Taking Blockchain into a Secure Mainstream Enterprise Technology

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EMEA

London

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How to make the most of your hour

- ✓ How can you leverage Blockchain value
  - ✓ Blockchain essentials
  - ✓ Use case modelling
  - ✓ Relevant use cases
- ✓ Blockchain Design Principles
  - ✓ Typical BC solution
  - ✓ Enterprise IT constraints
  - ✓ Best practice how to start your pilot project
- ✓ Oracle Blockchain
  - ✓ Oracle strategy & Market approach
  - ✓ Blockchain Platform capabilities
  - ✓ What if you'd like to see more

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How do you leverage Blockchain value?

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What Is Blockchain?

"…blockchain is an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value."

- Don Tapscott, author of Blockchain Revolution

Do new things without 3rd parties	**Do things more efficient**
Make things more transparent	**Do things more secure**

TRADITIONAL SYSTEM

DLT

Permissionless and Permissioned

Encrypted for confidentiality

Immutable and non-repudiable

Smart contracts

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Smart Contracts

Application logic that automatically **validates the content of transactions** through a set of policies shared by the parties and **determines how transactions behave**, i. e. how they change the state of the ledger.

enforce contractual clauses

change the state of the ledger

manage the triggered processes (eg. billing)

BlockChain

ERP, Digital Engagement, …

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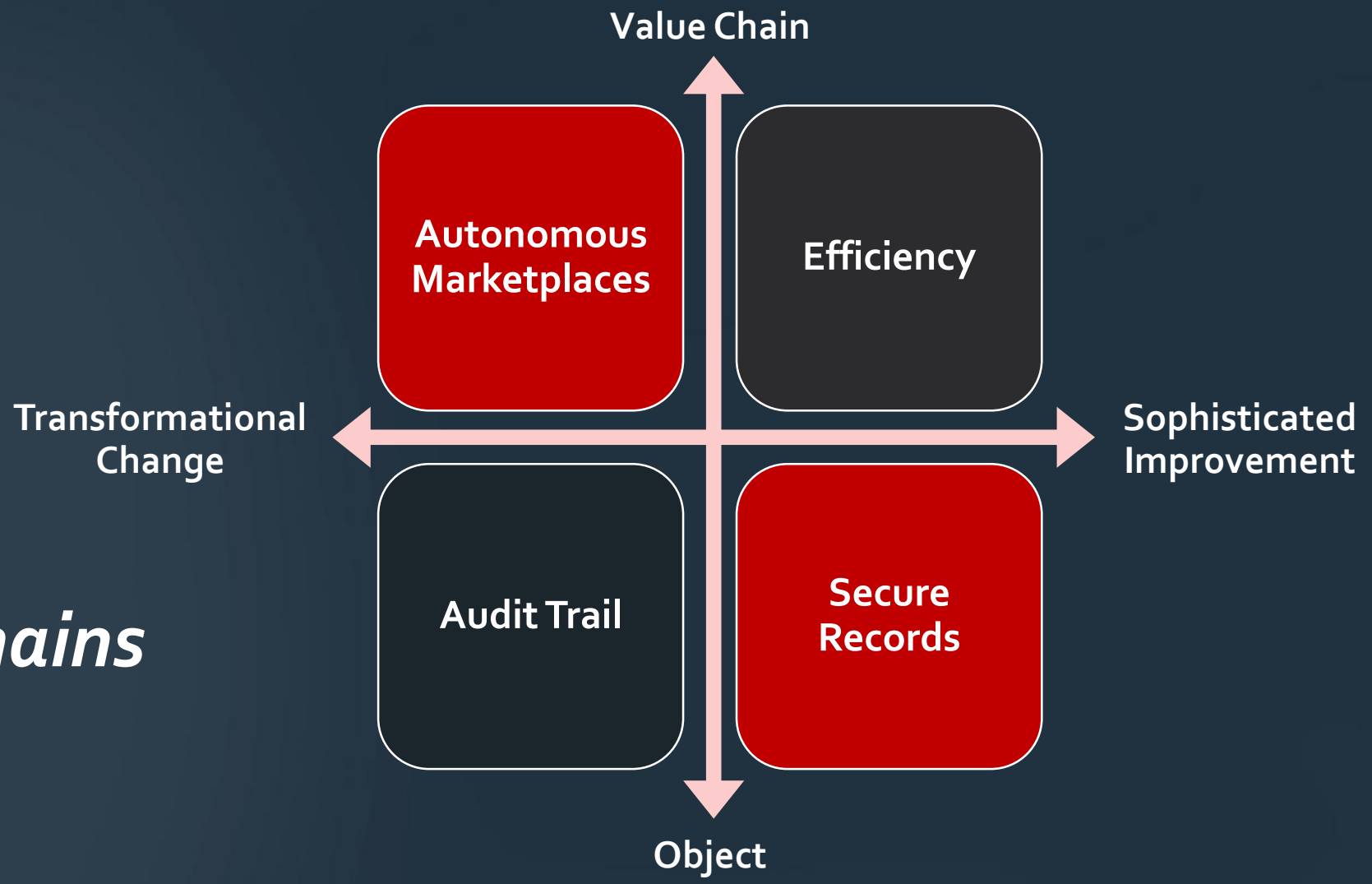
Blockchain, a game changer across *Business Domains*



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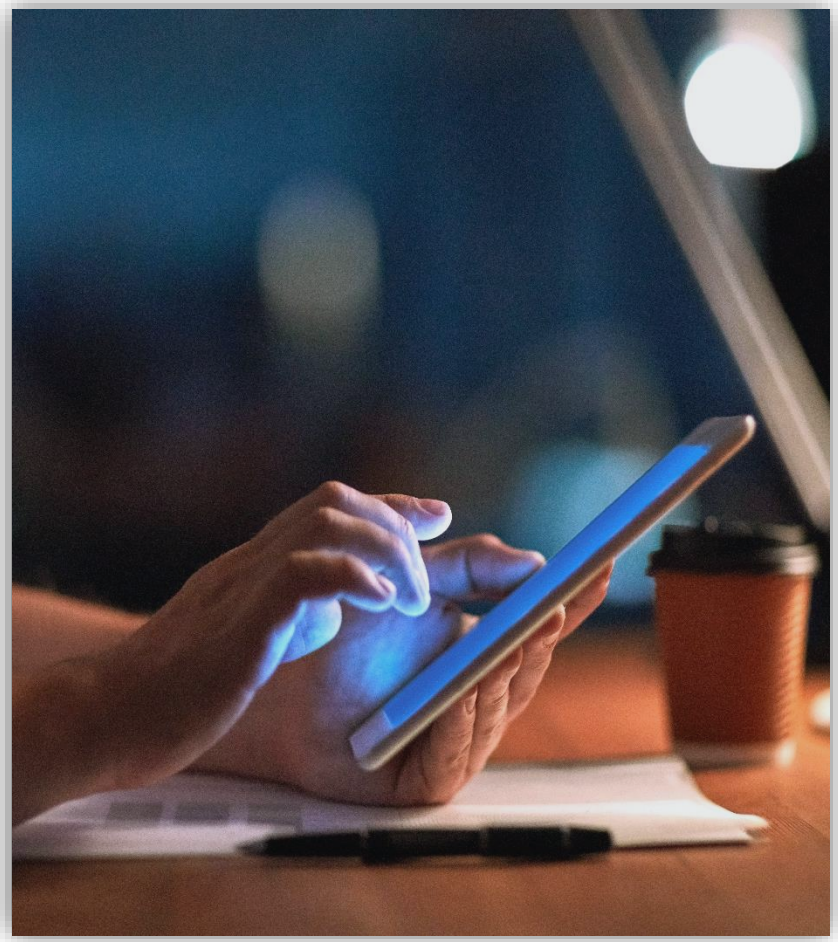
Secure records

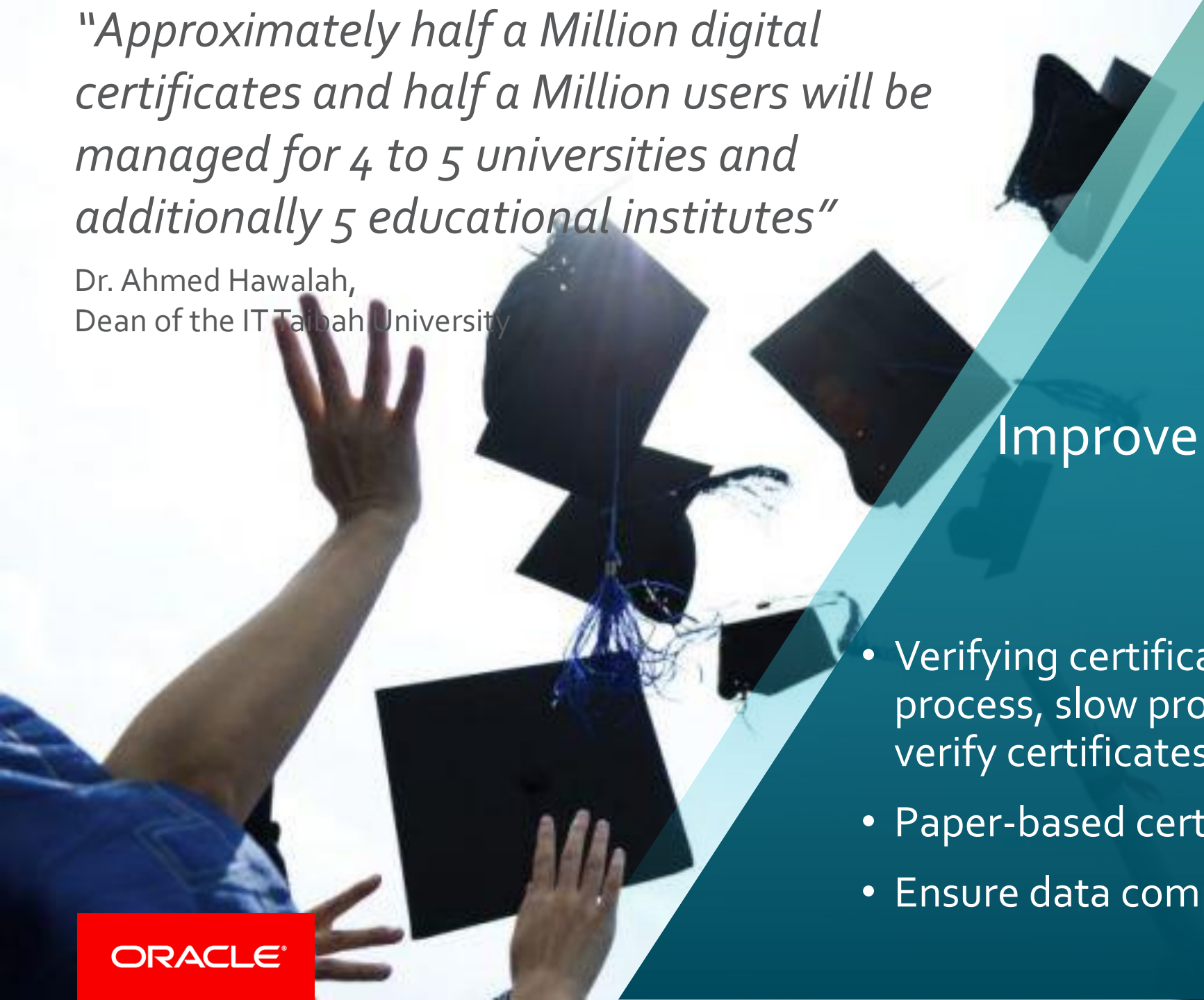
Store and retrieve data safeguarding Trust and Privacy

- Use encryption and cryptographic capabilities to provide additional security layer
- Leverage Digital Identities to monitor, detect and restore misconduct
- Provide timestamps to track and trace data access and usage



"Approximately half a Million digital certificates and half a Million users will be managed for 4 to 5 universities and additionally 5 educational institutes"

Dr. Ahmed Hawalah,
Dean of the IT Taibah University



وادي طيبة
TAIBAH VALLEY

Improve student experience beyond graduation

- Verifying certificates is largely a manual process, slow process of central authorities to verify certificates
- Paper-based certificates get lost over time
- Ensure data compliance and privacy

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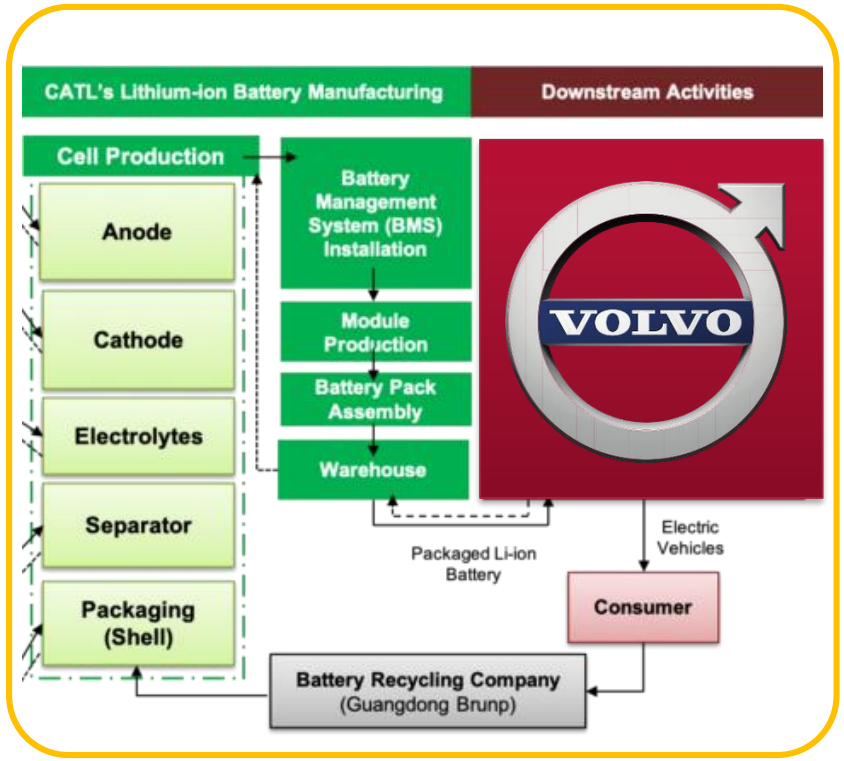
Audit trail

Provide valuable insights

- Allow more transparency, hence better audit trails and decentralized viewpoint
- Tamper-proof processes to prevent erroneous and fraudulent handling
- Consolidate to provide evidence of sequence of activities

