



Strategy | Consulting | Digital | Technology | Operations

Insight Driven Health

Blockchain

Securing a New Health Interoperability Experience

*ONC/NIST Blockchain Workshop
September 26, 2016*



High performance. Delivered.



Introductions



Brian Kalis

Managing Director
Accenture Digital Health




Hanif Dharamsi

Senior Manager
Accenture Digital Financial
Services and Payments

Executive Summary: Blockchain & ONC's Interoperability Roadmap

Blockchain's Important Application to Enable ONC's Mission:



Creating secured and trusted care records



Linking Identities



Recording Patient Consent

To effectively explore Blockchain technology, ONC will need to:



Understand Blockchain Technology



Build Team of Skilled Resources Knowledgeable in Blockchain



Connect with Private Sector and Academia

Blockchain Overview

What is Blockchain?



Open Access – share same data



Distributed Network - Decentralized transaction ledger database



Consensus/Autonomous validation

































Secure - Cryptographically secure

Applicability and Usage Growing

Some of the most promising use cases for blockchain:

- Payments
- Clearing & settlement
- Trade finance
- Peer to peer networks (payments, insurance, energy)
- Health records – secured & trusted
- Linking Identities
- Recording patient consent

Core Blockchain Principles

	 Open Access	 Distributed Network	 Consensus	 Secure
Key Attributes	<p>All participants share access to the same data.</p> <p>  Transparent  Ease of Access </p>	<p>Ledger database that is shared by all parties in a defined, distributed network.</p> <p>  Database Consistency  Unique (No Duplication)  No Single Point of Failure  Redundant (Single Truth) </p>	<p>Record of consensus that stores every transaction that occurs via systemic validation.</p> <p>  High Quality Validation  Immutable  Tamper-Evident </p>	<p>Data can't be tampered with, lost, or changed. Only the right people can access the right data.</p> <p>  Controlled Confidentiality  Authentication  Encryption </p>
Value Proposition	<p>  Borderless  Open P2P Network </p>	<p>  Eliminates Reconciliation </p>	<p>  Providence  Data Reliability </p>	<p>  Trust </p>
Challenge	<p>  Pseudonyms  Regulators </p>	<p>  Throughput  Scale </p>	<p>  Common Standards  Resource Intensive </p>	<p>  Infrastructure Investments  Privacy </p>

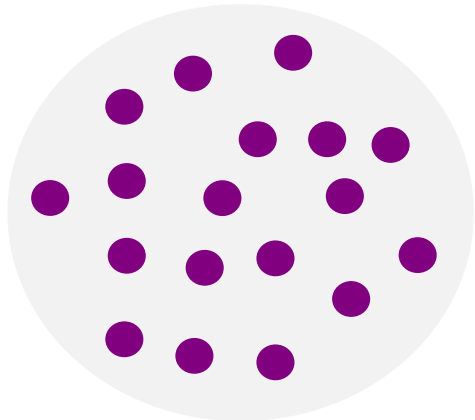
Blockchains can be public or private

Permissioned vs Permission-less

Semi- and fully-private Block Chains address concerns in privacy and permission management

Permission-less

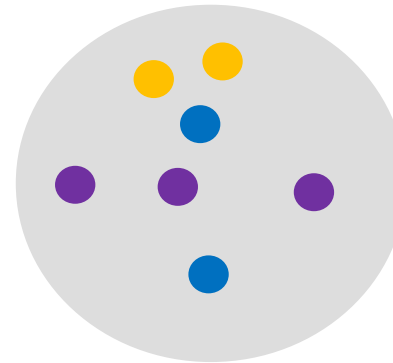
Permissioned



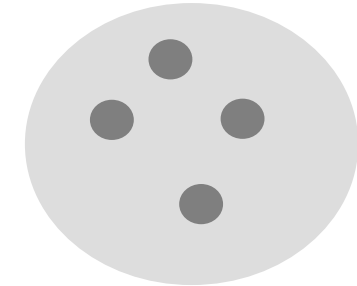
“internet”

Public block chain:

- Permission less – anyone can use it
- “Proof” consensus – “Proof of Work” for Bitcoin
- Public nodes
- Cryptocurrency token
- Open wallet access/internet



“extranet”



“intranet”

