

Investment Management and Hedge Funds: What's Happening Now

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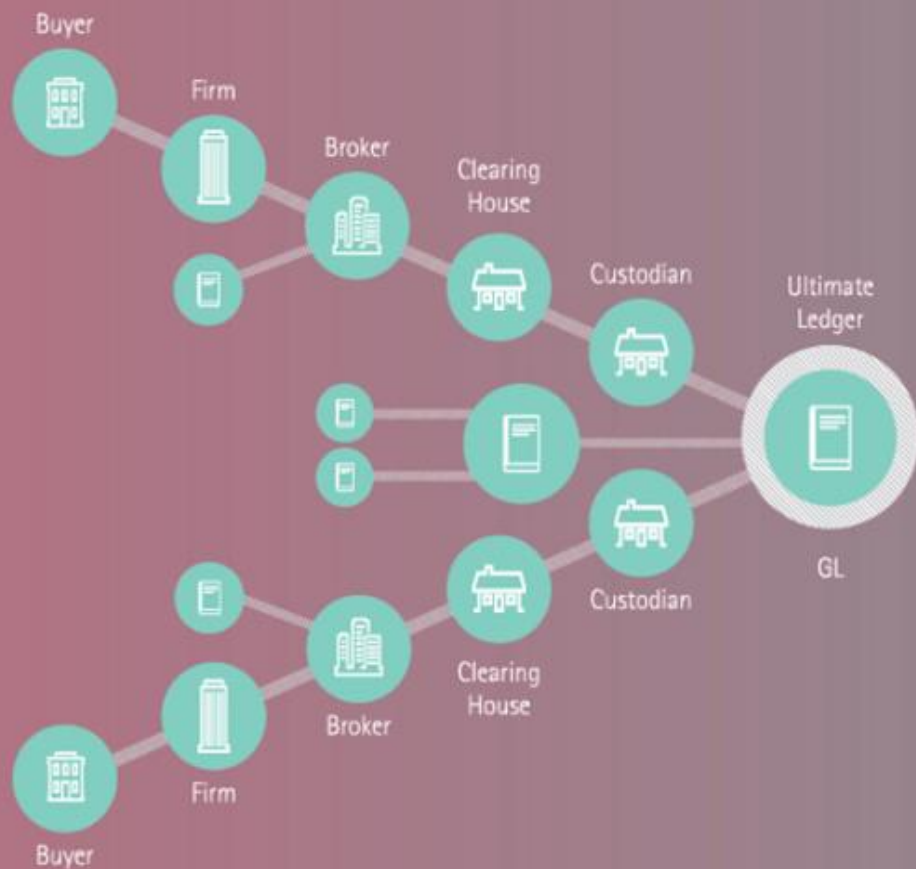
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Agenda

- ▶ Blockchains
- ▶ What it is and why it is important
- ▶ Smart Contracts history, characteristics and current challenges
- ▶ Examples
- ▶ Applications
- ▶ Current Players

Blockchain

Figure 1: Capital markets today



Source: Accenture Research

Figure 2: Capital markets in 2025



Source: Accenture Research

▶ Current –

- Current capital markets operate as a series of interrelated functions provided by various servicing firms. Each firm has its own role, and each firm is paid for its services. Ultimately, the record of a transaction is maintained at a clearing firm like DTCC. However, this is inefficient and prone to error (although, the model has persisted and functioned fairly well for the last 50 or so years).

▶ New Model –

- Figure 2 describes the evolution of the capital markets to an interrelated distributed ledger model where, instead of having one central depository of information, every participant in the market (whether public or private) verifies the information and thus verifies the completion of the transaction. Discrepancies between market verifiers (or “nodes”) are reconciled based upon rules laid down by the block chain protocol creator.
- This web model can be both public or private. It is up to the parties to define whether or not access to the ledger is available generally (as in the case of Bitcoin), or is proprietary and limited. Most private placement-type transactions, it is expected, would be through private distributed ledgers.

