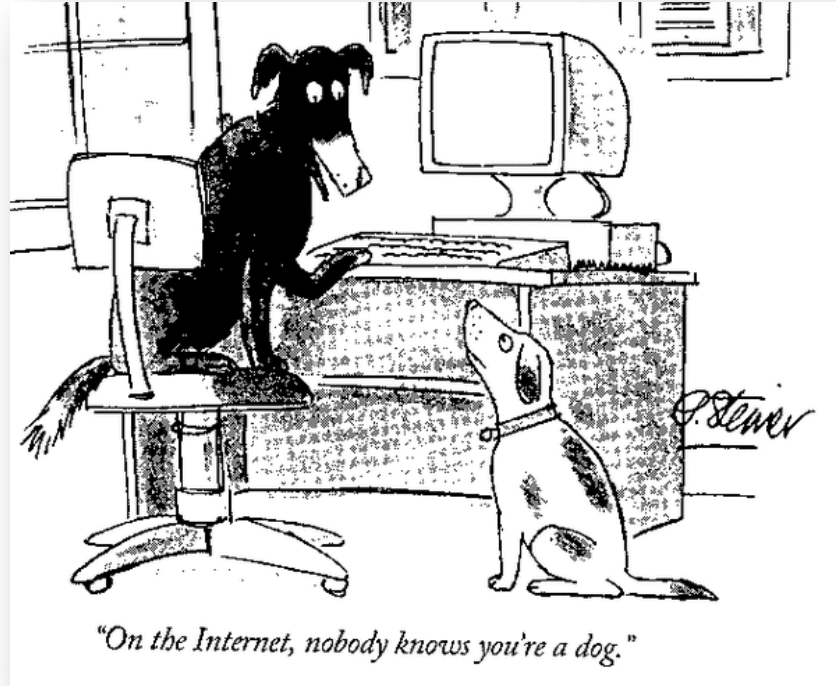
How do we verify identity online?

User ID

Password

PIN

Maybe: Machine ID, Token,
“Challenge” questions



Industry burden

e.g., AML/KYC

Private sector -> gov. credentials

High cost of compliance

banks spend up to

20%

of “run the bank” costs
on identity compliance

Source: Bain & Co.

\$270 billion / year and counting...

Industry burden (cont'd)

AML Systems:

95%

false positive rates



one large bank has

4,000 people

manually resolving F+

SOLUTIONS?

Need to address basics of ID

- **Validation**: do these credentials exist in the real world?
- **Verification**: is the information accurate?
- **Authentication**: are you actually linked to this accurate, real data?

What could robust digital identity look like?

DIMENSION

1. Strong provenanced attributes
2. Transitive source of trust (analog -> digital)
3. Self-issued personae (self-sovereign)
4. Privacy-preserving verification
5. Legal Trust Framework (LTF)

