
區塊鏈技術與資產數位化

資本市場交易結算架構新範式

February 2016

For Discussion Purposes

區塊鏈是全球金融科技創新的焦點

新型態信用基礎建設是金融變革的新希望

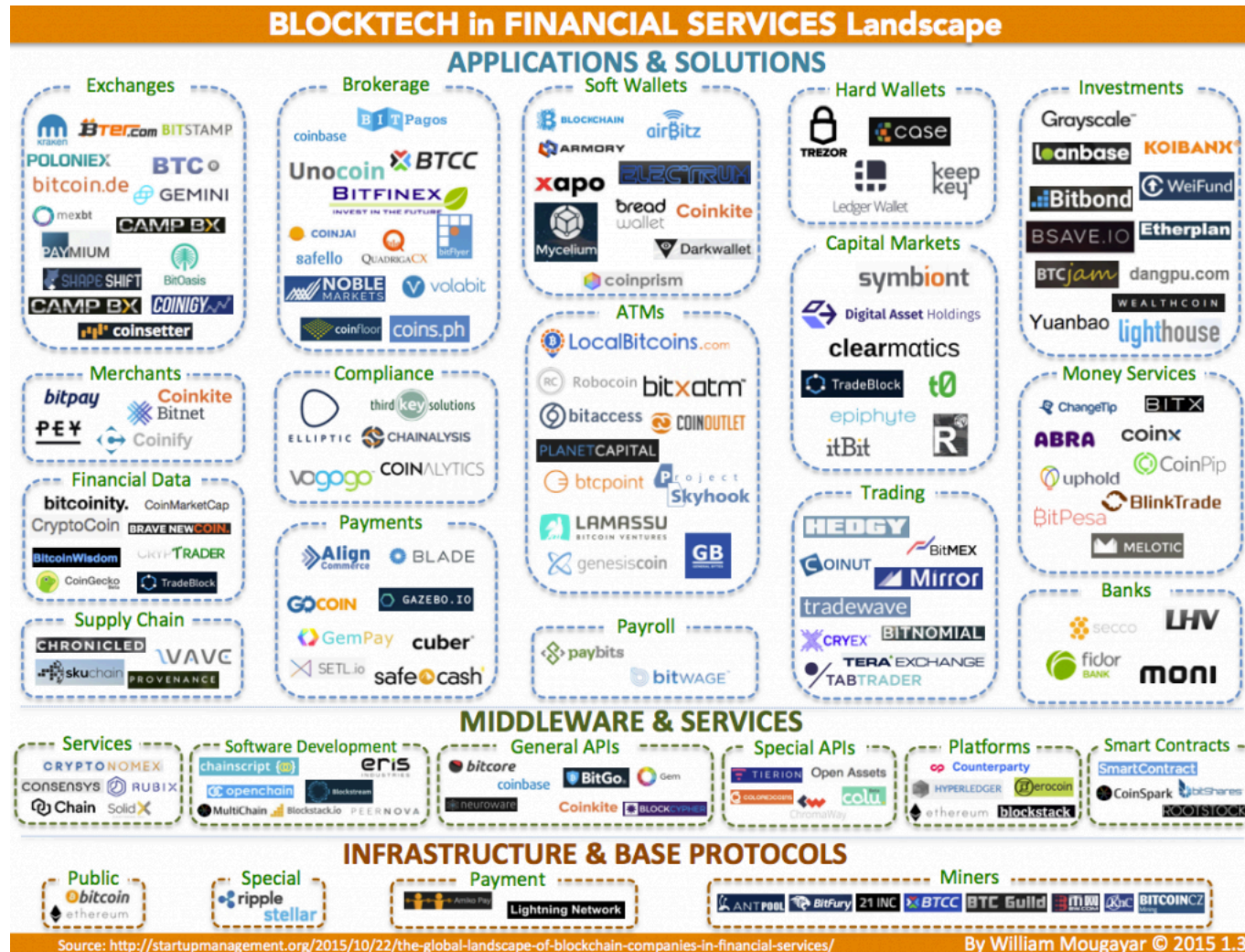


Blockchain Overview:

- An automated workflow process in which a disparate group of entities comes to majority consensus on the state of a shared ledger via non-hierarchical, peer to peer communication.
- A mathematically irreversible verification and authentication process which embedded in the network protocol.
- Ability to facilitate transactions between counterparties without a trusted central authority.
- A powerful new tool for implementing cross-entity, multi-asset clearing and settlement in market infrastructure.
- Potential as a viable alternative liquidity venue during liquidity crunch and credit crisis.
- Enabling technology for financial inclusion.

