To be read in conjunction with the report, *A Vision for the Finance Professional and the Finance Function*
Overview of this Slide Deck

- **Explain** the fundamental concepts in blockchain
- **Provide** a broad overview of developments in blockchain and how it can streamline processes, and change business models in use cases covering
  - Accounting and reporting
  - Financial services
  - Supply chain
- **Highlight** the potential role of finance and accounting professionals
WHAT IS BLOCKCHAIN?

“A distributed infrastructure technology held collaboratively that enables a decentralized exchange of trusted data. It uses cryptography to allow each participant on the network to manipulate the ledger in a secure way without the need for a central authority.”

- Rajat Kapur, Ernst and Young LLP
Limited understanding of blockchain and its potential among business and finance leaders

Important to understand how and where it might be applied

Recent surveys in UK and US suggest:

- Many non-IT staff do not understand blockchain
- Few business leaders think their organizations have required skills
- Many believe blockchain will not become a mainstream enabler of business transformation in 3-5 years
- Others believe that their company would be at a competitive disadvantage if it failed to adopt blockchain
At experimentation & development phase with proofs of concepts & use cases in finance & supply chain

Cryptocurrencies are one powerful application of blockchain but has potentially significant application in other areas

Most large and global banks, and emerging Fintech are experimenting with blockchain to
  - Streamline processes and reduce costs and
  - To create new competitive advantage through modified business models

Accounting firms facilitating innovation and application
Blockchain – A Distributed Ledger

- A protocol for transacting and implementing a distributed ledger enabling the
  - Recording and storing of digital records & transactions
  - Exchange of assets & transfer of ownership
  - Self governing digital contracts to automate processes

- A distributed ledger allows a shared record of a transaction distributed to all in a network
- A network of nodes - computers connected to the blockchain network - validate transactions, add to the ledger and broadcast to other nodes. There are as many identical ledgers as there are nodes
Potentially provides higher levels of transparency, visibility & accountability through **immutability**

No central authority or intermediary required to authenticate & settle transactions

Allows people who do not know each other to trust a shared record of transactions because they cannot be altered

- A transaction and record occur in one single event
- Changes to previous transactions need to be approved by all participants (nodes)
- Automated validation of a record in a “block” via a unique cryptographic identifier for each block (a hash).

**Hashing** refers to the repeated calculations to ensure block validity
Blockchain Fundamentals

- Blockchain combines two existing technologies
  - Peer to peer file sharing
  - Cryptography and cryptographic consensus
- Underlies the functioning of cryptocurrencies (e.g., bitcoin) but has diverse applications beyond financial transactions & records
- Blockchain serves as a platform for smart contracts (digital agreements), tokens representing real world assets such as currency or property, and decentralized autonomous applications
Programmable Blockchain – Smart Contracts

- Automating transactions and controls via self-executing smart contracts also extends blockchain use to multiparty agreements
- Programmable code replicates counterparty obligations & settlement instructions
- Any business logic (terms) can be encoded into smart contracts, not just legal contracts so that funds can be distributed correctly
- Use cases include transfer pricing, loan agreements, supply chain, trade finance

Using Blockchain for Smart Contracts, & Ethereum
Blockchain - Public and Private Network

**Public**
- Permission-less / full visibility of transactions
  - Public blockchains support cryptocurrencies with no identifiable ownership structure
  - No legal recourse

**Private**
- Permissioned access / transactions are private
  - Shared only between invited participants
  - Financial institutions & supply chain partners typically use private blockchains
  - Subject to same laws & regulations as non-blockchain records

**Consortium**
- Involvement of various industry players in a collaborative blockchain
  - Consensus process controlled by pre-selected nodes
Blockchain - Implications for Value Stream Processes

- Procure-to-Pay, customer to cash, account to report
- Potential to bring together goods/services with their respective payment
- Highest potential - transactions relevant to all parties in the chain (e.g., organization, customer, supplier, bank) visible & seamless on a distributed general ledger so no human validation needed
- Processes to complete transactions can be streamlined
  - Shared access between accounts receivable and accounts payable removes need for invoices
  - Smart contracts to automate generation of invoices & confirm payments & enabling automatic reconciliation of payments to corresponding invoices, and connectivity to bank payment network
BLOCKCHAIN - IMPLICATIONS FOR ACCOUNTING

- Fundamental shift from data held by a single owner to the lifetime open history of an asset or transaction
- Blockchain future allows full visibility on transactions with timestamp & audit trail across value streams
- Access and reporting tools could provide greater performance insights to various stakeholders in real time
- Programmable smart contracts reduce monitoring/enforcement
- The enhanced auditability and accountability in transaction data in a distributed ledger means that credibility and trust need not arise from a published set of financial statements
A Distributed Ledger Concept Has Many Use Cases

19 industries that Blockchain will disrupt

- Healthcare: records management
- Media: verifying intellectual property
- Supply chain and logistics: traceability
- Real estate: property records allowing proof and transfer of ownership
- Public sector: voting and public registries
- Manufacturing, power & utilities: cross-border trade & logistics
Supply Chain Use Cases

