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Blockchain's Potential Role in Payment Modernization

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Agenda

- Payment disruption – a convergence of forces
- What experience do we want to provide?
- Various paths to get there
- Industry payment modernization initiatives
- Blockchain's potential role in payments

Growing Pressures on an Imperfect Payments System

Market Forces

Millennials with New Expectations

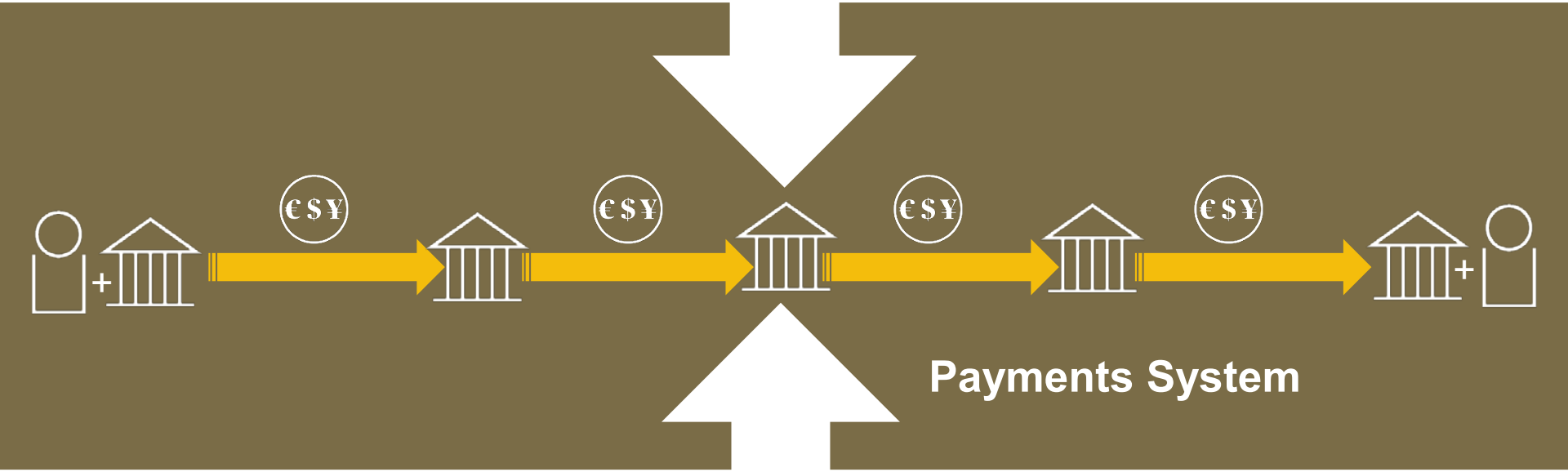
Advancing Technology

2008 Financial Crisis

Growing Regulation

Fraud & Cyber Attacks

Globalization of Trade Flows



Traditional Challenges

Risk

End to End Cost

Timeliness

Client Experience

Transparency

Managing Payee Information

What experience do we want to provide?

One Global, Real-Time Payment Experience

With today's technology, we can

- Send and receive texts, email, pictures, video, etc. in real time, globally
- ***Why not payments?***