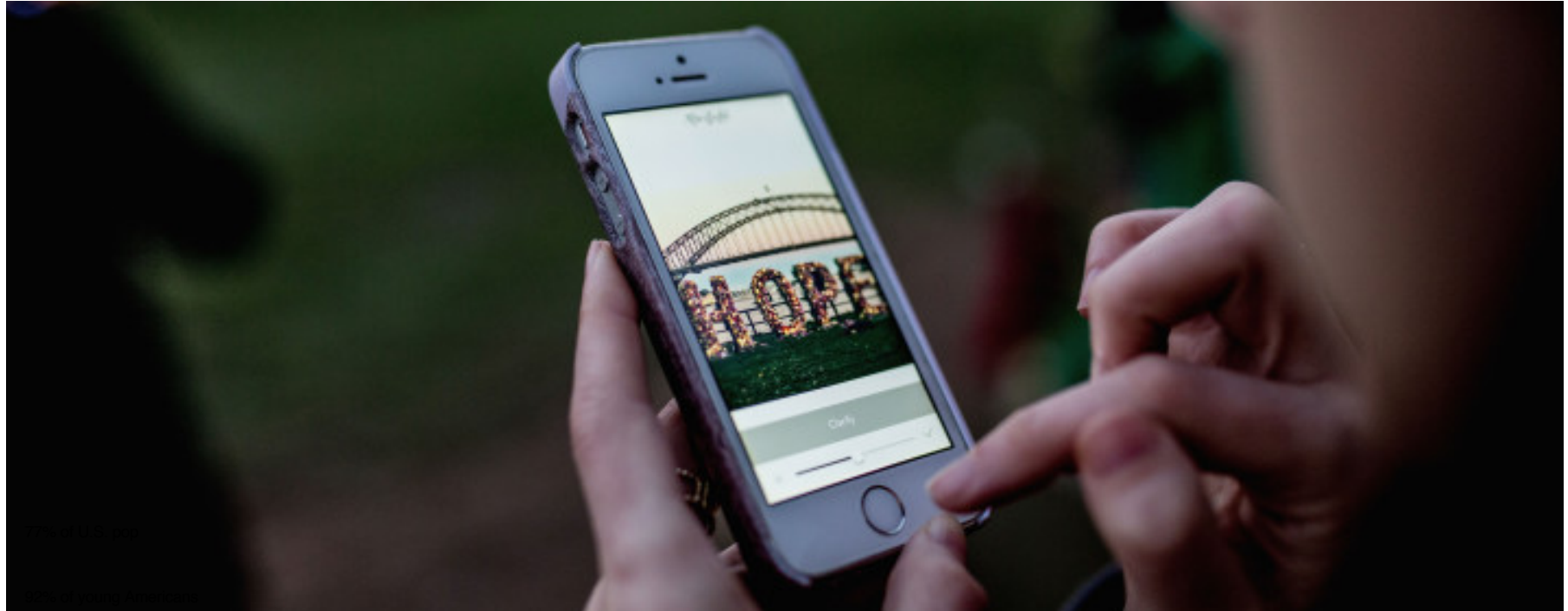
DIAGNOSTIC

On a scale of 1-10, score your country/institution for how it handles each dimension of identity

(take 5 minutes,
add up score)

What is your total score?

Powerful tool for robust identity



27% of U.S. pop

60% of young Americans

Behavioral & biomechanical biometrics

Digital

Hard to forge/hack

Irreplaceable
(so how do you secure data?)

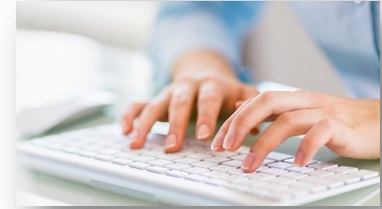
fingerprint

iris/retina

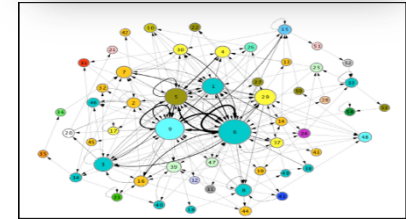
gait analysis



biomechanics
(flight & dwell)



movement
traces



Using ZKP to protect identity attributes

Zero Knowledge Proofs

- Enable someone to demonstrate something is true, without providing any other info besides the verification of truth
- Permit sharing of information while protecting underlying data
- Prevent data leakage
- Goldwasser et.al.
(<https://toc.csail.mit.edu/node/218>)

“Sleazy Hotelier” problem

- Name
- Home Address
- DOB
- Height
- Unique ID #

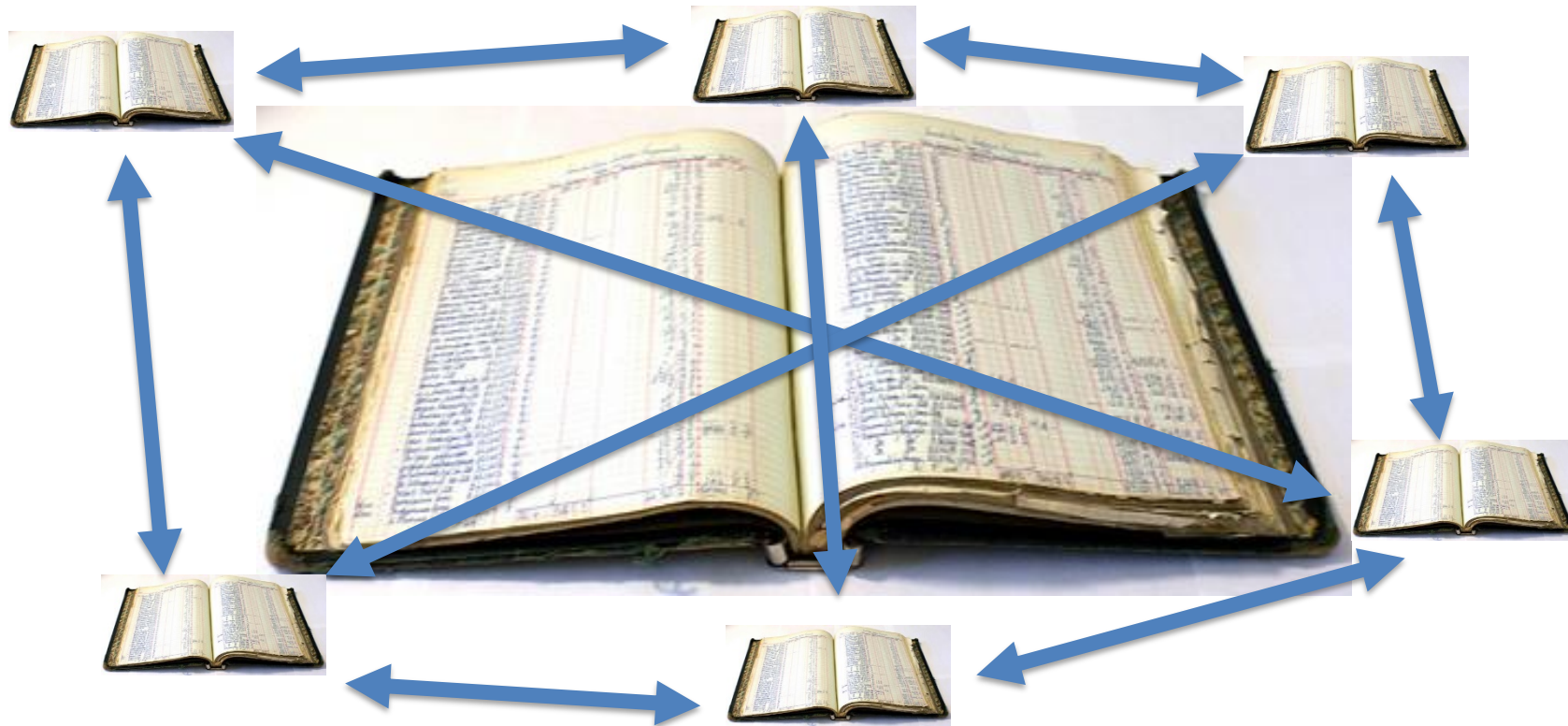


...all to check in to a
hotel room

instead, provide trusted answers

(ASIDE) WHAT IS BLOCKCHAIN?

