



Corporate Overview

Blockchain with Smart Contracts: Enterprise Use Cases and Guidelines

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TIBCO **Connected Intelligence** unlocks the value of real-time data, creating a strategic, competitive asset for smarter, faster decision making.

Blockchain with Smart Contracts

Enterprise Use Cases and Guidelines

Enterprise Drivers Behind Blockchain

Highly Connected Interactions

- New business models and processes are needed to cope with a world that is increasingly connected and blended.

Decentralized Business Networks

- There is a need to automate business transactions via contracts across network participants in an efficient and cost-effective manner.
- The old “B2B exchanges” and third parties reduce speed & agility.

Need for Integrity, Security, & Visibility

- Transactions must be conducted openly and securely, with full integrity.
- Many business transactions require an tamper resistant, agreed-upon log.

Lots of Enterprise Use Cases



Product Provenance

Perishables, valuables (art, jewelry), packages, containers, equipment, pharmaceuticals, cargo, aircraft parts, baggage.



Consumer Contracts

Apartment rentals, energy transactions, airline compensation, real estate, licenses, car leases.



IoT

Machine to machine micropayments, identity, automated resource sharing.



Health Care

Supply management, electronic health records, claims processing, registries.



Government

Voting, licenses, vendor interactions, identity, information sharing, compliance.



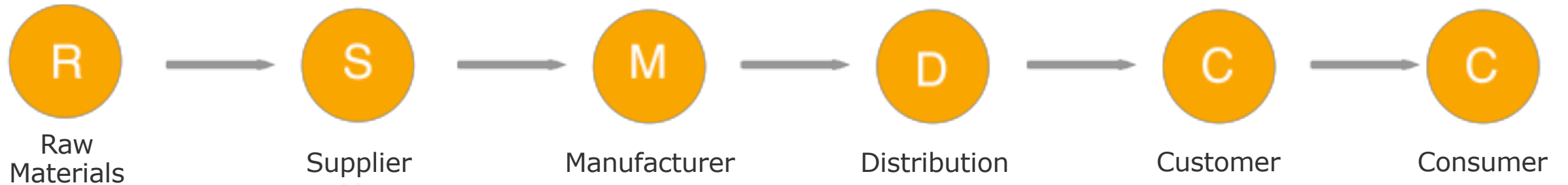
And Many Others...

Financial instruments, insurance premiums, music rights, ownership rights, payments, ...

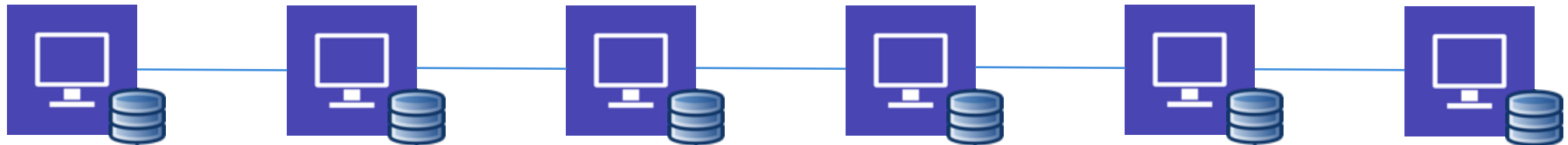
Use Cases: Airlines & Airports

- ✓ With blockchain, **airport operations must become a more collaborative process** between the airlines, supporting functions, and the passenger.
 - Share flight status details, airport operations processes, wait times, etc. across the network to promote earlier detection and responses to problems.
- ✓ With more data, **accuracy and timeliness of information sharing** can be improved.
 - Reduce batch-based updates, reduce decision latency, improve solutions for irregular operations and thus the overall customer experience.
- ✓ Identity providers based on blockchain (providing digital / decentralized identity) may also **improve (yet simplify) the passenger verification process**, and reduce the need for multiple ID checks.