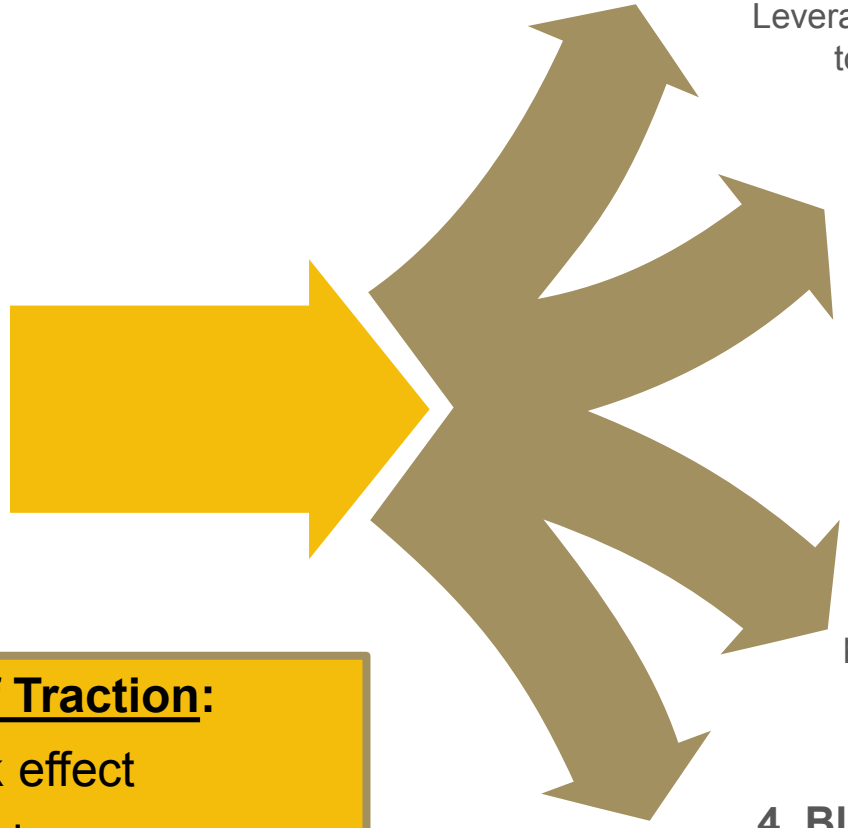
As an industry, we need to drive payment processing through the door technology has already opened:

- Real-time execution, globally
- Complete transparency as to
  - Status, beneficiary receipt
  - Pricing
  - Counterparties
- Real-time fraud analysis / prevention
- At reasonable cost

- When? **within 10 years**

Global, Real-Time Payments - How Will We Get There?

Traditional Global Transaction Banking



1. Connecting National RTP Systems

Leverage country-by-country real-time initiatives to connect multiple regions over time.

+

2. SWIFT Global Innovation

SWIFT builds out and operates, alone or with partners, a global real-time payment network.

+

3. Telecom-based Banking

M-Pesa like networks, provided by Vodaphone and others, provide basic payment services for the developing world.

+?

4. Blockchain / Distributed Ledger

Fintechs/banks develop credible decentralized ledger(s) permitting rapid adoption of global real-time payment and settlement.

Markers of Traction:

1. Network effect
2. Standards
3. Regulatory engagement

Banks, Networks, & Regulators see the need for change

Current Payment Modernization Initiatives

SWIFT Global Payment Innovation Initiative

- Launched 2015, Pilot Fall 2016
- Go live is expected in May of 2017
- SWIFT and 90+ global banks
- Leverage/enhance existing structure
- Improve speed and transparency
- Initial focus – cross border B2B payments

The Clearing House Real-Time Payments

- Approved November 2015
- Target Launch 2Q 2017
- 24x7, Credit Push only, irrevocable
- Optional Alias/Token ID origination
- $25K per transaction
- ISO 20022 Formatting

SEPA Instant Payments

- Target date - November 2017
- Harmonization of payments
- Electronic retail payments 24/7/365
- Immediate & confirmed
- Payment types – credit, debit, card

PSD2

- Target date – January 2018
- Third Party Providers – access to payment initiation & information via APIs
- Customer authentication using biometrics
- Leg Out Transactions

Challenges Solved by Payment Modernization Initiatives

	----------Challenges[1]----------					------Markers of Success[2]------		
New Solution	**Cost to User**	**Speed**	**Trans-parency[3]**	**Managing Payee Info[4]**	**Risk[5]**	**Network Effect**	**Standards**	**Regulatory Framework[6]**
SWIFT gpi	✓	✓	✓			✓	✓	✓
TCH RTP	✓	✓	✓	✓	✓	✓	✓	✓
SEPA Instant Payments	✓	✓	✓			✓	✓	✓
PSD2	✓		✓			✓	✓	✓
Blockchain	✓	✓	✓	✓	✓	?	?	?