Cobalt Traceability for Volvo Cars Electric Vehicle Batteries

- Volvo Cars sustainability initiative applied to all cobalt used in its EV batteries
- Recently signed an agreement for sourcing EV batteries from CATL and LG Chem
- Completed a POC that tracks recycled Li-Ion batteries processed by Brunp, precursor manufacturer ZEC and CATL.
  - At each step production processes have been mapped to ensure segregation and scans of material passing through the processes
  - All scan data points are captured to the blockchain to provide an immutable record or provenance.
- The next phase is to bring in LG Chem and capture their processes and materials flows on the blockchain



Smart Contracts
Consensus
Oracle Blockchain Platform
Distributed Ledger
Confidentiality

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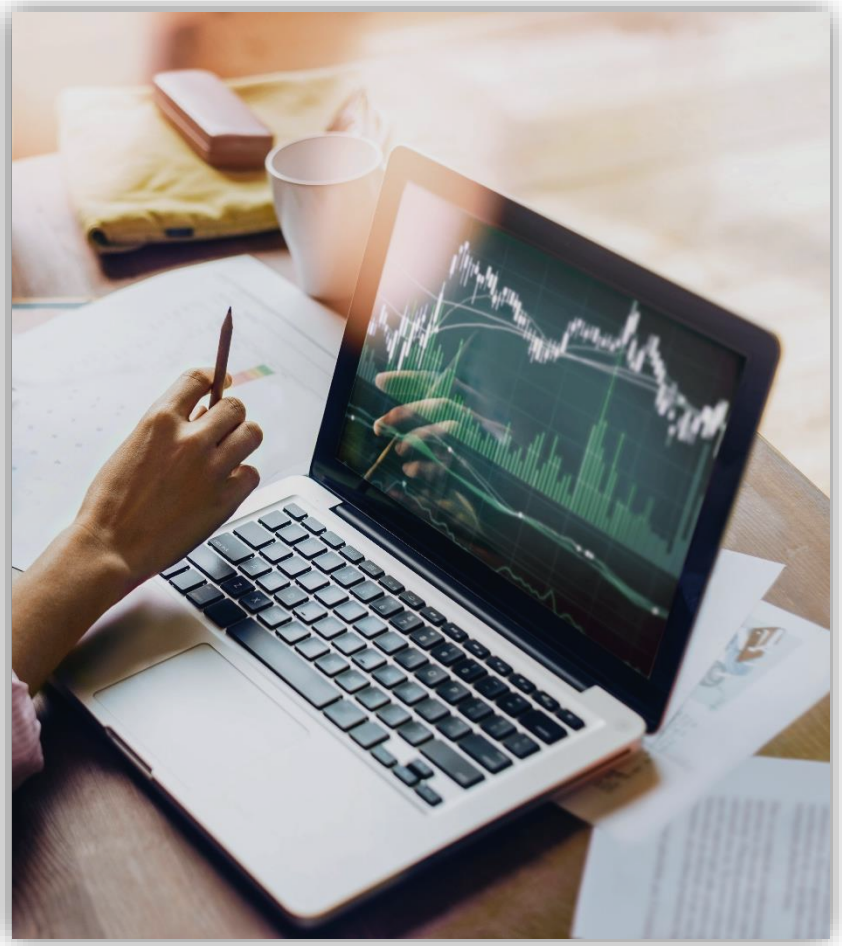
Efficiency

Reduce friction in the value chain

- Minimize delays, solve bottlenecks and automate labour intensive processes, due to offline reconciliations, hand-overs or gaps
- Remove paper trails (bill of lading, quality assurance etc.) to provide leaner and digital processing
- Synchronize process steps on the Blockchain with Smart Contracts



"The built-in features such as identity management and data encryption made it an ideal choice given our industry requirements and compliance needs. Additionally, the REST APIs helped us and our vendors accelerate application development and integration with existing core services."

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AJIB
بنك الاستثمار العربي الأردني

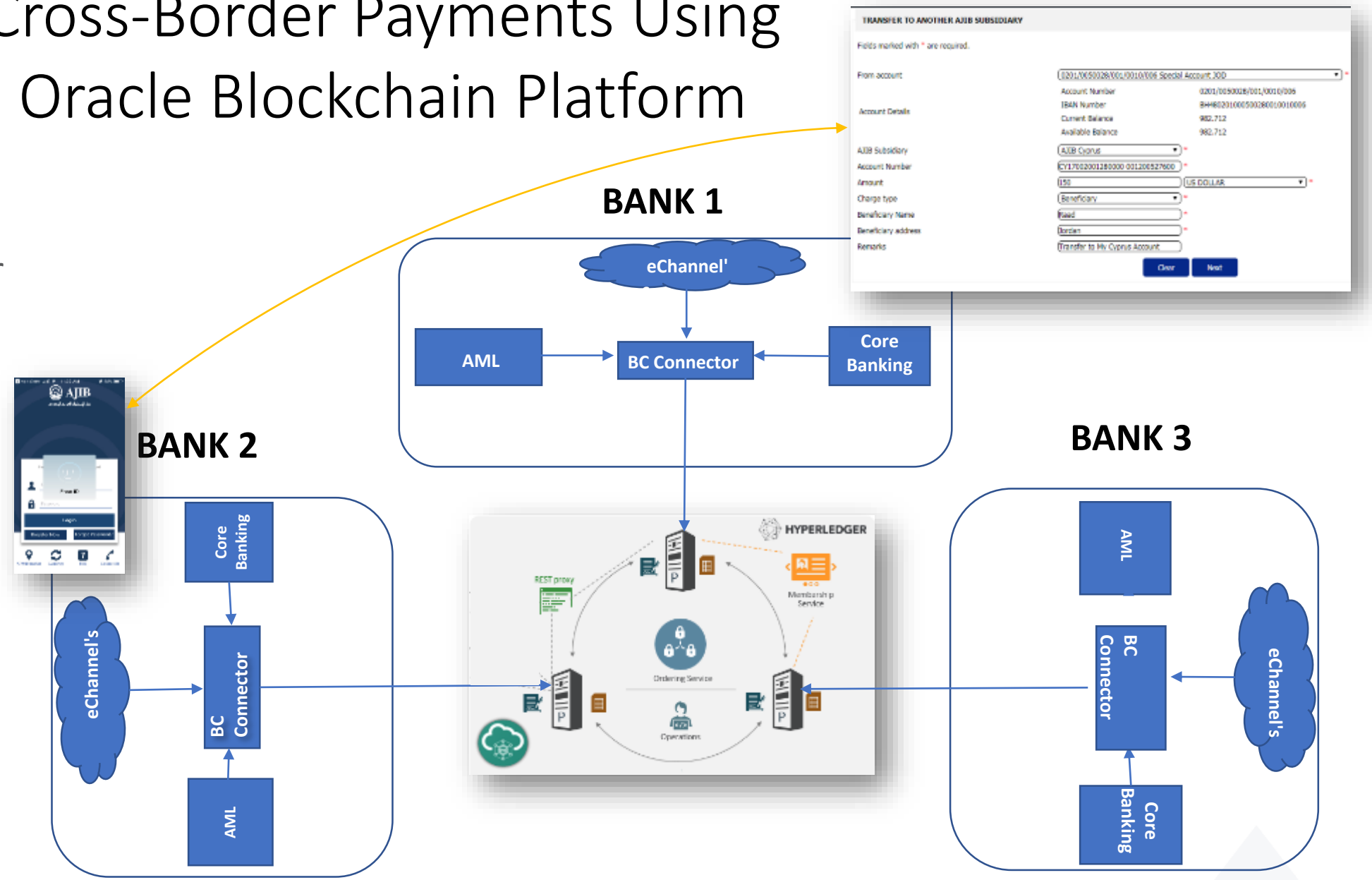
Instant Transfers without Intermediaries

- Eliminate expensive intermediary fees
- Instant reconciliation
- Increased transparency

Cross-Border Payments Using Oracle Blockchain Platform

- Traditional cross-border transfers between the subsidiaries use SWIFT messages and correspondent banks

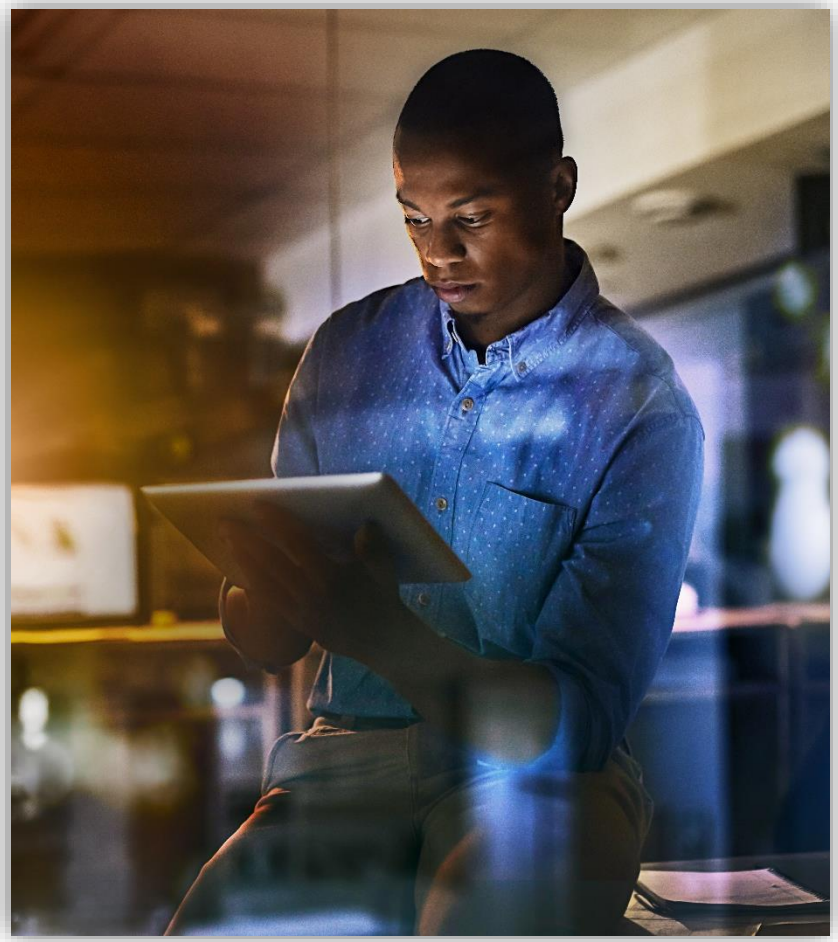
- Blockchain benefits
  - Automation via smart contract rules
  - Real-time handling, same day funds availability
  - Full audit trail and confirmations for clients



Autonomous market places

Create new market dynamics

- Build new trust relationships and disruptive peer-to-peer interaction
- Removal of the single entity authority, anyone can now authorize transactions and provide access to digital information
- Minimizes unnecessary costs from third parties/intermediaries



Blockchain based loyalty system for Decathlon

SHORT DESCRIPTION

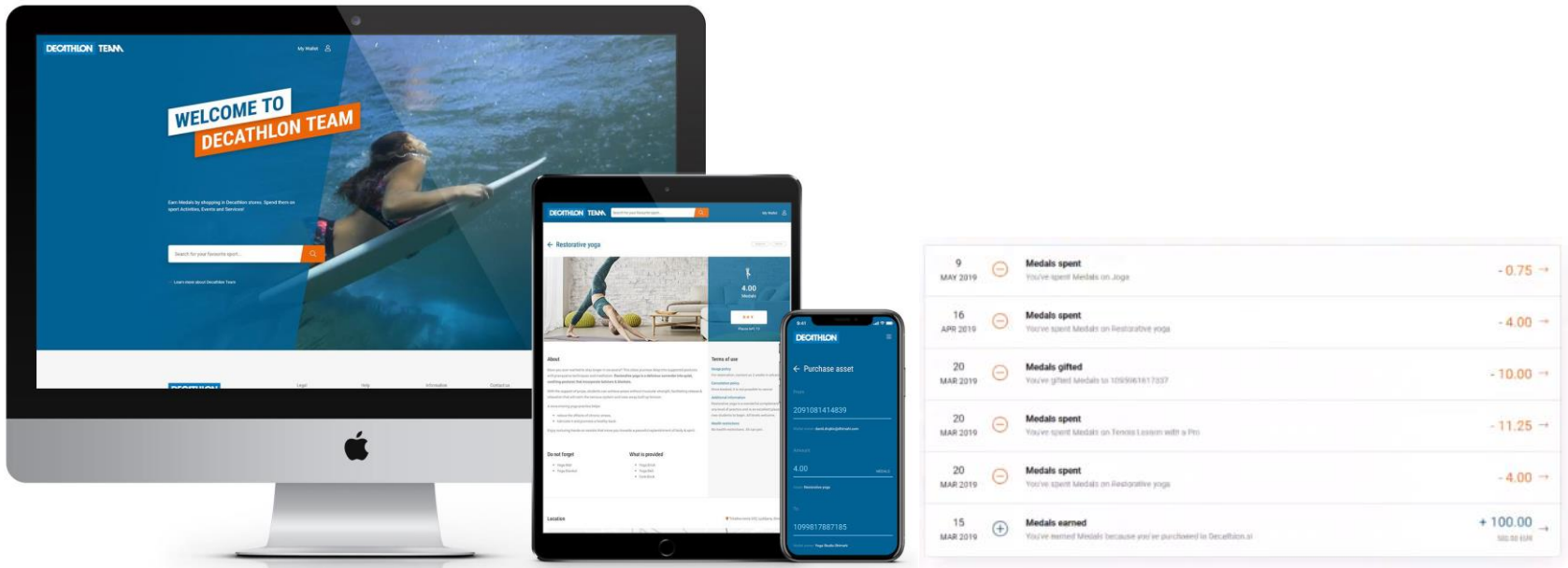
- API-centric solution, connecting Blockchain Platform Cloud Service with Customer apps, Google K8s, MongoDb
- When purchasing goods in Decathlon stores or Decathlon websites, sports users earn Medals [symbol: MDL] to be redeemed with partner offerings

USE CASE

- To connect all that love sports
- To create a secure and safe transaction environment across different regions with different currencies.