Use Cases: Provenance Tracking



Product / Asset Journey



Distributed Business Network (Blockchain)

Asset Ownership, Asset Details, Auditable / Traceable Distributed Ledger
Secure, End-to-End Asset Provenance

Use Cases: IoT (e.g. Provenance Tracking)



IoT Device



IoT Device



IoT Device



IoT Device



IoT Device

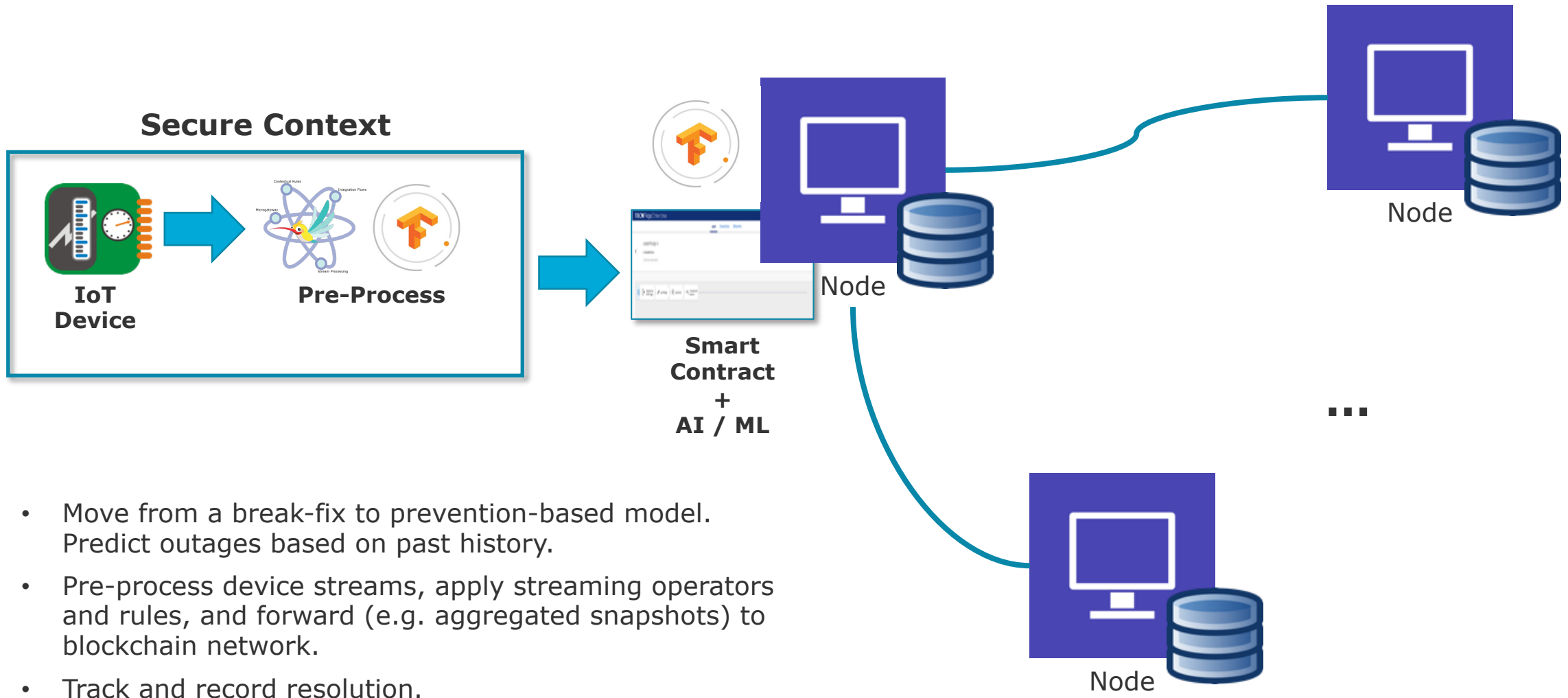
Product / Asset Journey (e.g. Equipment/Asset Lifecycle Management)



Distributed Business Network (Blockchain)

IoT Triggered Smart Contracts, IoT Augmented Asset Information
IoT Device Verification and Tracking, Micropayments

Use Cases: Preventative Maintenance



- Move from a break-fix to prevention-based model. Predict outages based on past history.
- Pre-process device streams, apply streaming operators and rules, and forward (e.g. aggregated snapshots) to blockchain network.
- Track and record resolution.

Use Cases: Airlines & Airports

Bag Tracking Parts Tracking “Anything” Tracking

Capture the complete, end-to-end provenance of components or “anything” related to operations.

Passenger Journey Data Distribution

Distribute passenger information (opt-in / non-PII) across a network of stakeholders.

