The Impact of Disruptive Technologies

Mark Montoya
What is Fintech?

Fintech (financial technologies) are computer programs and other technology used to support or enable banking and financial services.

Traditionally, used by banks for their back-end services.

Most recent developments in Fintech have seen technologies that are disrupting traditional financial services (mobile payments, money transfers, loans, etc.)
Zenefits Settles With SEC Over Charges It Misled Investors

By Eric Newcomer
October 26, 2017, 6:42 PM EDT  Updated on October 26, 2017, 7:05 PM EDT

- Company, former CEO to pay $984,000, without admitting guilt
- SEC says startup failed to disclose unlicensed insurance sales
Disruptive technologies in Fintech

What is a disruptive technology?

• Any technology that is developed outside a core industry that is seen as beneficial for that industry is called ‘disruptive’.

• The industry has no choice but to evaluate the use of it.
Disruptive technologies in Fintech

There are many disruptive technologies impacting financial services such as machine learning and chatbots but the most prominent have been:

- **Distributed ledger technology (DLT) or Blockchain**
  
  A structure of data that represents a financial ledger entry or a record of a transaction. A decentralized, shared network database that is synchronized across multiple locations and geographies. Transactions are securely linked through cryptographic algorithms (cryptography).

- **Smart contracts**
  
  A self-executing contract with the terms of the agreement between buyer and seller being directly written into lines of code. A computer program that controls the transfer of (crypto)currency or assets between parties.

/* Allow another contract to spend some tokens in your behalf */
function approve(address _spender, uint256 _value)
    returns (bool success) {
    allowance[msg.sender][_spender] = _value;
    return true;
}

/* Approve and then communicate the approved contract in a single tx */
function approveAndCall(address _spender, uint256 _value, bytes _extraData)
    returns (bool success) {
    tokenRecipient spender = tokenRecipient(_spender);
    if (approve(_spender, _value)) {
        spender.receiveApproval(msg.sender, _value, this, _extraData);
        return true;
    }
}

/* A contract attempts to get the coins */
function transferFrom(address _from, address _to, uint256 _value) returns (bool success) {
    if (balanceOf[_from] < _value) throw;       // Check if the sender has enough
    if (balanceOf[_to] + _value < balanceOf[_to]) throw;    // Check for overflows
    if (_value > allowance[_from][msg.sender]) throw;   // Check allowance
    balanceOf[_from] -= _value;                  // Subtract from the sender
    balanceOf[_to] += _value;                   // Add the same to the recipient
    allowance[_from][msg.sender] -= _value;
    Transfer(_from, _to, _value);
    return true;
You will never see the technology.

Blockchain and smart contracts are a technologies that you will never physically see.

The FFIEC collects the Call Report using a technology called XBRL. The DIR Call analysts know that XBRL is being used to collect and validate the Call Report but the technology itself sits behind software and the analysts never see the technology.

...but Blockchain and smart contracts will definitely have an impact on our work as time progresses.

The fourth industrial revolution is moving faster than the digital revolution which began in the 1950’s with the microprocessor and ended with the smartphone.
What are the advantages of Blockchain?

Blockchain enables the creation of a digital ledger of transactions with the ability to share within a distributed network of computers. Blockchain utilizes advances cryptography to enable each user on the network to use the ledger in a secure way (without a central authority).

Plain text

"Hi! My name is Mark Montoya"

Cryptographic hash function

Hashed text

blc#2n
#h23&!
8fg@1n
What are the advantages of Blockchain?

Each node (or computer) has their own copy of the complete ledger. If some of the nodes go offline or are brought down, the chain (or system) is still fully operational.

<table>
<thead>
<tr>
<th>Ledger</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>me =&gt; you</td>
<td>30</td>
</tr>
<tr>
<td>him =&gt; me</td>
<td>40</td>
</tr>
<tr>
<td>you =&gt; her</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ledger</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>me =&gt; you</td>
<td>30</td>
</tr>
<tr>
<td>him =&gt; me</td>
<td>40</td>
</tr>
<tr>
<td>you =&gt; her</td>
<td>10</td>
</tr>
</tbody>
</table>
What are the advantages of Blockchain?

