Trusting the Source and Content of Internet Communications

A Global Transformation Project

Scott Perry CPA, CISA

Founder & CEO - Digital Governance Institute

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

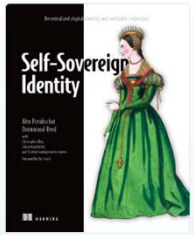
ISACA

SESSION SPEAKER

Scott Perry

Founder and CEO,
Digital Governance Institute

- Career Audit Professional – Two Big Four, One Global Consulting, One National CPA, and Ten Years Operating Own CPA Firm
- Cryptography Auditor and Advisor
- Co-Chair ToIP Governance Stack Working Group
- Author, ToIP Governance Toolkit
- Advisor – US Federal PKI Policy Management Authority
- Advisor - ISACA Digital Trust Framework
- Contributing Author – Self-Sovereign Identity



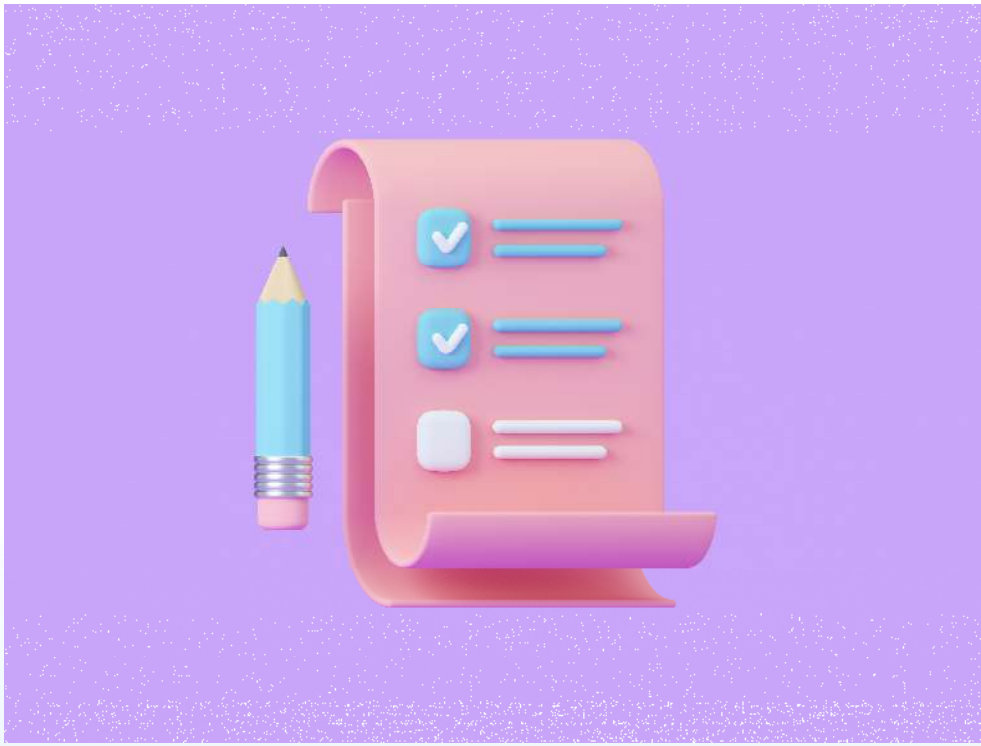
https://www.manning.com/books/self-sovereign-identity

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

AGENDA

- Life in Trusttown
- Underlying Internet Trust Issues
- Architectural Trust Model
  - Elements of the ToIP Model
  - Governance and Accreditation
  - How Ecosystems Use the Model in Practice
- Case Studies
  - C2PA
  - Switchchord
  - The Velocity Network
  - Bhutan National Digital Identity Project
  - The Global Acceptance Network (GAN)



DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

LIFE IN TRUSTTOWN

A Vision for the Internet's Future

A diverse set of concerned citizens who want trust in the source and content of their digital life make up Trusttown

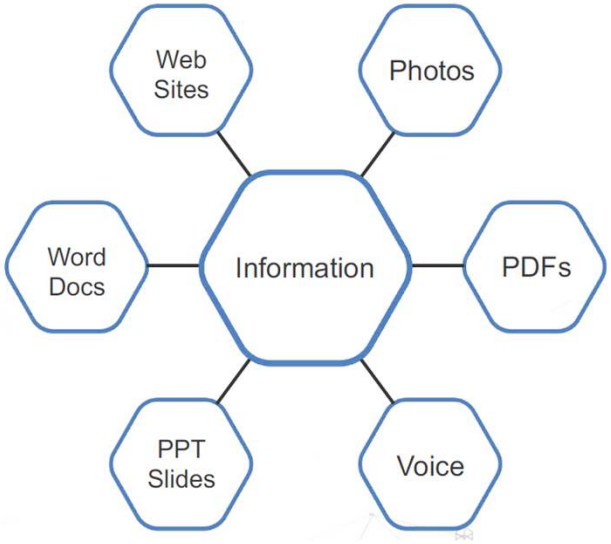
DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

Underlying Internet Trust Issues

THE EVOLVING WEB

The Internet of Information

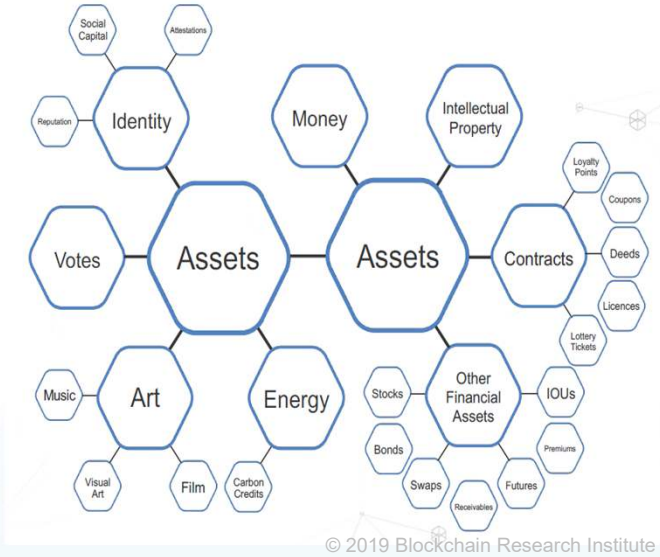


Web 1.0

The Internet of Society

Web 2.0

The Internet of Value

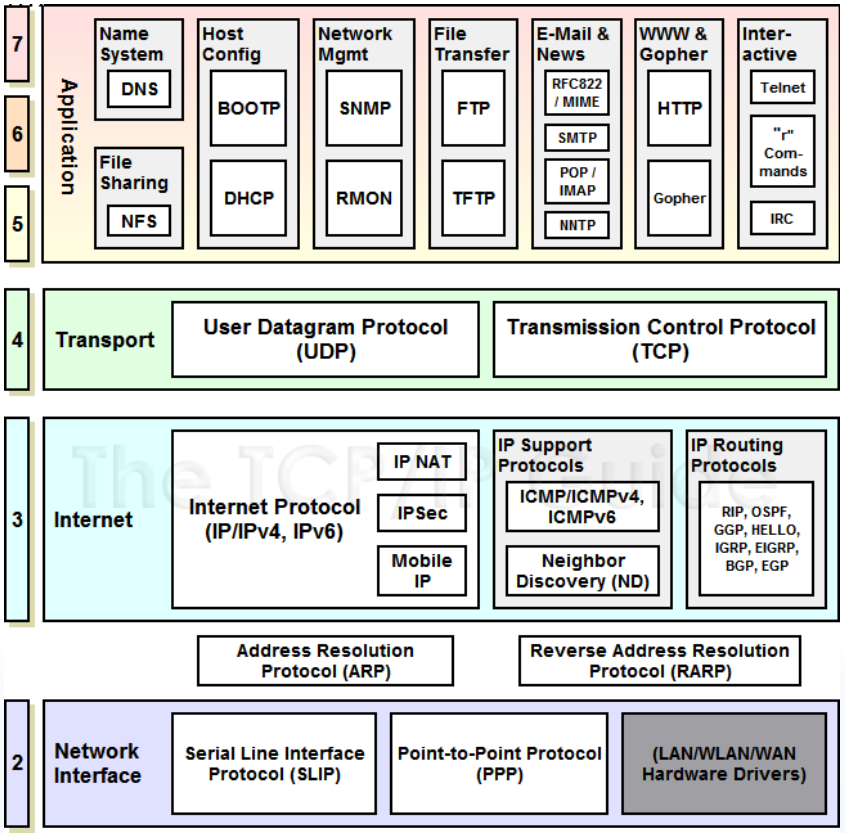


Web 3.0

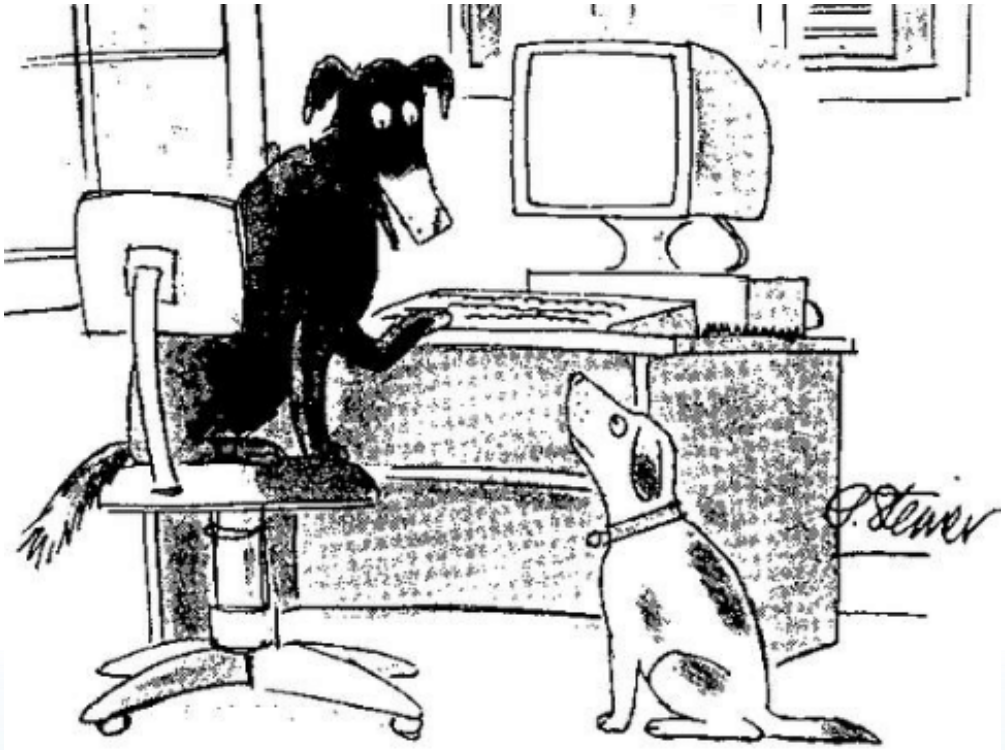
DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET GOVERNANCE

ISACA

THE TRUST PROBLEM WITH TCP/IP



© TCP/IP Guide

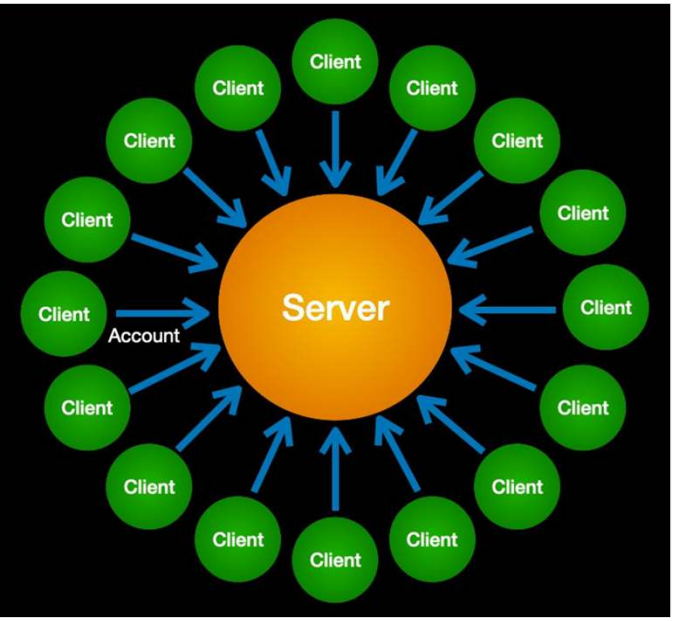


"On the Internet, nobody knows you're a dog."