Blockchain 101



How can we implement robust digital identity?

DIMENSION

Strong provenanced attributes

Transitive source of trust (analog -> digital)

Self-issued personae (self-sovereign)

Privacy-preserving verification

Legal Trust Framework (LTF)

TOOLS

Multimodal biometrics+AI

Multimodal biometrics+AI

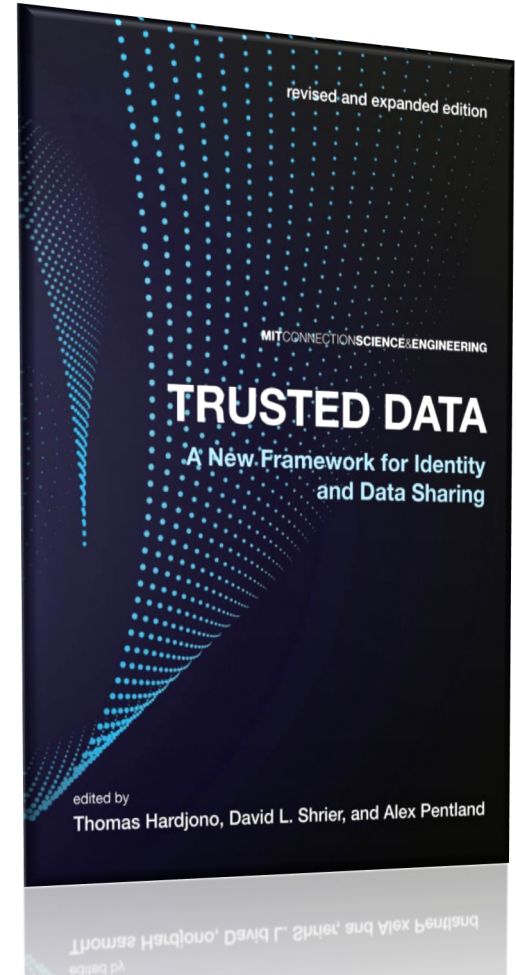
AI+blockchain

AI+ZKP

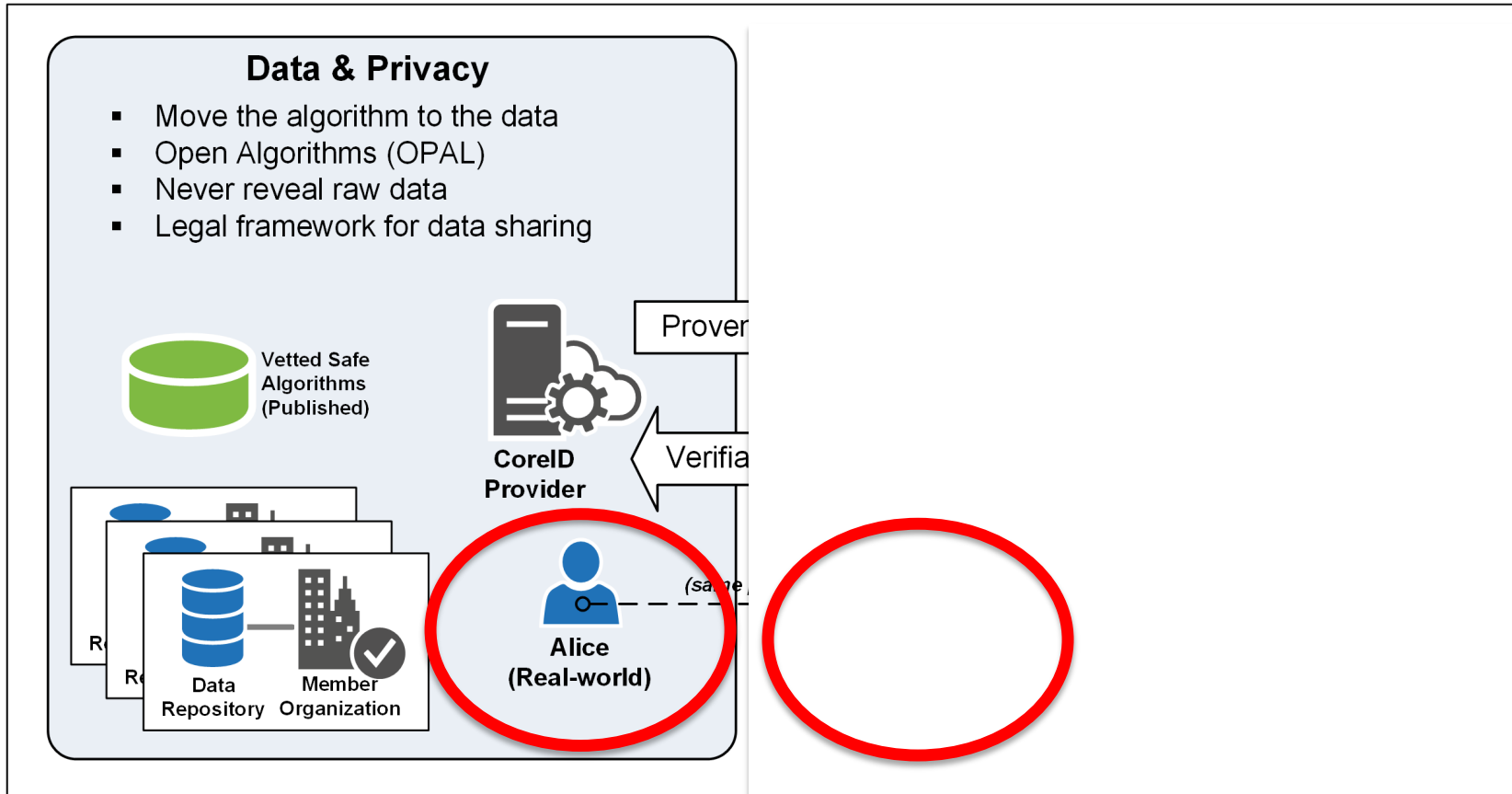