Immutability

Blockchain uses a consensus protocol to operate. The nodes (or computers) must approve the information that is submitted by one of the other nodes. When an outside party tries to submit fraudulent information, it will be rejected.
Fintech companies researching Blockchain and smart contracts
May 22 2018 American Banker article – “The Many Ways Banks are using Blockchain”

Among banks, blockchain gets a green light

Bankers have historically been skeptical of how secure blockchain technology will be for their tightly regulated industry.

But that attitude has shifted dramatically over the past few years as executives have recognized the distributed ledger technology’s potential.

More than half of business executives say that blockchain will be critical to their company’s success over the next three years, according to a report by Accenture.

At Consensus 2018, FedEx CEO and founder Frederick W. Smith said “blockchain has the potential to completely revolutionize trade across borders.” The Deloitte survey of over 1,000 global executive attitudes noted 43% said blockchain is one of their top-five strategic priorities.

In 2018, financial industry leaders seem less afraid of using blockchain as banks begin making significant transactions aided by the technology, and large investments into different initiatives.
May 22 2018 American Banker article – “The Many Ways Banks are using Blockchain”

Slide 2 of 10

**Bank blockchain leader**

By adopting blockchain, the global banking industry could save as much as $20 billion by 2022, according to global management consulting firm Accenture.

Santander certainly seems to think that will happen. It became the first U.K. bank to use blockchain to create a new international payments service called One Pay FX, which will first allow customers to transfer money between Santander accounts in Europe and South America.

Santander also piloted a blockchain effort for shareholder voting with Broadridge, JPMorgan Chase and Northern Trust.
May 22 2018 American Banker article – “The Many Ways Banks are using Blockchain”

Testing continues at JPMorgan’s Quorum

Batting off rumors it will be spun off, JPMorgan Chase’s blockchain unit Quorum has tested a new application to handle finance instruments, and phantom-issued a $150 million, one-year, floating-rate Yankee certificate of deposit on the blockchain.

“Overall, the promise of blockchain is that you’re sharing infrastructure between participants — so issuer, dealer, investors, custodians and administrators can all see one golden source of truth of a trade or in this case a debt instrument,” said Christine Moy, program lead for JPMorgan Chase’s Blockchain Center of Excellence.
Big money bets

Goldman Sachs has become one of the biggest investors in blockchain technology, according to CB Insights.

Cryptocurrency startup Circle, which is backed by Goldman Sachs, raised $110 million in an investment round led by Chinese virtual coin mining giant Bitmain Technologies on May 15. Goldman is also still committed to being the first Wall Street bank to open a first bitcoin-trading firm.
Global consortium

Canada’s Bank of Montreal joined several other European banks in developing Batavia, a blockchain trade finance platform.

The consortium — which includes Spain’s CaixaBank, Germany’s Commerzbank, Central and Eastern Europe-based Erste Group, IBM and Switzerland’s UBS — said it successfully completed its first live pilot transactions with corporate clients in April. Among the trades? Cars and fibres for textiles.
Possibilities for process improvement

- Blockchain protects transactions and increases security and privacy
- Accounting impact
  - Accounts payable and receivable
  - Intercompany transactions, client-customer transactions
  - Trust in transactions
- Value for the audit
  - Speed in the transactions (instead of months after the fact)
  - Auditors need to develop a more data centric approach
    - Forward rather than a historic perspective
New kids on the block(chain)

- Official payload support
- Official smart contract support
- Ethereum and Smart Contracts
  - Development environment
  - Can develop new coin/tokens
  - Smart Contracts
    - Programs
    - Run and act in an unattended fashion
    - Can write to their blockchain
- Other coins, tokens, development environments
  - Hyperledger (Linux Foundation)
Confusion?