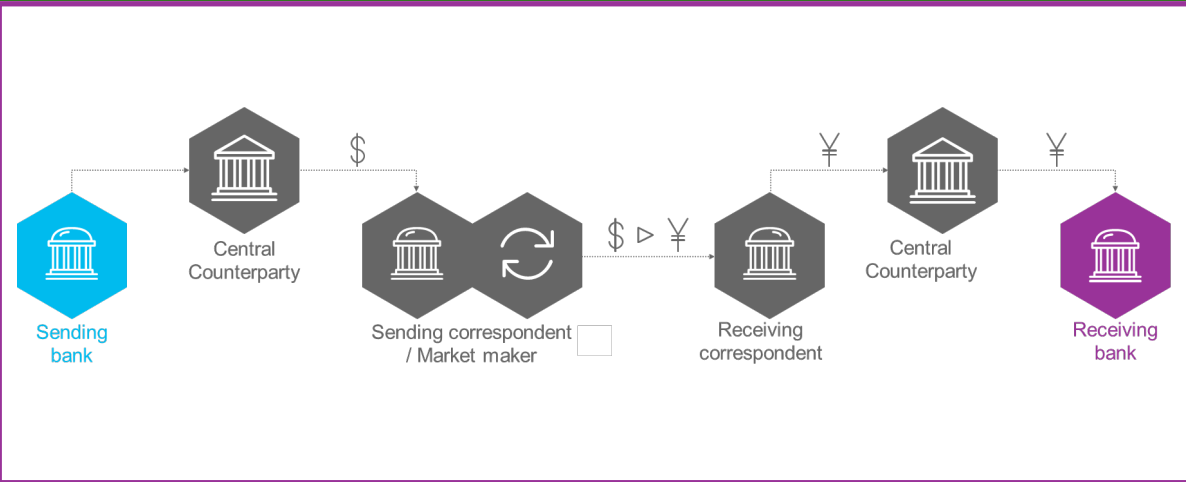
Semi-private & private block chain:

- Permissioned – defined group can participate
- Custom consensus engine – rules set by participators
- Private nodes – closed group
- Optional token
- Closed wallet access/VPN

Case Study: Bank-to-Bank Money Movement

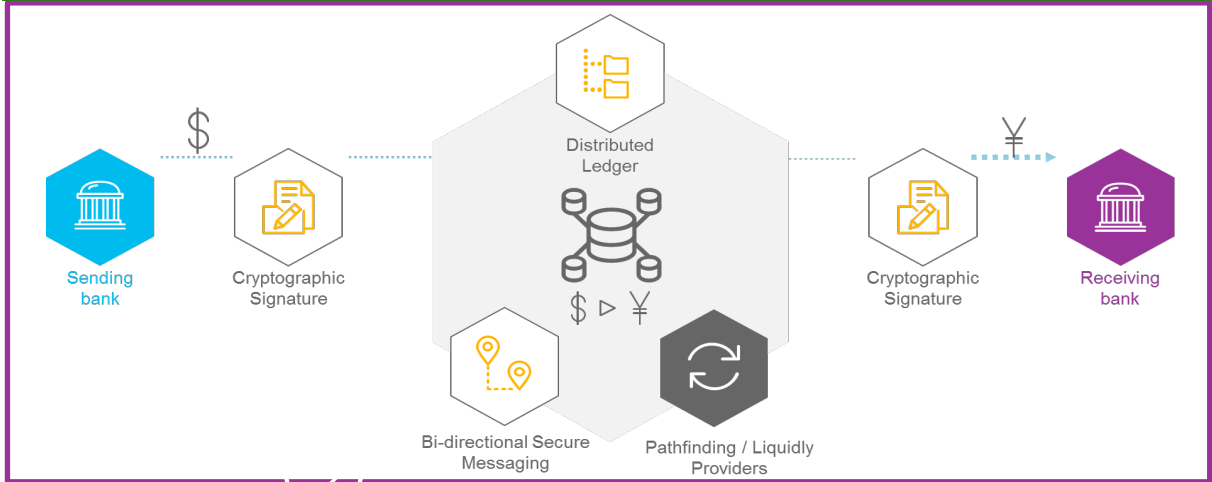
Moving Money Today:

clearing and settlement through one or more correspondent banks is slow, expensive and introduces counterparty risk