Policy interventions

Trust::Data Architecture

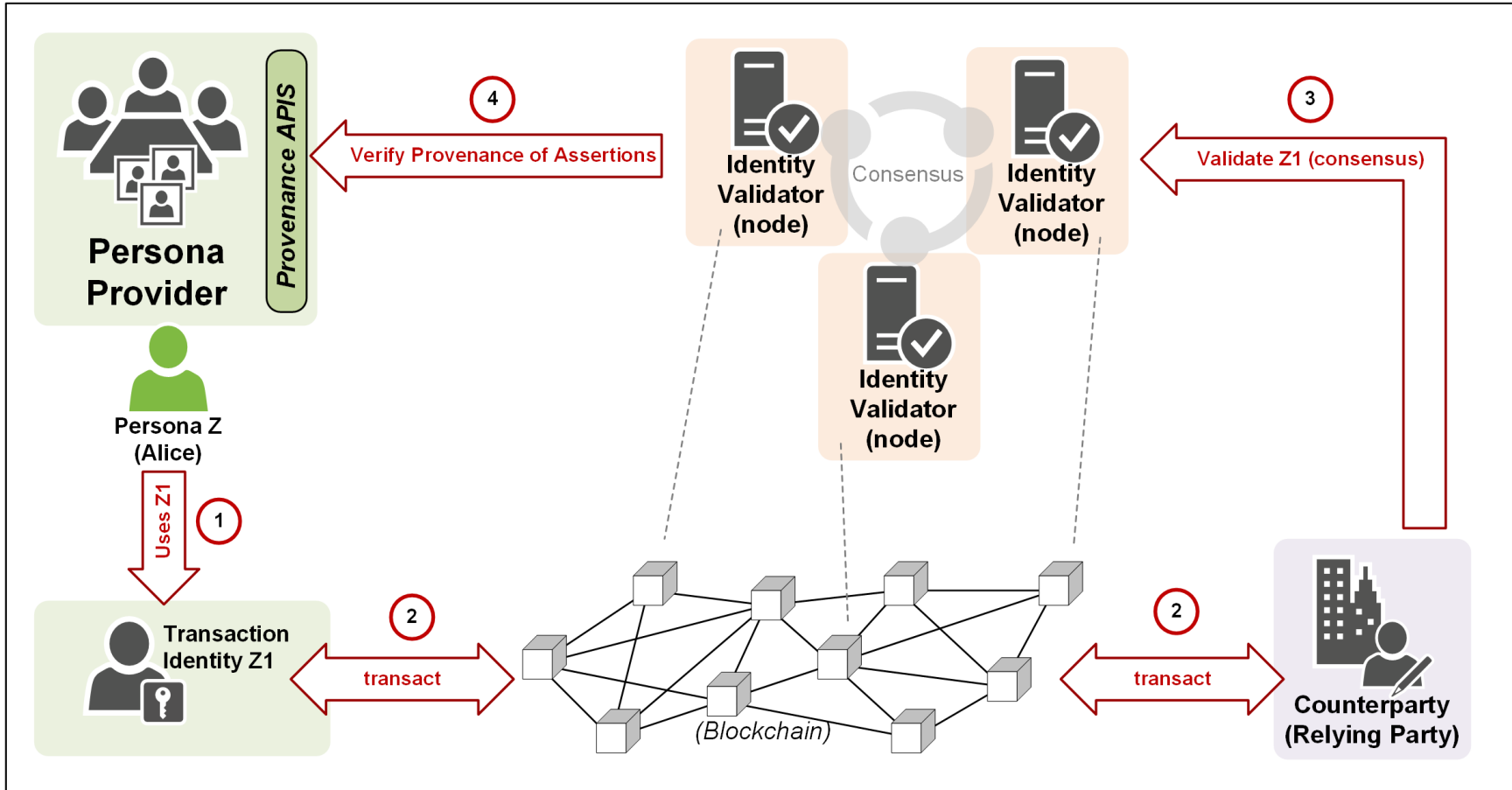
<http://trust.mit.edu>



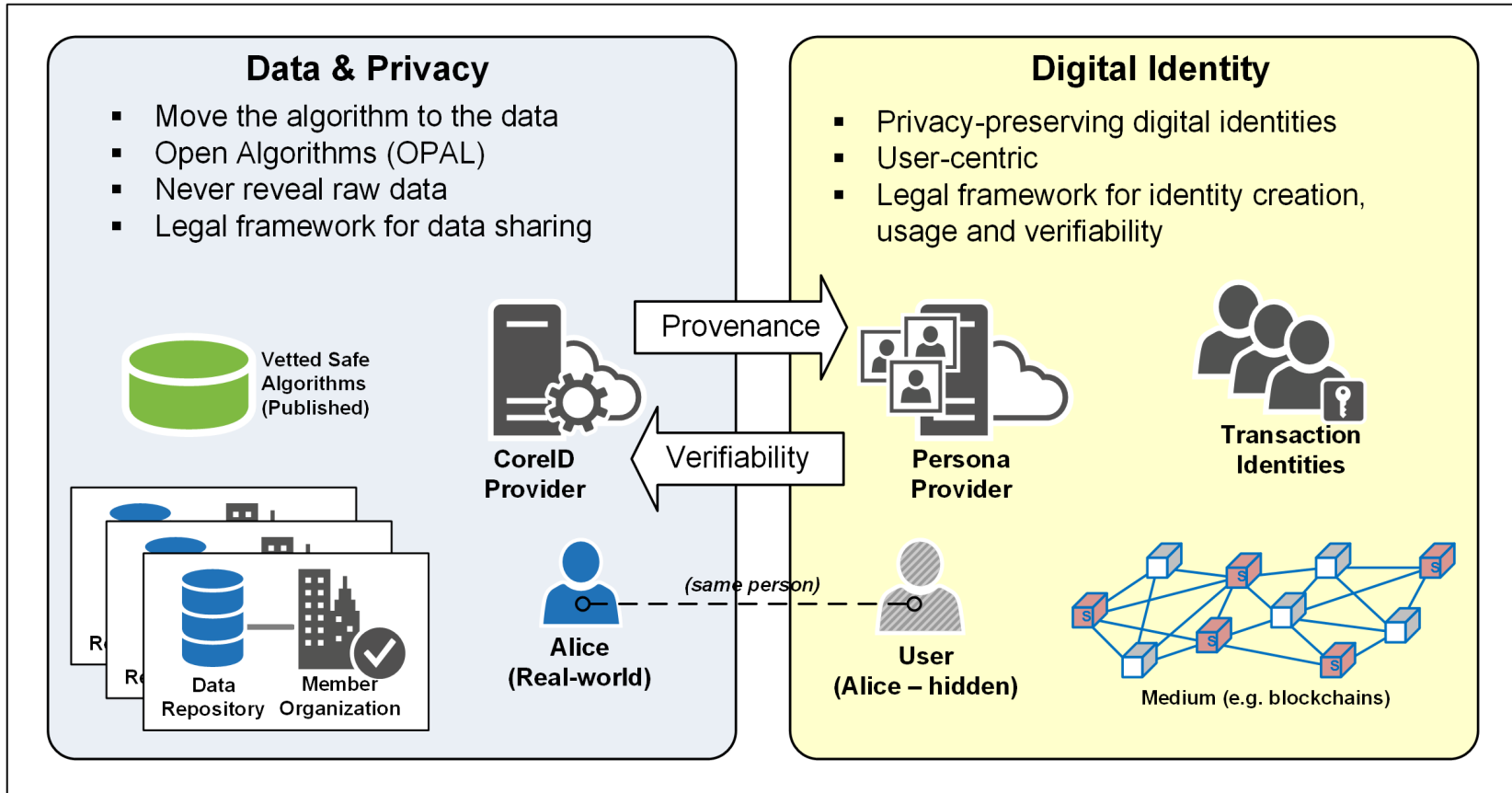
From data attributes to digital identity