ACHIEVEMENTS

- Time to market – 4 months.
- Prototyping chaincode logic in a matter of hours.
- Development and new feature deployment was drastically reduced
- 100 partners connected



Top growth use cases in BC last year

- Commodities track & trace – CG&M
  Minerals, assets, food, audits
- Supply Chain collaboration – Logistics, CG&M, High Tech
  Terminals, shipments, BoM, 24/7
- Custodianship – GOV, Comms
  Criminal evidence, e-voting, identities, ownership, certification
- Trade finance – Services/CG&M
  Invoice factoring, im/export, Customs
- Intercompany transfers – FSI & cross-industry
  Bank transfers, system settlements, cross-charging

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Blockchain Design Principles

Key Components of a Blockchain System

Applications

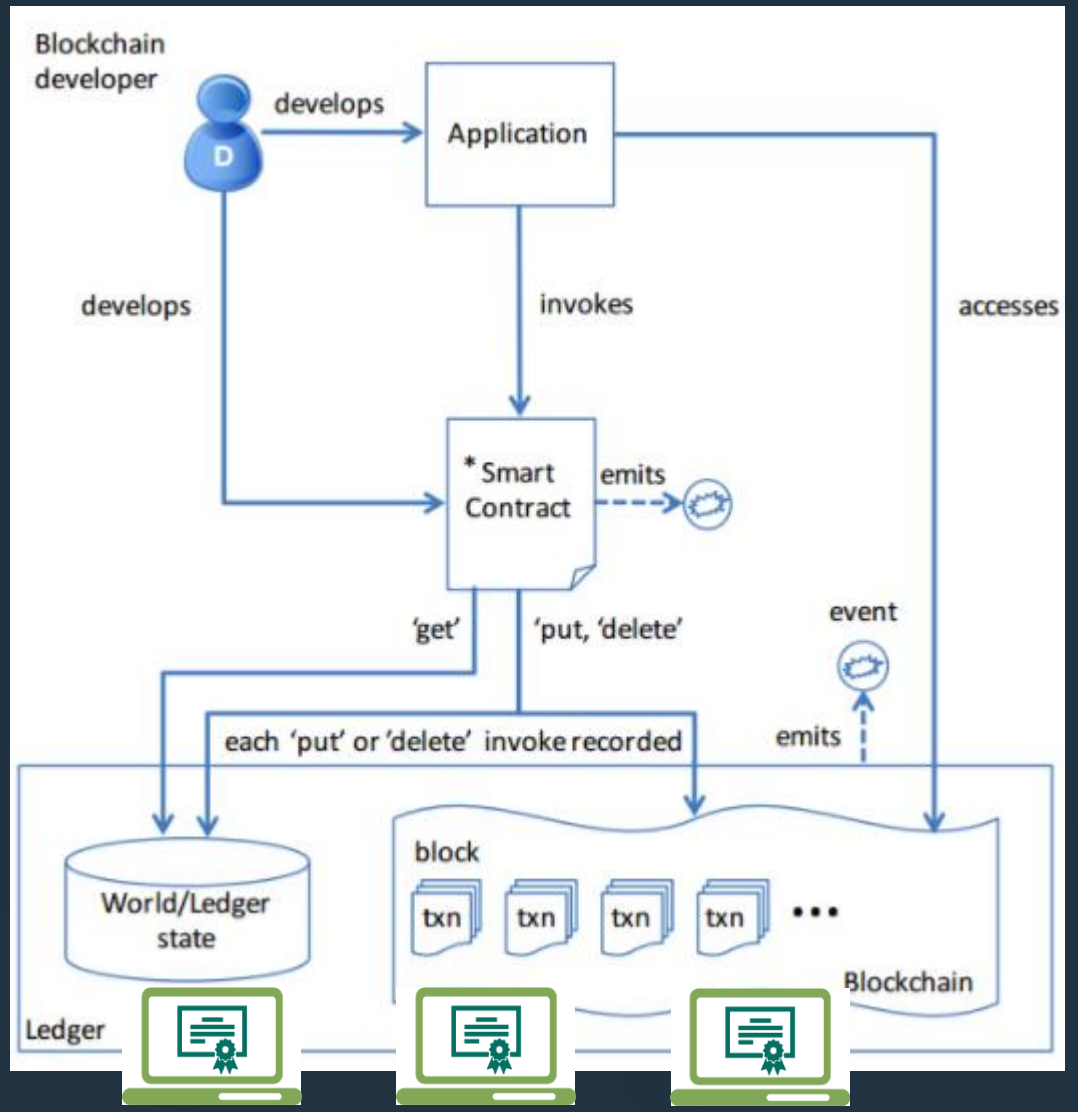
- Register users
- Invoke smart contracts to update or query data
- Consume events

Smart Contracts

- Business logic to update the ledger
- Query data
- Publish events

Blockchain Infrastructure

- Network of validating nodes
- Distributed Ledger
- Membership services (for permissioned)



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Blockchain is not an island

Making it enterprise grade, requires a platform

- Many use-cases
- Provisioning at speed
- Enterprise “ilities” are needed
- Common operations platform
- Security and SoR Integration a must

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Security and confidentiality – Not optional

Asking for permission, not for forgiveness

- Enrolling authenticity to the blockchain
- Transport level security, Encrypt messages in transit for privacy
- Encryption of data at rest
- Certificate revocation
- Fine grained authorisation
- Adaptive security control

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Integration – Real world application

Augmenting, not replacing Systems of Record

- Connecting to existing apps
- Connecting to ERP, SCM and other SoRs
- Enforcing security to the eco-system
- Connecting to other networks
- Opening to new members

Supportability – Managing long term

Getting into production and staying there without NASA

- Assembling the network
- Harden the security
- On-boarding new members
- Supporting the components and infra
- Day to day administration
- Monitoring & Troubleshooting

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Blockchain Appeal to Enterprise Customers

Data Integrity

- Consistent, timely, accurate data
- Blocks of records are tamper-evident

Ecosystem simplification

- Faster transactions in seconds and processed 24/7
- Lower transaction costs
- Greater automation

Process Integrity

- Trust the transactions
- Executed exactly as the protocol and smart contracts command
- Evaluate performance against SLAs

High Availability & Reliability

- No single point of failure
- Resilient to malicious (insider) attacks and disasters

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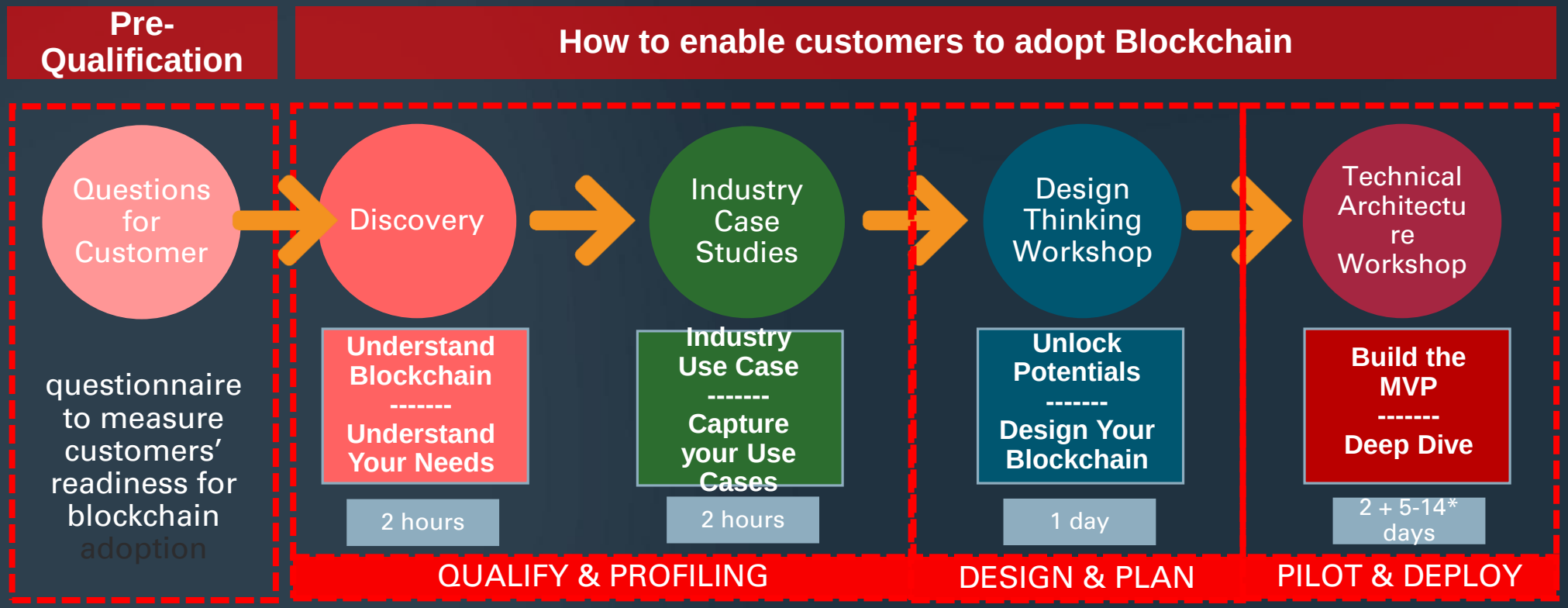
MIT Blockchain Journey



* Depends on development effort required

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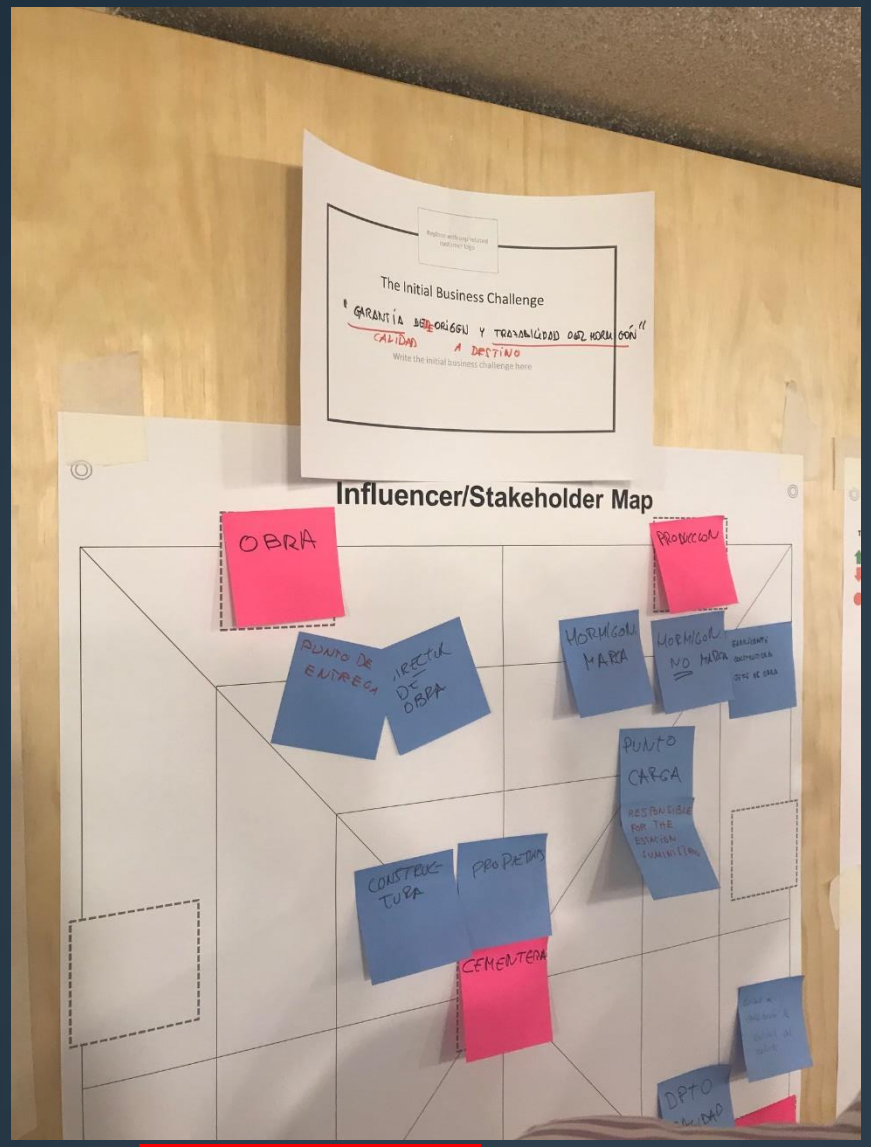
Discovery Workshop Style



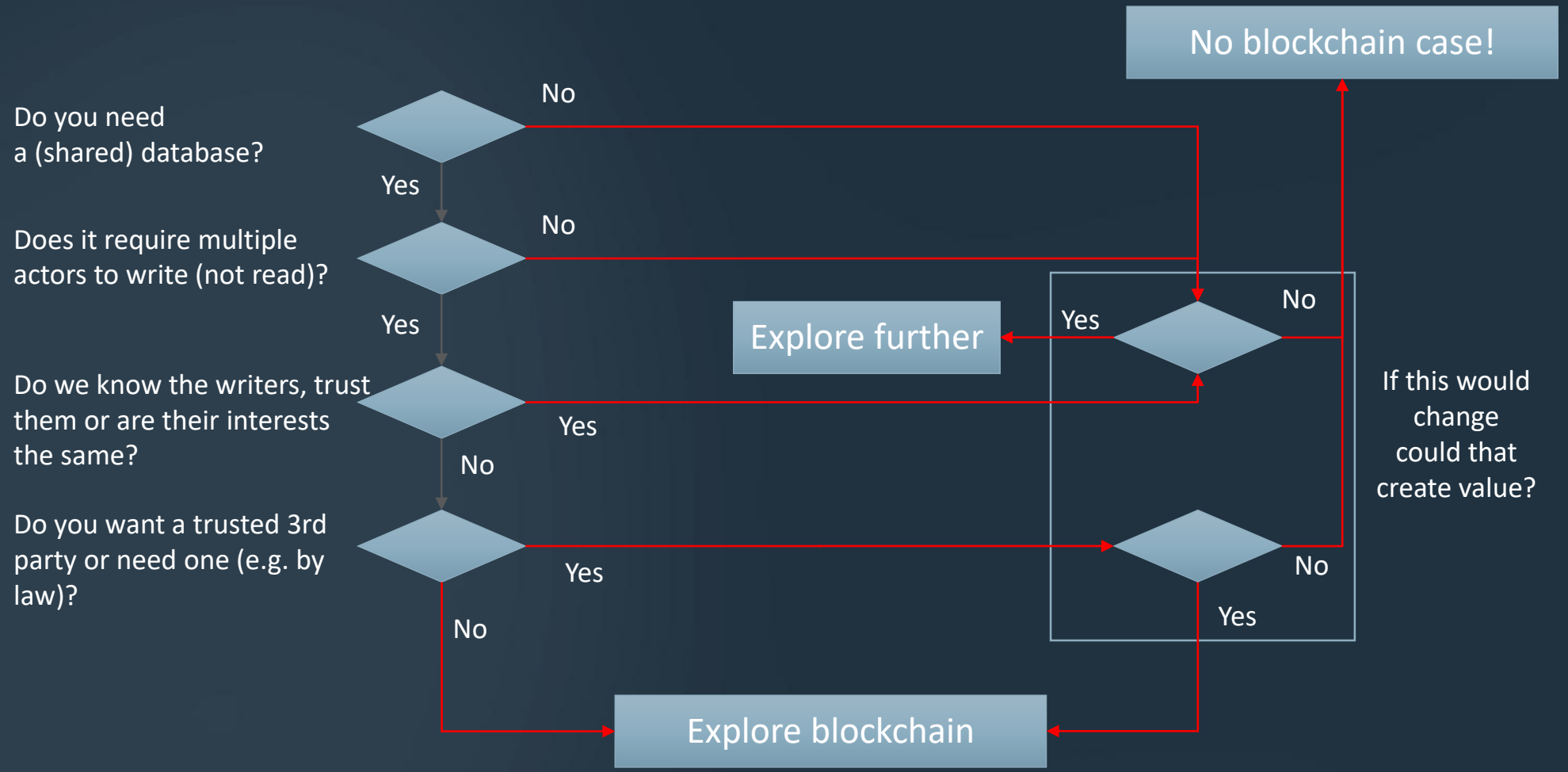
Madrid, February 2019

2 hour discovery session

15 participants

3 workgroups

When to use a blockchain



(partially based on a model by Bart Suichies 2015)

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Blockchain favorable processes

What to look for

- Critical processes that suffer from duplication and reconciliation
- Costly processes that suffer from cumbersome hand-overs, paperwork or regulation
- Inquiries that request unnecessary load on organization due to dispersed information
- Recurring inquiries on verification
- External reporting and auditing that fall short
- Processes lacking digital signatures and digital assets
- Correlated IT systems not integrated on data sharing

How to select the opportunity

- What parts of the process do you seek to eliminate, and why?
- Where do you spend most of your time, and why?
- Where in the process do you repeat work? How often, and why?
- What does your manager think happens in the process? What really happens?
- When pressed for time, what steps in the process do you skip or work around?