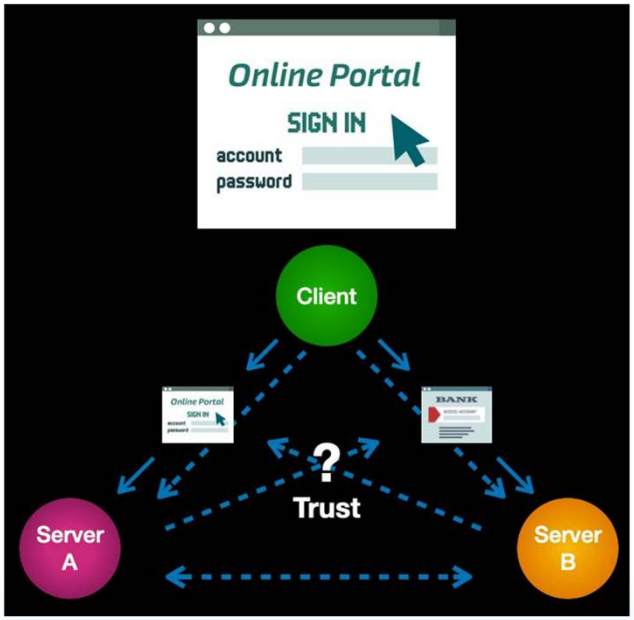
DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

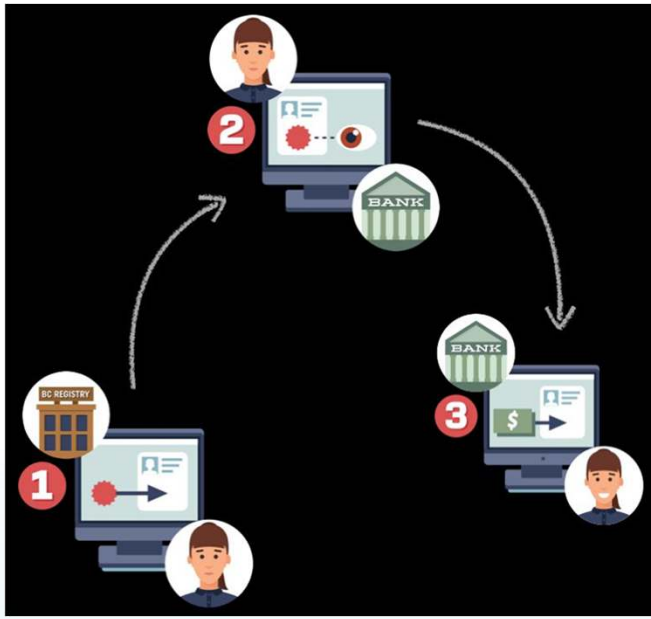
EVOLVING MODELS OF DIGITAL IDENTITY



Login Accounts



Federated Accounts

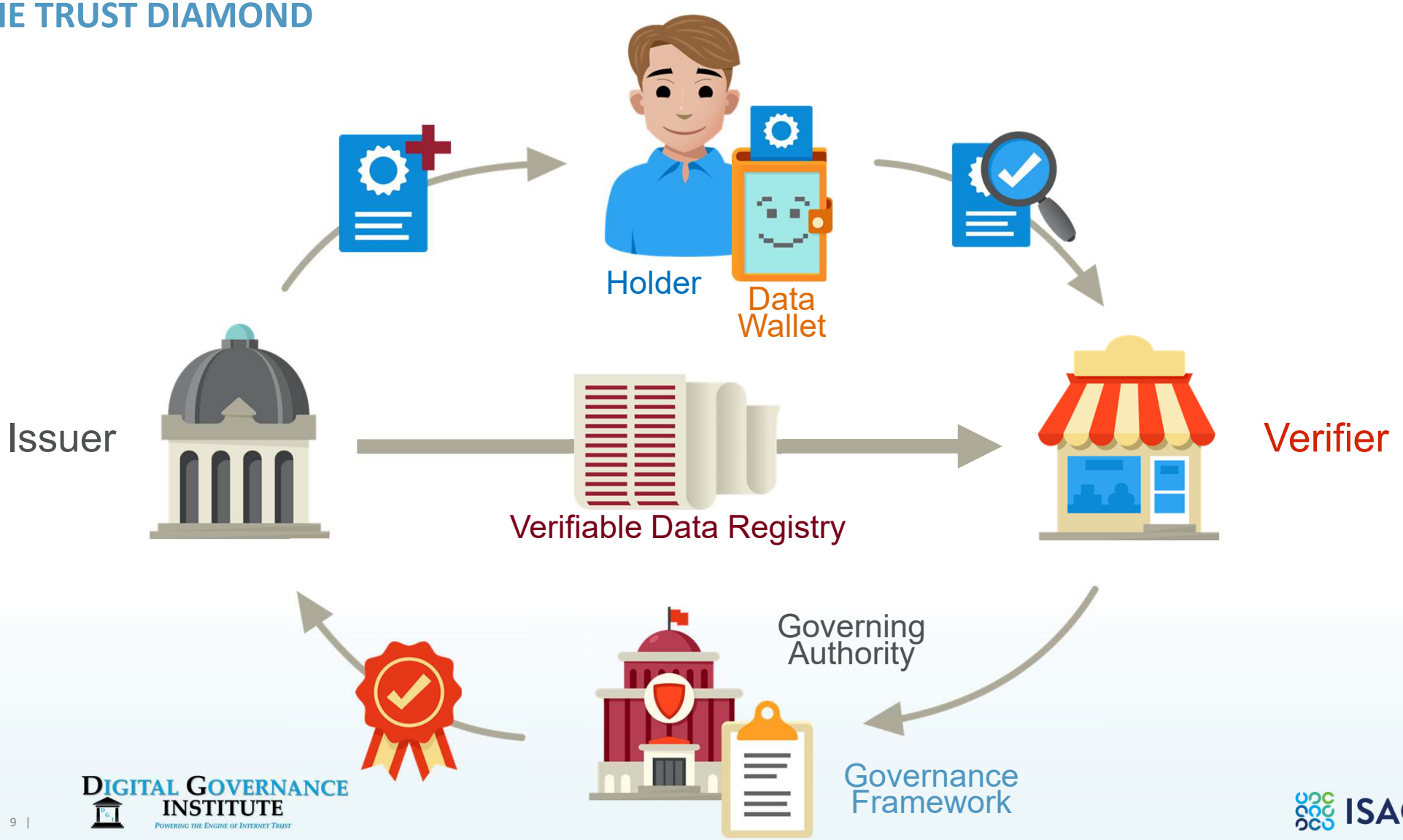


Verifiable Digital Credentials

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

THE TRUST DIAMOND



DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

VERIFIABLE CREDENTIALS IN A NUTSHELL

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

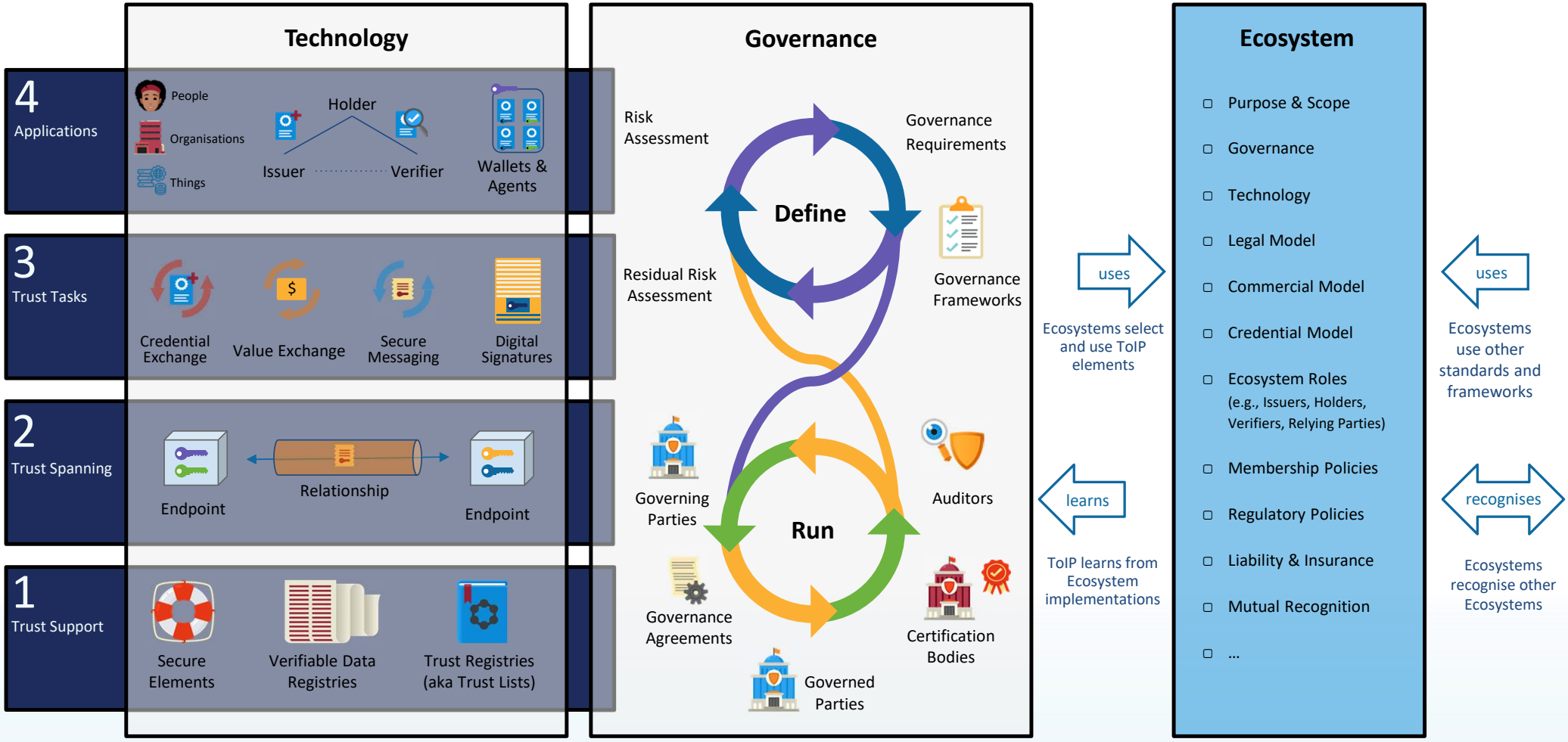
ISACA

TYPES OF VERIFIABLE CREDENTIALS

- Birth Certificate
- ID Badge
- Certificate of Completion
- College Diploma
- College Transcript
- Driver's License
- Songwriter Credential
- Health Insurance Card
- National Identity ID
- Industry Membership
- Green Card
- CISA Credential
- Museum Pass
- CPA License

Architectural Trust Model

THE TRUST OVER IP STACK MODEL



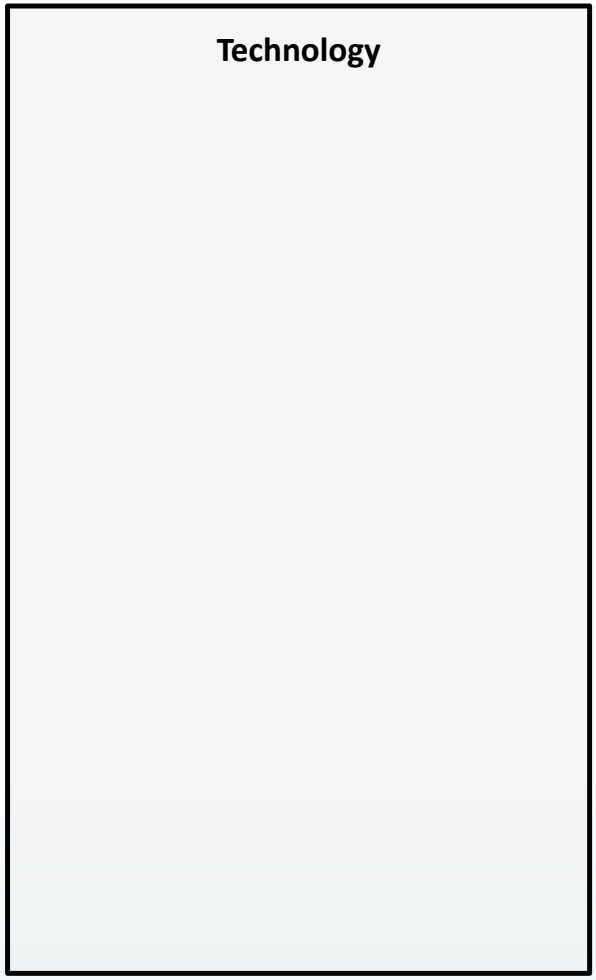
DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

Multi-Layered Technology Architecture

THE NEED FOR A TECHNOLOGY STACK

Since we are trying to define an architecture for digital trust on the internet, we need technology…



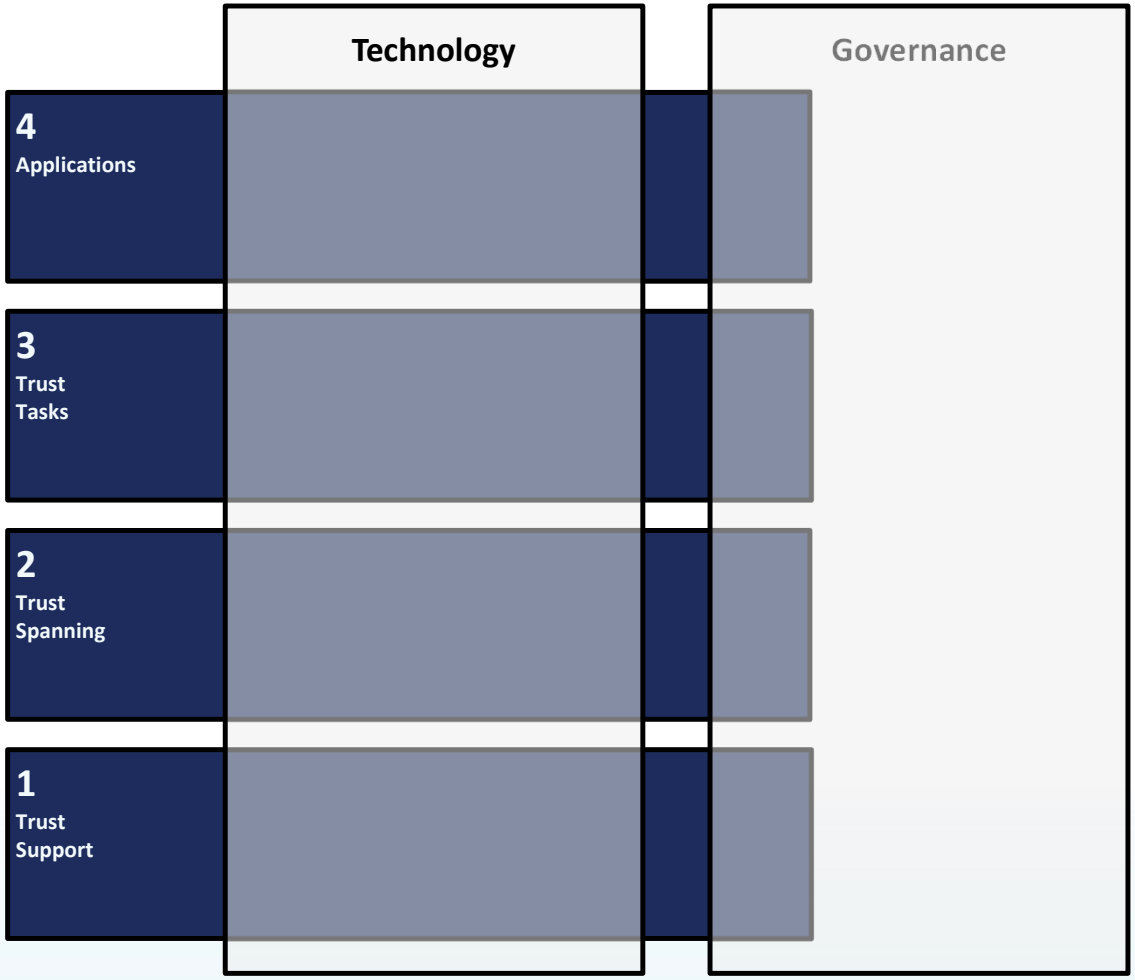
TECHNOLOGY NEEDS TO BE GOVERNED

Experience has taught us that for technology to be trustworthy, we need to understand how it is governed

Technology	Governance

TECHNOLOGY STACK LAYERS

Using layers helps to describe how technology systems are built, and we can see the need for governing each layer.