- Anarchy tool or regulatory tool?
- Terminology (Block chain vs Blockchain)
- Satoshi Nakamoto vs beyond
- Permissionless/permissioned
- Public/private key
- Decentralized/centralized
- Proof of Work/Proof of Stake
- Mining/Consensus
- Distributed Ledgers don’t have to be blockchains...
- “Blockchains” don’t have to be distributed...
Initial Coin Offerings (ICOs) everywhere
Blockchain/DLT projects everywhere
Regulators considering their response
Standards groups considering their role in developing Blockchain/DLT standards individually or together
Use cases...abound
  - Payments, stocks, collectibles, global identities, voting, MIT diplomas...
  - Anything that can be tracked or exchanged can be tracked or exchanged in a distributed ledger
Incredible potential for blockchain

- Operations or audit trails
- A trustworthy middle ground
  - Tracking
- A new kind of protector/provenance
  - Cars, jewelry, musical instruments
  - Mad cow disease
  - Management assertions and auditor’s opinions
- Track Rolexes on the Clockchain
- Track boats on the Dockchain
- Track guns on the Glockchain
- Track diamonds on the Rockchain
- Track derivatives on the Stockchain
- Track Star Trek collectibles on the Spockchain
- Track Chinese restaurant reviews on the Wokchain
What is FDIC doing with Fintech?

FDIC created an interdivisional Fintech working group in 2016 headed by RMS Capital Markets.

The FDIC Fintech working group meets monthly and includes additional sub-groups that are tasked with researching:

- Fintech software vendors
- Fintech examiner education
- Fintech impact on FDIC policy and procedures.

In 2016, the Chairman was presented with the possible impacts Fintech could have on FDIC operations and policy.
Impact on community banks

Community banks are fully aware of blockchain and smart contracts.

Community banks are embracing blockchain and smart contracts but they do not have the necessary resources to fully invest into the new technologies.

A different story for the large and mid-size banks.

The Memphis field office conducted an interview with a $100 million community bank on blockchain and smart contracts technologies.
Community bank Blockchain use case

Use Case:

- $100 million bank
- 27 employees, three branches, and a loan production office
- Bank established for more than 100 years
- Significant internal turnover every year when there is a new exam
- Traditional problems include:
  - Internal routines and controls issues
  - Timely filing of Call Report
  - Poor Call Report workpapers
  - Reconcilements that lack dual controls
  - No supporting documentation missing documentation to support reconcilements.
  - Transactions fall off core system after 2 years and are stored in backup files
- CFO has been at the bank for 14 months. CFO tries to rely on employees for reconcilements however;
  - Turnover of support staff hinders accuracy
  - Have to continuously train someone
  - Trying to find a way to create separation of duties
  - Bills and checks being handled by different departments
Bank identified 3 benefits of using Blockchain

Potential Benefits of a DLT

1. Accounts Receivables / Accounts Payables
   a. Use a DLT to establish procedures, approval and tracking from when a bill is received to when a bill is paid
      i. Invoice comes in, added to DLT with specific public key and that corresponds with invoice number. Bill digitally scanned and stored on server outside of DLT
      ii. CFO is notified when it is recorded, reviews details on DLT, approves or rejects on DLT.
      iii. Another employee received CFO information, cuts check based on CFO approval, records check number with public key and invoice number.
   b. Process establishes dual controls, confirms check has been paid, and then pulls into bank’s core system with the amount, that gets rolled into GL and eventually Call Report based on coding on the front end.
   c. Regulators/Auditors could review DLT and core system to confirm recordation and what bill was for. Would not create additional work for CFO to document workpapers
Bank identified 3 benefits of using Blockchain (cont’d)

2. Call Report
   a. CFO spends two full days working on Call Report, in addition to time throughout the quarter organizing and documenting transactions
   b. Directors require their approval for the Call Report prior to submission
   c. DLT Could:
      i. Provide directors public / private keys to ensure approval when Board meetings do not take place in a timely fashion and provide a recordation of approval
      ii. Centralize recordkeeping and documentation that transactions occurred
      iii. Used for workpaper documentation
      iv. Provide tracking for different employees who entered in transactions
   d. Must establish proper coding on front end, and establishing proper controls of keys and user access.
   e. May result in need to not file call report but provide transparency to DLT.

3. ATM/Vault User Access Controls
   a. More research is needed; maybe operate similar to AirBNB research.