區塊鏈是全球金融科技創新的焦點（續）

總計高達十億美元的創投資金已投入相關的新創企業



區塊鏈是全球金融科技創新的焦點（續）

華爾街與矽谷精英：錯過區塊鏈就好比二十年前錯過互聯網

MARKETS

Ex-J.P. Morgan CDS Pioneer Blythe Masters To Head Bitcoin-Related Startup

Wall Street veteran will become CEO of Digital Asset Holdings, which formally launches Wednesday



Blythe Masters, shown in Denver in April 2012, helped pioneer the credit-derivatives markets in the 1990s. PHOTO: DENVER POST VIA GETTY IMAGES

By **MICHAEL J. CASEY**

March 11, 2015 12:41 a.m. ET

2 COMMENTS

Former **J.P. Morgan** Chase & Co. executive Blythe Masters has become one of the most high-profile Wall Street bankers to join the burgeoning digital-currency sector, taking on the leadership of a new platform for settling trades in bitcoin and other digital assets.

“How seriously should you take this blockchain technology? About as seriously as you should have taken the concept of the Internet in the early 1990s.”

- Blythe Masters
CEO, Digital Asset Holdings



Mark Andreessen – Tim Draper – Fred Wilson:
Bitcoin today is like the Internet in 1994

區塊鏈是全球金融科技創新的焦點（續）

華爾街與矽谷精英：錯過區塊鏈就好比二十年前錯過互聯網

JPMorgan Chase

Blythe Masters and JPMorgan trial blockchain project

Bank working with Digital Asset Holdings in efforts to cut trading costs



Blythe Masters © Bloomberg

JANUARY 31, 2016 9:25 PM
by: Ben McLannahan in New York

Goldman Sachs Group

Goldman Sachs files patent for virtual settlement currency

US bank files patent application for bitcoin-like ledger system



© EPA

DECEMBER 3, 2015 5:05 PM

Less than a year after
Blythe joining DAH!

區塊鏈是全球金融科技創新的焦點（續）

全球知名金融機構已積極加速佈局投資

- **Goldman Sachs – part of \$50M investment into Circle (US) and has filed US patent for SETLcoin**
- **NASDAQ – enabled first-ever private security issuance via its blockchain platform Linq**
- **New York Stock Exchange (NYSE), BBVA, USAA, Westpac – part of \$75M investment into Coinbase (US)**
- **CME, Euroclear, LCH.Clearnet, LSE formed blockchain settlement group**
- **R3CEV, a permissioned Blockchain pilot program with broad support from 42 leading global banks**
- **Mitsubishi UFJ Capital & Mitsui Sumitomo Insurance – \$4M investment in bitFlyer (Japan)**
- **Bank of England also proposed to study the feasibility of “digitizing” GBP onto Blockchain.**
- **People’s Bank of China considered launching its own digital currency.**