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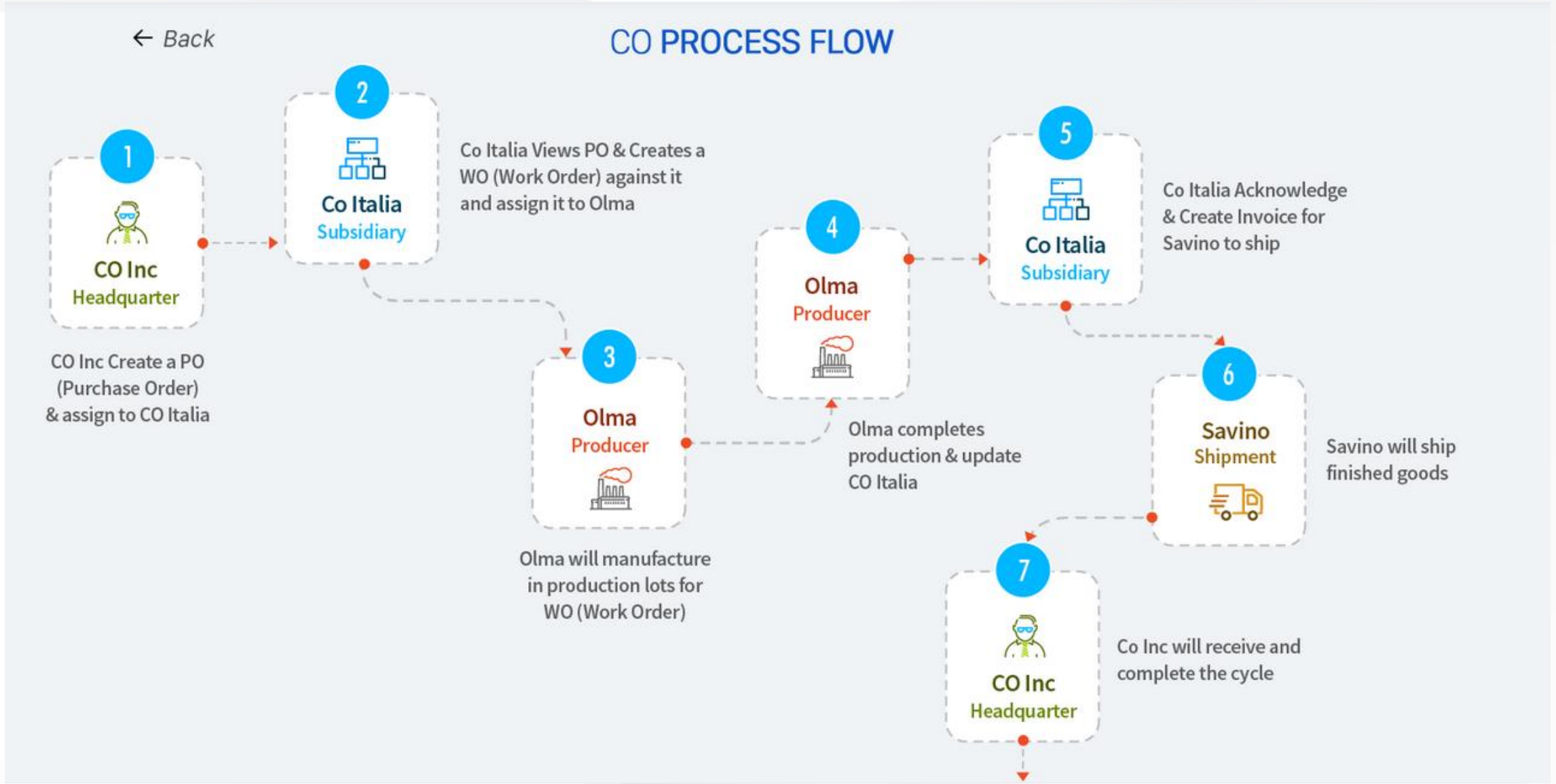

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DASHBOARD

Search

CO Italia

PURCHASE ORDER CHANNEL

CO Inc — CO Italia

PRODUCTION BATCH CHANNEL

Olma — CO Italia

SHIPMENT CHANNEL

CO Inc — CO Italia — Savino

ORDER DETAILS

P. O. Number	Item	Status	Action
1111	Olive Oil	PO_Completed	
11118943	Olive Oil	PO_Completed	
1112	Olive Oil	PO_Assigned	View
121121	Olive Oil	PO_WO_Created	

WORK ORDER DETAILS

W. O. Number	Manufacturer	Status	Action
121121	Olma	WO_Production_s...	
2321	Olma	WO_Completeion...	Create Invoice
23423323	Olma	WO_Completed	
121121	Olma	WO_Production_s...	

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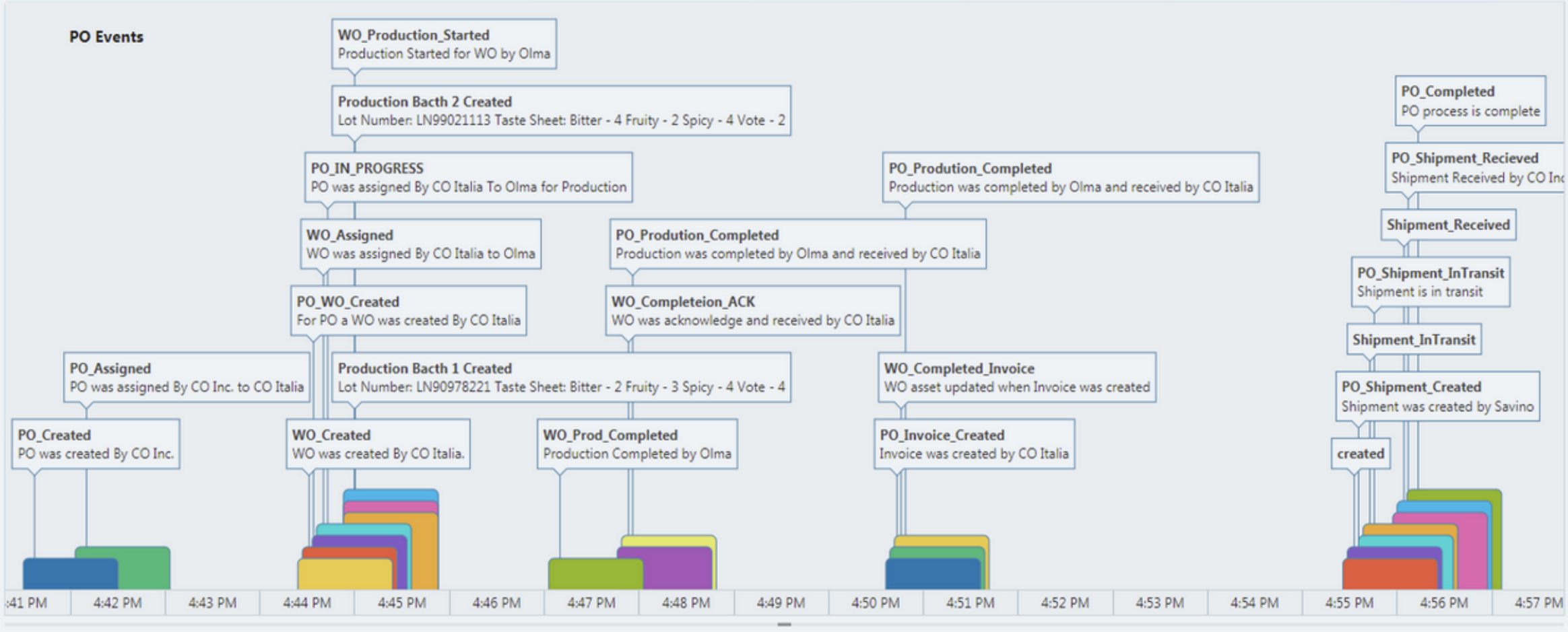
DASHBOARD

1112

CO Inc

P O Number "1112"



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Oracle Blockchain Platform

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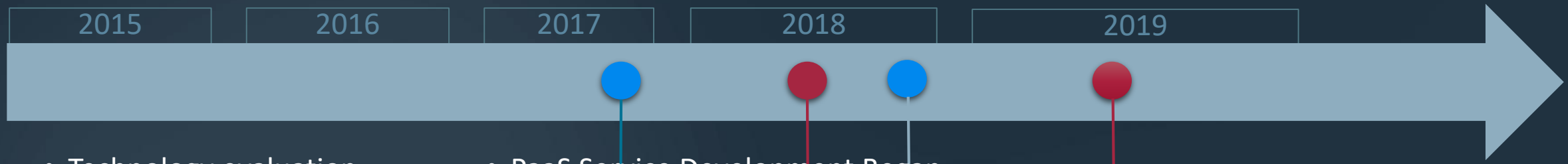
History of Oracle Blockchain Efforts



- Technology evaluation
- Customer discovery
  - Use case analysis
  - Market analysis

- PaaS Service Development Began
- Joined Hyperledger
- Announced OBP at OOW
- Started Early Access Program
- Began Beta Program
- **GA Release of Oracle Blockchain Platform (OBP)**
- Production Customers on OBP
- Announced SaaS Apps on top of OBP
- **Releasing first SaaS Application on OBP**
- Doubling number of Data Centers & Releasing OBP On-Premise

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Oracle’s Approach

1

Adopt a Permissioned Blockchain offering

Member of the Open Source Hyperledger Fabric consortium
Secure, Integrated, high adoption rate

Why Hyperledger Fabric?

Open Source

Compatibility with others, larger expert community

Permissioned

Much more efficient, higher transaction rates possible

Modular

Oracle can bring key modules to enterprise grade, higher transaction rates possible, smart contracts

Channels

Intelligent protection of competitive data in same blockchain

No Cryptocurrency required

Much easier design, administration of processes

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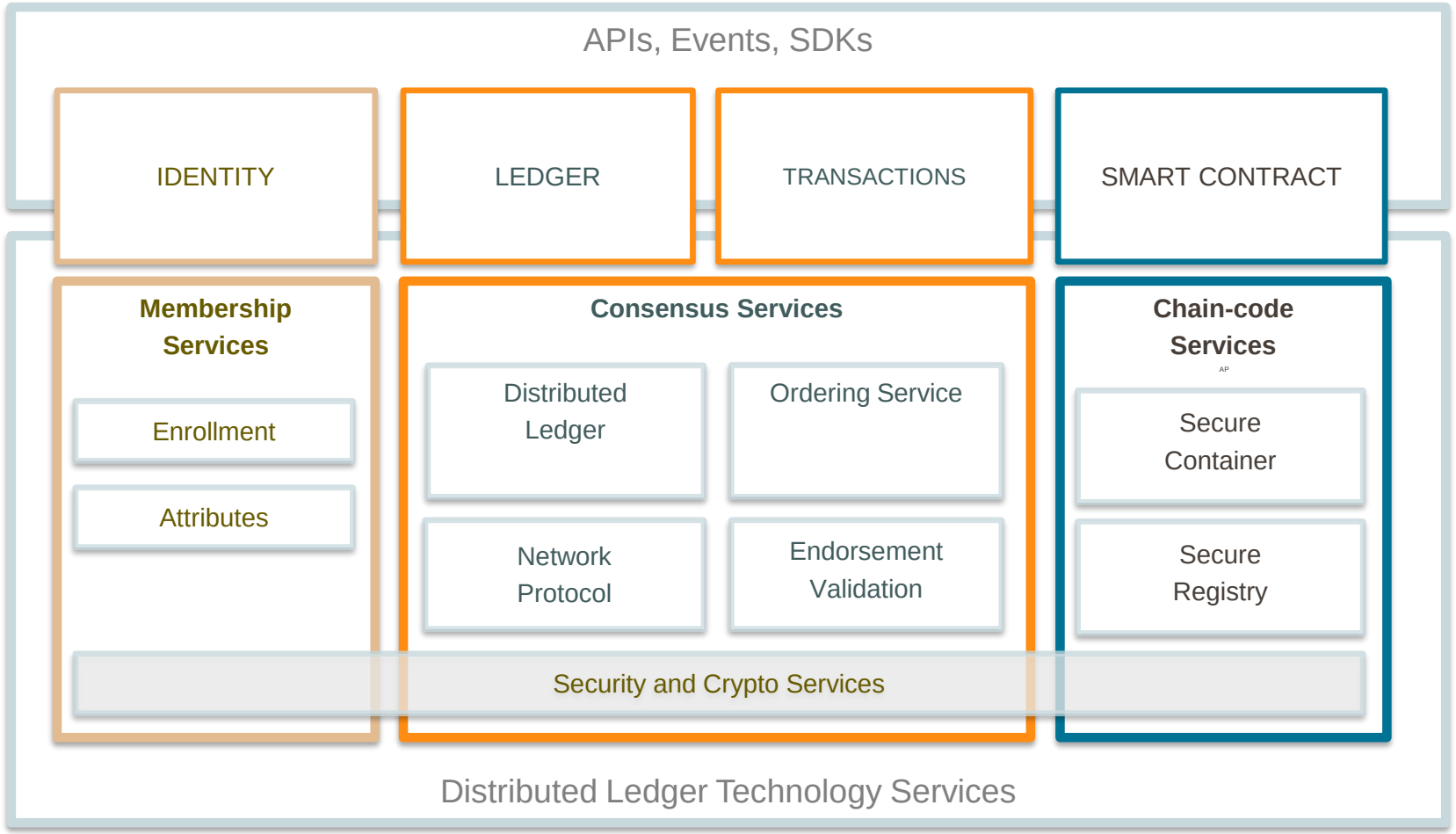
Hyperledger Fabric Reference Architecture