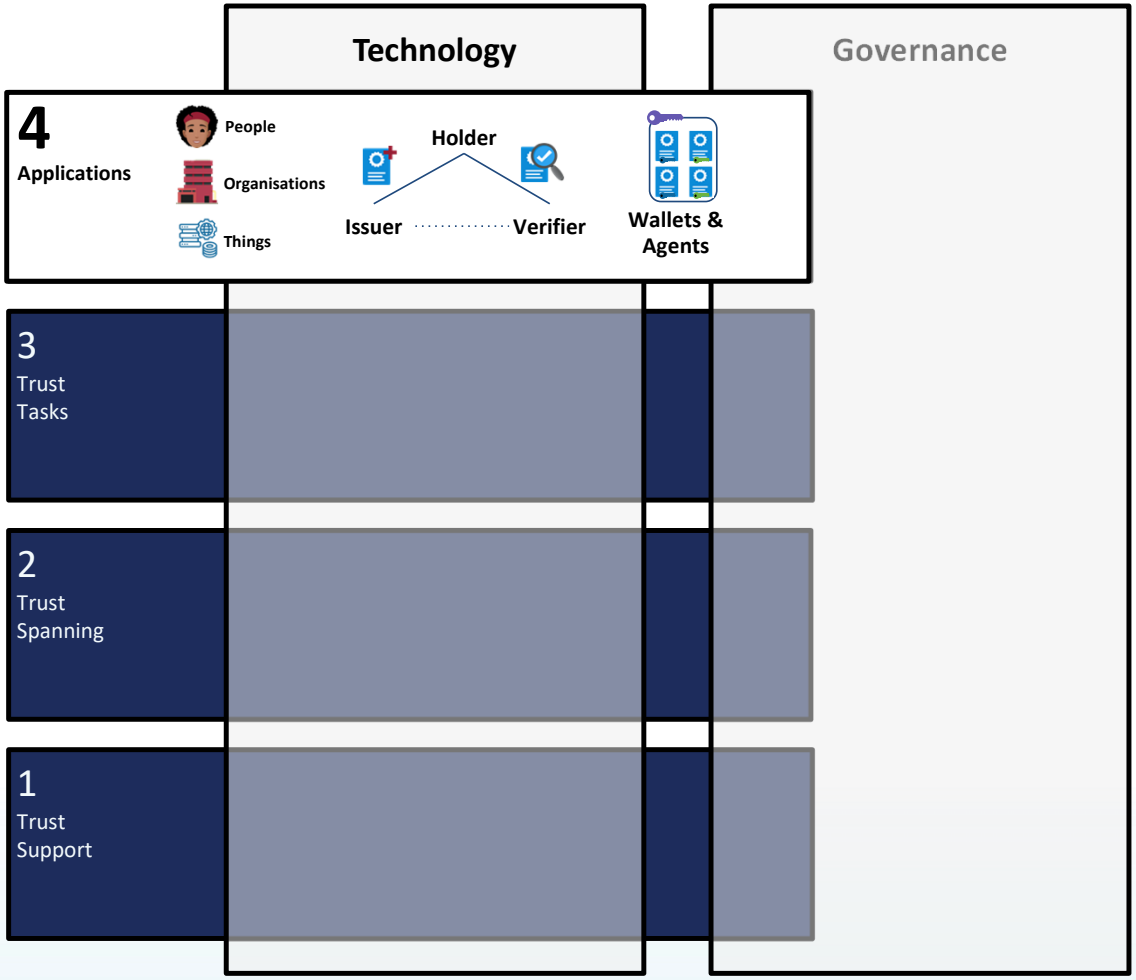


DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

LAYER 4 - APPLICATIONS

Layer 4 contains system endpoints including devices and “trust diamond” participants. It reaches down the stack to engage in trusted interactions and trust tasks.

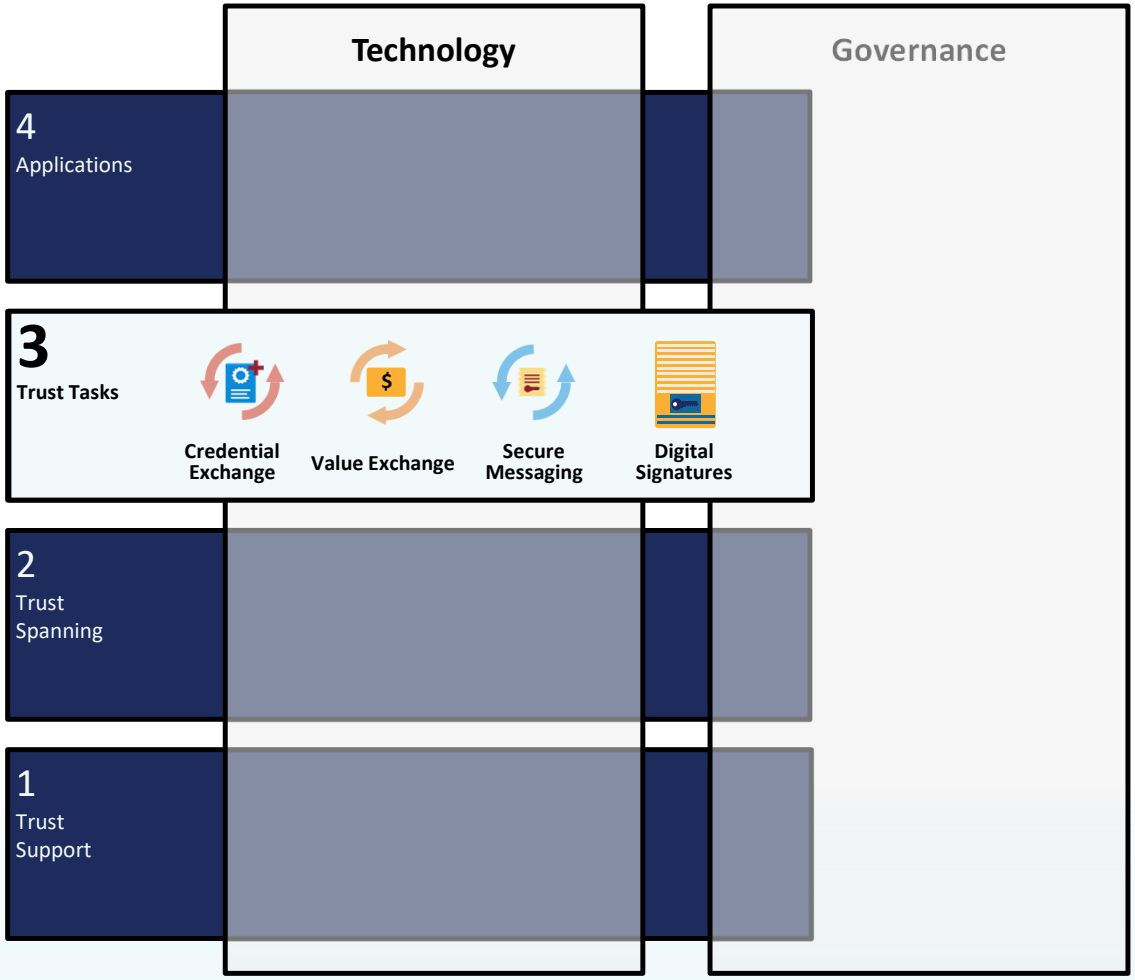


DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

LAYER 3 – TRUST TASKS

Layer 3 focuses on the tasks that support the overall trust objectives of the application.



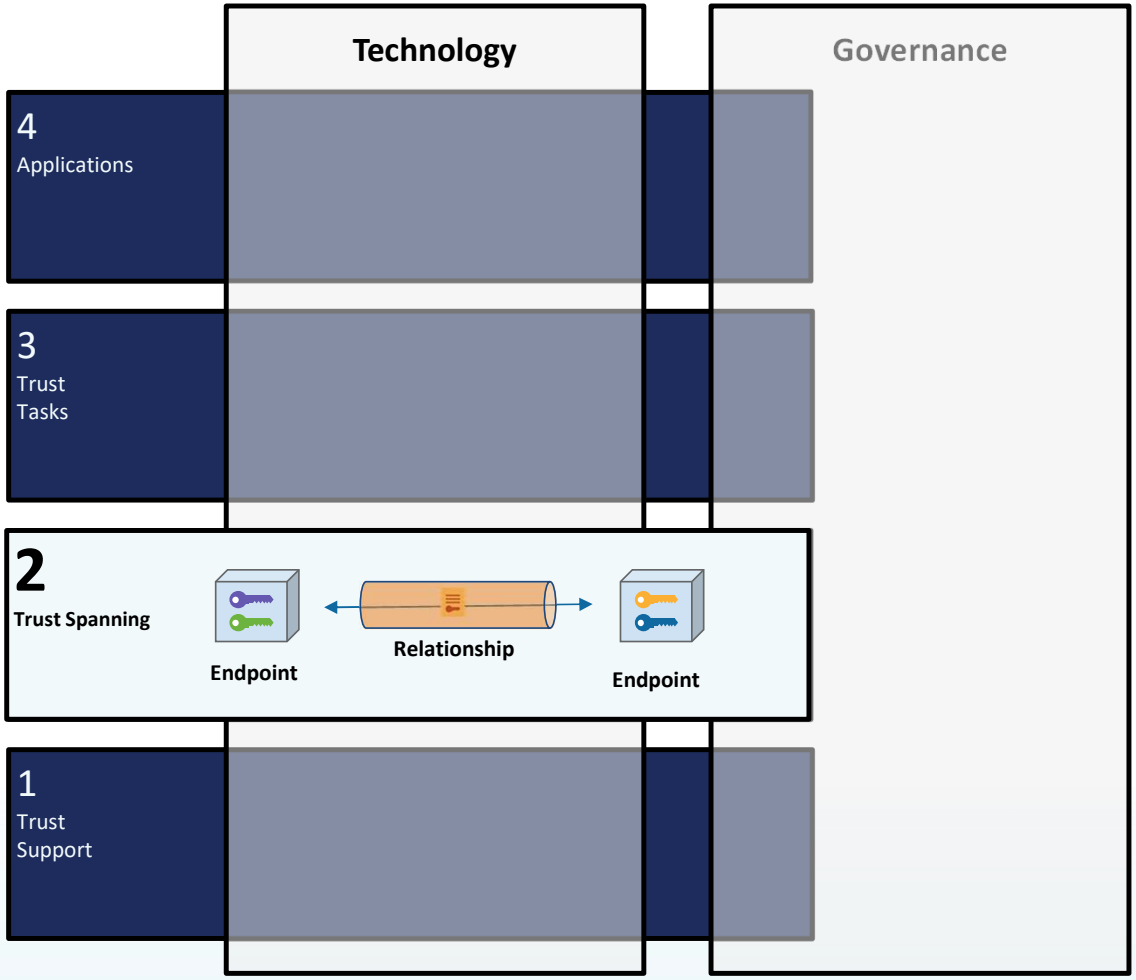
DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

LAYER 2 – TRUST SPANNING

Layer 2 is the layer that enables the establishment of a trusted connection between any two peers using a single standard trust spanning protocol.

Note: This layer is to the ToIP stack what the IP layer is to the TCP/IP stack.