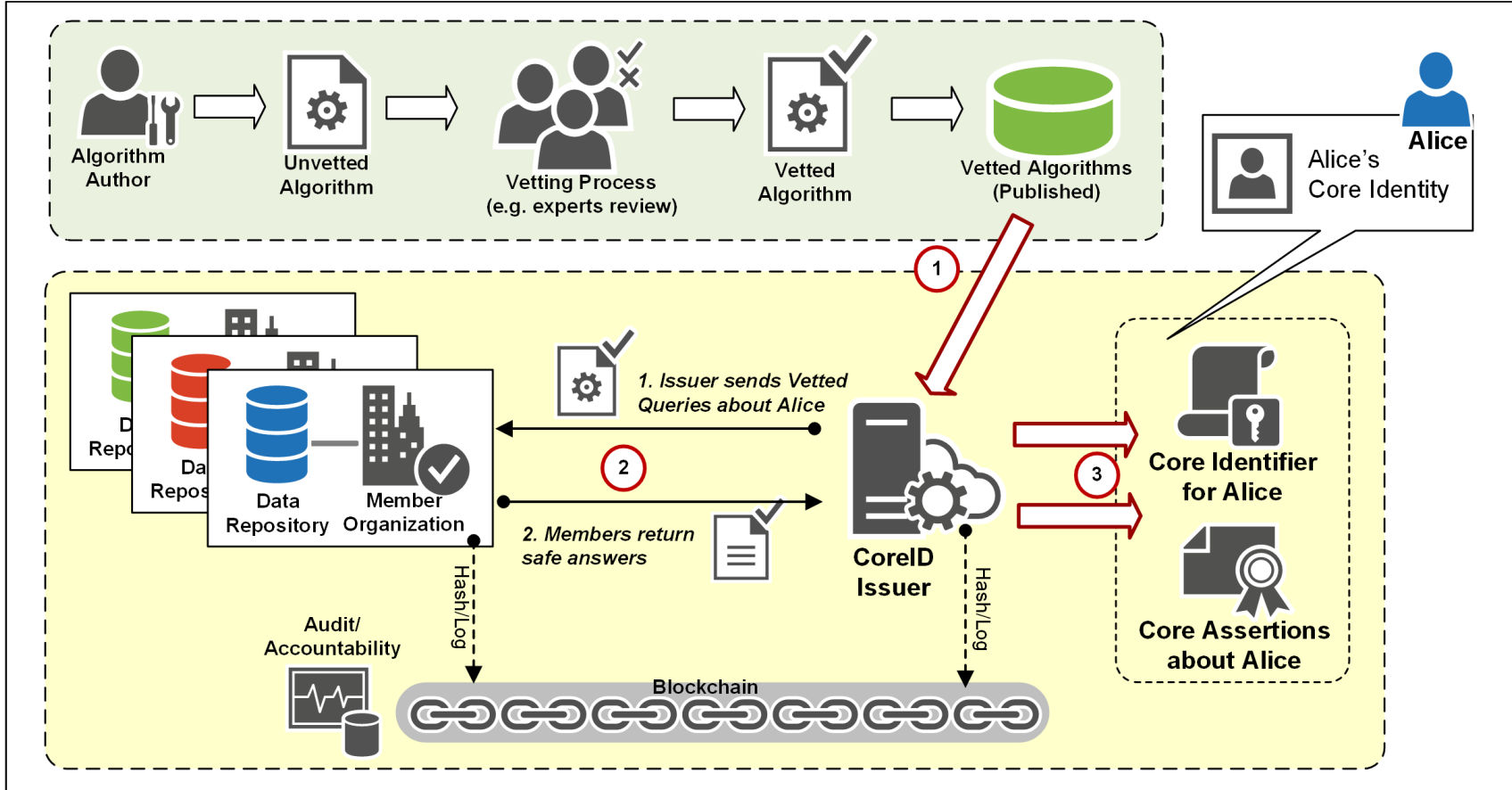
How would it work?



Core Identities: OPAL/ENIGMA + Biometrics



Vetted Algorithms for Establishing Core Identities



Separate private Core ID from Transaction IDs



**Persona
Provider**

- Persona-Provider hides Alice's Core-ID by deriving new privacy safe Transaction Identities
- Persona-Provider issues new assertions based on Core Assertions about Alice