區塊鏈技術與相關法規挑戰

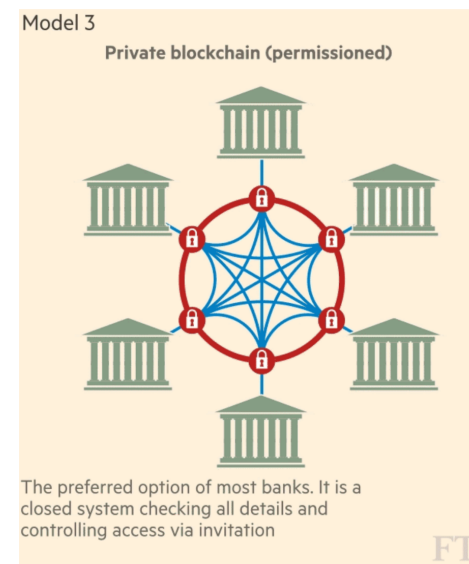
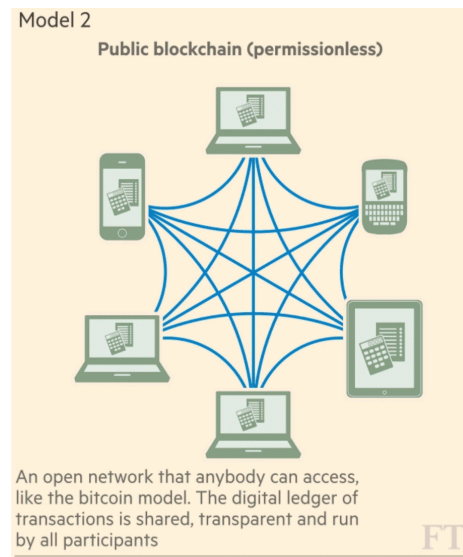
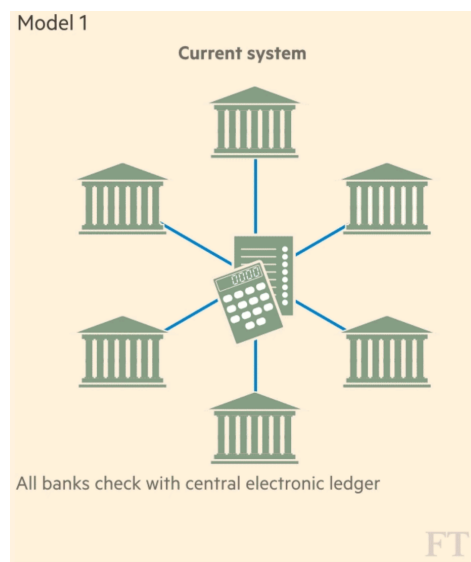
先進國金融監管機關持審慎開放態度支持金融創新

- UK Treasury, HM Revenue & Customs, Bank of England have put together the most comprehensive set of policies (<http://www.thenewslens.com/post/141218/>)
- NY State has begun collecting applications for BitLicenses (<http://www.coindesk.com/nydfs-22-bitlicense-applications/>)
- European Court of Justice Rules Bitcoin Exempt from VAT (<http://www.coindesk.com/bitcoin-is-exempt-from-vat-says-european-court-of-justice/>)
- Japan is still in deliberation mode and widely expected to promulgate constructive policy (<http://www.japantimes.co.jp/news/2014/12/04/business/bitcoin-policymaker-tries-gain-converts-election/>)
- Russia remains conservative due to ideology (<http://www.coindesk.com/russian-president-vladimir-putin-addresses-bitcoin/>)

區塊鏈技術概覽

從單中心到多中心清算網絡的新型態信用基礎建設

- 區塊鏈結合先進密碼學與網絡通信科技，實現了「共享帳簿」（shared ledger）或「帳聯網」此一新型態信用基礎建設。
- 單一中心信用架構：效率最高，但若該中心節點被攻陷，整個支付系統也就隨之癱瘓，且發展受限於經濟體的先天限制。
- 多中心化信用架構：同儕節點均保有一份經最新密碼技術保護的交易帳簿達成清算共識，創新快速但監管較為不易。
- 經監管機關認許（permissioned）的多中心化清算網絡是可在效益與效率之間取得平衡，又能與既有系統兼容並蓄的新方案。