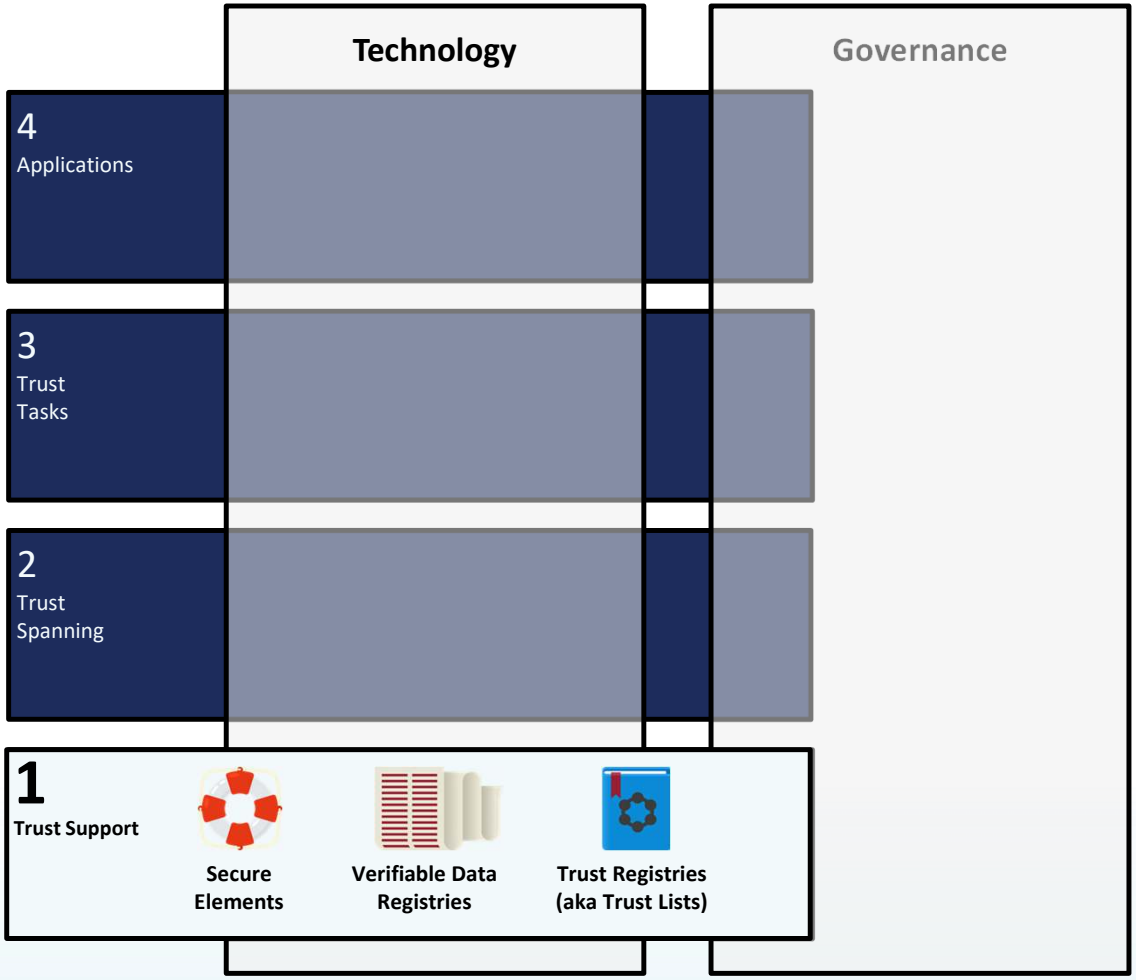


DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

LAYER 1 – TRUST SUPPORT

Layer 1 contains the foundational elements to support the higher layers, to provide decentralized roots of trust that can span within and across different digital trust ecosystems).



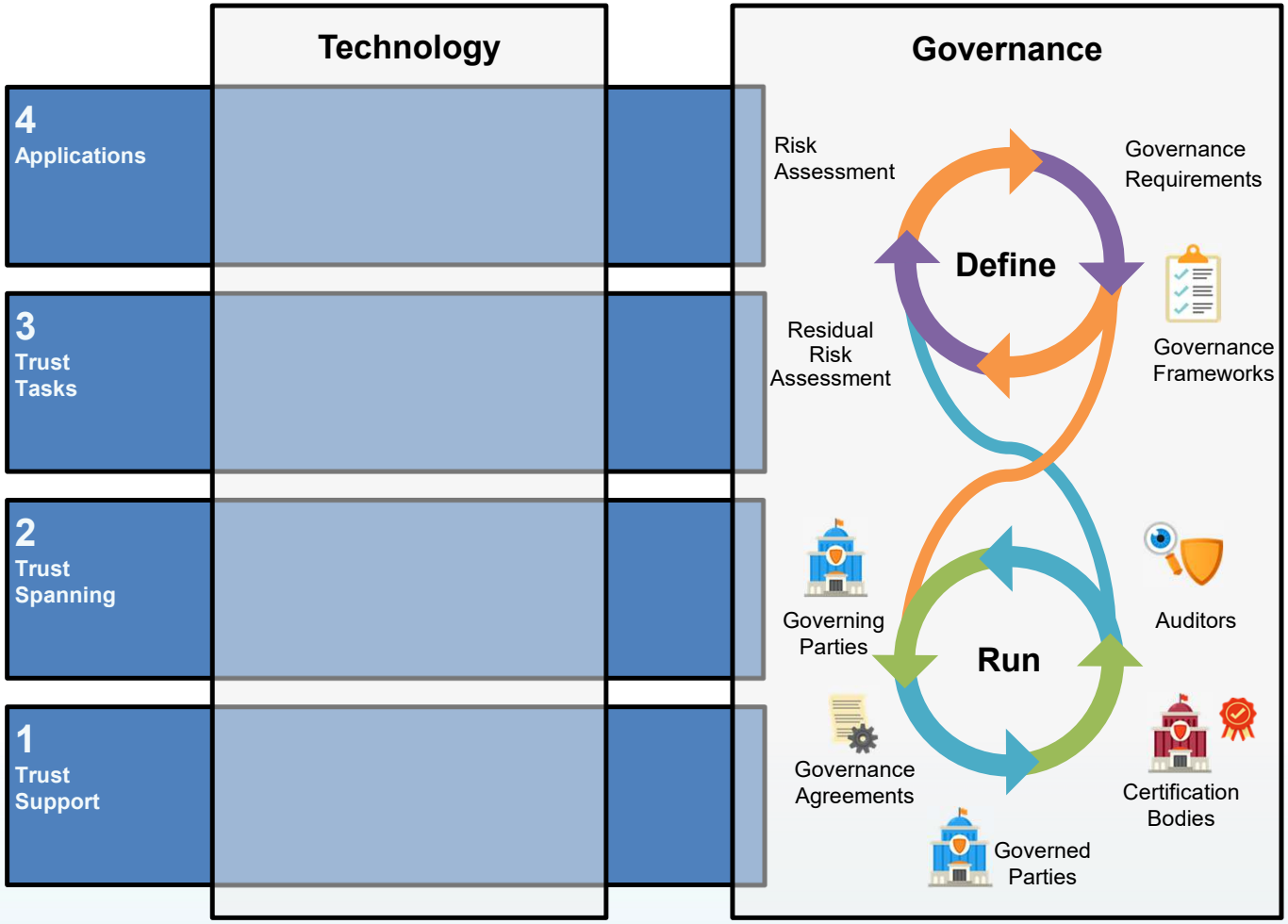
DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

Governance and Accreditation

FOCUS ON GOVERNANCE

In this topic, we'll discuss the elements of governance in the ToIP Model



DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET GOVERNANCE

ISACA

GOVERNANCE OPERATION

Controllable risks are evaluated for likelihood and impact

Selected risks are addressed with requirements (MUST statements)

Audit reports are reviewed for framework effectiveness in mitigating risk to an acceptable level

Certification scheme is developed from requirements with independent evaluations from qualified auditors and test labs

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

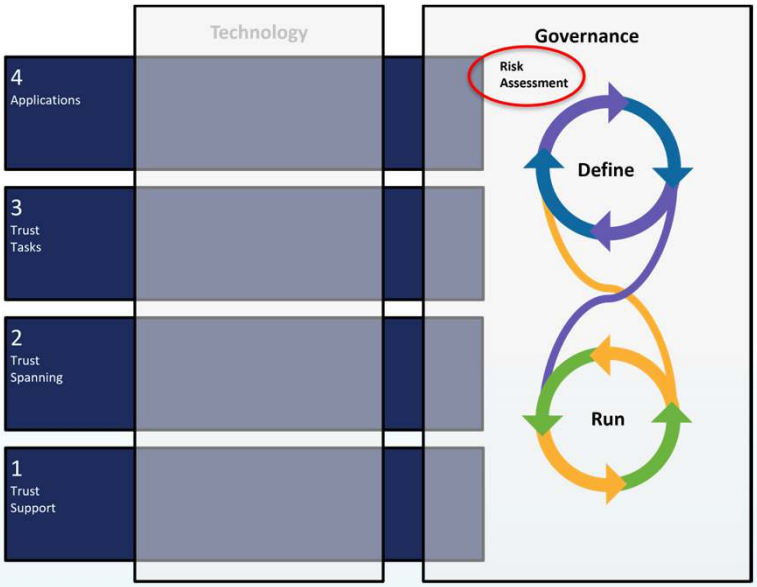
ISACA

RISK ASSESSMENT

LEGEND			
COLUMN HEADER	EXPLANATION	Potential Values	
Risk #	A unique identifier of a risk for reference purposes	#	
Risk Description	Description of a unique risk	Text	
ToIP Layer	The Governance Stack Layer the risk operates based on the ToIP Governance Stack	Ecosystem	
		Credential	
		Provider	
		Utility	
Trust Area Affected	Information trust component affected by the risk	Governance	
		Availability	
		Security	
		Availability	
		Privacy	
		Processing Integrity	
Severity	Judgemental evaluation of impact the risk would have on the entity if realized	Negligible	1
		Minor	2
		Moderate	3
		Major	4
		Critical	5
Likilihood	Judgemental evaluation of the potential that the risk will occur risk without controls or other circumstances to prevent it.	Highly Unlikely	1
		Unlikely	2
		Possible	3
		Likely	4
		Highly Likely	5
Impact	Judgemental scoring of risk's effect based on severity and and likilihood.	Low	1-3
		Low-Medium	4-7
		Medium	8-12
		Medium-High	13-18
		High	19-25
Risk Consideration Actions	Factors to consider reguarding risk treatment	Text	
Risk Treatment	Recommended action category to take to handle the risk	Mitigation	
		Avoidance	
		Transference	
		Acceptance	
		Other	
Risk Treatment Action	High level action identified to treat risk	Text	
Residual Risk	Judgemental level or state of risk after applying risk treament	Text or Impact Level	

SCALE OF LIKELIHOOD	SCALE OF SEVERITY 1	2	3	4	5
	NEGLIGIBLE	MINOR	MODERATE	MAJOR	CRITICAL
1 HIGHLY UNLIKELY	LOW	LOW	LOW	LOW - MEDIUM	LOW - MEDIUM
2 UNLIKELY	LOW	LOW - MEDIUM	LOW - MEDIUM	MEDIUM	MEDIUM
3 POSSIBLE	LOW	LOW - MEDIUM	MEDIUM	MEDIUM	MEDIUM-HIGH
4 LIKELY	LOW - MEDIUM	MEDIUM	MEDIUM	MEDIUM-HIGH	HIGH
5 HIGHLY UNLIKELY	LOW - MEDIUM	MEDIUM	MEDIUM-HIGH	HIGH	HIGH

Controllable risks are evaluated for likelihood and impact



Risk Assessment Worksheet Template: https://trustoverip.org/permalink/ToIP-Risk-Assessment-Worksheet-Template-V1.0-2021-08-24.xlsx

Risk Assessment Companion Guide: https://trustoverip.org/permalink/ToIP-Risk-Assessment-Companion-Guide-V1.0-2021-08-24.pdf

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

GOVERNANCE REQUIREMENTS / GOVERNANCE FRAMEWORKS

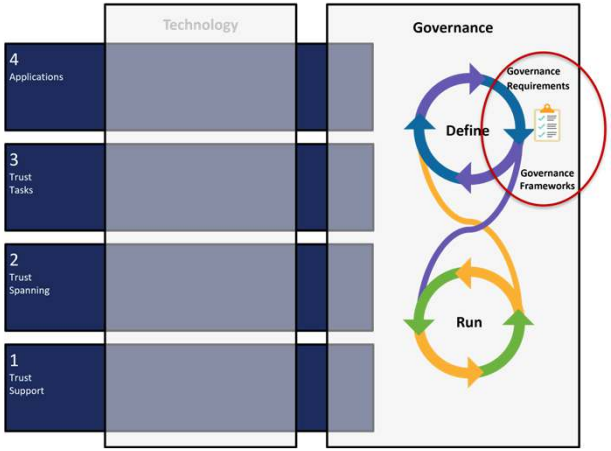
Primary Document

- Introduction
- Terminology
- Governing Authority
- Administering Authority
- Purpose
- Scope
- Objectives
- Principles
- General Requirements
- Revisions
- Extensions
- Schedule of Controlled Documents

Controlled Documents

Glossary	Risk Assessment	Trust Assurance & Certification
Governance Requirements	Business Requirements	Technical Requirements
Information Trust Requirements	Inclusion, Equitability, & Accessibility	Legal Agreements

Selected risks are addressed with requirements (MUST statements)



Governance Architecture Specification: https://trustoverip.org/permalink/ToIP-Governance-Architecture-Specification-V1.0-2021-12-21.pdf

Governance Metamodel Specification: https://trustoverip.org/permalink/ToIP-Governance-Metamodel-Specification-V1.0-2021-12-21.pdf
Companion Guide: https://trustoverip.org/permalink/ToIP-Governance-Metamodel-Specification-Companion-Guide-V1.0-2021-12-21.pdf

Governance Framework Matrix: https://trustoverip.org/permalink/ToIP-Governance-Framework-Martix-V1.0-2021-10-19.xlsx
Companion Guide: https://trustoverip.org/permalink/ToIP-Governance-Framework-Matrix-Companion-Guide-V1.0-2021-10-19.pdf

TRUST ASSURANCE (CONFORMANCE)

TRUST Over IP FOUNDATION

Trust Assurance and Certification Controlled Document Template

Version 1.0
19 October 2021

This publicly available template was approved by the ToIP Foundation Steering Committee on 19 October 2021.

The mission of the Trust over IP (ToIP) Foundation is to define a complete architecture for Internet-scale digital trust that combines cryptographic assurance at the machine layer with human accountability at the business, legal, and social layers. Founded in May 2020 as a non-profit hosted by the Linux Foundation, the ToIP Foundation has over 300 organizational and 100 individual members from around the world.

Please see the end page for licensing information and how to get involved with the Trust Over IP Foundation.