----------Theoretical—to be validated----------

Notes:

[1] Checkmarks indicate challenges each solution could significantly improve.
[2] Markers of Success – checkmarks indicate if they exist or are fully expected to exist.
[3] Transparency = visibility of transaction status through end-to-end payment process.
[4] Managing Payee Info = collecting, storing and securing payee bank account information
[5] Risk is generally defined as settlement risk throughout this document, unless otherwise noted.
[6] Inclusive of legal, OFAC, and AML

and what about Blockchain?

Key Terms

- **APPLICATION PROGRAM INTERFACE (API)** - Set of routines, protocols, and tools for building software applications. An API specifies how software components should interact. Additionally, APIs are used when programming graphical user interface (GUI) components.

- **BITCOIN** - Cryptocurrency and payment system invented by Satoshio Nakamoto, released as open source software in 2009. The system is peer to peer allowing users to transact directly without an intermediary

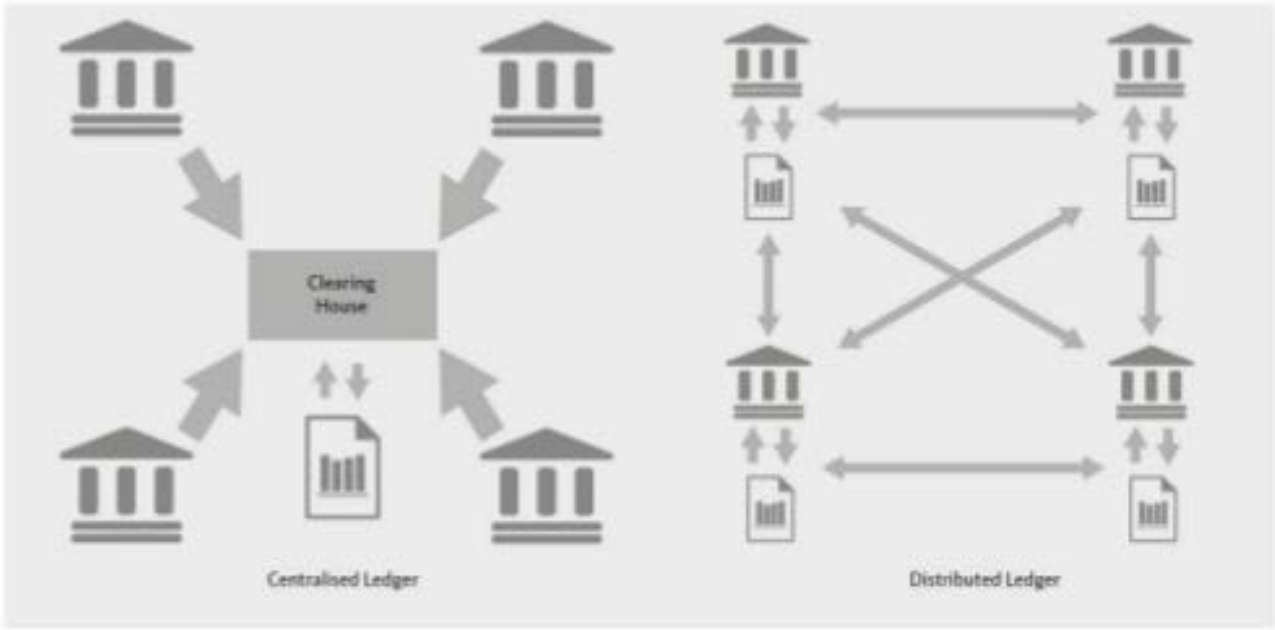
- **BLOCKCHAIN** - Technology underpinning the Bitcoin cryptocurrency, Blockchain is a database structure which can only be updated by appending a new block of validated transactions to previous blocks of validated transactions

- **DIGITAL CURRENCY** - Money that is distinct from physical (such as banknotes and coins) that exhibits properties similar to physical currencies, but allows for instantaneous transactions and borderless transfer-of-ownership..