Moving Money Tomorrow:

direct clearing and settlement that reduces costs, delays and transaction risks



Limited visibility , fees and FX spread

Payment notification in minutes; settlement overnight; batch processing

Intermediary charges processing fees; limited FX providers

Counterparty risk due to intermediaries and long processing time

Bank reserves provides liquidity; capital is tied up nostro accounts



Full visibility into transaction status, fees and FX spread



Payment notification and settlement in seconds; processing 24/7/265



No intermediary to charge processing fees; competitive FX rates



Counterparty risk eliminated by straight through, instant processing



Option of liquidity provider to fund transaction and reduce bank capital

Blockchain can Enable ONC's Interoperability Roadmap



Core technical standards and functions



Certification to support the adoption and optimization of health IT products and services



Privacy and security protections for health information






Supportive business, clinical, cultural and regulatory environment



Rules of engagement and governance of the exchange of health information

Three Important Applications for ONC's Interoperability Roadmap

 Creating secured and trusted care records	 Linking Identities	 Recording Patient Consent
<ul style="list-style-type: none">• Secure healthcare records created by healthcare professionals and patients• Preserves provenance and integrity of the records while also allowing for anonymity	<ul style="list-style-type: none">• Single trusted source of identity data• Strong identity proofing• Preserves immutable record of identities of patients and healthcare professionals	<ul style="list-style-type: none">• Record consent decisions and patient directives within secured healthcare record• Empowers patients

Blockchain technology can advance ONC's Interoperability Roadmap	Privacy
	Security
	Risk Management

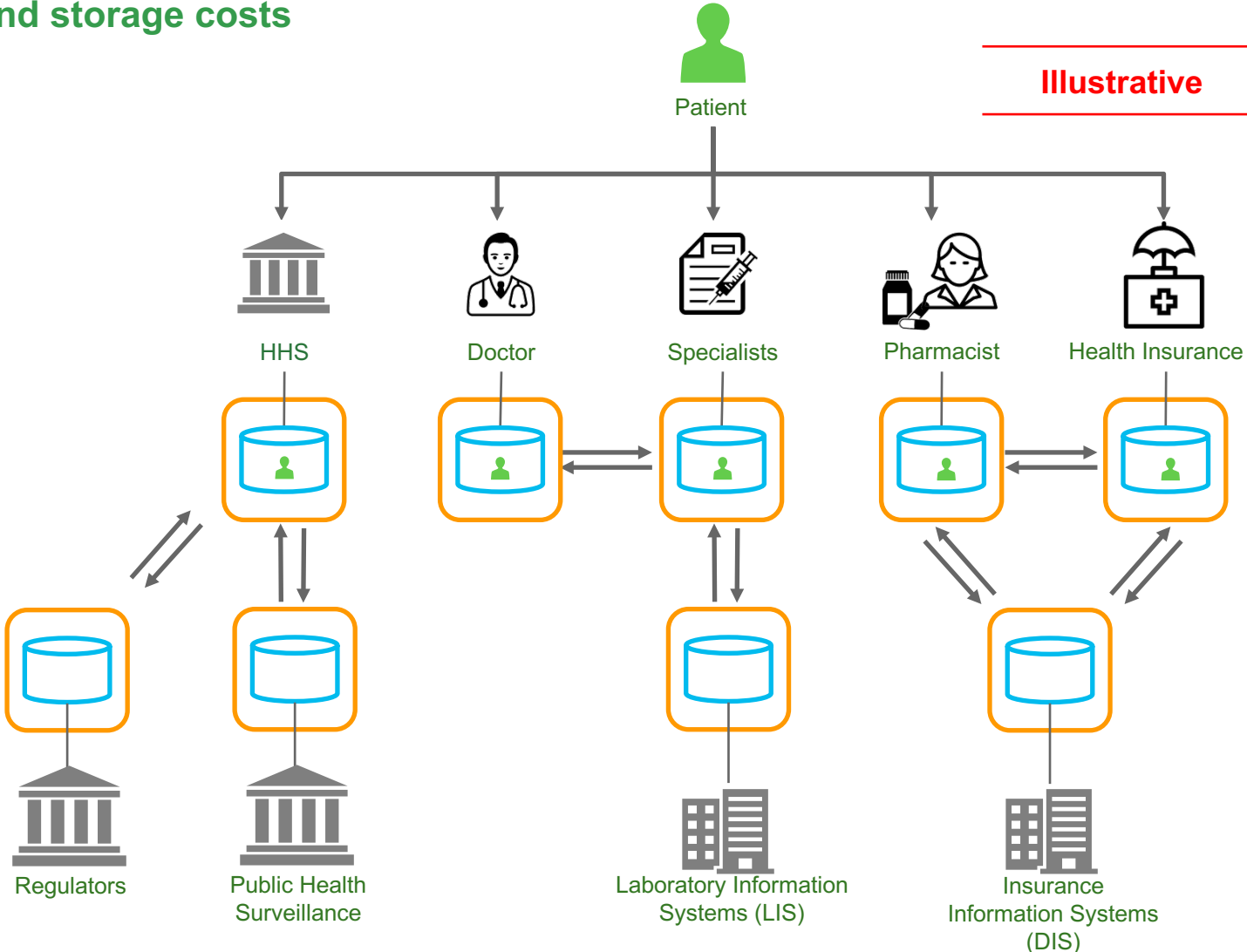
- **Enable Quadruple Aim**
 - **Root causes of waste in healthcare spending**
 - **Support an Interoperable Learning Health System**