Blockchain

- ▶ Blockchain: just a record, or ledger, of digital events.
- ▶ Distributed: Bitcoin Blockchain has 7068 nodes (= copies) on 4/17/2016
- ▶ Can only be updated by consensus of a majority of the participants, 1 block at a time. Bitcoin Block size is 1 Megabyte.
- ▶ Once entered, information can never be erased.
- ▶ **Technical vocabulary :**
 - The block chain consists of blocks that hold timestamped batches of recent valid transactions. Each block includes the hash of the prior block, linking the blocks together. The linked blocks form a chain, with each additional block reinforcing those before it, thus giving the database type its name.

More information

- ▶ 22 min in-depth Youtube video on Bitcoin :
<https://youtu.be/Lx9zgZCMqXE>
- ▶ Existing live Distributed Apps (=smart contracts):
<http://dapps.ethercasts.com/>

Value Proposition

What it is and why it's important

The **Internet** changed how we move information, but did not change processes.



A **blockchain** creates a new medium for assets.

- ▶ Much has been written about the so-called “internet of things.”
- ▶ Obviously, “things” cannot be dematerialized and sent across the internet; however, evidence of ownership of “things” can be dematerialized into a digital form and evidence of ownership can be transmitted.
- ▶ The purpose of block chain is to eliminate a central clearing organization and, instead, use a distributed ledger technology verified by a limited number of nodes, as the mechanism for transacting business and evidencing the ownership of assets.