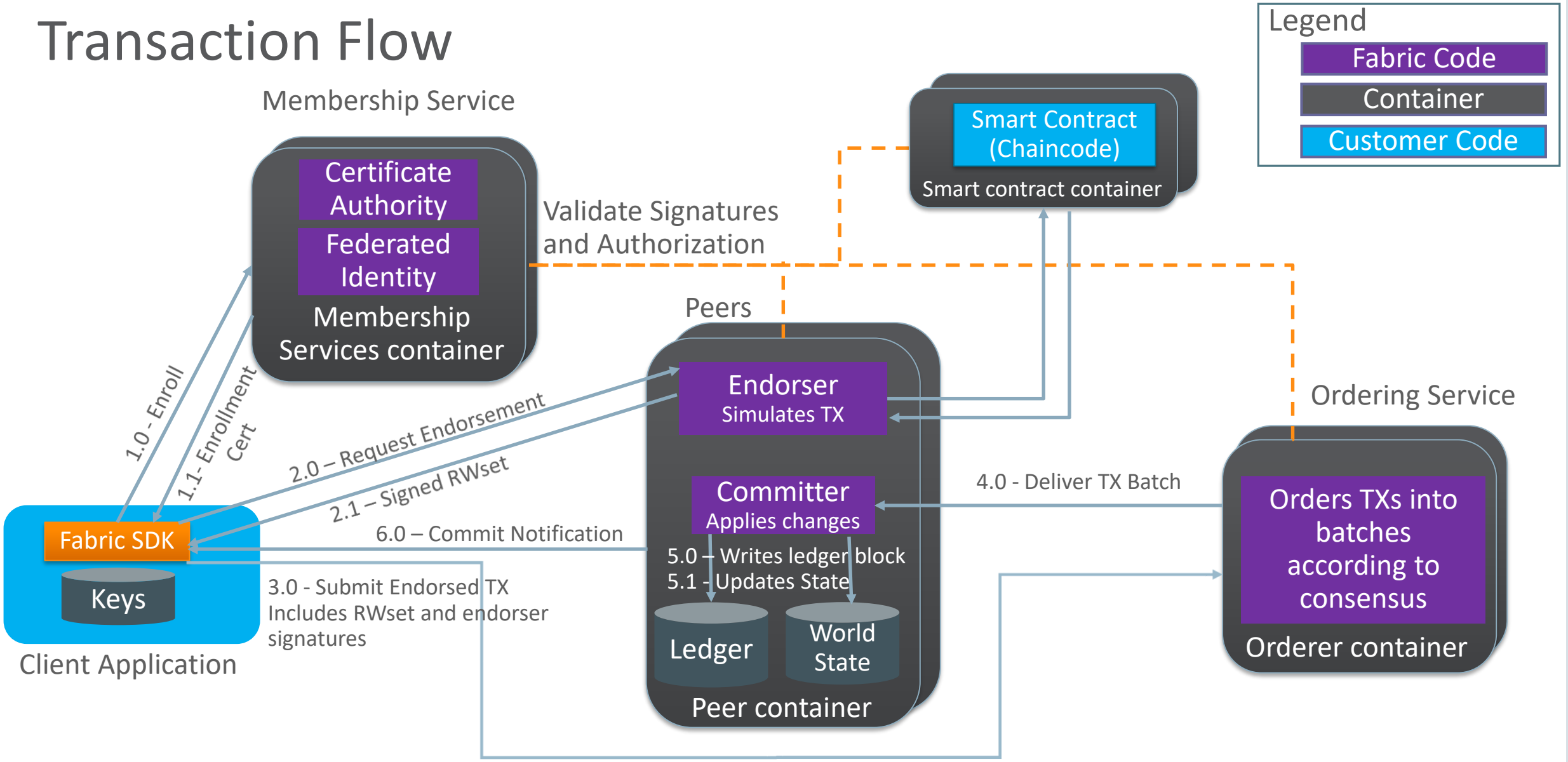
IDENTITY
Pluggable, Membership, Privacy and Auditability of transactions.

LEDGER | TRANSACTIONS
Distributed transactional ledger whose state is updated by consensus of stakeholders

SMART-CONTRACT
“Programmable Ledger”, provide ability to run business logic against the blockchain (aka smart contract)

APIs, Events, SDKs
Multi-language native SDKs allow developers to write DLT apps

Transaction Flow



Oracle's Approach

1

Adopt a Permissioned Blockchain offering

Member of the Open Source Hyperledger Fabric consortium
Secure, Integrated, high adoption rate

2

Make it (really) Enterprise-Ready

Built-in monitoring, IdM, Database optimizations, REST APIs, SDK, Integrations, a modern UI

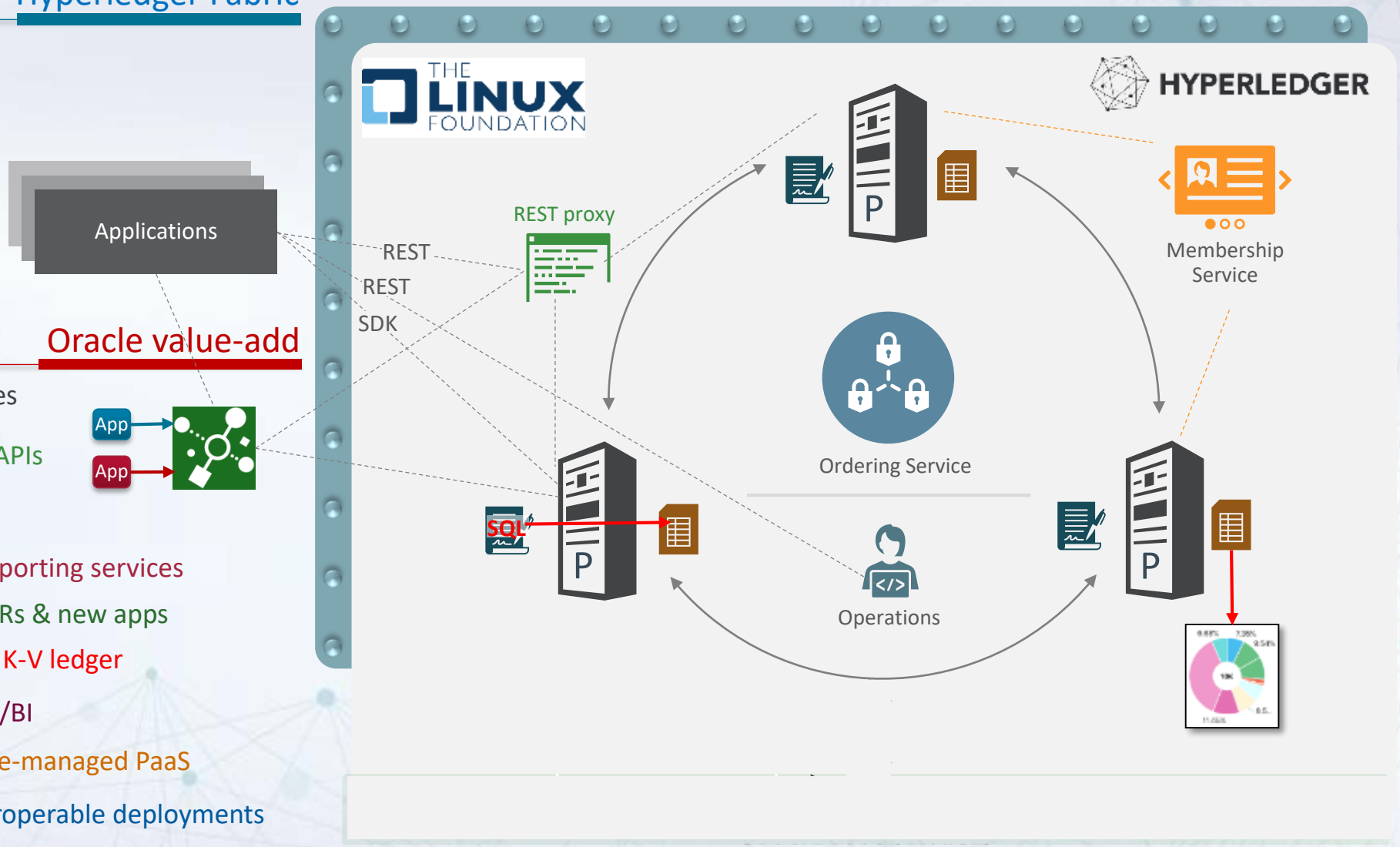
Comprehensive Blockchain Platform

Hyperledger Fabric

- Validating Nodes/ Peers
- Distributed Ledger (Single Version of Truth)
- Smart Contracts (aka Chaincode)
- Ordering Service
- Membership Service

Oracle value-add

- Pre-assembled Dependencies
- REST Proxy and Operations APIs
- Admin/Operations Console
- Integrated backplane of supporting services
- Rich integration tools for SORs & new apps
- SQL-based rich queries over K-V ledger
- Rich history DB for Analytics/BI
- Automated DevOps in Oracle-managed PaaS
- Flexible, global, hybrid, interoperable deployments



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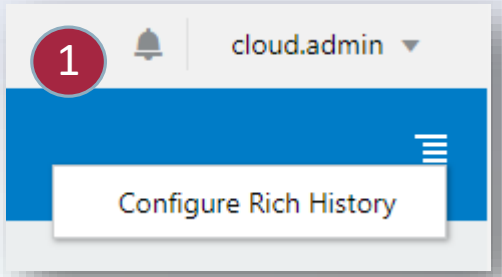
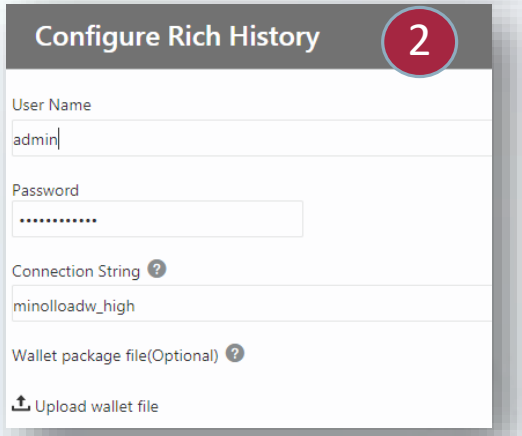
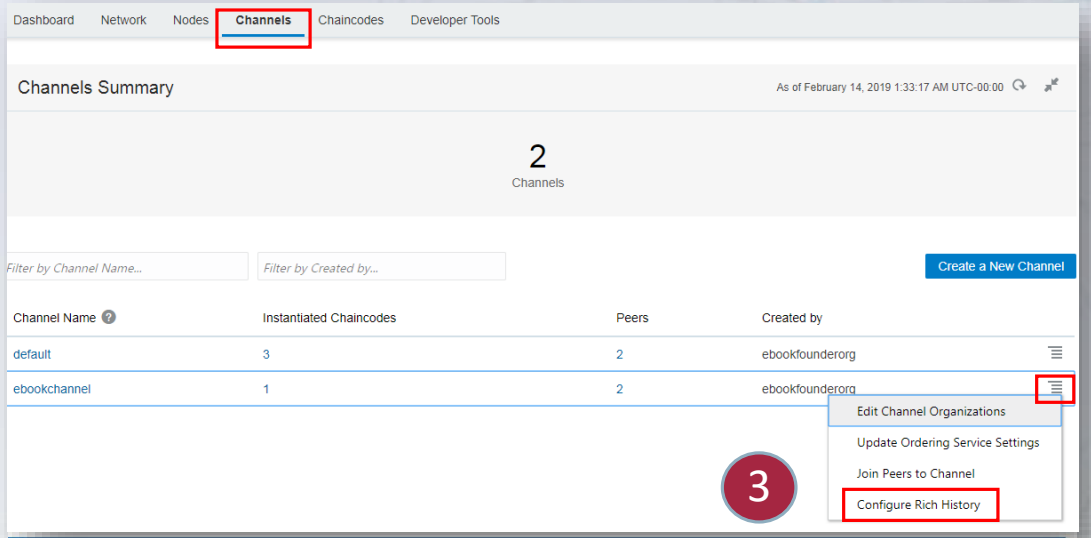
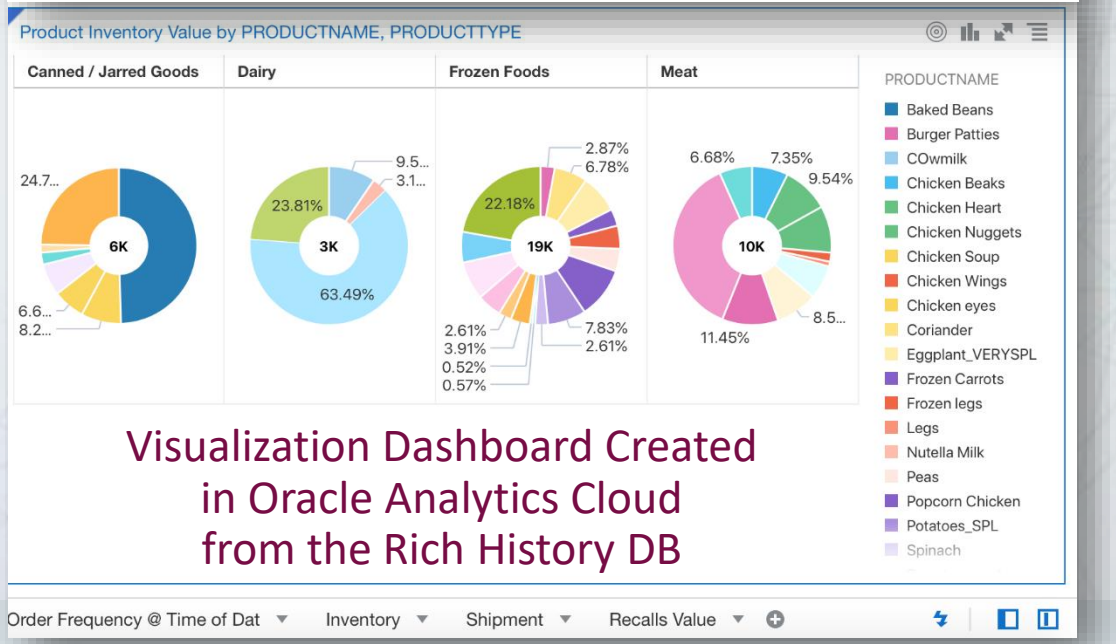
Rich History DB for Analytics Integration