- **DISTRIBUTED LEDGER TECHNOLOGY (DLT)** - A term which describes a database architecture where all nodes in a system collaborate to reach a consensus on the correct state of a shared data resource. Do not necessarily keep track of all transactions but rather track a ledger of accounts and their balances

- **SMART CONTRACTS** - Self executing algorithm that updates accounts automatically. Smart contracts are programmed to generate instructions for downstream processes (such as payment instructions or moving collateral) if reference conditions are met. Like a paper contract that can read itself and carries out the agreed terms as and when they come into effect.

Distributed Ledger Explained



Source: Rebooting Financial Services Report, Santander, Anthemis, OW, 2015

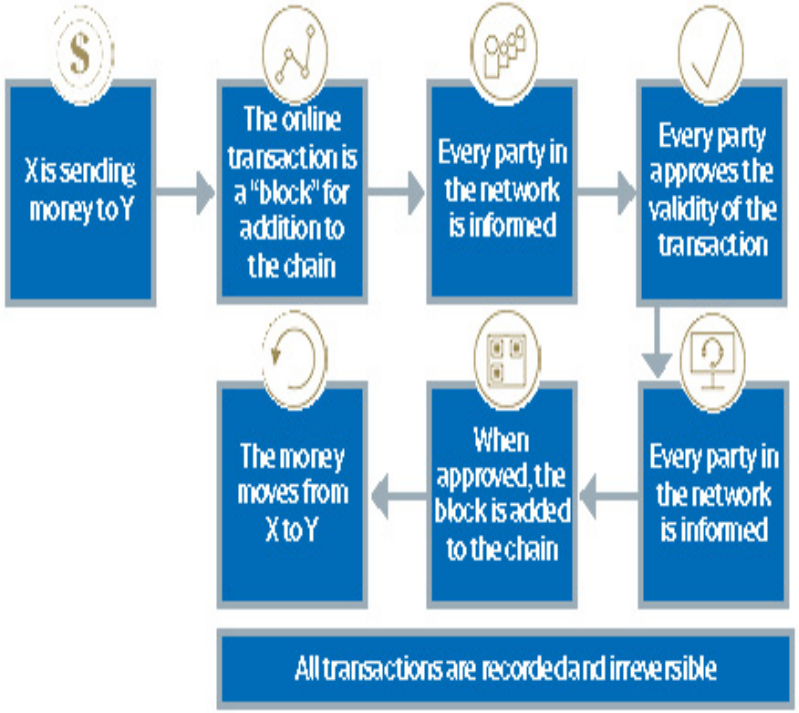
www.dccbconsulting.com

- Multiple actors in the network have write access to the ledger
- Single version of truth used by all participants (nodes)
- Richer dataset than exists in a single system
- Exchange of value via native digital assets
- Representations of real world 'off ledger' assets can be achieved by 'tokenising' the asset

- Transparent, real time data
- Security enabled by encryption and a combination of public and private keys
- Mutual consensus verification protocols allows the dataset to remain correct at all times
- Proof of work & proof of stake verification options
- Can be anonymous or permissioned

Blockchain Basics

- Decentralized, transparent, immutable, time-stamped distributed ledger of cryptographically secured transactions
  - Keeps track of all transactions that have ever happened in the system
  - Can permit real-time settlement of transactions
  - Can serve as a “clearinghouse” with increased automation and reduced counterparty risk



Blockchain/DLT could be transformative in financial services

KEY CONSIDERATIONS

- Permissioned ledger with an intermediary is better suited for financial transactions
- Regulatory, accounting and legal frameworks needs to evolve. Fiat currencies not going away.
- Technology is still evolving. Standards will drive adoption and interoperability

KEY TAKEAWAYS

- Fundamental business process redesign is required to reap the benefits of blockchain
- Effectively representing cash in-ledger is first step towards any financial use cases
- Internal use cases are a good start but Network Effect will be the key to harness the benefits of distributed ledger

2015 Q1- Q2 | 2015 Q3- Q4 | 2016 Q1- Q4 | 2017- .....

BNY MELLON INITIATIVES

Education

Educating clients and internal businesses for organizational readiness.