Value Proposition

What it is and why it's important

Complexity of Post Trade Settlement Process and How Blockchain Connects It All

Flows in new post-trade settlement process for cross-border transactions

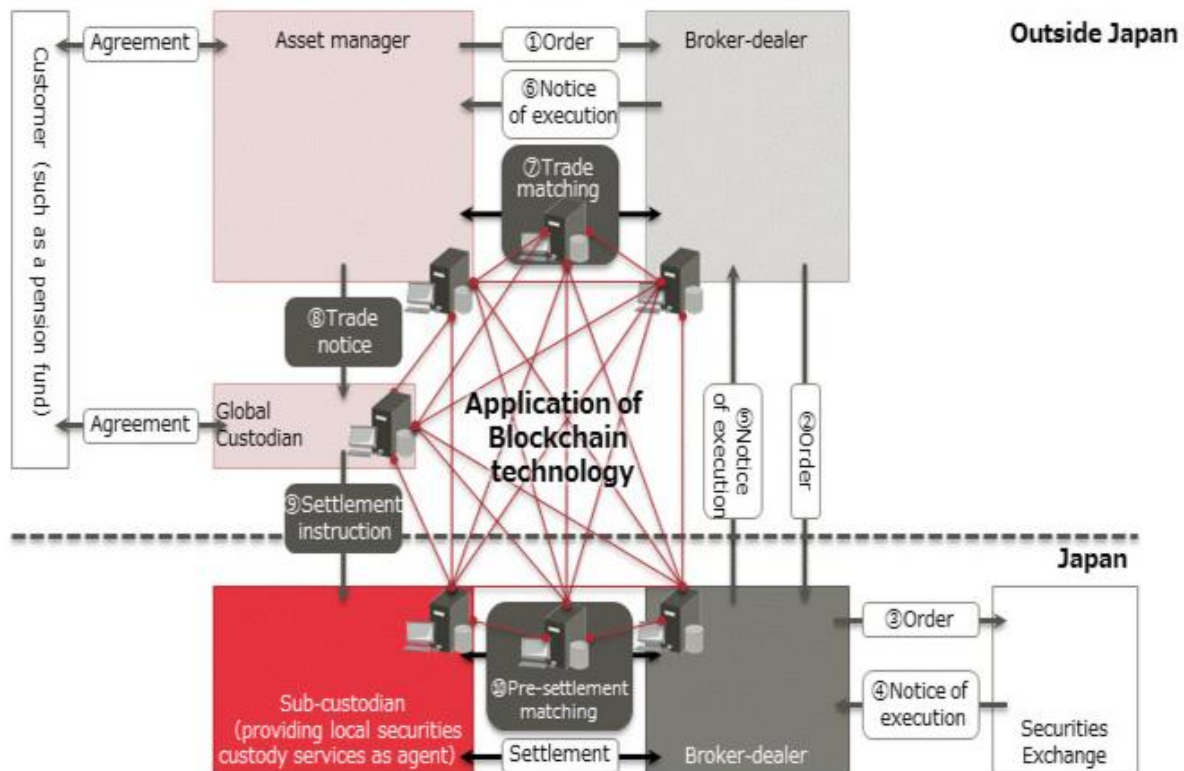


Photo: Fujitsu

- ▶ Interpreting the previous slide, it is important to start at an opening point. In this case, the opening begins with the asset manager (upper left-hand corner). The asset manager places an order to purchase security that happens to have its origination and custody in Japan. It transmits that order to the broker-dealer.

- ▶ The broker-dealer transmits that order to a corresponding broker in Japan.
- ▶ That broker then sends the order to the Securities Exchange in Japan, where the exchange is actually effected.
- ▶ The Exchange gives a notice of the execution of that transaction.
- ▶ The transaction is then “cleared.” Clearing occurs through a series of interrelated steps with custodians and sub-custodians but essentially means that a custodian who holds the underlying asset changes, on its ledger, who owns that particular instrument. Therefore, the ledger of the custodian becomes the ultimate arbiter of who owns what.

- ▶ Once the transaction is “settled,” a notice of that settlement is sent back to the Japanese broker-dealer.
- ▶ The Japanese broker-dealer sends notice to the broker-dealer that is the corresponding broker-dealer outside of Japan.
- ▶ The corresponding broker-dealer sends the notice to the asset manager indicating that in fact the trade has occurred.
- ▶ The asset manager and broker-dealer must verify that the transaction has in fact occurred and that settlement has occurred and that the ownership now is reflected on the books of the asset manager.

- ▶ The application of block chain technology results in not a linear or circular projection of information but rather a simultaneous multi-noded processing of information whereby every participant in the transaction knows that a sale has occurred, who now owns the property, what was paid for it.
- ▶ The sum and substance of the order, clearing, and verification – are all done in one fell swoop.
- ▶ Why wouldn't anyone embrace this technology?
 - There are many parties vested in the current system, however.

History

Smart contracts

- ▶ Transparent
- ▶ Self-executing
- ▶ Self authenticating
- ▶ Immutable
- ▶ Trade and settle T+0
- ▶ Breach is expensive



- ▶ In essence, a smart contract is like a vending machine.
 - With a vending machine, the purchaser places a token, a credit card, a coin into the machine and then makes a selection. The vending machine automatically dispenses the product (unless of course it gets stuck).
- ▶ That is the essence of a smart contract.
 - Some agent (the coin, the credit card, the token) starts a process; once the process is begun, it cannot be stopped.
- ▶ Smart contracts have been around for a long time; marrying them to the block chain, however, allows for a self-executing, self-verified contract without the need for a central clearing or verification house. A smart contract becomes like the vending machine: point of sale delivery.

Smart Contract Characteristics

Key characteristics and ecosystem

- ▶ Reduce the human factor / processes
- ▶ Enable embedding of contract conditions
- ▶ Multiple steps and multiple parties
- ▶ Interact with external data feeds
- ▶ No central authority

Smart Contracts

▶ Are smart contracts legal contracts?

- Connection between human-language documents and smart contract code?
- Fundamental changes in foundation of contract law?
- Are there implied terms of a contract, or terms incorporated by reference?

Smart Contracts (in FinTech)

- ▶ **What are some of the challenges?**
 - **Confidential disclosures of trade terms**
 - **“Pure” blockchain/smart contract implementations poses one size doesn’t fit all challenge**
 - **Public v private blockchains**
 - **Smart contracts / blockchain not the only solution to “real time” (e.g., T+0) settlements**

Challenges

Business and legal challenges

- ▶ Fragmentation
- ▶ Interoperability
- ▶ Need for standards
- ▶ Scalability
- ▶ Privacy
- ▶ Regulatory
- ▶ Skeptics

- ▶ Fragmentation – While this can be viewed as a negative, it is also a positive. Therefore, in terms of evaluating whether smart contracts will be implemented, fragmentation is a mutual concept. The concept that a number of verifiers are present in an ecosystem allows for fragmentation of individual contract pieces.
- ▶ Interoperability – A contract becomes automatically operational upon the occurrence of certain events. This is no different than certain letters of credit under the UCC, or futures contracts or other options that are put into place that must occur unless an intervening event or supervening event stops them. The smart contract will operate in the exact same way.