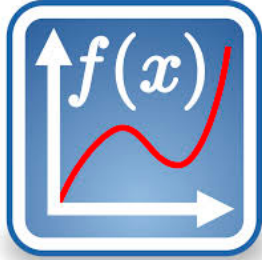
Airline / Airport Information Exchange

Accurate, timely distribution of data between the airlines and airports.

Contactless Digital Vouchers Loyalty Program Execution

Contactless approach to distributing vouchers for meals, flight delays, transportation, etc.

Use Cases: Airlines & Airports



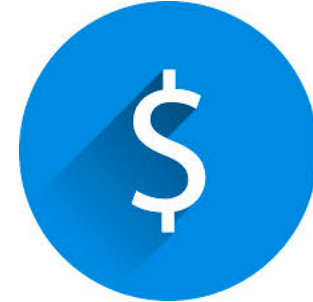
Analytical Model & Data Tracking

Record metadata, lineage, and results of analytical models. Useful for model explainability, regulatory compliance, and for verifying why certain decisions were made (e.g. in an automated fashion via AI/ML).



Process Tracking & Optimization

Utilize process & IoT as inputs into a decentralized business network to support transparency & immutable record of behavior. Track & record process behavior, share information between stakeholders such as airlines, manufacturers, maintenance contractors & regulatory bodies.



Payments & Micropayments

Execute payments to business network participants based on key transaction states / smart contract execution. Support micropayments between devices (for example) for certain capabilities, without human involvement.

Use Cases: AML & Fraud

Blockchain, given its characteristics, thus may be useful for providing a **more accurate, secure, distributed, tamper resistant, and shared record** of:

