Corporate Overview

Blockchain with Smart Contracts: Enterprise Use Cases and Guidelines

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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.

**IoT**
Machine to machine micropayments, identity, automated resource sharing.

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

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

**Health Care**
Supply management, electronic health records, claims processing, registries.

**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

Raw Materials → Supplier → Manufacturer → Distribution → Customer

Product / Asset Journey

Distributed Business Network (Blockchain)
Asset Ownership, Asset Details, Auditable / Traceable Distributed Ledger
Secure, End-to-End Asset Provenance

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

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

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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.
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:

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<th>Required Collaboration</th>
<th>Supporting Infrastructure Needs</th>
<th>Legal Implications</th>
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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?
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Typical Blockchain Implementation Journey

- **Use Case Study**
  - Look at when/where blockchain may be applied.
  - Develop and prioritize a set of candidate use cases based on fit and business focus areas / pain points.

- **Proof of Concept**
  - Define the minimal viable capabilities that will prove the use case fit and value.
  - Define the technical architecture, select appropriate blockchain stack.
  - Summarize results.

- **Deployment**
  - Establish operating models, governance, identity/create any consortiums.
  - Establish test network, refine use case, integrate with legacy systems as required.
Security needs to be reviewed constantly on every system, blockchain is no different, having a patching, reviewing strategy is needed.

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?)

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.

The battle for dominance among the frameworks continues.

Interoperability will move center-stage.

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

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

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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