- Parallel with regular history DB updates, we asynchronously update Oracle ADW/DBaaS for every transaction commit
- DB maintains rich data model using Oracle JSON support (can be unpacked in OAC project)
- Accessible for Analytics / BI / DWH reporting, interactive visualization dashboards, etc.
- Can be used for transaction confirmations and high volume read-only access when async delay is not critical









Visualization Dashboard Created in Oracle Analytics Cloud from the Rich History DB

Oracle's Approach

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2

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3

Offer it as a Service (Autonomous PaaS)

Rapid, global provisioning & simplified operations, High Availability, autonomous recovery

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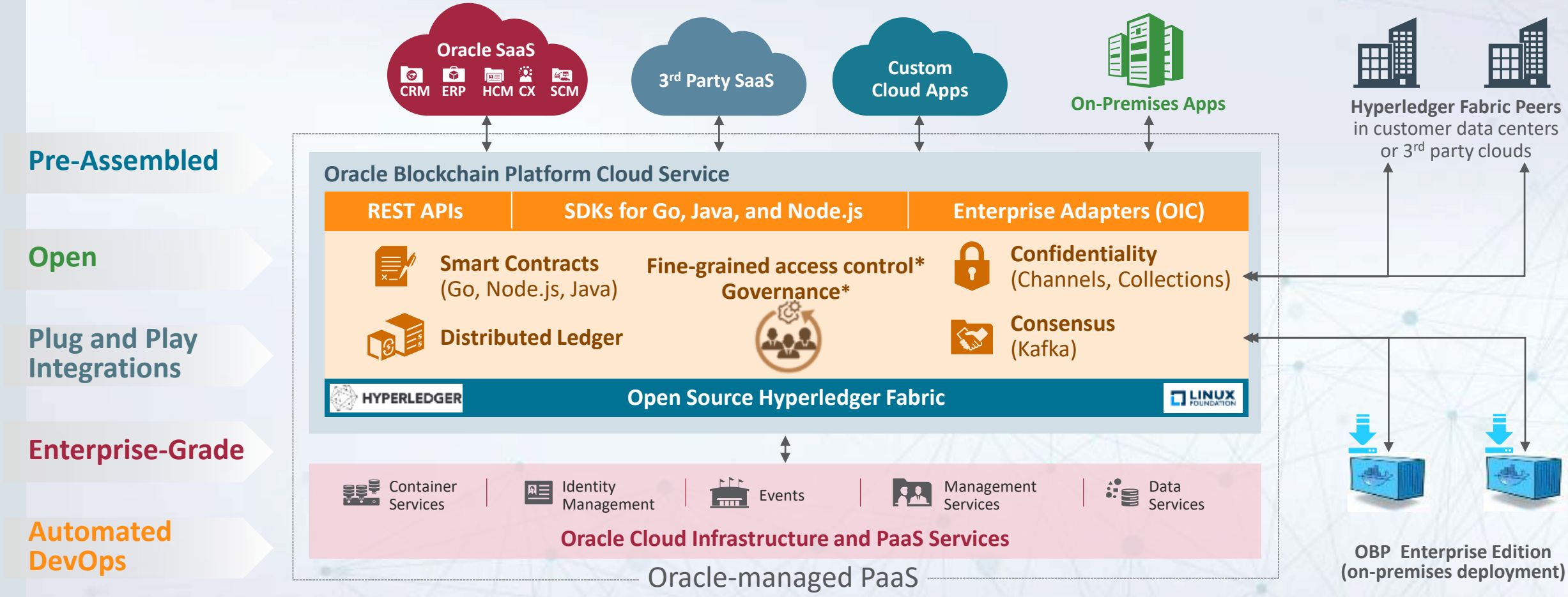
Oracle Blockchain Platform

Hardened for enterprise applications



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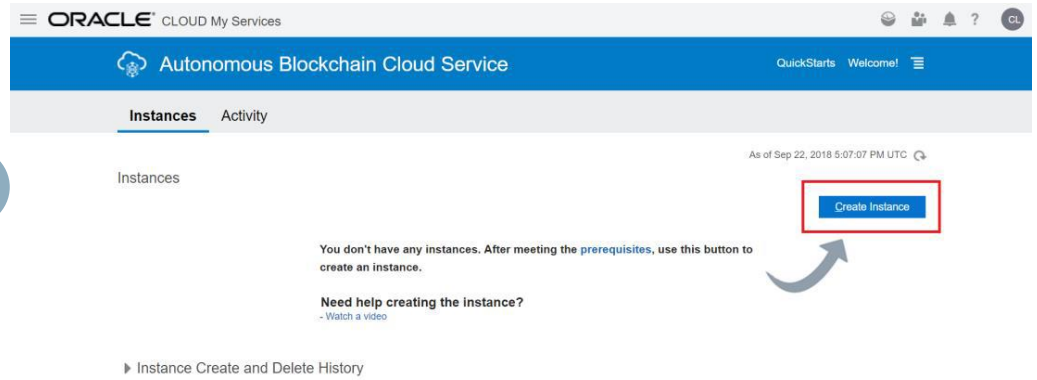
Setting up a network in minutes not days…or weeks

1



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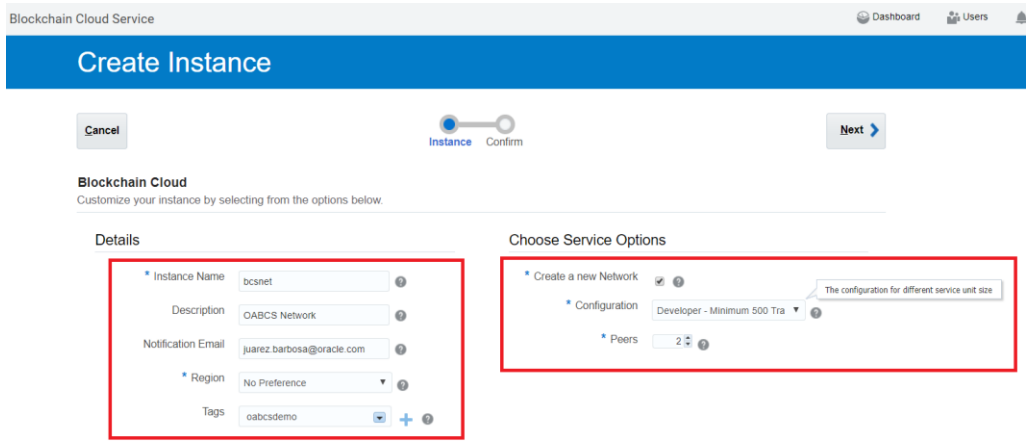

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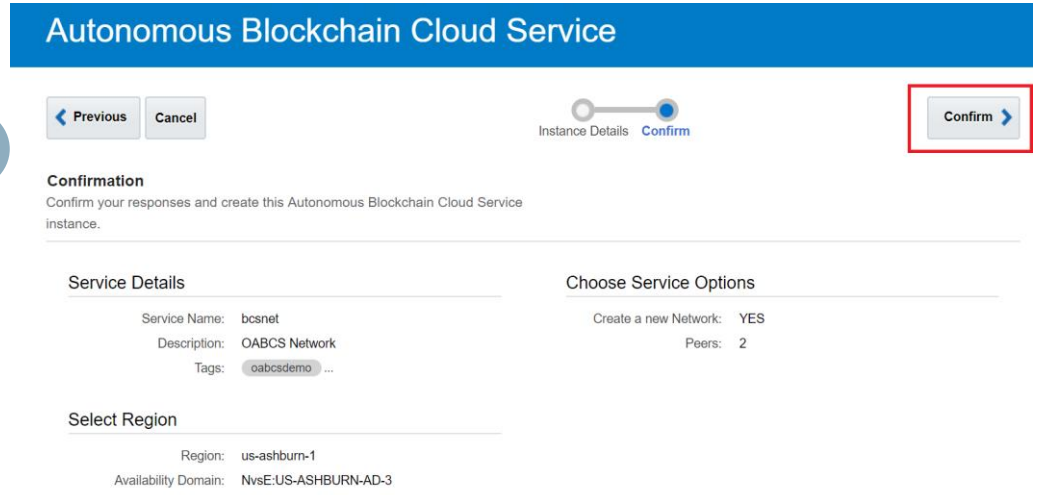

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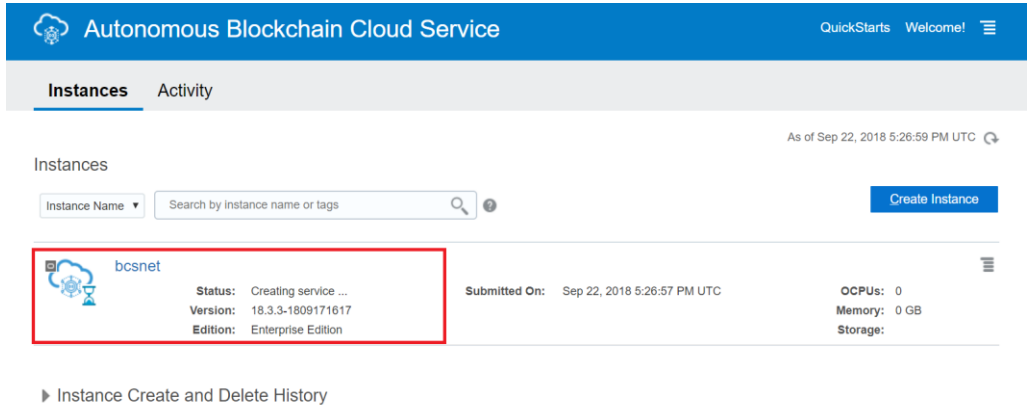
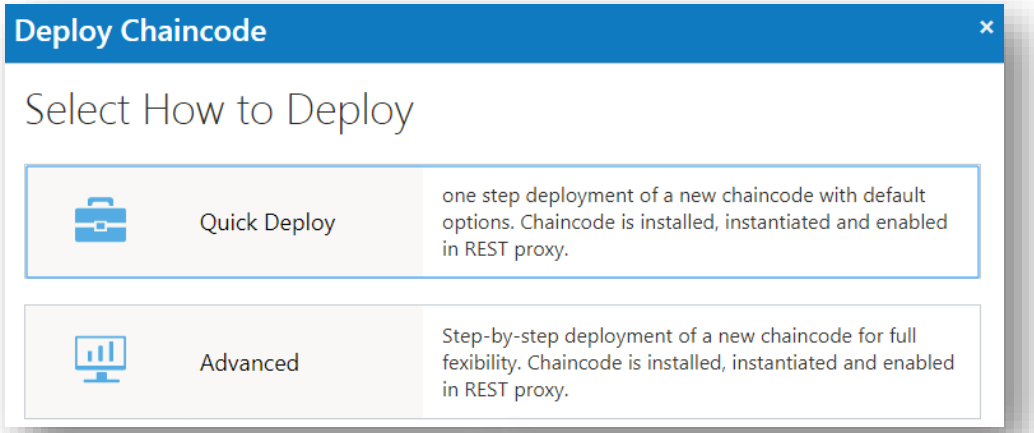
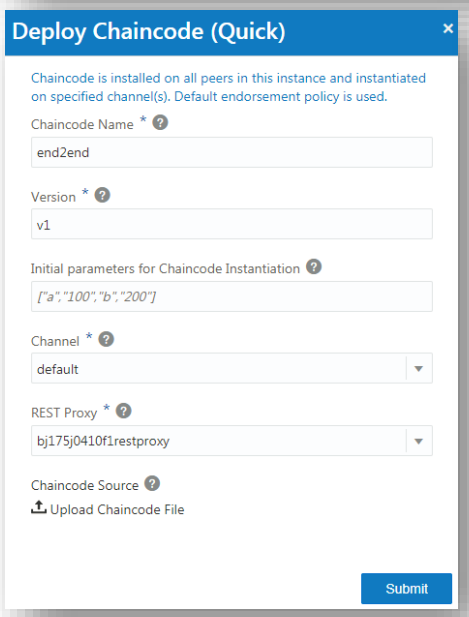
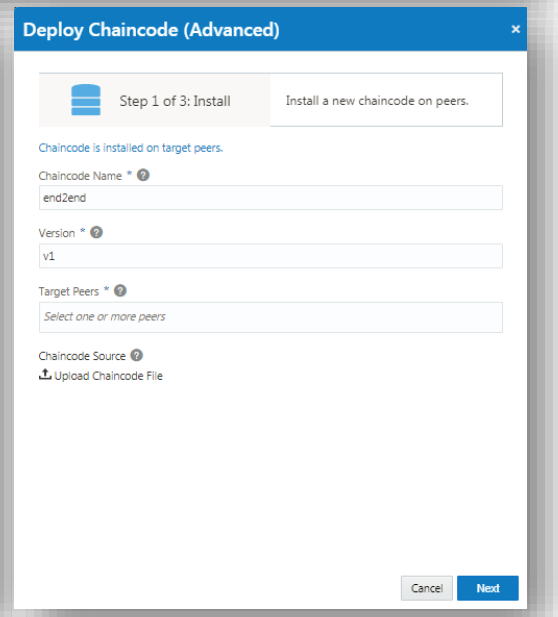