Whitelists

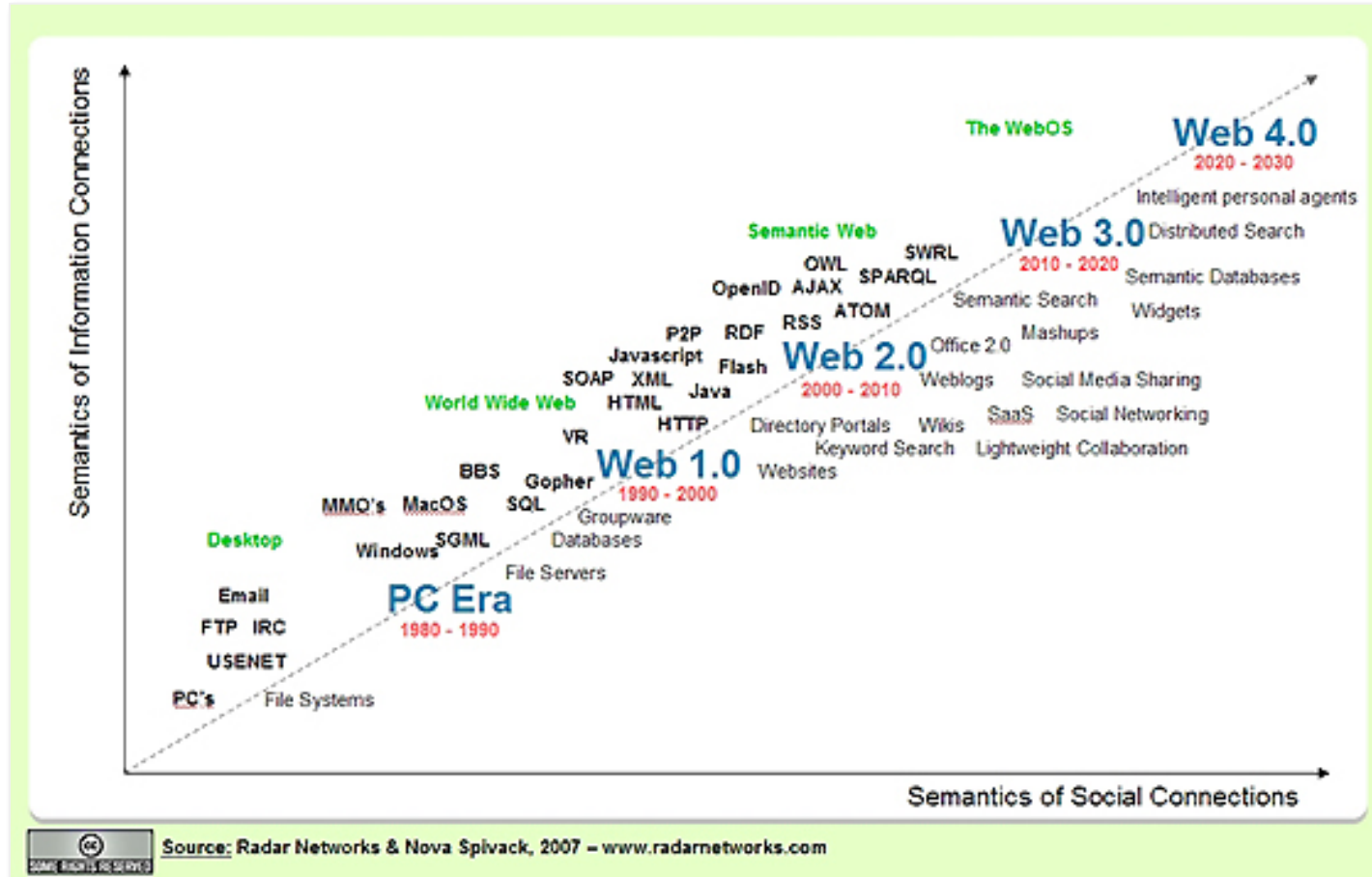
**Blacklists &
Known Risks**

**Various
Financial
Transactions**

**Personal &
Device Identity**

**Fraud Case
Management
Processes**

Use Cases: Web 3.0



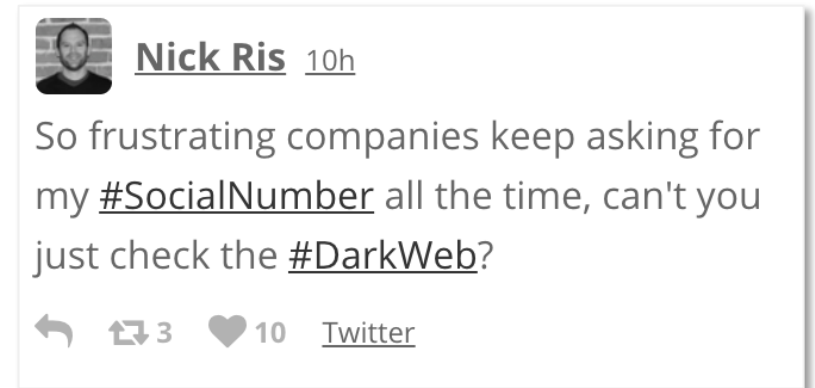
Blend of next-generation web technologies:

- Semantic web
- Artificial intelligence / Machine Learning
- Data mining
- Natural language
- Autonomous / recommendation agents
- Available anywhere at anytime.

Interaction on the web becomes contextual based on user behavior and preferences.