- ▶ Need for standards
 - There is an acute need for a standardization of terms. There is, however, precedence for this as specified in the Uniform Commercial Code and later by the ISDA swaps master agreement protocols.
- ▶ Scalability – Smart contracts, the internet of things, and block chain are infinitely scalable.
 - There virtually is nothing that can stop the implementation of these contracts regardless of how large they may become or how big the dollar amounts or volume is. The one constraint is whether or not there is sufficient bandwidth on the internet to accommodate an influx of massive block chains with a multitude of verification nodes and many transactions in the history.

▶ Privacy is an issue

- The block chain becomes public. Even in a private network, it is public to the people who are party to the private network. The essence of the block chain is the ability to verify the information in the block chain. That requires transparency, and therefore privacy becomes secondary as a consideration.

▶ Regulatory

- There presently is no regulatory backdrop – that means that these contracts will need to be forced into standard regulatory models. That may slow down but will not stop the implementation of block chain technology.

▶ Skeptics

- Sure, there are many, but whether or not the skeptics will rule the day is still an open question.

An Example of Smart Contract

- ▶ At core, these automated contracts work like any other computer program's if-then statements.
- ▶ They just happen to be doing it in a way that interacts with real-world assets.
- ▶ When a pre-programmed condition is triggered, the smart contract executes the corresponding contractual clause.

```
// this function is executed at initialization and sets the owner of the contract
function Diana() {
    owner = msg.sender;
}

// fallback function - simple transactions trigger this
function() {
    enter();
}

function enter() {
    if (msg.value < 10 finney) {
        msg.sender.send(msg.value);
        return;
    }

    uint amount;
    if (msg.value > 100 ether) {
        msg.sender.send(msg.value - 100 ether);
        amount = 100 ether;
    }
    else {
        amount = msg.value;
    }

    // add a new participant to array
    uint idx = participants.length;
    participants.length += 1;
    participants[idx].etherAddress = msg.sender;
    participants[idx].amount = amount;

    // collect fees and update contract balance
    if (idx != 0) {
        collectedFees += amount / 10;
        balance += amount - amount / 10;
    }
    else {
        // first participant has no one above him,
        // so it goes all to fees
        collectedFees += amount;
    }
}
```


Players in Blockchains for Capital Markets

- ▶ Seemingly every major bank and broker dealer.
- ▶ Major “settlement players” such as DTCC and Markit.
- ▶ New financial services blockchain providers such as
 - Digit Asset Holdings, owned by major banks and broker-dealers, and players such as DTCC and CME (CEO is Blythe Masters), and
 - Axoni (who codes permission and ledger technology)
- ▶ Non-profits such as Linux Foundation and its Hyperledger project.

Potential Applications for Blockchains in Financial Services (excluding payments).

- ▶ Share Registration.
 - In France BNP Paribas is creating a blockchain platform for crowd funding of private companies, with resales permitted.
 - Overstock.com
 - Trade and settle its own preferred stock on a platform run by their tø.com subsidiary.
- ▶ Trading, netting and settlement of CDS and repo.
- ▶ Maybe trading, netting and settlement of anything?
[equities, stock loan, futures, currencies, bonds, etc.]

CDS

- ▶ Players: BAML, Citi, CS, JPM, DTCC, Markit, Axoni.
 - Single name CDS.
 - A peer to peer distributed ledger was used to record the trades after they were generated and matched the old fashioned way.
 - Created a distributed record of the CDS contract terms.
 - Maybe not as exciting yet as press releases seemed to make it sound.