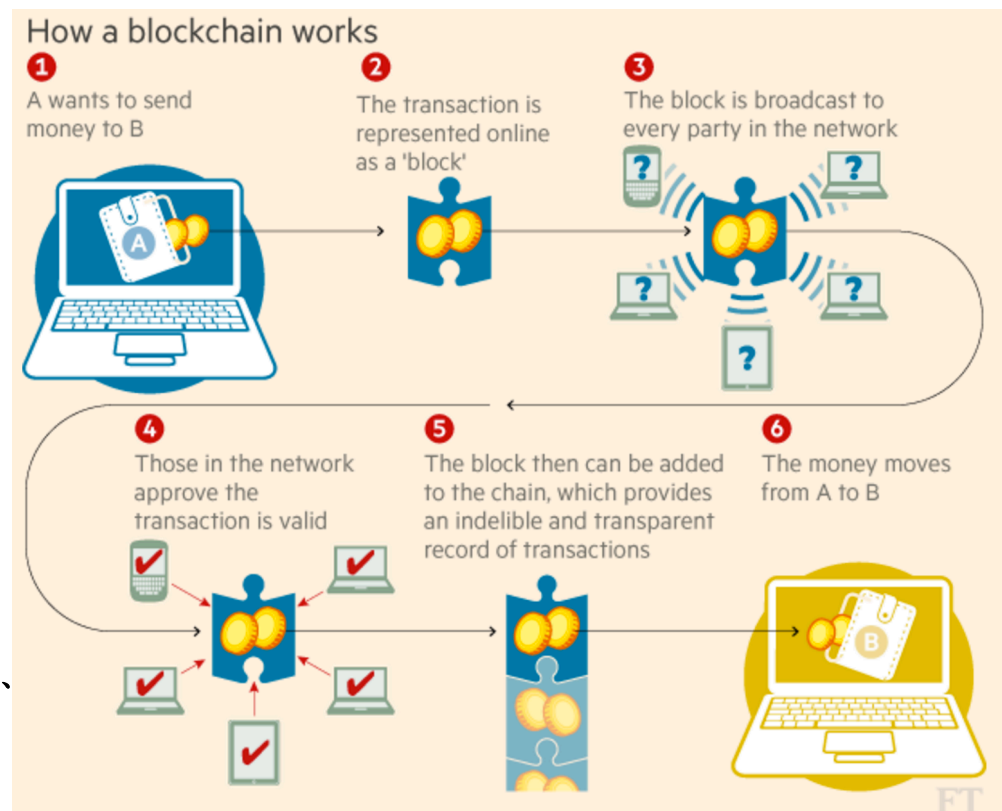


Source: Financial Times

區塊鏈技術概覽（續）

從單中心到多中心清算網絡的新型態信用基礎建設

- 想像一個連結不同支付與交易平台紀錄資料庫的「帳聯網」。
 - 經監管機構認許的帳聯網節點如同電子郵件伺服器。
- 「價值」傳遞應該如同電郵傳遞一般方便。
 - 網內互打 vs. 網外漫遊
- 支付平台之間應該達成無障礙互通互聯（interoperability）。
 - 範例一：用戶手機號轉換電信商；
 - 範例二：金融卡ATM跨行轉帳；
 - 範例三：小額點對點移動支付；
- 區塊鏈技術可立即實現支付平台，消費者與商家之間傳遞價值、紀錄交易的金融基礎建設。
 - 共享帳簿互聯網是繼複式簿記以來金融界的根本創新。