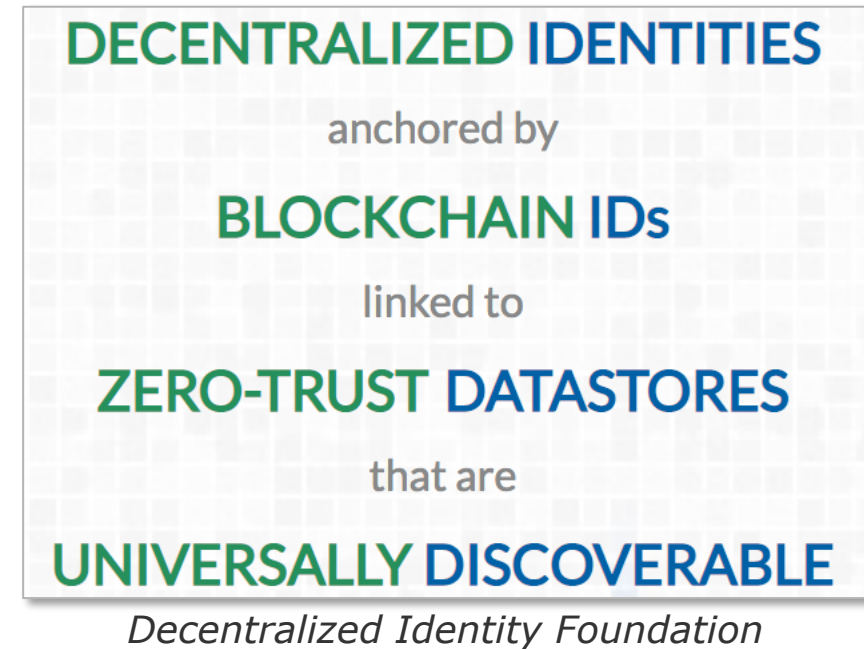
Web 3.0: Potential Role of Blockchain

- **Individual security and privacy.**
 - Identity is placed back in the **control of the individual**. Private data and credentials are stored "off-chain".
 - May be applied to people, organizations, or devices.
- **Data security and privacy.**
 - Decentralized and distributed data, difficult for hackers to obtain or attack.
- **Uninterrupted service.**
 - No central database or application to attack via denial-of-service or other techniques.



Identity: Decentralized via Blockchain

- Identity is comprised of **verifiable credentials**, such as a digitally verified driver's license or passport.
- Identity is placed back in the **control of the individual**. Private data and credentials are stored "off-chain".
 - Can be instantly verified by the receiver.
 - Need to meet regulations such as GDPR.
- May be applied to **"people", "organizations", and "devices"**.
- **Examples** include the Hyperledger Indy project, Sovrin (provides a trust framework / constitution around identity), Evernym, etc.



Use Cases: Central Bank Digital Currency (CBDC)

- Currently being investigated by **various governments** across the globe.
 - China, Japan, Canada, Thailand, Sweden, France, ...
 - Various uses, including interbank settlements / transfers.
- Several **classes** of CBDC:
 - Retail (digital fiat money, issuance from a central bank)
 - Wholesale (like central bank reserves, facilitate interbank settlements)
 - Hybrid (combination, extends issuance to commercial banks)
- Shift to a “synthetic CBDC”, where **digital currency is distributed to the general public** through an intermediary like a bank.
 - “Programmatic money”

Blockchain with Smart Contracts Guidelines and Things to Watch

Challenges and Considerations

In the **enterprise**, common thinking may not apply in the same way:

“Disintermediation”

The promise of “no middleman” has not met the expectations of blockchain made in the past.

“Decentralized Organizations”

The notion of the DAO is likely more realistically a combination of legacy structures with networks of decentralized entities.

“Programmable Cryptocurrencies”

The ICOs of 2017/2018 have died. Regulatory issues, unrealistic expectations, and an unwillingness to move from fiat currency proved difficult. Shift to value transfer and tokenized assets.

Challenges and Considerations

In the **enterprise**, common thinking may not apply in the same way:

"No Third Party"

Enterprise blockchains may actually require a "third party" to run nodes, govern the network, and manage relationships.

"Data Privacy"

Blockchain data is not necessarily encrypted on the network. How does one control access, manage keys, prevent breaches, etc.?

"Immutable Record of Events"

If data is immutable, how does one handle "mistakes"? How does one ensure that data placed on the network in the first place is correct?

Challenges and Considerations

Blockchain is not without its challenges; we have **considerations** such as:

**Governance &
Stewardship**

Data Privacy

**Legal &
Regulatory Risks**

**Deployment,
Management, &
Logging**

**New Technology,
“Picking a Winner”**

Challenges and Considerations

Smart contracts show a lot of promise, but there are also **concerns** such as the following:

**Programming
Errors**

**Required
Collaboration**

**Supporting
Infrastructure
Needs**

**Legal
Implications**

**Lack of
Standards**

Challenges and Considerations

For the **appropriate use case**, blockchain can provide “part” of the solution. However, during implementation, there are still **questions** like the following to answer:

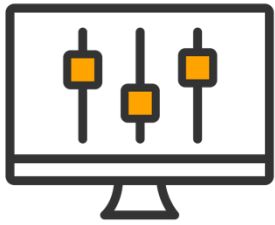
**How Do I Get
Data In/Out of
the Blockchain?**