TRUST Over IP FOUNDATION

Trust Assurance Criteria Matrix Template

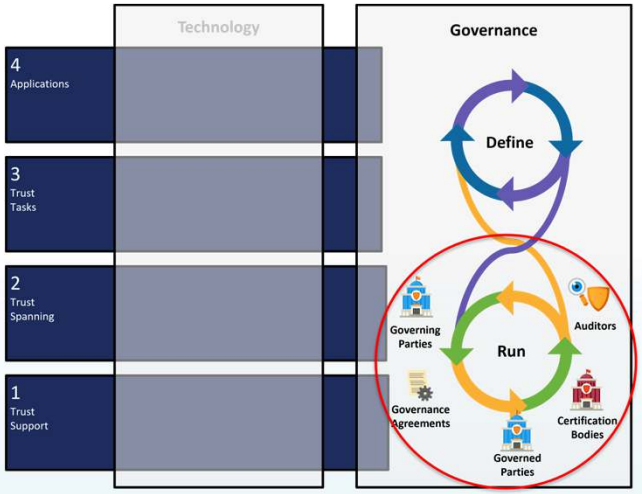
Version 1.0
20-Oct-2021

This publicly available worksheet, was approved by the ToIP Foundation Steering Committee on [date of approval(20 October 2021.

The mission of the Trust over IP (ToIP) Foundation is to define a complete architecture for Internet-scale digital trust that combines cryptographic assurance at the machine layer with human accountability at the business, legal, and social layers. Founded in May 2020 as a non-profit hosted by the Linux Foundation, the ToIP Foundation has over 300 organizational and 100 individual members from around the world.

Please see the end page for licensing information and how to get involved with the Trust Over IP Foundation.

Certification scheme is developed from requirements with independent evaluations from qualified auditors



Trust Assurance and Certification Template:
https://trustoverip.org/permalink/ToIP-Trust-Assurance-and-Certification-Controlled-Document-Template-V1.0-2021-10-19.pdf

Companion Guide:
https://trustoverip.org/permalink/ToIP-Trust-Assurance-Companion-Guide-V1.0-2021-10-19.pdf

Trust Assurance Criteria Template:
https://trustoverip.org/permalink/ToIP-Trust-Assurance-Criteria-Matrix-Template-ToIP-Approved-V1.0-2021-10-10.

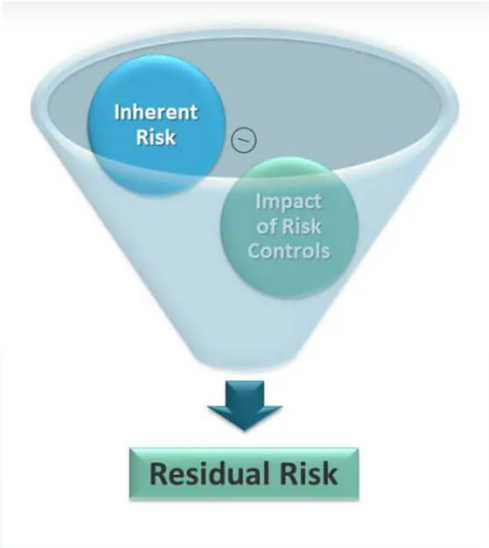
Companion Guide:
https://trustoverip.org/permalink/ToIP-Trust-Criteria-Matrix-Companion-Guide-V1.0-2021-10-19.pdf

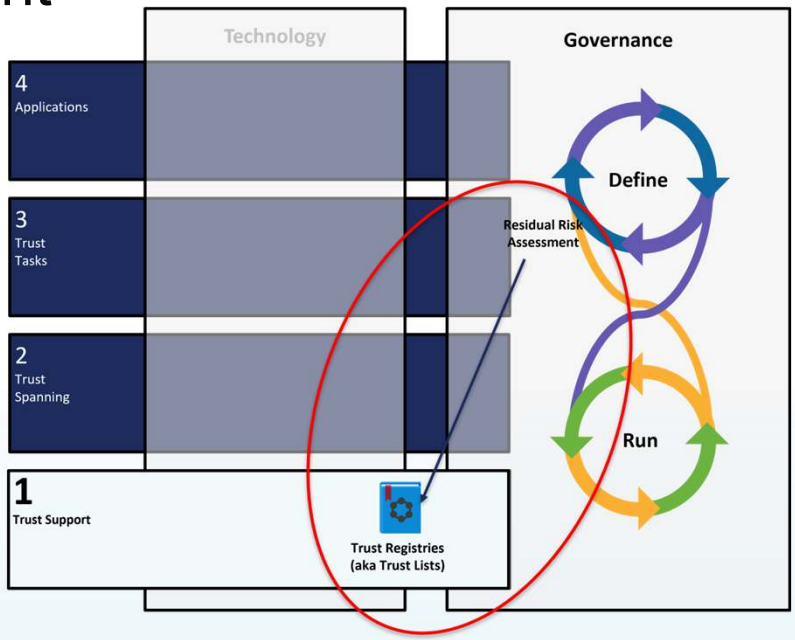
DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

RESIDUAL RISK ASSESSMENT

Audit reports are reviewed for conformity to the governance framework in mitigating risk to an acceptable level. Those conforming entities may appear on a Trust Registry. Non-conforming practices are assessed for risk which feeds back into the risk assessment



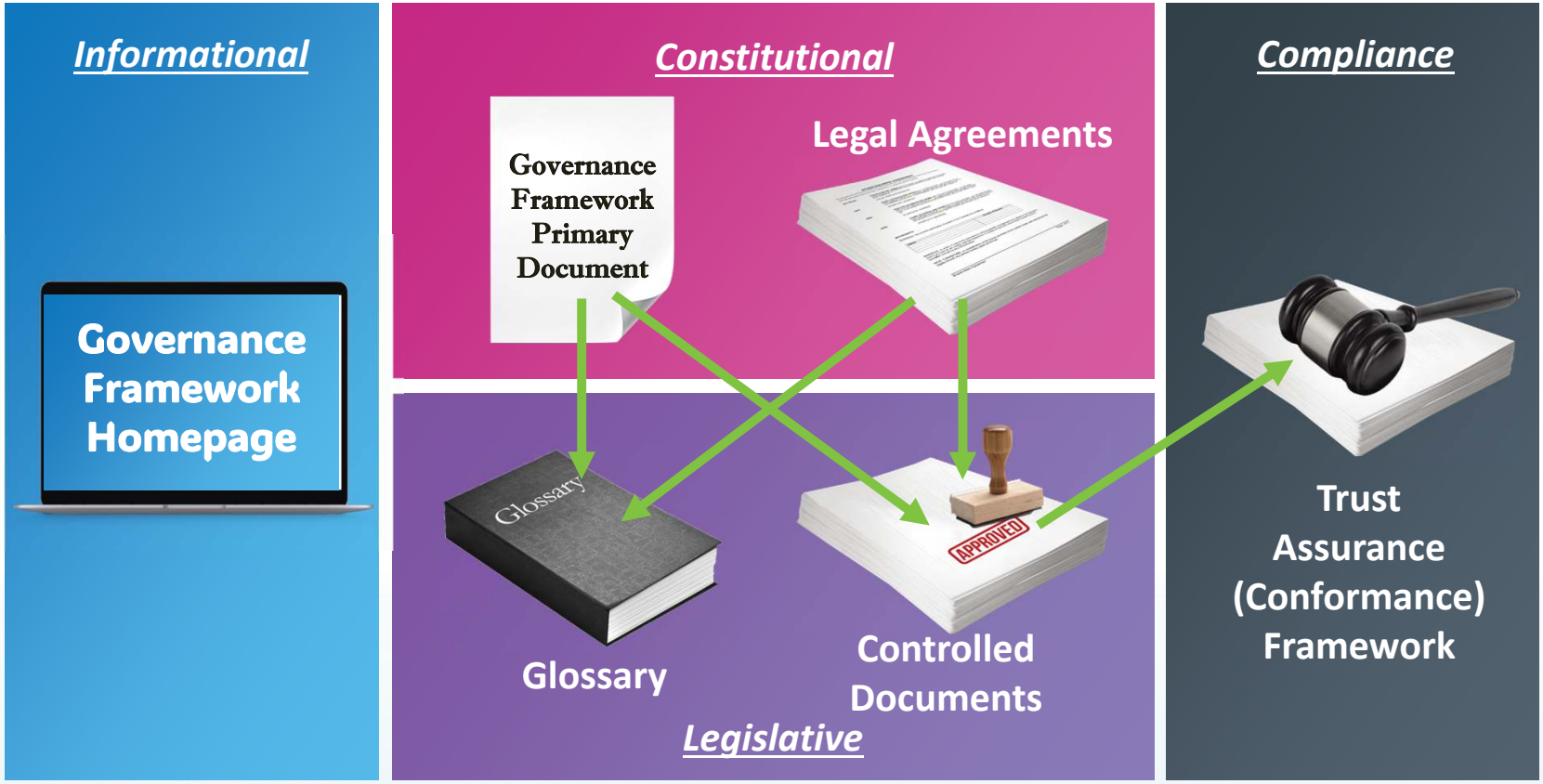


DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

EDUCBA

ISACA

RELATIONSHIP OF GOVERNANCE DOCUMENTS



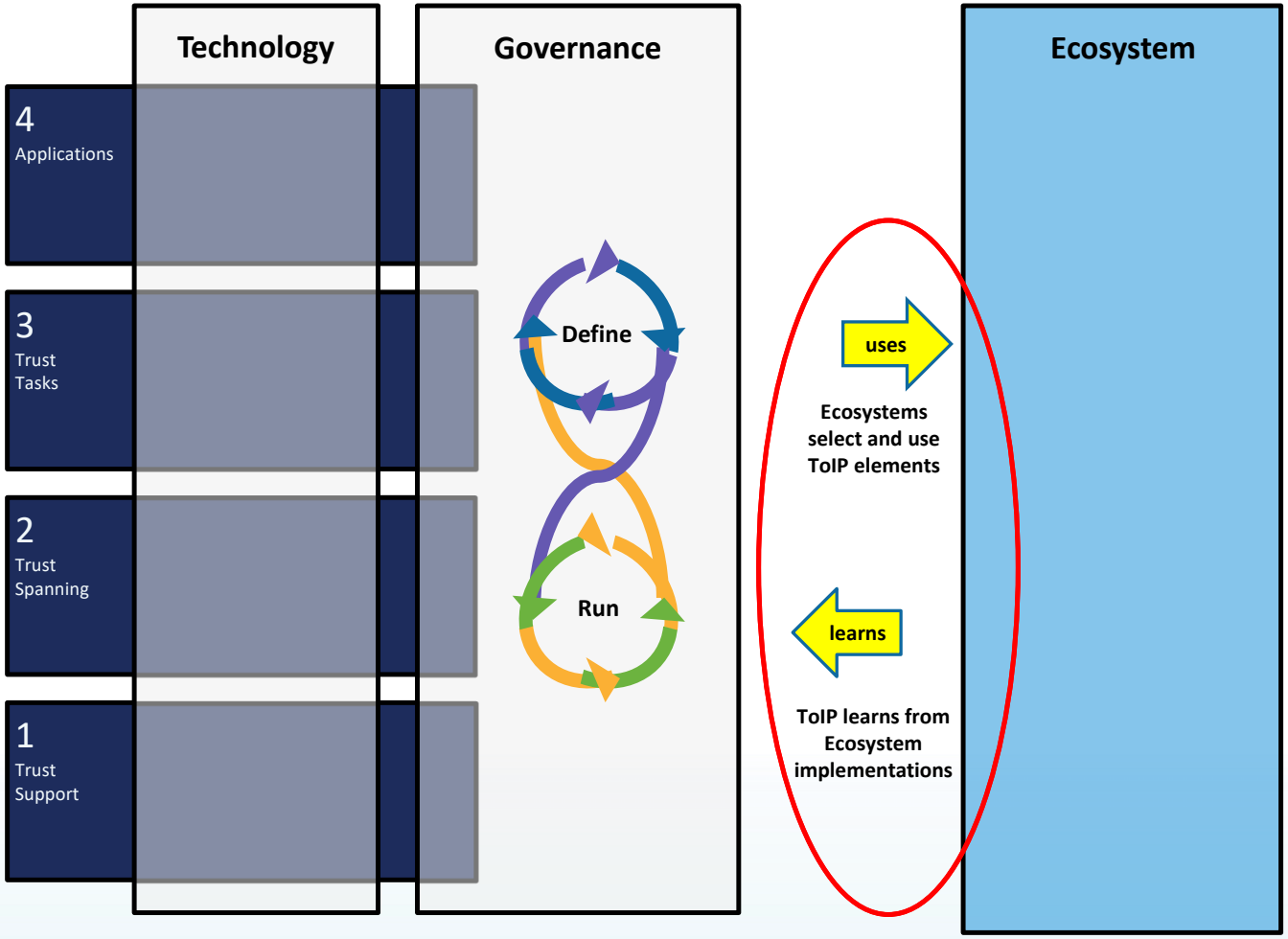
DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

How Ecosystems Use the Model in Practice

TOIP INFLUENCE ON ECOSYSTEMS

Ecosystem implementations will use ToIP elements and ToIP will learn from how they are used.