Automated Lifecycle of Smart Contracts

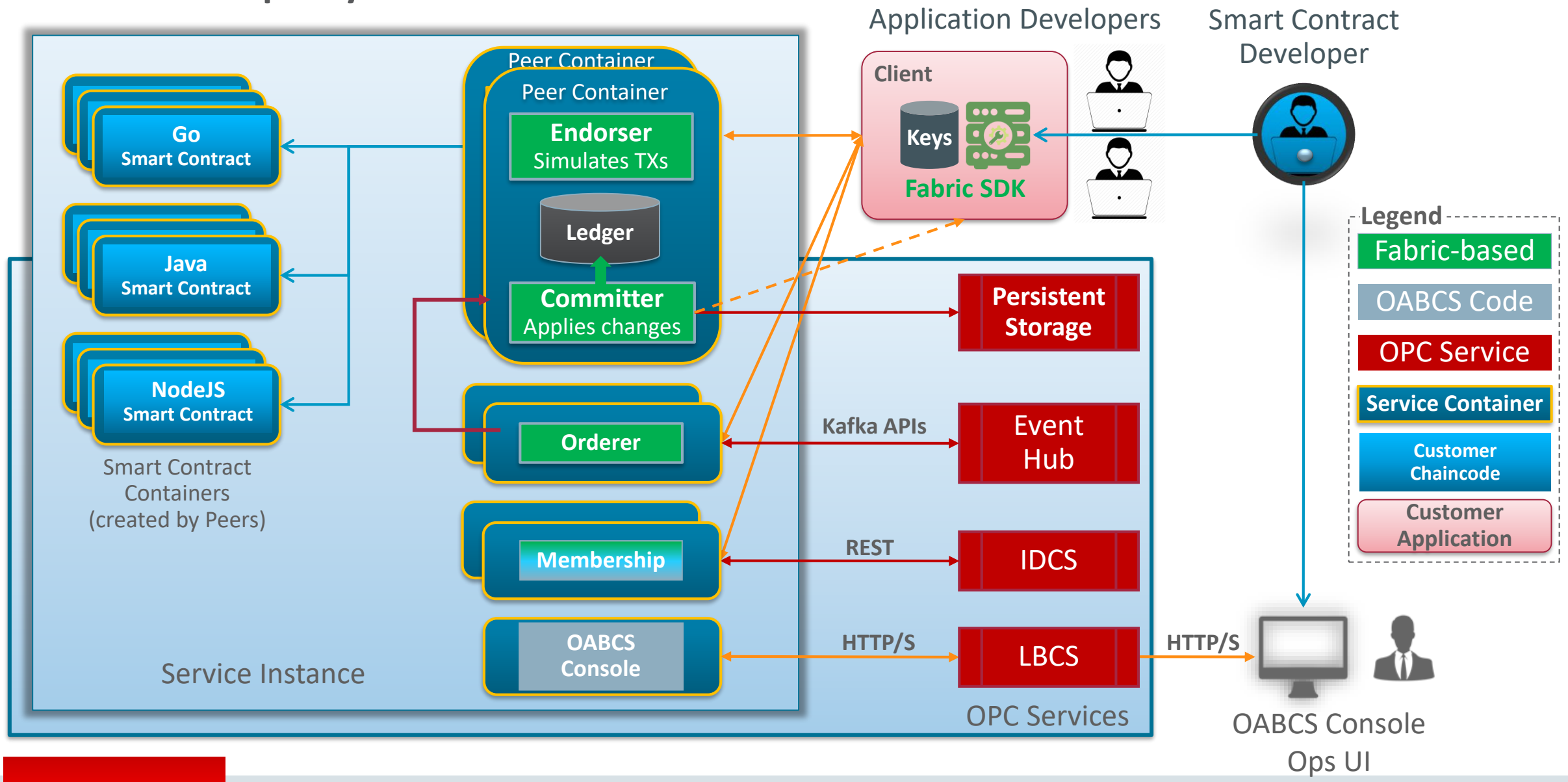
- Package – create a zip pkg of the source directory on the development side
- Install
  - Copies source package to requested peers
  - Creates deployment spec
- Instantiate
  - Builds (compile/link) the GO code, creating a binary
  - Binds it to a channel
  - Creates execution container and load the binary
  - Runs Init method in the chaincode, which can create new data values in the ledger
- Export REST end point for deployed chaincode
- Invoke transactions from client SDK or REST proxy
  - Calls Invoke method in the chaincode, which can run functions that update or query the ledger
- Upgrade – select existing chaincode on a channel, provide new version
  - Install & instantiate steps are automatic







OABCS Deployment Architecture

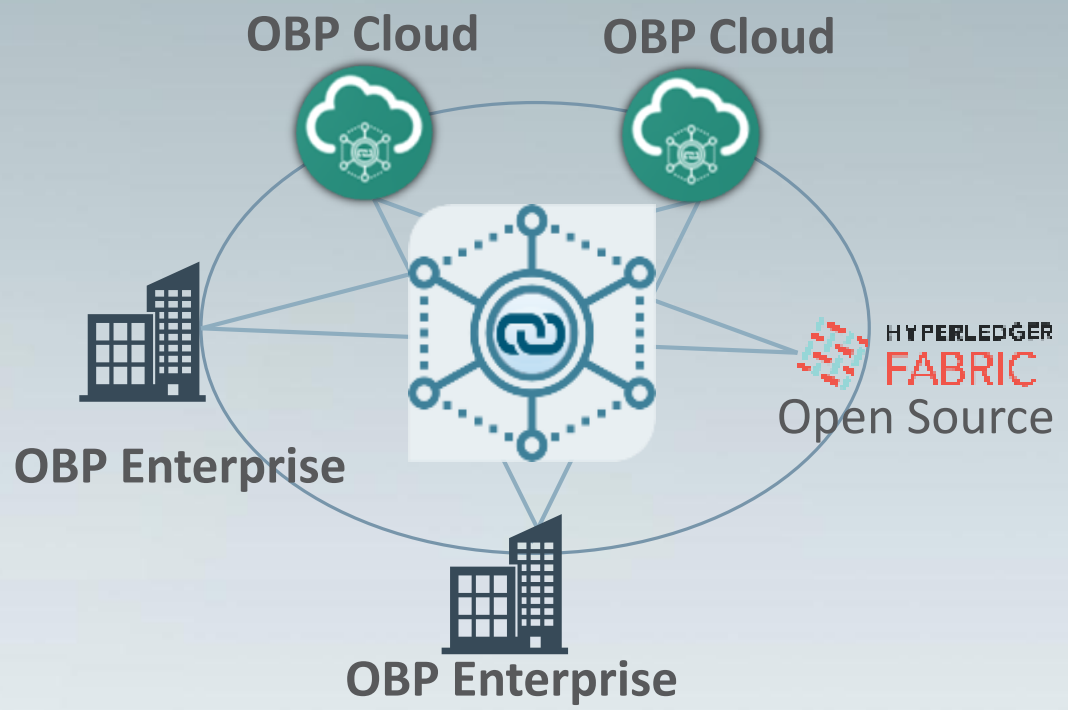


Oracle Blockchain Platform
Enterprise Edition 19.3

On-premise blockchain solution for customers who must meet data sovereignty or data residency regulations

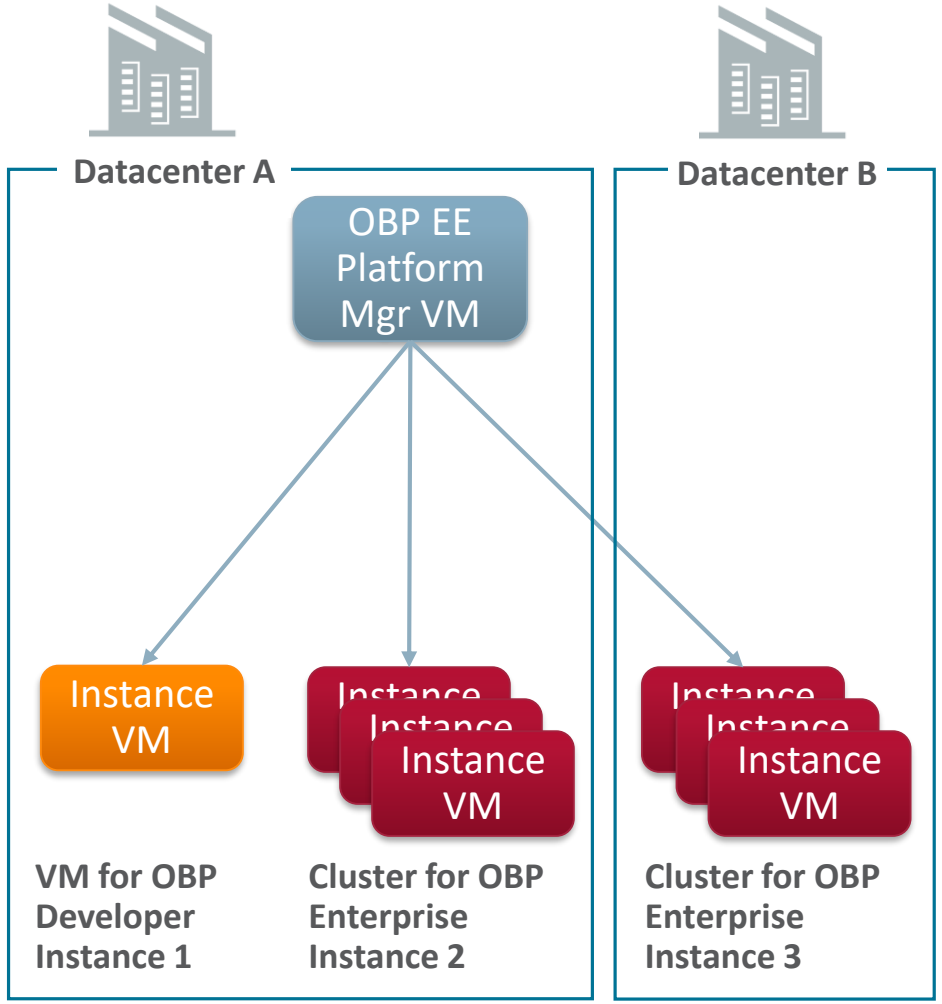
- Deploy Oracle Blockchain in your data center
  - Choice of virtualization platforms
  - Enterprise-grade with HA and Dynamic Scalability
- Create Blockchain network with a few clicks
  - Fully pre-assembled with Hyperledger Fabric 1.4, Blockchain Platform Manager, Operations Console, REST Proxy, Identity Management
- Feature parity with Blockchain Cloud
  - Same APIs & portability of applications
- Support for hybrid networks
  - Oracle Cloud, On-Premise, 3rd party Blockchains using Hyperledger Fabric

Available	Planned
Toronto	Mumbai
Seoul	Zurich
Tokyo	Sao Paolo
London	Sydney
Phoenix, AZ	Jeddah
Frankfurt	Osaka
Ashburn, VA	



Deploying OBP Enterprise Edition

- Virtualization Options
  - Oracle VirtualBox 5.x or 6.0+
  - Oracle Linux Virtualization Manager 4.2.8.2-1.0.8.el7
  - VMware vSphere ESXi 6.7+
- Deployment Shapes
  - Developer: 1 Kafka orderer and single VM deployment topology
  - Enterprise: 3 Kafka orderers and 3+ VM deployment topology
- Cluster Configuration for Enterprise
  - 3+ VMs for Platform Components
  - 1+ VM for Chaincode
  - 3+ VMs for ZK/Kafka



Oracle's Approach

1

Adopt a Permissioned Blockchain offering

Member of the Open Source Hyperledger Fabric consortium
Secure, Integrated, high adoption rate

2

Make it (really) Enterprise-Ready

Built-in monitoring, IdM, Database optimizations, REST APIs, SDK, Integrations, a modern UI

3

Offer it as a Service (Autonomous PaaS)

Rapid, global provisioning & simplified operations, High Availability, autonomous recovery

4

Connect with Applications

Out-of-the-box API access in Netsuite ERP, Flexcube core banking

Plug-n-Play integration with Oracle SaaS and PaaS and custom/3rd party cloud and on premises apps

Templates for supply chain track & trace use cases and more

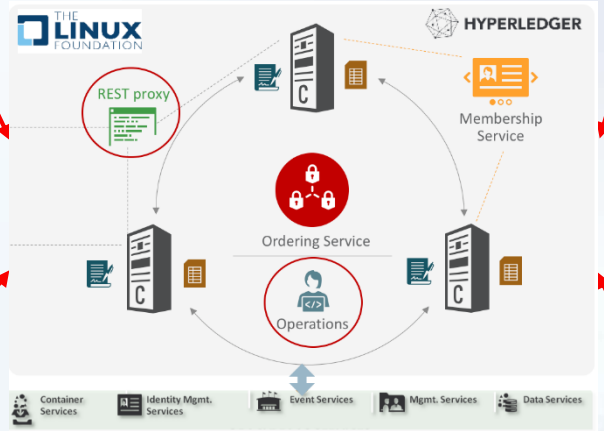
Ease of Integration and Systems of Record Connectivity

REST API-DRIVEN INTEGRATION

- Invoke txn's in sync & async mode
- Get txn status
- Register event callback URL
- Query ledger data
- Provisioning API
- *Operations/Configuration APIs*

JAVA, GO, AND NODE.JS CLIENT SDKS

- Invoke txn's asynchronously
- Get txn status
- Query ledger data
- Subscribe to events
- Add channels/peers
- Enroll new members



Apps Apps

ORACLE INTEGRATION CLOUD

- Adapters for Oracle & 3rd party applications in cloud and on-prem: ERP, SCM, CX, HCM…
- Technology adapters (MFT, JMS…)
- Turn application events into REST calls to run blockchain transactions

NEW SAAS BLOCKCHAIN APPLICATIONS

- Supply chain track & trace use cases and more
- Oracle GBU applications in selected industries

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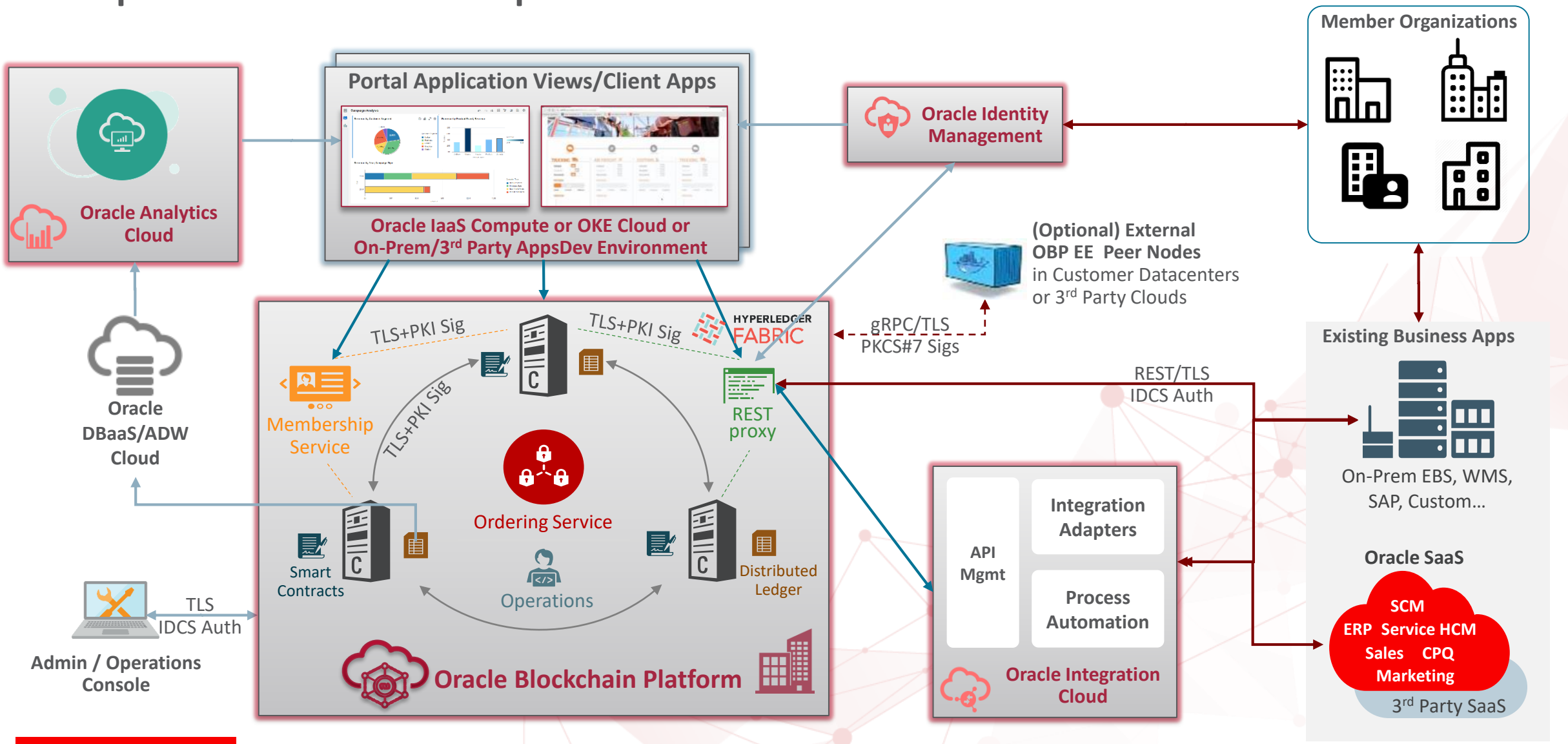
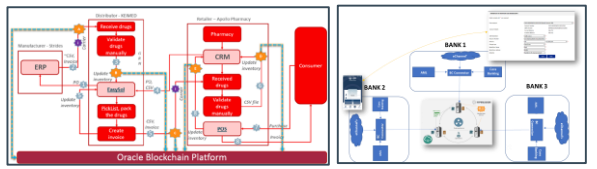
Comprehensive Sample Solution Architecture