**How Do I Extend
Smart Contract
Logic To My
Enterprise?**

**How Do I
Respond To
Events from
my Ledger?**

**How Do I Analyze
Data Contained
Within the Ledger?**

**Can I Provide
Controlled,
Managed Access
to Blockchain
Capabilities?**



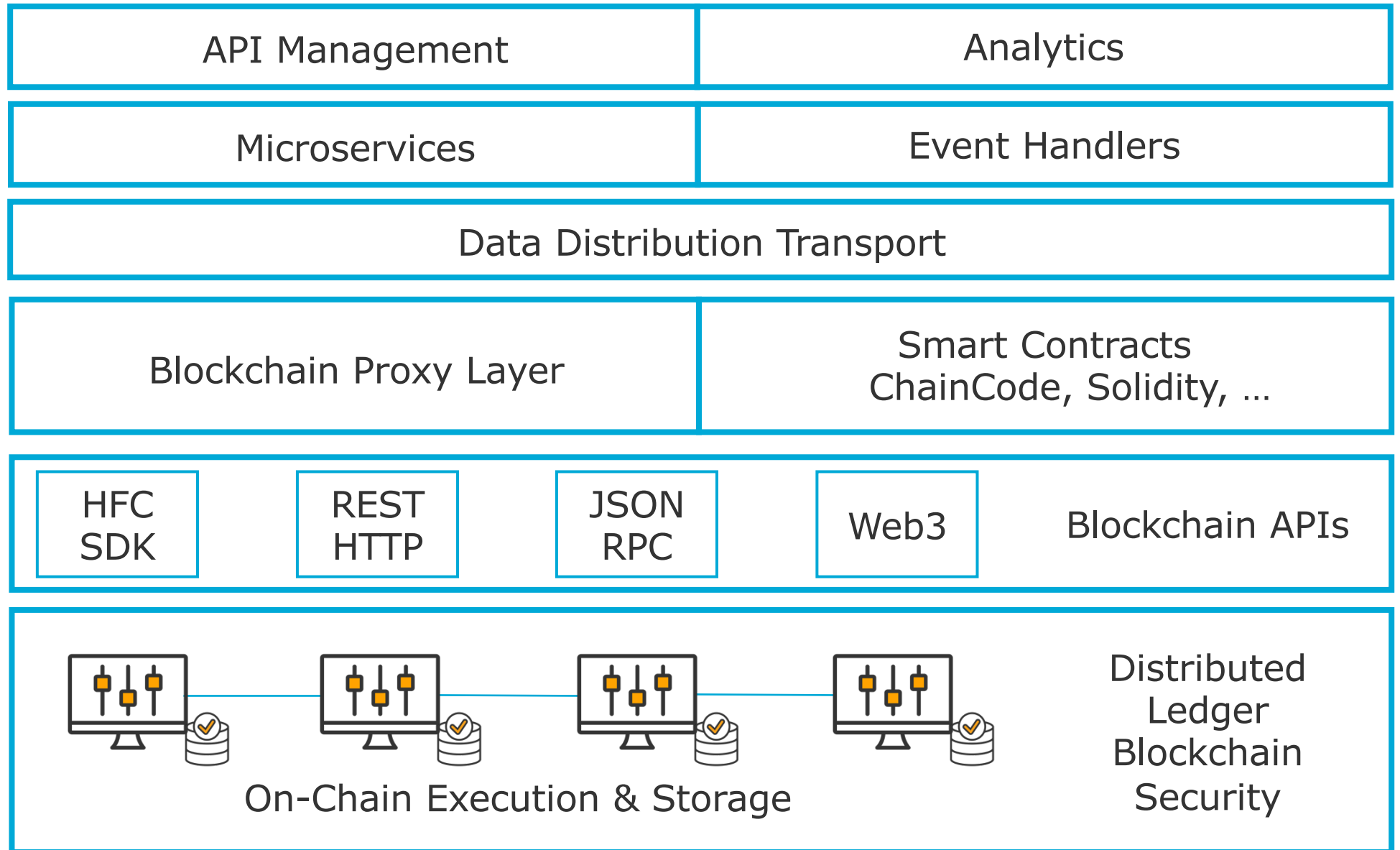
Off-Chain
Execution &
Storage



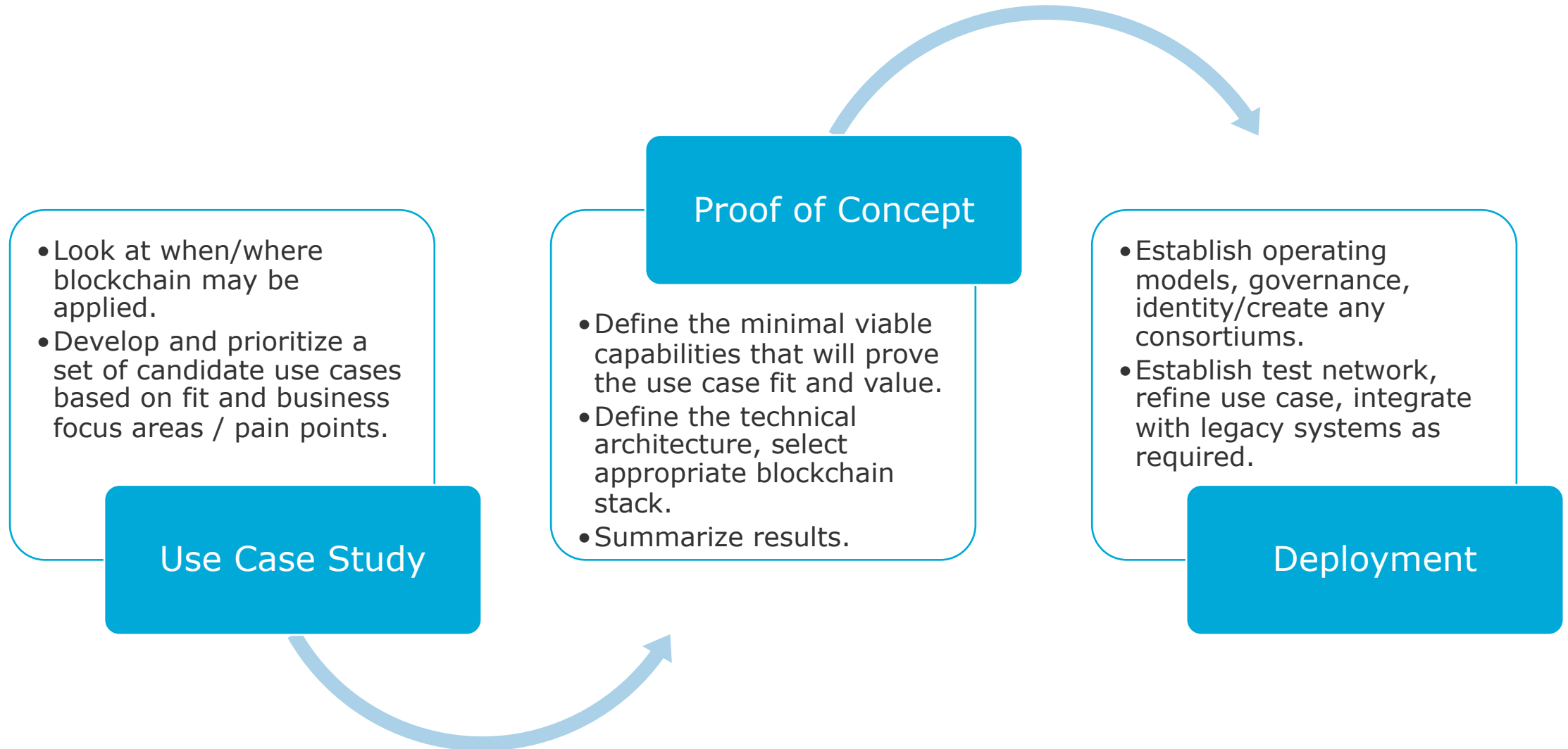
Identity



Edge
Processing



Typical Blockchain Implementation Journey



Best Practices & Considerations

"Timeproof security"

Security needs to be reviewed constantly on every system, blockchain is no different, having a patching, reviewing strategy is needed.

"Only relevant information"

Blockchain data should be carefully chosen and only relevant data should be added. For example (Do you need to add a full file? Can you just add a hash?)

"Understand Private vs Public"

Public, private and hybrid blockchain strategies give you different properties (Privacy, security, visibility, etc...) Understanding their differences is key.

Best Practices & Considerations

"Governance structure"

Multiple entities collaborating need a strong and suitable governance model, this model should be defined as soon as possible.

"Performance and Scalability"

Different blockchains provide a different range of performance and scalability, defining these requirements early will help choosing the right blockchain.

"Focus on use cases"

Map the use cases needs with properties of blockchain networks to identify the need and type of system.