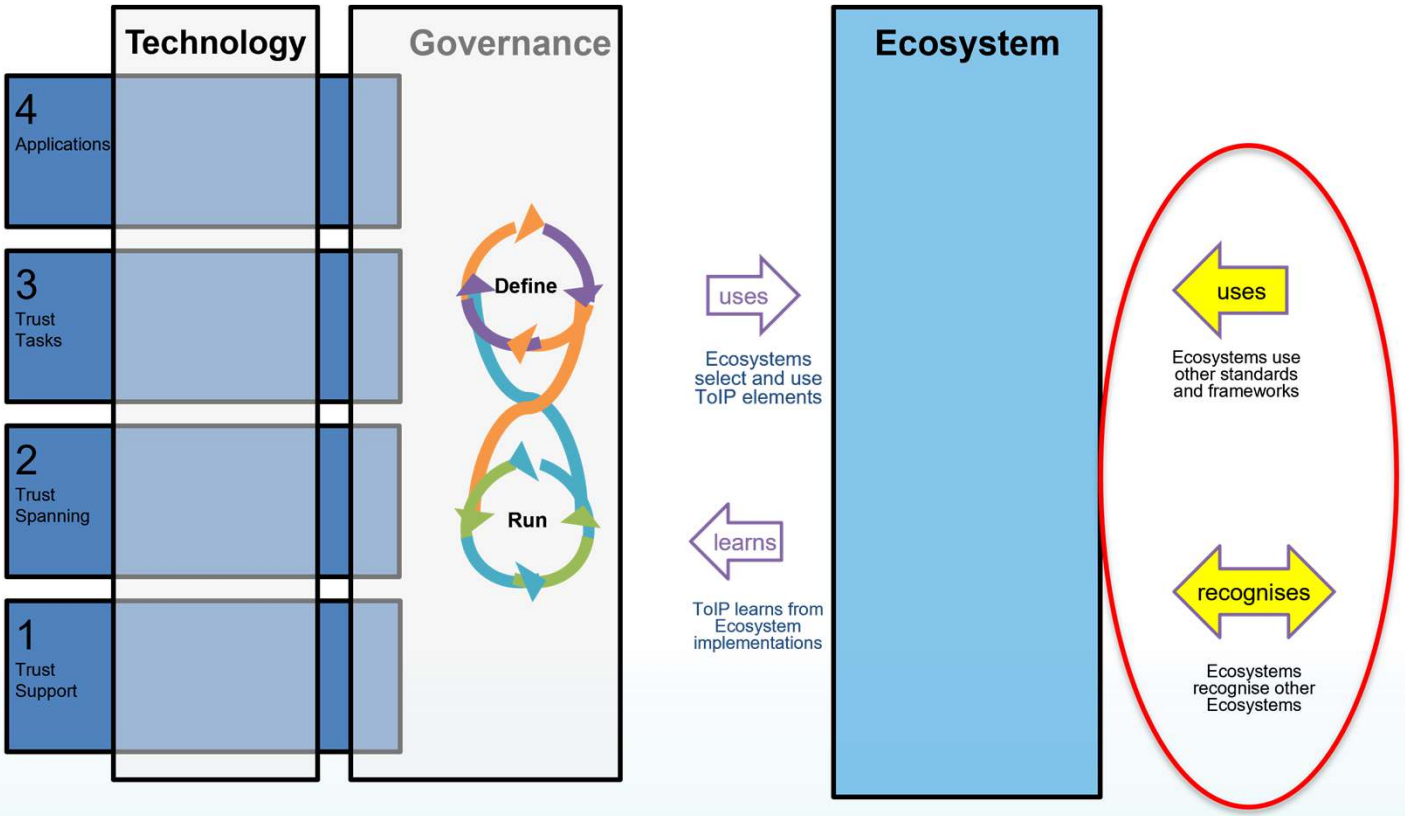


DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

MARKETPLACE INFLUENCE ON ECOSYSTEMS

Ecosystem implementations may make use of other systems in addition to ToIP. Ecosystems may have relations with other ecosystems

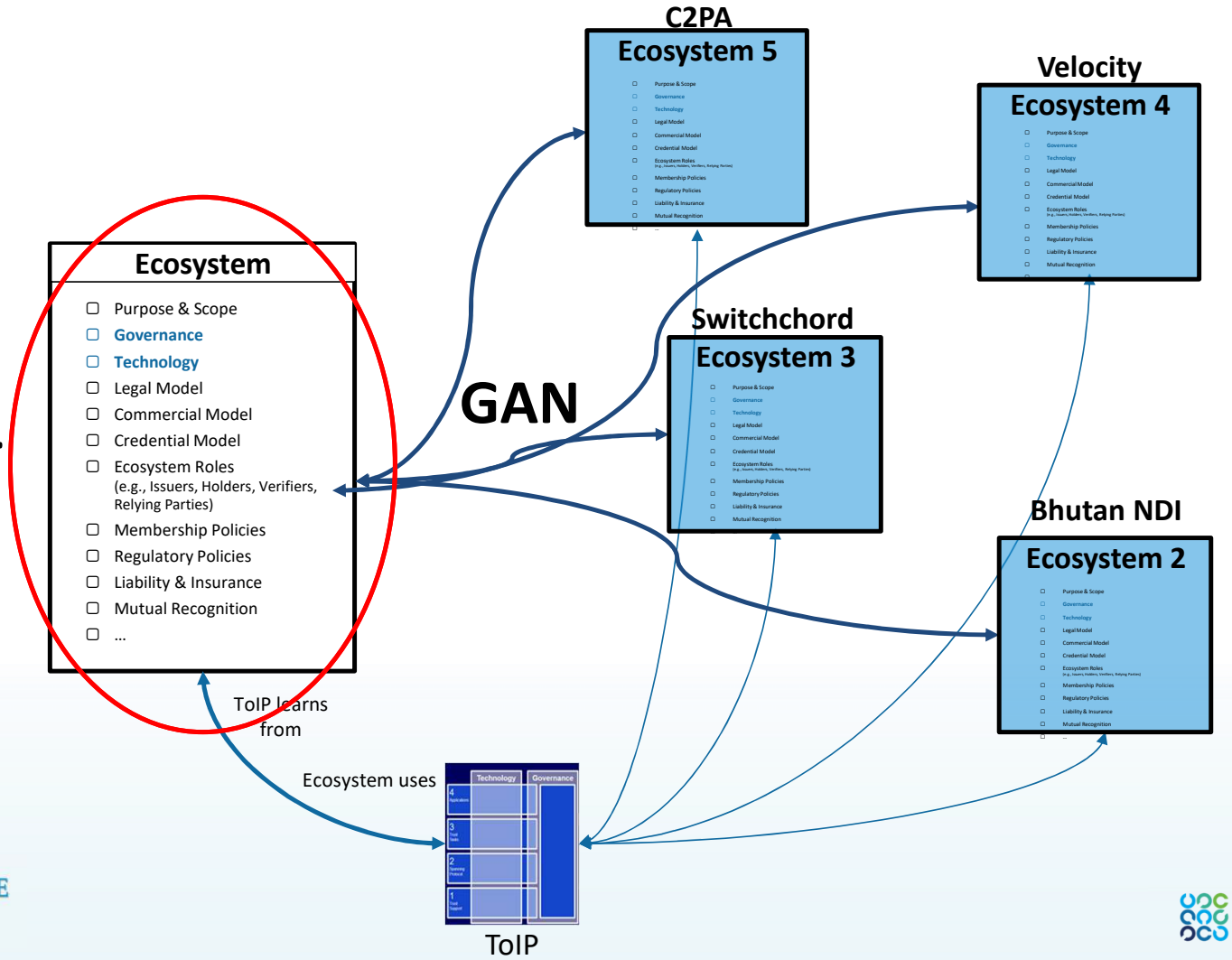


DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET GOVERNANCE

ISACA

ECOSYSTEMS OF ECOSYSTEMS "TRUST TOWNS" WILL REVOULTIONIZE THE INTERNET

Ecosystems are impacted by claims issued and verified in other ecosystems. This contributes to technology and governance choices.



DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

Case Study – The Coalition for Content Provenance and Authenticity (C2PA)

C2PA

Coalition for Content Provenance and Authenticity

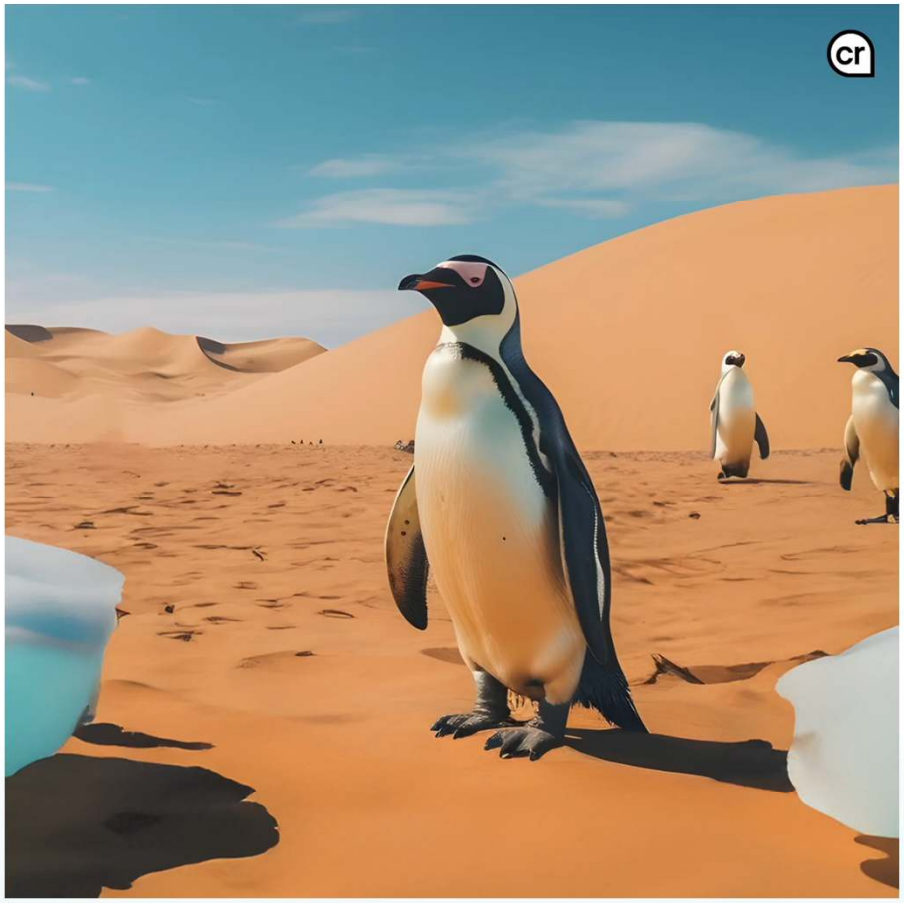
An open technical standard providing publishers, creators, and consumers the ability to trace the origin of different types of media.

Steering Committee Members

Adobe amazon BBC Google intel

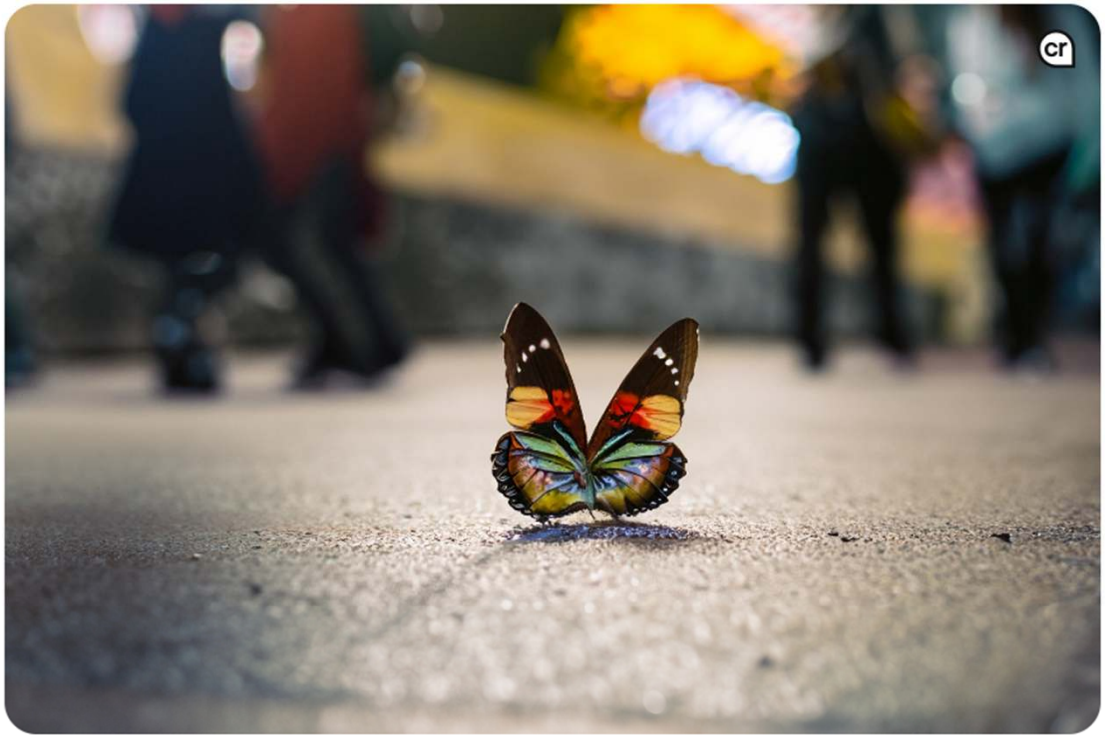
Meta Microsoft OpenAI PUBLICIS GROUPE SONY

truepic



DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA



Building trust in what you see online

Content Credentials make the origin and history of content available for everyone to access, anytime. With this information at your fingertips, you have the ability to decide if you trust the content you see—understanding what it is and how much editing or manipulation it went through.

Empowering creators to get credit for their work

Content is often miscredited or not credited at all when shared online, creating tons of lost opportunity for creators. Content Credentials enable creators to get recognized for their work, market it, and build their following.

content credentials

Introducing the Content Credentials pin

When you see the Content Credentials pin, it means Content Credentials are attached! Simply click the pin to reveal more information about the content you're viewing.

How it works

1 Anytime content is captured, created, or edited, Content Credentials can be attached

Creators can choose to attach Content Credentials to their content, which might include things like whether AI was used or not. Voila! This information is added to the edit history of the content—creating a permanent record that can be confirmed.