Oracle and Partner Ecosystem Investments

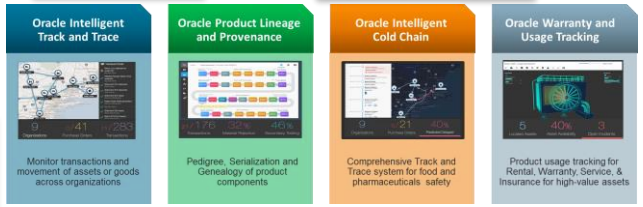


Custom Applications

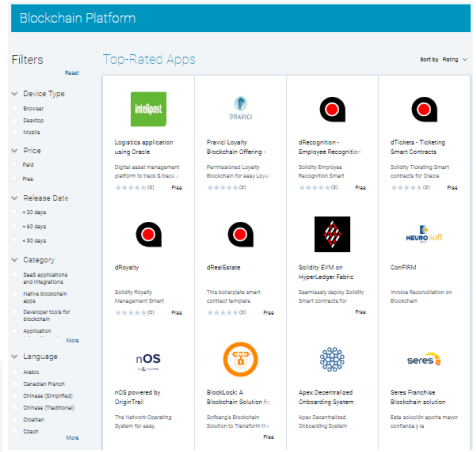
accenture pwc KPMG LTI Deloitte. Infosys

SI Solution Accelerators

ERP Retail Health Sciences Transit



Oracle SaaS
SCM Blockchain Apps Cloud
Vertical GBU Apps



ISV Applications

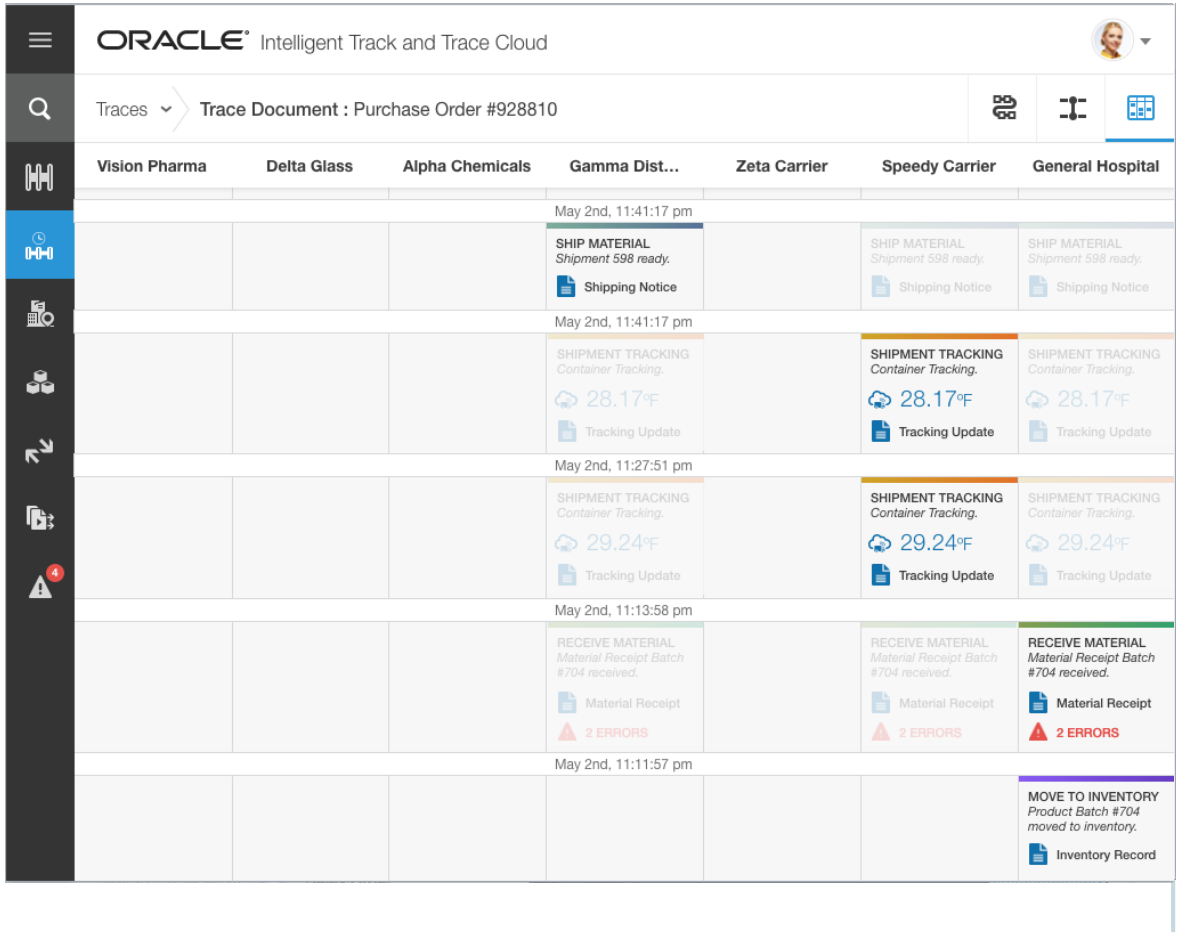
Consensus **Smart Contracts** **Oracle Blockchain Platform** **Distributed Ledger** **Confidentiality**

App Integrations | Data Repository | Off-chain Synch | DevOps | Governance | Access Control | Interoperability

Oracle Cloud Infrastructure

On-Premise Deployment

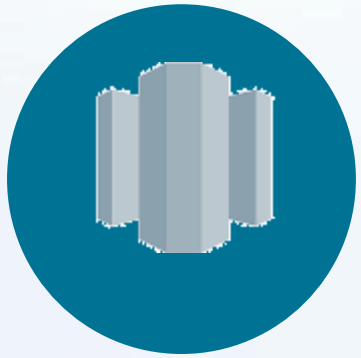
Tracing



- Trace based on a document
- Composite trace view for
  - Timeline
  - Transaction and document details
  - Location of associated assets at a given point in time
  - Associated IoT events
- Swimlane view

Delivering **Enterprise Grade** Capabilities

Performance at Scale
Parallel execution
Elastic scale-out
Much faster world-state DB
Auto-tuning and dynamic scaling



Operational Resilience
High availability VMs
Autonomous recovery agents
Continuous backup to object store
Multi-AD and multi-region DR

Security & Confidentiality
Integrated identity management
Identity federation
Data encryption at-rest
Certificate revocation management
Fine-grained access control mechanism

Supportability & Operations
Cloud and on-premise deployments
Dynamic configuration
Monitoring dashboards
Zero-downtime managed patching
Multi-datacenter deployments
Governance for consortia

Development & Integration
SQL-based rich queries
Synchronous & async REST APIs
Java, GO, and Node.js SDKs
Enterprise App Adapters
Rich queries for history DB
Analytics integration
Data modeler, IDE, Java chaincode
Dev mode testing with cloud Peer

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Italics – planned enhancements

Oracle Blockchain Momentum – sample public cases

Securely, reliably extend business processes and accelerate B2B transactions

CG & MF SUPPLY CHAIN

- certifiedorigins — Extra Virgin Olive Oil provenance
- circulor — Commodity & Minerals Tracing
- everledger
- VOLVO — Responsible Sourcing
- retraced — Sustainable Fashion
- ALPHA ACID BREWING — Beer production provenance
- ICBF.com — Farm-to-Fork
- Infosys Navigate your next — Palm Oil Provenance

FINANCIAL SERVICES

- AJIB — Funds Transfer
- norbloc — KYC made easy
- kompany — Register Information
- eMcREY — PoS On-boarding
- Trasion (Borderless for the People Frictionless for the Banks) — Serving underbanked and unbanked
- Standard Chartered — Securities service
- BERETTA — Gun identification

LOGISTICS

- NIGERIA CUSTOMS SERVICE (NCS) — Excise Licensing and Taxes
- seres — Franchise doc exchange
- intelipost — Logistics/TMS
- CargoSmart GSBN — Maritime shipping documentation

FINANCE SUPPLY CHAIN

- GE — Intercompany Billing
- oman — Invoice Reconciliation
- NEUROsoft — Invoice Factoring

HEALTH CARE

- HEALTHSYNC — Remote Patient Monitoring
- नीति आयोग, Apollo HOSPITALS, Strides — Drug Counterfeit

E-COMMERCE

- M M2O — Multi-brand loyalty
- DECATHLON — Tokenized Loyalty Points
- PRAVICI

EDUCATION & RESEARCH

- وادي طيبة TAIBAH VALLEY — University Grade certificates
- 正保远程教育 CDEL — Training record certificates

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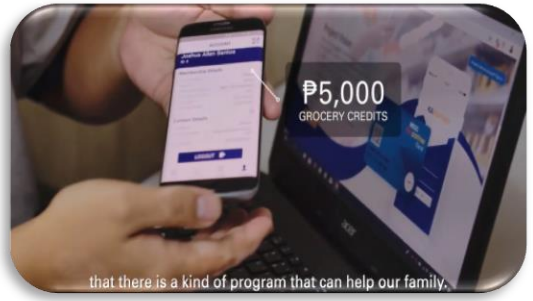
Video testimonials

Certified Origins

CargoSmart

Arab Jordan Investment Bank



Traxion

Everledger

HealthSynch

Seres

eSentri

Alpha Acid Brewery

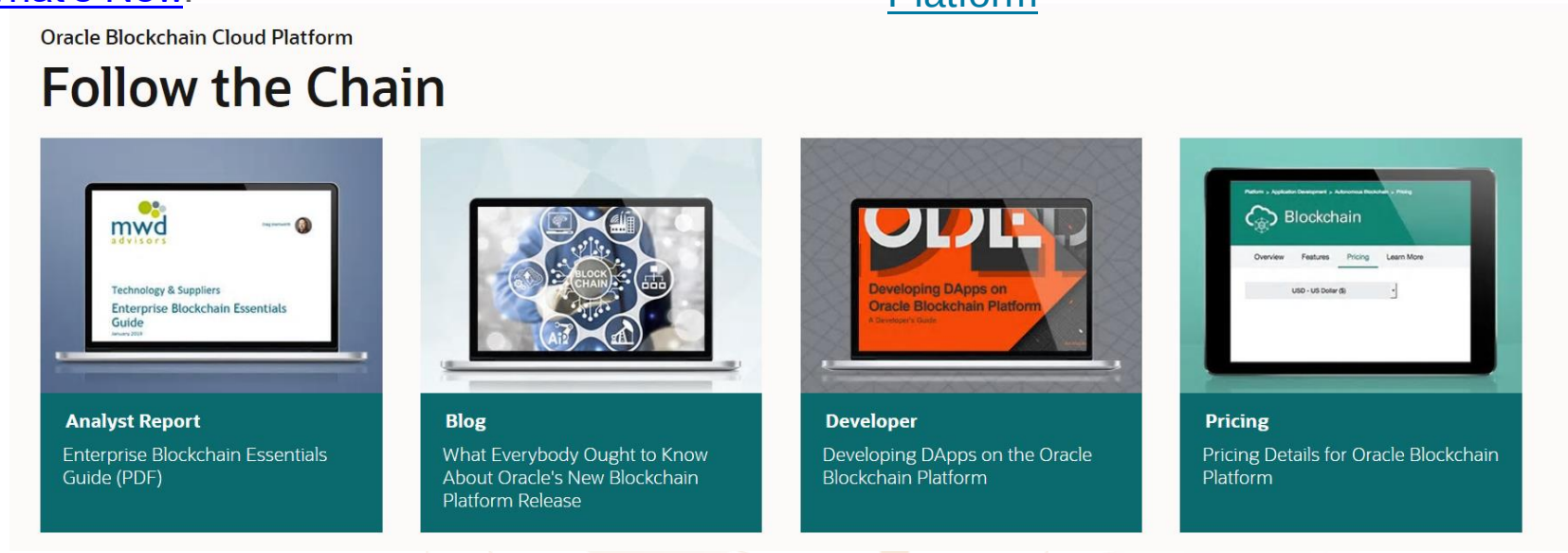
Taibah Valley

Palm Oil - Infosys

Getting Started….and delivering the promise

- **Oracle's Blockchain Specifics [All]**
- Generic Blockchain positioning: https://www.oracle.com/cloud/blockchain/
- Blockchain Platform Cloud Service positioning: https://cloud.oracle.com/en_US/blockchain
- OBP 19.2.3 release (based on Hyperledger Fabric 1.4.1). See What's New.

- **Oracle's Blockchain Specifics [Developers, Administrators, Architects]**
- https://www.oracle.com/webfolder/s/assets/ebook/developing-dapps-oracle-blockchain/index.html
- https://developer.oracle.com/blockchain/
- Developing Smart Contracts in Oracle Blockchain Platform



Oracle Blockchain Makes Blockchain Easy

Easy-to-Deploy: Production Ready

Pre-assembled: automatic provisioning of network and infrastructure resources

Easy-to-Integrate

APIs and SDKs to integrate with All applications

Easy-to-Control Access

Identity management and granular access controls

Easy-to-Monitor and Manage

Admin console for management, Hyperledger Fabric technology for interoperability

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