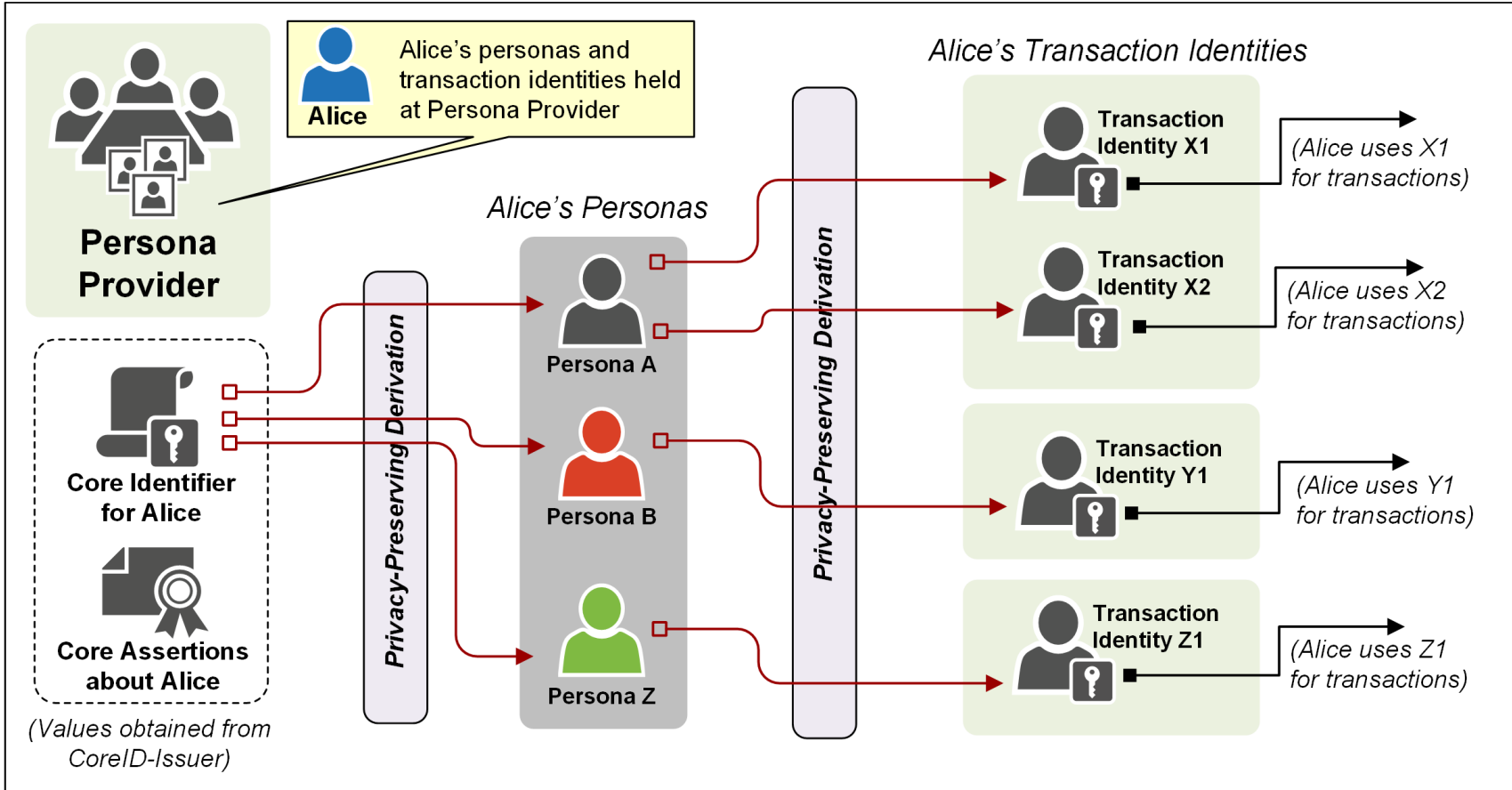
**Core Identifier
for Alice**



**Core Assertions
about Alice**

*(Values obtained from
CoreID-Issuer)*

Scale up: Multiple Transaction IDs



Trust::Data Consortium

<http://trust.mit.edu>



WHAT POLICY INTERVENTIONS ARE NEEDED?

Emerging standards can help support

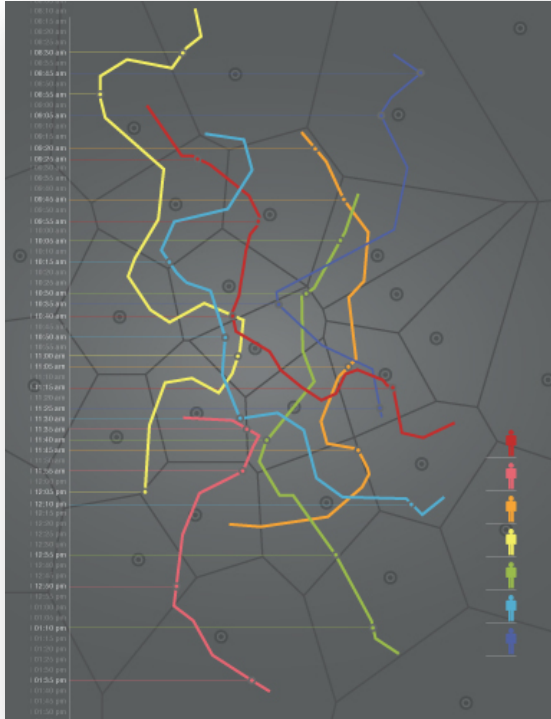
- E.g., FIDO (**F**ast **ID**entity **O**ne)
- Replaces simple password ID with biometrics, 2FA via mobile, security keys
- Provides standardization, and built-in browser support for those standards

Suggestions on Policy Interventions

1. **Standards for digital ID (harmonized!)**
2. **Legal enforceability (e.g., EIDAS)**
3. **Enabling environment for innovation (+competition)**
4. **Mechanisms for inclusion (SDGs 9 and 16.9)**
5. **Requirements for cyber security**

**WHAT OUTCOMES
CAN BETTER ID DRIVE?**

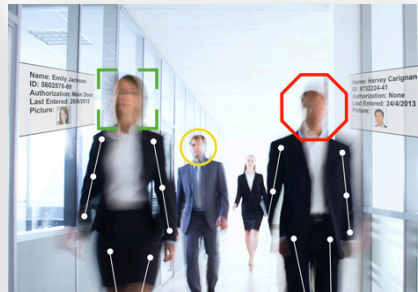
Improve AML/KYC (compliance)



**ID bad actors:
from 2% to 95+%**

**False positives:
from 80% to <1%**

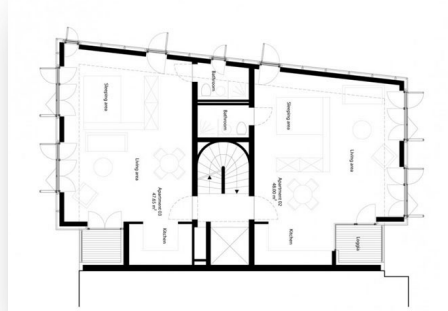
“Instant KYC?”