Current State: Decentralized data system

Data that is spread across multiple parties for the purposes of executing a process is often prone to discrepancies, expensive reconciliation and storage costs

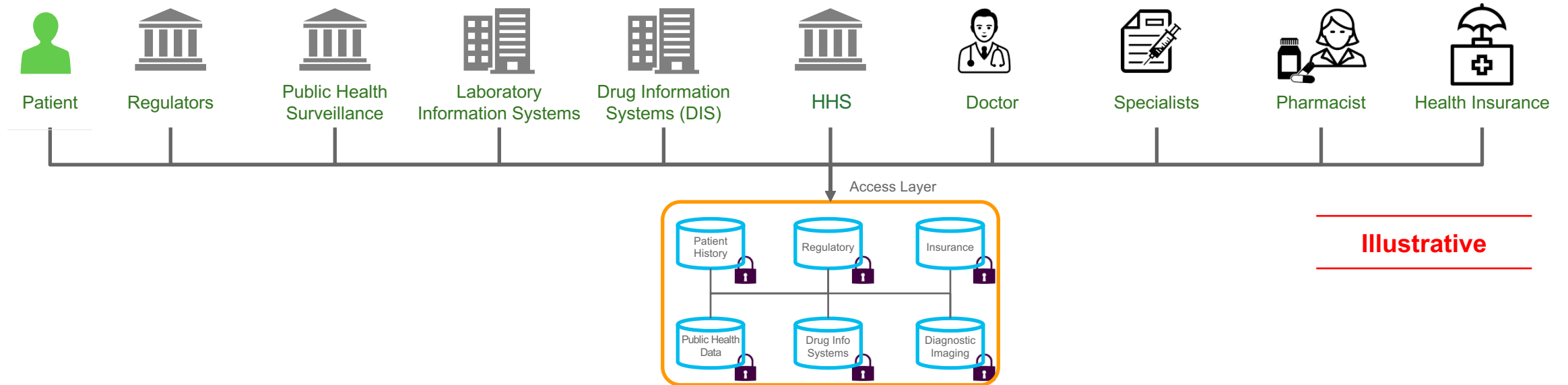
Current State

- Redundant data stores
- Lack of trust/data integrity results in expensive data reconciliation at each step of the process
- Incomplete end-to-end view of transaction, customer, and product; as required by regulators
- Opportunities for data breach
- Inconsistent data storage and use across parties



Target State: Mutualized view of the data enabled via blockchain

A centralized view of the data across all parties would allow for access to relevant data, guarantee data integrity and significantly reduce reconciliation costs