Repo

- ▶ DTCC and Digital Asset Holdings are working on a distributed ledger solution for clearing and settlement of U.S. Treasury, Agency, and Agency mortgage-backed repos.
- ▶ DTCC (FICC) does not currently settle the start leg of same-day starting trades; they are settled bilaterally in a cash and securities exchange. That means day to day rolls of overnight repo cannot be net settled.

▶ 39287857.1

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- ▶ Concentrates his practice in securities law, particularly in representing investment management companies and other clients on matters arising under the Investment Company Act of 1940 and the related Investment Advisers Act of 1940, and broker dealers and commodity futures traders and pool operators
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- ▶ Leads Global Debt Registry's commercial operations including business development, partnerships and marketing, bringing to his role more than 20 years' experience in building new financial services businesses
- ▶ Led teams in Europe and the United States at Thomson Reuters, Lloyds of London and Barclays Bank, helping to grow early stage ventures with roles covering innovation, strategy, marketing, business development and account management
- ▶ Marketing graduate of London Guildhall University and received his MBA from the University of Surrey, in parallel with the International Management Center, during which time he was awarded a scholarship to attend the Executive Management Program of Kellogg Business School



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- ▶ Chairman of the Board of Advisors for Gatecoin, a blockchain asset exchange; Founder, CEO and Editor in Chief of Lending Times, a media and affiliate marketing company in the peer-to-peer, marketplace and alternative lending space
- ▶ Sold and exited his most successful company, Boston Technologies (BT) group, in 2014. BT was a technology, market maker, high-frequency trading and inter-broker broker-dealer in the FX Spot, precious metals and CFDs space company.
- ▶ Over the last 10 years, founded 10 companies in online lending, craft beer brewery, exotic sports car rental space, hedge funds, peer-reviewed scientific journal, etc.
- ▶ Advised 30+ early stage start-ups in different fields and was a mentor at MIT's Venture Mentoring Services and Techstars Fintech in NY



Questions & Answers

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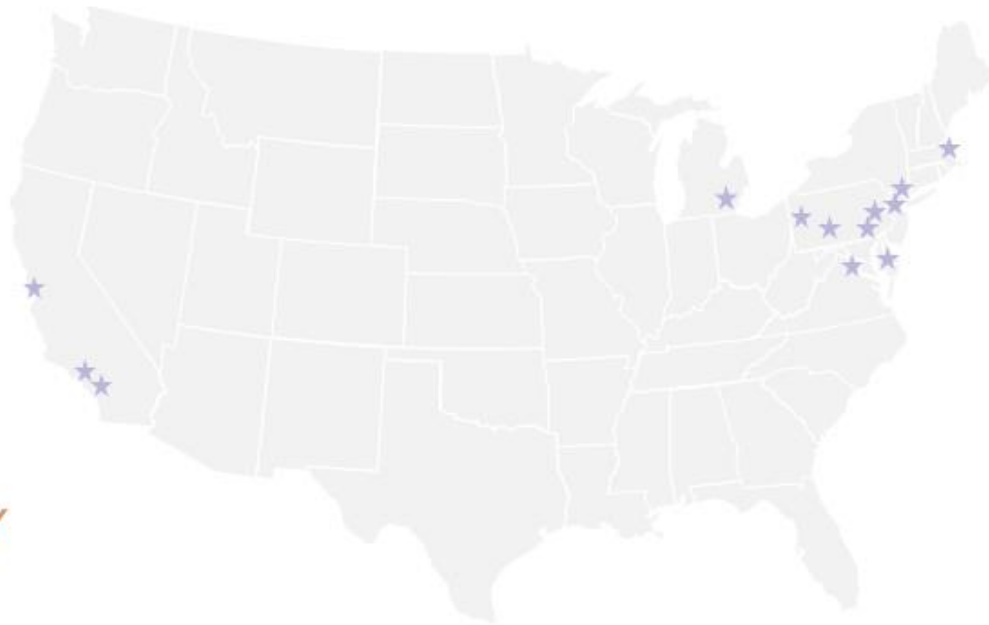
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