30+ Clients educated,

8+ Internal businesses educated

Exploration

Exploring FinTechs, and internal use cases for efficiency, security and resiliency.

50+ FinTechs explored,

5 internal POCs

Collaboration

Clients, Fin Techs & Industry Peers to explore opportunities.

Consortiums participation to drive standards.

4+ Consortiums, 6+ Collaboration opportunities with Clients

Transformation

Sort Term: Incremental benefits – efficiency, security, resiliency.
Long Term: Organizational readiness for potential disruption

2 internal Use cases in production

DLT – Promise and Challenges

Legal: Does the asset *comprise* the property or *account for changes* in ownership

Payment leg: how to achieve RVP / DVP without fragmented liquidity or pre-funding

Cost / benefit: Still not proven. Transition costs may be high.

Ownership: Holdings would be 'owned' based on possession of public and private keys – lost keys?

Governance: Much more granularity required on role definition, software development, standards.

Inter-operability: Multi asset ledger vs fungible assets vs tokenisation

Data Controls Need to take into account privacy

RoE: Transform the cost base of incumbents. Mutualise the costs of non-differential but essential processes.

Collateral & Liquidity Benefits through shorter settlement cycles.

Efficiency: Avoid replication of business processes. Clean data is replicated in real time.

Connectivity: Bring the buy side community closer to the asset servicing platforms

Ownership: Collapsed hierarchy of vertically integrated players

Security: Current databases contain raw, unencrypted data with outer security. DLT encrypts the data itself.

Audit history: Transparent ownership allows monitoring by regulators / supervisors

24/7 potential: Due to no central operator

Blockchain as the Backbone of the new Payments Ecosystem?

----------Challenges----------					----------Markers of Success----------		
Cost to User	Speed	Transparency	Managing Payee Info	Risk	Network Effect	Standards	Regulatory Framework
✓	✓	✓	✓	✓	?	?	?

Theoretical—to be validated

Promising Aspects

- Appears to be capable of recording movement of digital assets real-time
- Based on public/private encryption key technology. Would be very difficult to hack without private keys
- Encodes all transactions into blocks that cannot be altered
- Immediate, global confirmation that block has been finalized
- Decentralized, no one place for cyber attack
- Can be effectively separated from crypto-currencies

Questions Remain

- Open source – is it secure?
- Adoption requires network effect – how to build critical mass of adopters? Level of investment required?
- Scalability for global applications?
- How much transactional data can be incorporated into the blockchain?
- Transparency of transaction details to comply with regulations like AML/OFAC?
- Who provides validation function? How do we ensure continuity of service?

Sample Blockchain-based Payment Initiatives

Ripple Global Pmt Network

- 20+ global banks
- Live
- Ripple Consensus Ledger
- P2P and C2B primarily, some B2B
- Market Makers provide FX & liquidity
- Works with XRPs or fiat currency

Veem (formerly Align Commerce)

- Cross border payments using Blockchain and traditional rails
- Live
- B2B payments for SMEs
- Payment tracking and transparency
- Send/Receive in 23 countries, Receive-only in 37 countries

Utility Settlement Coin

- UBS, Santander, Deutsche, BNYM, ICAP and Clearmatics
- POC
- Synthetic representation of fiat
- Backed 1-1 with fiat at central banks
- Facilitate delivery versus payment market scenarios

MAS Digital S$ POC

- Monetary Authority of Singapore (MAS) will test digital currency and use Blockchain driven system for interbank payments.
- 8 banks participating in POC
- POC involves exchanging fiat cash for digital currency , banks paying each other with digital currency, Banks redeem digital currency for cash

Payment Modernization is Underway

- A convergence of market forces and new entrants have spurred payment innovation to overcome various challenges.
- Banks and payment operators have launched significant payment modernization efforts.
- Blockchain/DLT has the ***potential*** to dramatically modernize payments, but impact and timing is TBD.
- BNY Mellon is invested in payment modernization, with efforts underway to:
  - Extend our capabilities with new solutions
  - Play a leadership role in industry initiatives to modernize payments
  - Explore the transformative potential of blockchain technology and other fintech solutions

Questions?

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