- Collaborations key in obtaining data needed to track objects
  - The more organizations that participate the more valuable the solution
- Wine: this [video](#) outlines how Blockchain has been used by wine producers to verify authenticity
- Blockchain for food safety consortiums – based on collaboration, standardization as well as new technology
  - Worldwide food safety IBM-led [coalition](#)
  - China [collaboration](#) – Walmart, IBM, JD, Tsinghua University
- Logistics: [Maersk and IBM](#) – recording & tracking shipments
- Exotic – Diamonds [Everledger](#)
Other Use Cases Relating to Social Impact

- Using blockchain to advance the Sustainable Development Goals
- Link to sustainable development through financial inclusion
  - Reducing cost of payments and increasing access to capital
- UN sponsored Climate Chain Coalition researching use cases in climate relate initiatives
- UN World Food Programme – blockchains for aid payments
Use Cases in Financial Services and Exchanges (beyond digital currencies & peer-to-peer payments)

**Finance**
- Related entity transactions, such as those involving intercompany, joint ventures and franchises allowing instant transactions with immutable documentation, and cross-border payments
- Financial proxy voting and securities lending, repurchase agreements
- Securities and derivative clearing & settlement streamlining internal processes and processes which are typically siloed and require reconciliation, and leading to improved transparency with external market participants

**Finance Markets Use Cases – Bain & Company**
- Virtually every function in financial services could be disintermediated and decentralized
Blockchain Helps Address Transactions with Related Entities e.g., Intercompany

- Intercompany challenges include manual payment procedures, inconsistent processes, high volume, disparate ERP systems, poor compliance
- Smart contracts can establish automated intercompany transaction processes
- Potential to eliminate transaction imbalances and reduce discrepancies between different ERP systems
- Overall reduction on manual intercompany procedures
- More accurate and timely reporting to improve compliance
- Start-ups challenging established banking business models in providing peer-to-peer financial services
- >50 of world‘s largest banks are in a consortium to develop blockchain solutions
- Fintech applies to banking, payments & wealth mgt
  - Industries where Fintech is changing the game
  - ACCA Fintech report
  - How banks can keep up with digital disruptors
  - International Organization of Securities Commissions (IOSCO) Research Report on Financial Technologies
  - Citi GPS What Fintech Investments Tell Us
Governance & trust of blockchain & digital currencies evolving
- Regulatory concern about certain aspects of decentralization
- Perhaps a need to develop & enforce certain standards and rules around blockchain? E.g., digital identities and cross-border standards

Implication for financial regulation needs to be considered particularly in relation to cryptocurrencies
- Blockchain could reinvent regulatory compliance
- Company regulations need to allow business to use blockchain for record keeping
When to Consider Blockchain?

Guidance from **Sam Peterson**, Partner/Principal, Blockchain Leader, Americas FAAS Digital & Analytics, EY [presentation at PAIB Committee]

- **Multiparties** – greater security with more parties
- **Network effect** – more value with greater number of users
- **Seeking to enhance trust** between all parties at scale (records are permanent and cannot be changed)
- **When a system could benefit** from improved transparency in terms of records and ownership of assets
Blockchain Investment Case – Key Questions

- What new business opportunities exist from blockchain?
- Is disintermediation beneficial in all use cases?
- What benefits does a shared database provide in terms of improved effectiveness and reduced cost? (in the context of existing databases and systems)
- What is required in terms of data and digital security?
- How mature is the source data? Blockchain does not solve data accuracy (garbage in, garbage out)
- Where will the development expertise come from?
- Are regulatory arrangements enabling or disabling?
- How much investment is needed in appropriate security? E.g., complexity of consensus algorithms used can be key to proper data validation
**Blockchain - Challenges**

- **Scalability**: Expanding ledgers and the need for all participants to access the ledger creates need for storage capacity, computing power and electricity
- **Security**: The smart contracts that enable automated transactions to a blockchain can be exploited if badly coded. Blockchain will not solve bad coding or sub-optimal processes
- **Data privacy concerns**: Data can be stored indefinitely, which raises concern over compliance with data protection regulations
- **Loss of keys**: Public and private digital keys that represent a user’s address on the blockchain providing access can be stolen or misplaced
- **Immutability**: any time lag until transactions are verified can be an opportunity for manipulation
Blockchain - A Selection of Resources

- Blockchain and the Future of Accountancy
- The Future of Blockchain
- Audit Futures, Unchaining the Blockchain
- Blockchain will Impact Accounting
- Introduction to Blockchain Technology
- How Blockchain Technology Could Change Our Lives
- Blockchain: So much bigger than bitcoin
- Divided We Fall, Distributed We Stand. The Professional Accountant's Guide to Distributed Ledgers and Blockchain
- Blockchain: Re-imagining Multi-Party Transactions for Businesses
- Crunch Time IV, Blockchain for Finance
• How secure is blockchain really?
• Blockchain to Blockchains: Broad Adoption and Integration Enter the Realm of the Possible
• Blockchain: The New Technology of Trust
• Blockchain, the Next Disruptor for Finance
• Blockchain: How This Technology Could Impact the CFO
• How tax fits into blockchain
• Blockchain audit technologies
• How Blockchain can bring Greater Value to PTP Processes
• Trust Me, Digital Identity on Blockchain