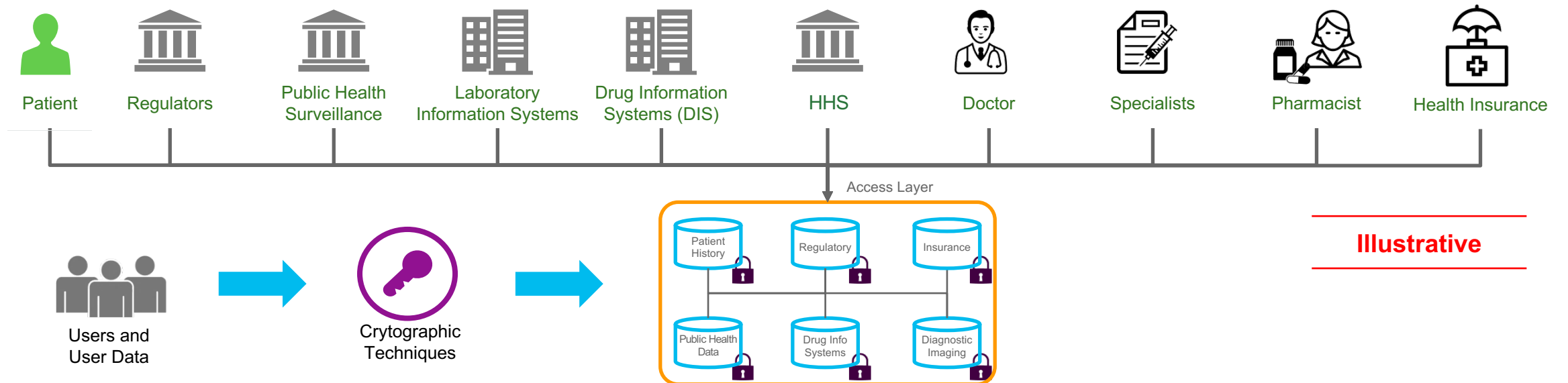
Illustrative

Target State

- Central store or “golden state” of data
- Guarantee data quality and availability
- Improved security (e.g., data-level encryption)
- Entitlement-based access
- Consistent data storage and use
- End-to-end view
- Auditability

Application: Creating Secure and Trusted Records

Permissioned blockchain that integrates with current health IT investments could be used to create secured and trusted care records.



In this model, risks related to sensitive data leaks are reduced:

Data

- No Personal Health Information is stored on blockchain

Authentication

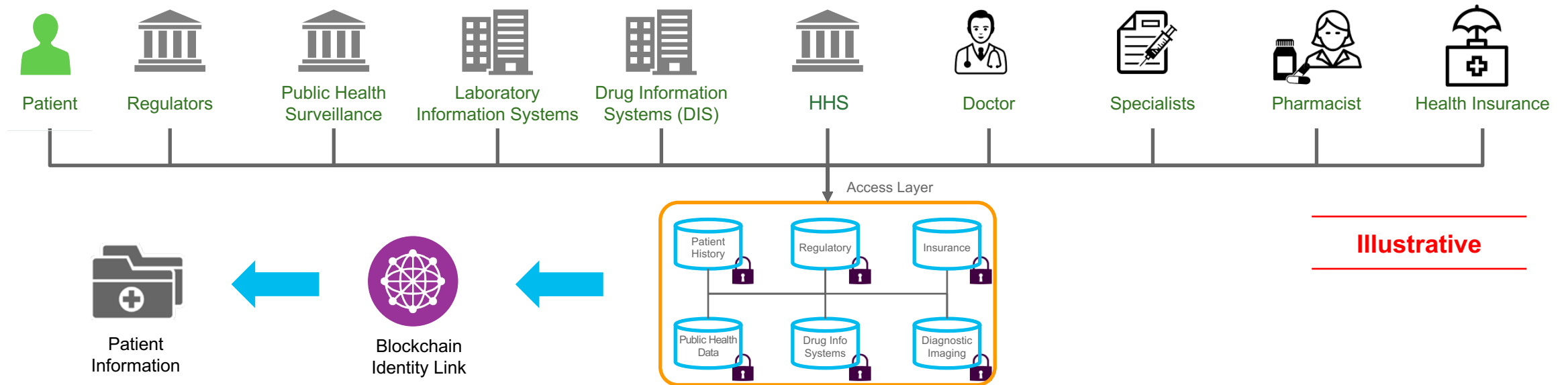
- Cryptographic keys used to authenticate a user

Authorization

- Governance rules predefine access and control permissions to ensure appropriate mix of privacy vs transparency

Application: Linking Identities

Integrated nature of blockchain means the technology inherently links disparate identities authenticated at the point of care for both patients and healthcare professionals.