Better help people in crisis



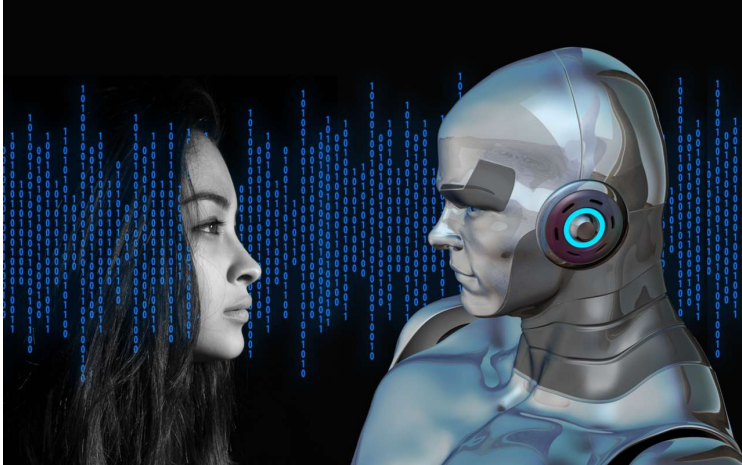
The Potential

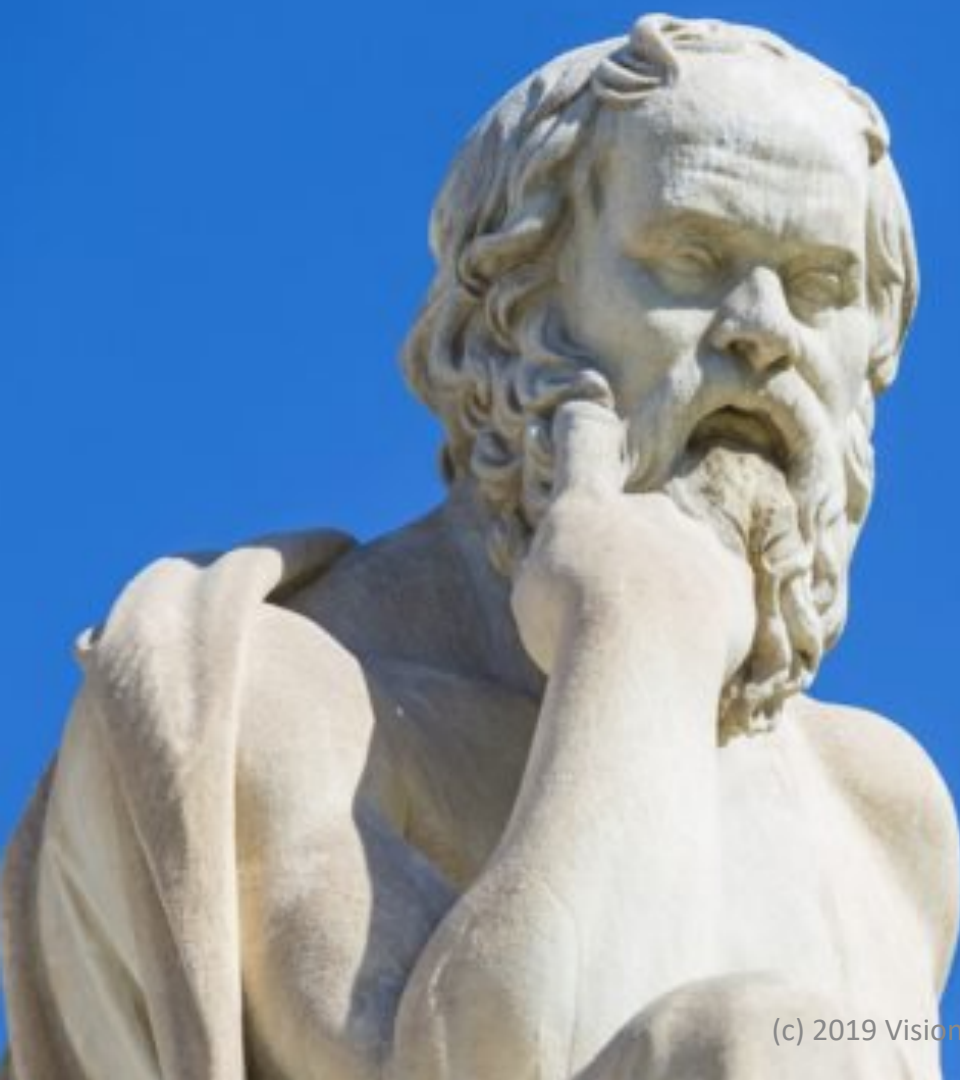


1,000X
more secure

**LASTLY,
HOW SHOULD WE INNOVATE?**

What can we build?





**How can we
build innovation
responsibly?**



We are shaping a human society

**How will we use technology
to make it better?**

VisionaryFuture.com

PREORDER



available at
amazon



OxfordFintech.org

OxfordBlockchain.org