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

How it works

2 Content Credentials are viewable across the internet

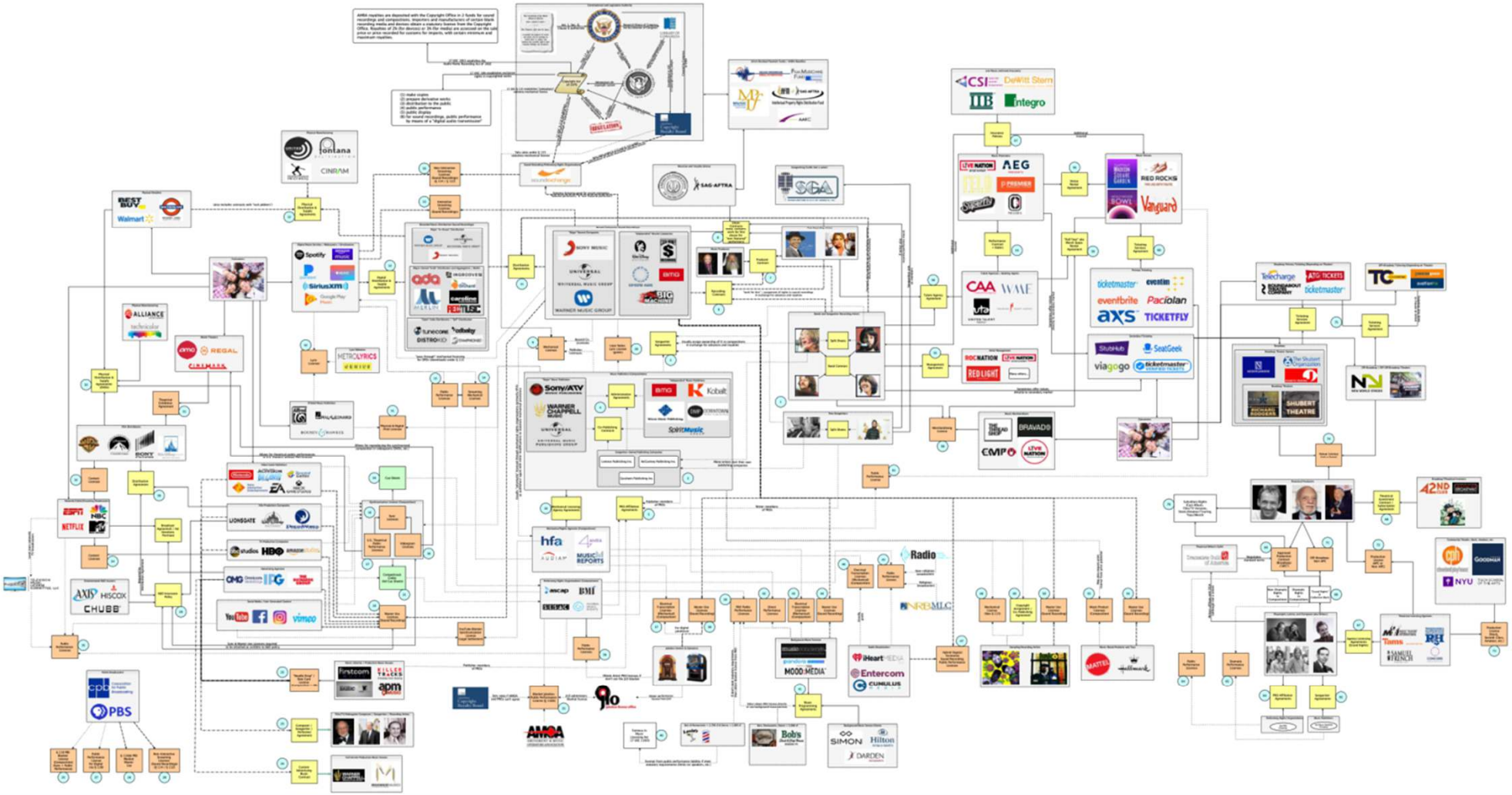
Once the content is made available, anyone can view its Content Credentials by clicking the pin, which reveals the most relevant information directly in context.

How it works

3 Go deeper to explore the full edit history

Content Credentials can capture a detailed history of changes over time. The Verify feature allows you to explore this information in depth, and upload any content to see if it has Content Credentials.

Case Study - Switchchord



DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

Real harms with a common culprit...

The MLC.gov Primer

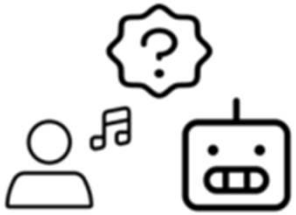
>$2.5 Billion

Global "black box" unallocated royalties that can't be paid out.

>120,000

New tracks uploaded to streaming services per day. Most lack accurate legal and identity data.

Digital Trust



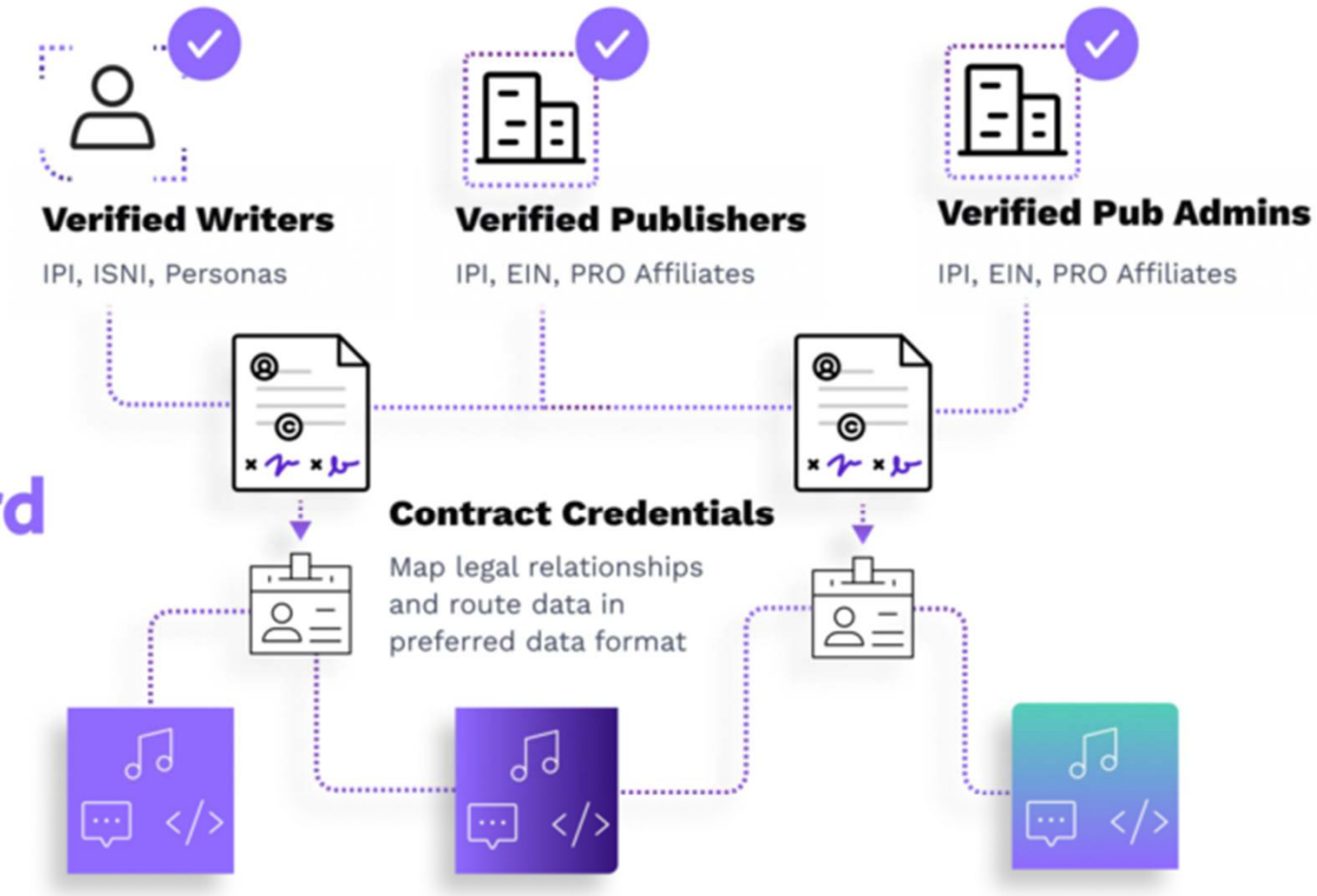
AI or Human?

Deep fakes, voice cloning, synthetic media.

$2 Billion

Annual streaming music revenues estimated to be fraudulent.

The Switchchord Way



Supercharge Your Operations

Eliminate Manual Data Entry

Reduce both the time and cost of ingesting new music by 80% or more.

Trusted Data

Identity verification prevents fraud. Digital signatures provide data provenance.

Automations Across Services

Empowering you to route verifiable data across the systems you already use.

Simplified Contracting and Communications

No more juggling texts, emails, WhatsApp, and phone calls. All writer and producer communications and legal data in one place.

Easy Writer Onboarding

Slash songwriter and producer onboarding time by 90% or more.

Discoverable Identities

Cross-platform identity lookups. Access to real-time publisher, writer, and copyright data.

Case Study - The Velocity Network

Overview Video

THE PROBLEM

The timing: a defining moment

The disrupted labor market is one of humanity's biggest challenges for the next few decades.

The lack of a globally-inclusive infrastructure for proof of qualifications, limits the potential to mitigate these mega trends.

1.1Bn
jobs are liable to be radically transformed by technology in the next decade[1].

1.57Bn
people freelanced in 2023. More than ever before in history[5].

+1Bn
employees across the globe will require reskilling before 2027[1].

X2
growth expected in remote work in the next 5 years[4].

$8.5Tn
unrealized annual revenues due to skill shortage[2].

+300M
international migrants disrupting job markets. More than ever before in history[3].

$237Bn
HR tech market size in 2030[6]

$15Bn
annual venture investment into HR tech[7]

[1] Future of Job Survey, World Economic Forum, 2023
[2] The Global Talent Crunch, Korn Ferry
[3] United Nations Publications
[4] EurDev, Remote Work in Europe, 2023
[5] World Bank Publications
[6] Global Human Resource (HR) Technology Market, Verified Market Research, 2023
[7] HR Technology 2023, Josh Bersin, 2023

THE BUSINESS PROPOSITION

The ‘Great Transformer’ the market has been waiting for

Verify education and career credentials in seconds, not weeks.

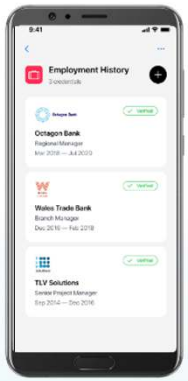
Individuals

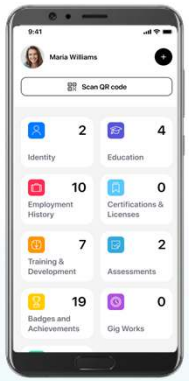
It’s about people’s right to own their career reputation, access better career opportunities and maintain complete privacy when navigating their careers.

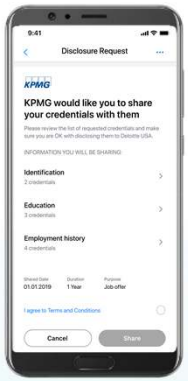
Claim proofs of your employment history, educational background, skills, and qualifications.

Privately store your verified records on career wallets…

…and choose what to share and what to keep private.



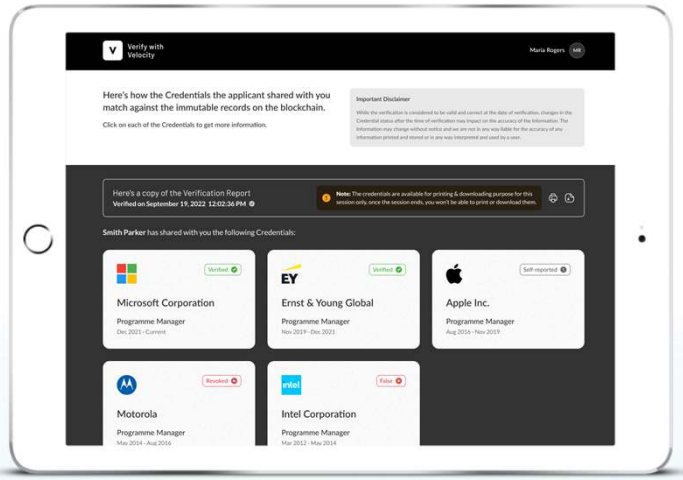




Relying Parties (Employment, Financial Services)

Instantly verify career and education records shared by applicants, students, employees, freelancers and consumers.

Accelerate processes. Improve compliance and unlock innovative engagement models.



DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

THE VELOCITY NETWORK SOLUTION

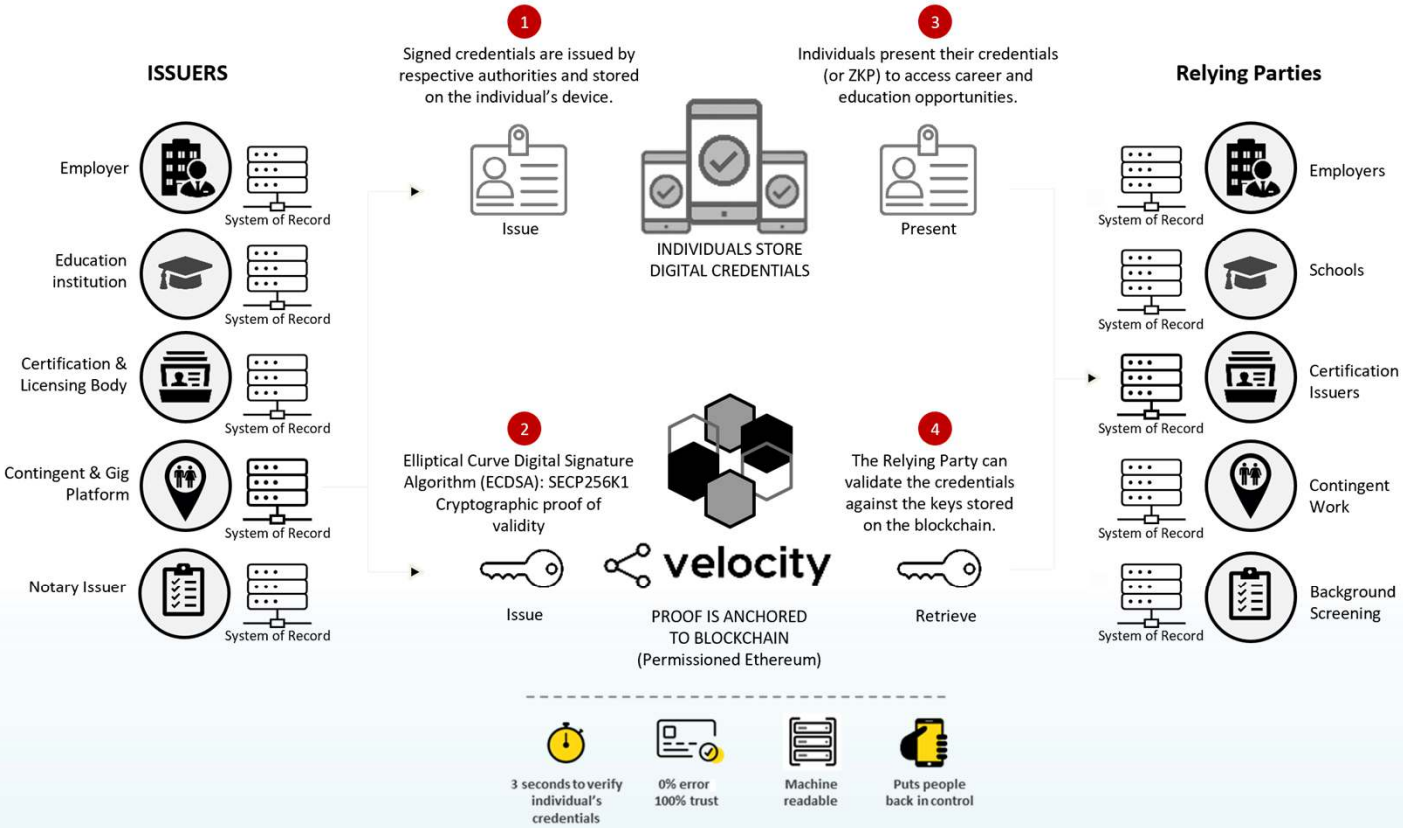
The Solution

Scalable, compliant, tamper-proof

A blockchain based utility layer, which makes it simple for people and organizations to exchange verifiable, immutable, trusted career credentials .

Issuers write to Velocity Network's blockchain a cryptographic key for each credential making it verifiable and trusted.

The keys hold no PII and used for verification only.



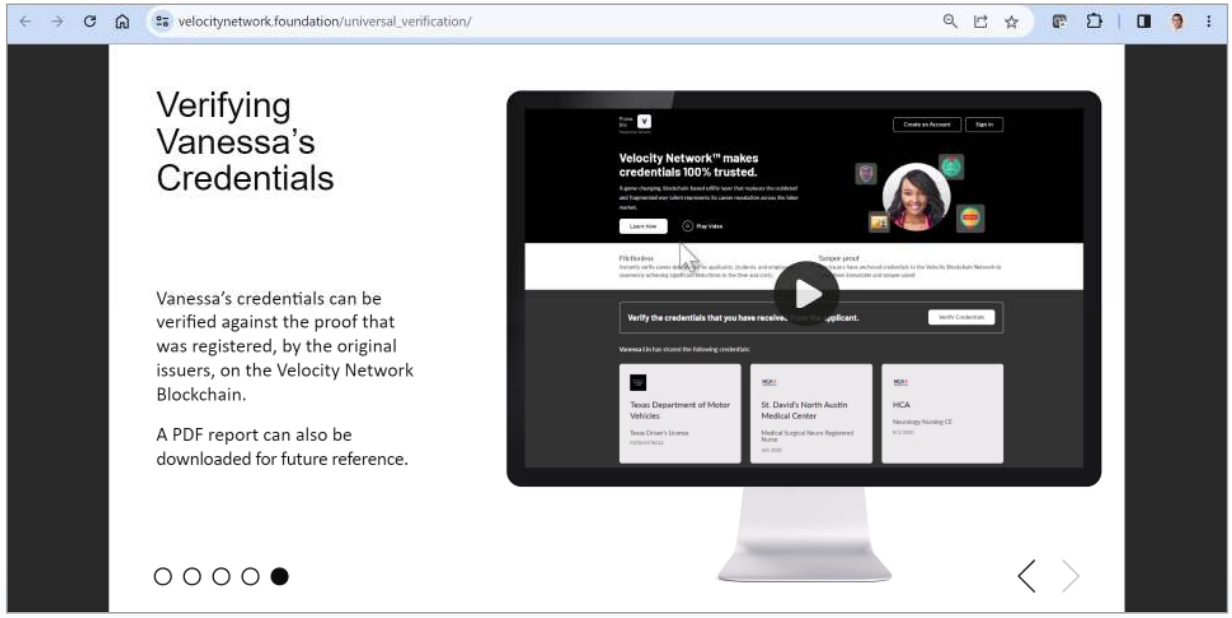
DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

VELOCITY NETWORKS VERIFICATION PROCESS FLOW

A semi-interactive demo showcasing the Universal Verification service (aka www.prove.bio) is available on the VNF website:

- Vanessa claims credentials
- Vanessa creates a presentation – a set of credentials she wants to share – and generates a QR-code or URL.
- Vanessa includes the QR-code or URL in any document, email, resume
- Any organization with the QR-Code or URL can access the universal verification service, view the credentials and verify them.



https://www.velocitynetwork.foundation/universal_verification/

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

Case Study –

The Bhutan National Digital Identity Network

Bhutan NDI Introduction

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET GOVERNANCE

ISACA

BHUTAN NDI's DESIGN PHILOSOPHY

Driven by His Majesty The King's personal vision to provide every citizen with the right to privacy, Bhutan NDI has been launched with the philosophy of Self-Sovereign Identity.

Data is stored on the user's personal biometrics-enabled wallet (and not with a third party or in the cloud).

Individuals control their personal data and are empowered to share only the information that is required for a specific transaction or interaction.

Individual's identity proofs are not owned or controlled by a single authority and cannot be altered or deleted without detection, reducing the risk of a single point of failure.

BHUTAN NDI's PRODUCT ROADMAP

PRODUCT

- CUSTODIAL WALLET
- HYBRID WALLET
- CONTROLLER CAPABILITIES
- GUARDIAN CAPABILITIES
- KAIOS NATIVE APP
- DIGITAL SIGNING
- PEER-TO-PEER CHAT

USE CASES

- ELECTRONIC PATIENT MANAGEMENT SYSTEM
- NATIONAL SERVICES
- FINANCIAL INSTITUTIONS
- TELECOMMUNICATIONS
- ROAD & AIR TRAVEL
- NATURAL RESOURCES
- SECURITY, AUDIT, TAX CERTIFICATIONS

BHUTAN NDI DEMO VIDEO

Issuance of Verifiable Credentials

Verified e-KYC

Passwordless Login

Backup & Restoration

Bhutan NDI Demo Video

Case Study

The Global Acceptance Network

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

GAN

What is the Global Acceptance Network?

The **Global Acceptance Network (GAN)** aims to establish a trust layer for the Internet, enabling the cross-ecosystem exchange of verifiable data.

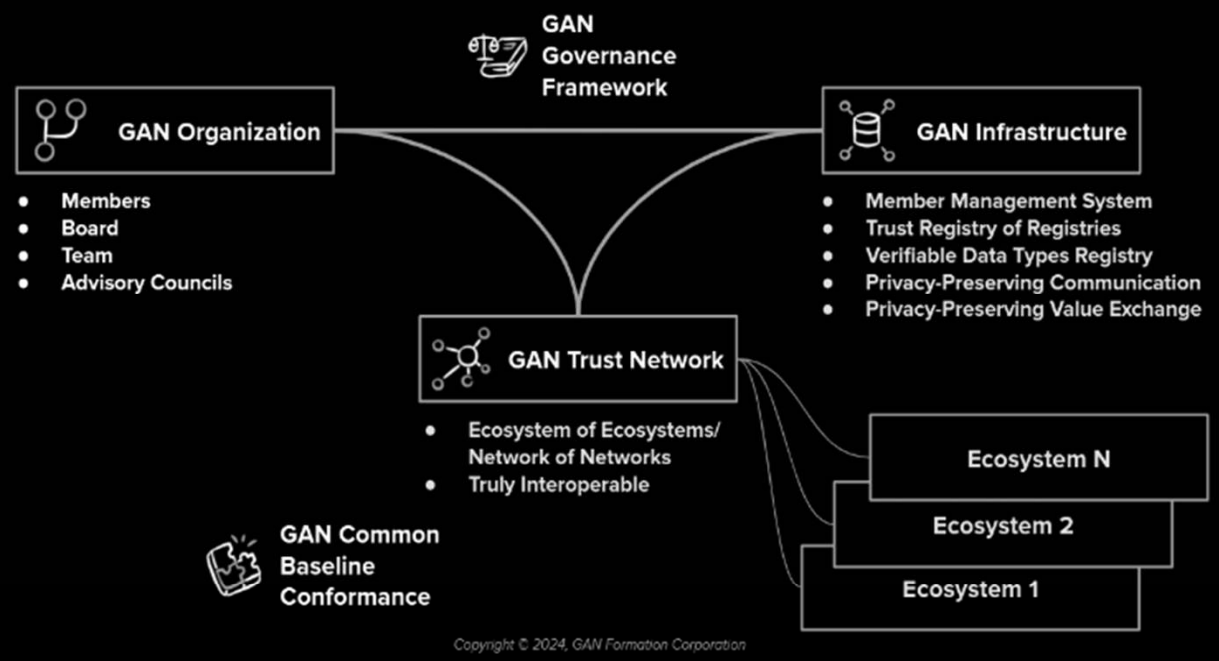
To achieve this, the GAN will:

- **Establish** a neutral nonprofit organization that follows our Guiding Principles to represent, serve, and advocate for the shared interests of all people, organizations, and ecosystems within the network.
- **Establish** and **govern** a layer of digital public infrastructure that interconnects digital trust ecosystems, enabling parties to form authentic, private, and secure digital relationships that encourage the growth and value of the decentralized data economy.

The GAN will facilitate safe and secure data exchange across various ecosystems while encouraging them to evolve independently.

GAN

The nonprofit GAN Organization is responsible for the GAN Governance Framework that governs GAN Infrastructure and the GAN Trust Network

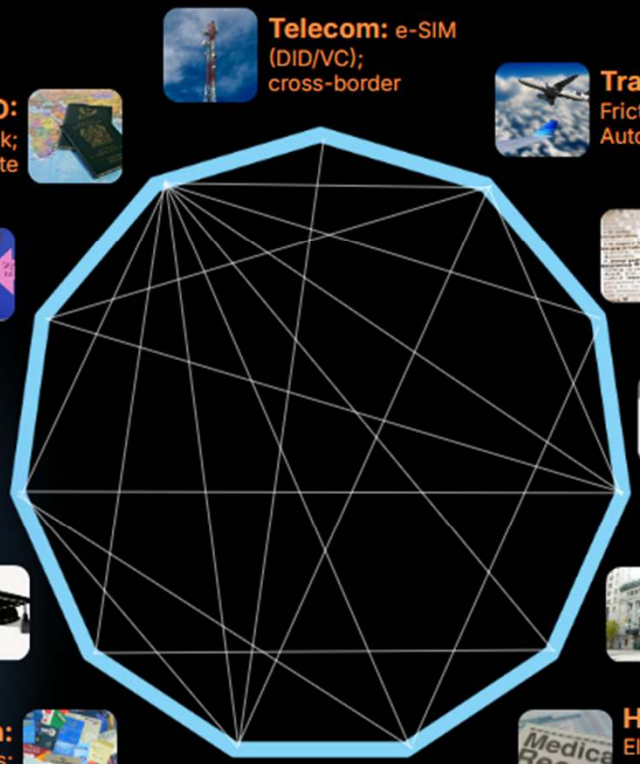


- The **GAN Organization** incorporates lessons learned about Internet governance (ICANN, UN DPI, eIDAS 2.0) to broadly represent all participants in digital trust ecosystems.
- **GAN Infrastructure** is the digital public infrastructure governed by the **GAN Governance Framework** to enable interconnection and interoperation between ecosystems.
- The **GAN Trust Network** is the worldwide network of trust registries representing all GAN member ecosystems and their participants.

GAN

The GAN is the essential bridge between ecosystems for high-value, verifiable data exchange

Just a few of the many use cases the GAN makes possible



Telecom: e-SIM (DID/VC); cross-border

Travel/Hospitality: Frictionless travel; Automated check-in

Insurance: Personalized insurance; r/t risk pricing

Worker Mobility: Streamline travel; migration; right-to-work; employee credentials

Banking/Finance: Retail banking; Payments, Open Banking, KYC/AML

Healthcare: Electronic health records; Population scale research

Supply Chain: Origin of Material; Product Passports; Trade Finance

Loyalty/Affiliation: Loyalty rewards; Affiliation-based Offers

Education/Work: Skills; Gaps; Worker Qualifications; Continuous Learning

Retail & FMCG: Direct-to-Consumer relationships; D2C

Content: Content Signing; Creator ID; Organization ID;

Government/Legal ID: National Identity Stack; Sovereign State

GAN

Committed GAN Members

FRAGOMEN
NTT Digital
accenture
Gen
Quanata™
a State Farm® company
Pearson
Credivera
esatus
Northern Block
cheqd
PROVENANT
PROOFSPACE
sentiance
Umazi
Fireblocks
dock
Interac
SCOPEfusion
DANUBE TECH GMBH
YOTI
cira
inGo
trinsic
velocity
FinClusive
National Student Clearinghouse
GLEIF
DIDAS

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA

QUESTIONS?

SCOTT PERRY, CPA, CISA

scott@digitalgovernanceinstitute.com

LinkedIn Profile

DIGITAL GOVERNANCE INSTITUTE
POWERING THE ENGINE OF INTERNET TRUST

ISACA