Best Practices & Considerations

"Security and privacy"

It is fundamentally important to design correctly the access to the blockchain as well as the data privacy.

"Legal framework"

There need to be a legal framework between parties to account for any flaws, conflicts in the deployed system (From governance to business logic and regulation)

"Infrastructure ecosystem"

Distributed systems are complex, a good design in infrastructure, networking is of high importance.

Forrester: 2020 Blockchain Predictions

Over 80% of blockchain deployments will be hybrid, multi-cloud, or both.

Networks dependent on a single cloud provider won't thrive long-term.

The battle for dominance among the frameworks continues.

Tooling and services continue to improve but capabilities still vary widely.

Interoperability will move center-stage.

The proliferation of private/permissioned networks has led to increasing interest in interoperability.

*Martha Bennett
Vice President & Principal Analyst, Forrester, Oct 2019*

Forrester: 2020 Blockchain Predictions

Ties will strengthen between blockchain & existing business management solutions.

No blockchain/DLT network exists in isolation. Integration with core business systems is a must.

Executive teams will be drawn into the permissioned vs. public network debate.

Driven by concerns about a landscape of isolated networks, & cost/complexity of running private networks.

“Consensus as a Service”

Experiments with separating consensus from the ledger to address scale issues.

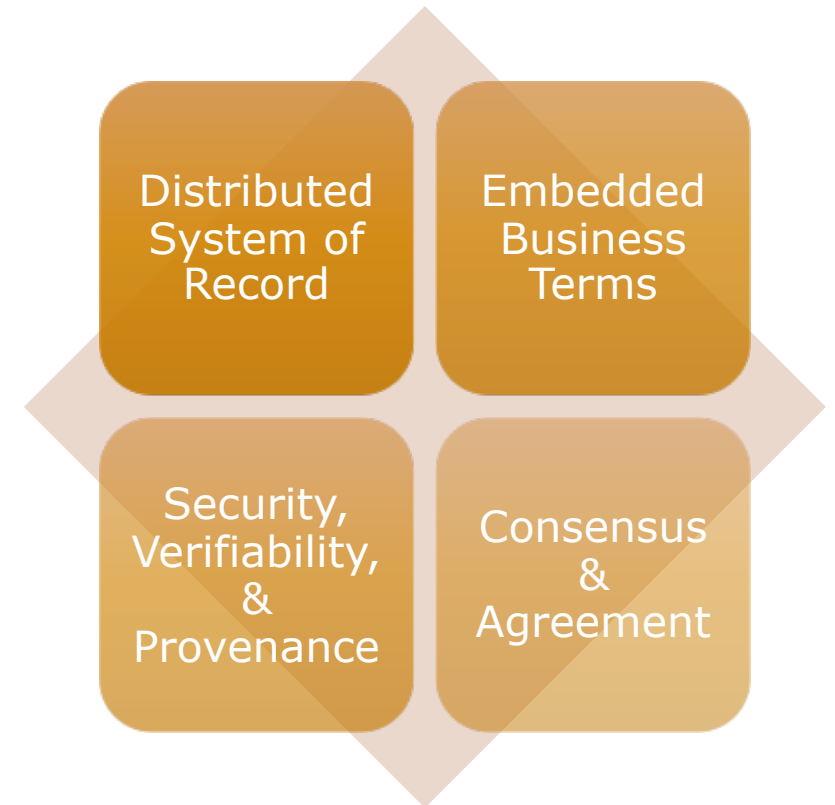
*Martha Bennett
Vice President & Principal Analyst, Forrester, Oct 2019*

Recommendations

- **Not every problem requires a blockchain!**
 - Peer to peer networking, distributed data stores, and cryptography have been around for some time.
- Need to **look at a number of factors**. For example:
 - Number of network participants.
 - Required trust and integrity levels.
 - Amount of data to be stored.
 - Performance requirements and transaction processing times.
 - Ability to automate business interactions across a network.
- **A blockchain is only part of the equation.**

Recommendations

- **Gain awareness through experimentation.**
 - Cloud based services make it easier to get started.
- Answer the factors (previous slide), and **identify use cases / value** appropriate for your business.
- Determine how the **key characteristics** of a blockchain can be **beneficial to the business network.**



Resource Pages / Links



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Questions?