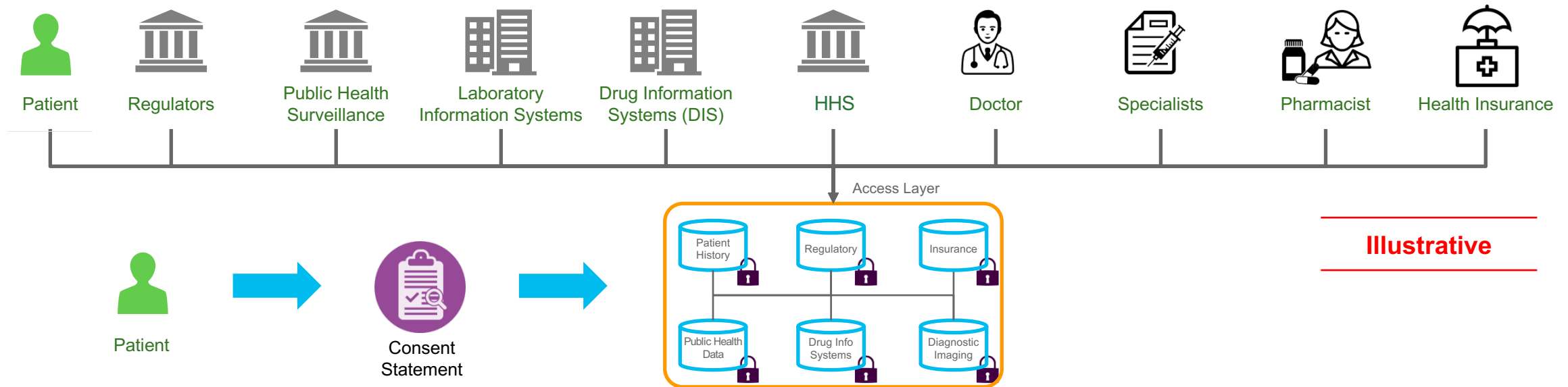


In this model, benefits of a Blockchain identity include:

Distributed	<ul style="list-style-type: none"> ▪ Complete record integrity and transparency
Nonrepudiation	<ul style="list-style-type: none"> ▪ Ensures party cannot deny the authenticity of their signature on a document or sending of a message that they originated
Verification	<ul style="list-style-type: none"> ▪ A number of other entities inside and outside of healthcare could provide, support and attest to identity claims

Application: Recording Patient Consent

Patient consent statements may be captured in an immutable blockchain allowing healthcare professionals and others involved in the care cycle to trust the statements and act upon the accordingly.



In this model, benefits of a Blockchain identity include:

Trust	<ul style="list-style-type: none"> ▪ Patient consent statements captured in the immutable blockchain allowing health professionals and others to trust the consent
Empowerment	<ul style="list-style-type: none"> ▪ Patients are empowered to add consents at any point in their care with confidence they will be secured
Directives	<ul style="list-style-type: none"> ▪ Healthcare professionals can act upon consent statements with the assurance they are adhering to patient wishes

Other Potential Blockchain Uses in the Healthcare Ecosystem



Patient profiling for population health



Improved audit logging



Patient data as a service



Improve health IT application development








New access points for healthcare data



Connecting traditional databases in a blockchain environment

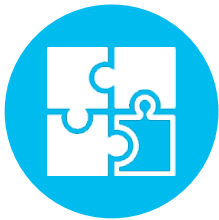
Blockchain Faces Barriers to Implementation

There are implementation barriers that must be overcome for blockchain technology to gain a legitimate place in the healthcare industry.

Barriers	
 Regulatory	Redefining legal and regulatory frameworks to govern use of this new socio-political paradigm
 Scalability	Finding solutions that can handle the required volume
 Verification Speed	Determining optimal verification process to avoid latency over time as the data on the blockchain grows
 Security Breaches	While blockchain protocol is stable and secure, supporting infrastructures have suffered from security breaches
 Immutability	Governance models and solutions must exist for situations when users need to remove data from the blockchain, for privacy or legal reasons

Recommendations for ONC

ONC should support, track and highlight demonstration projects for the application of blockchain platforms to encourage private sector innovation and inform future policy.



1 Environmental Scans and industry outreach



2 ONC Blockchain White Paper



3 Blockchain Workshops



4 Federal Advisory Committees



5 Blockchain Demonstrations



For more information:

Brian Kalis

Managing Director
Accenture Digital Health
brian.p.kalis@accenture.com

Hanif Dharamsi

Senior Manager
Accenture Digital Financial Services
hanif.s.dharamsi@accenture.com