區塊鏈技術平台效益與風險

多中心化架構較能發揮網絡效益

單一中心清算架構

優勢：

- 每秒處理交易量較高
- 單一監控節點易於監管
- 高資本門檻建立市場秩序

劣勢：

- 單一失敗環節
- 高額前期資本投入
- 所有用戶均須與中心節點連結
- 大者恆大不利創新

多中心化網絡架構

優勢：

- 僅需聯網節點傳遞訊息
- 無單一弱點癱瘓網絡風險
- 基於互聯網的軟體通訊協定

劣勢：

- 同儕節點須守望相助
- 網絡共識仰賴同儕節點多數決

區塊鏈技術平台效益與風險（續）

帳聯網發展須努力兼採認許與非認許架構的長處

非認許帳聯網（Permissionless）

長處：

- 多中心化架構無須信用機構存在
- 可在金融基礎不足的經濟體迅速佈建
- 有效抗衡極權管控
- 開放系統促進跨境聯網（例：bitcoin）

短處：

- 網絡共識能源耗費高（“mining”）
- 容易出現監管漏洞

認許帳聯網（Permissioned）

長處：

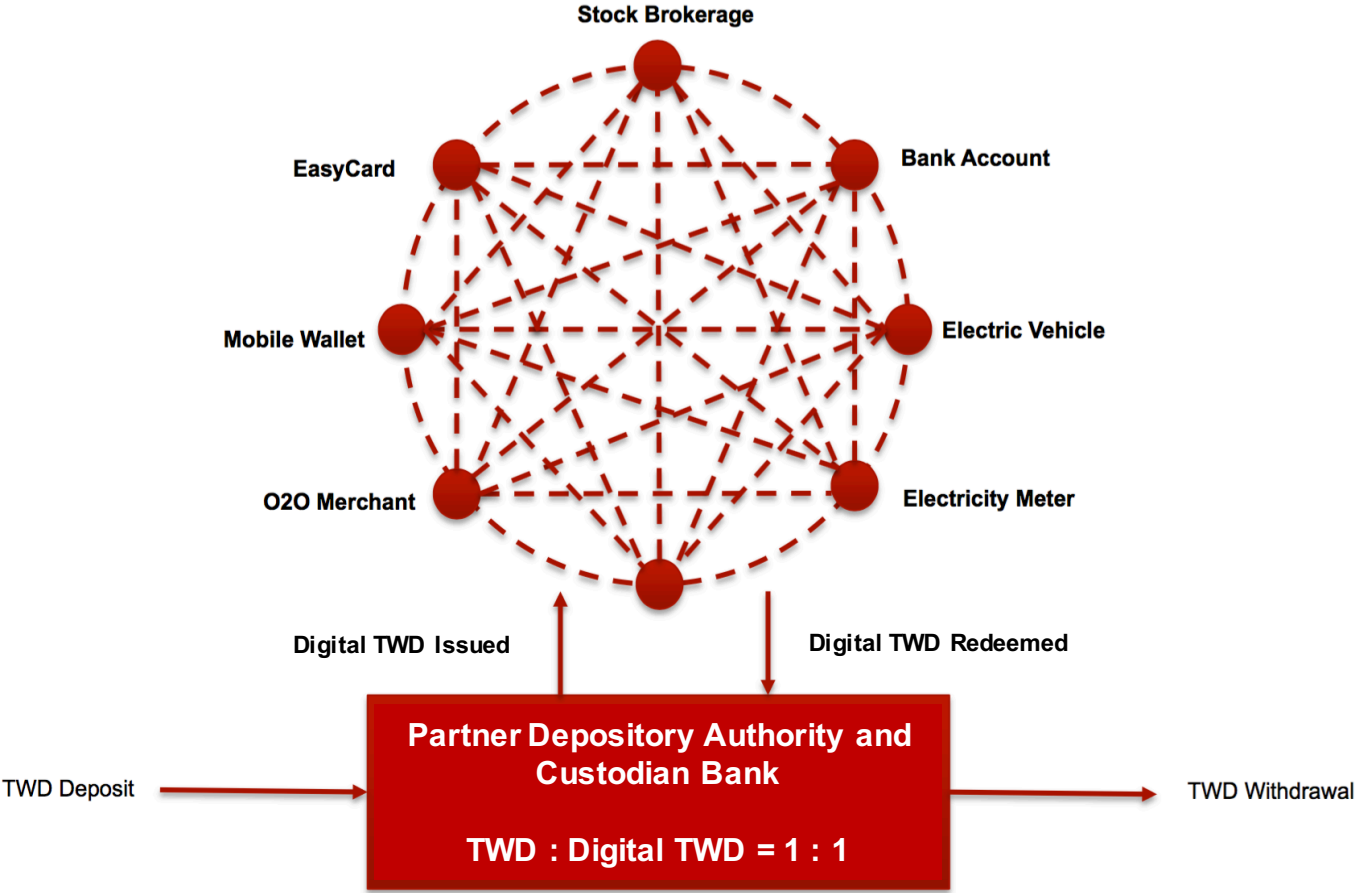
- 容易管理與換代升級
- 網絡共識較有效率
- AML/KYC程序較易落實

短處：

- 同儕節點必須有信用
- 跨境聯網不易無縫對接

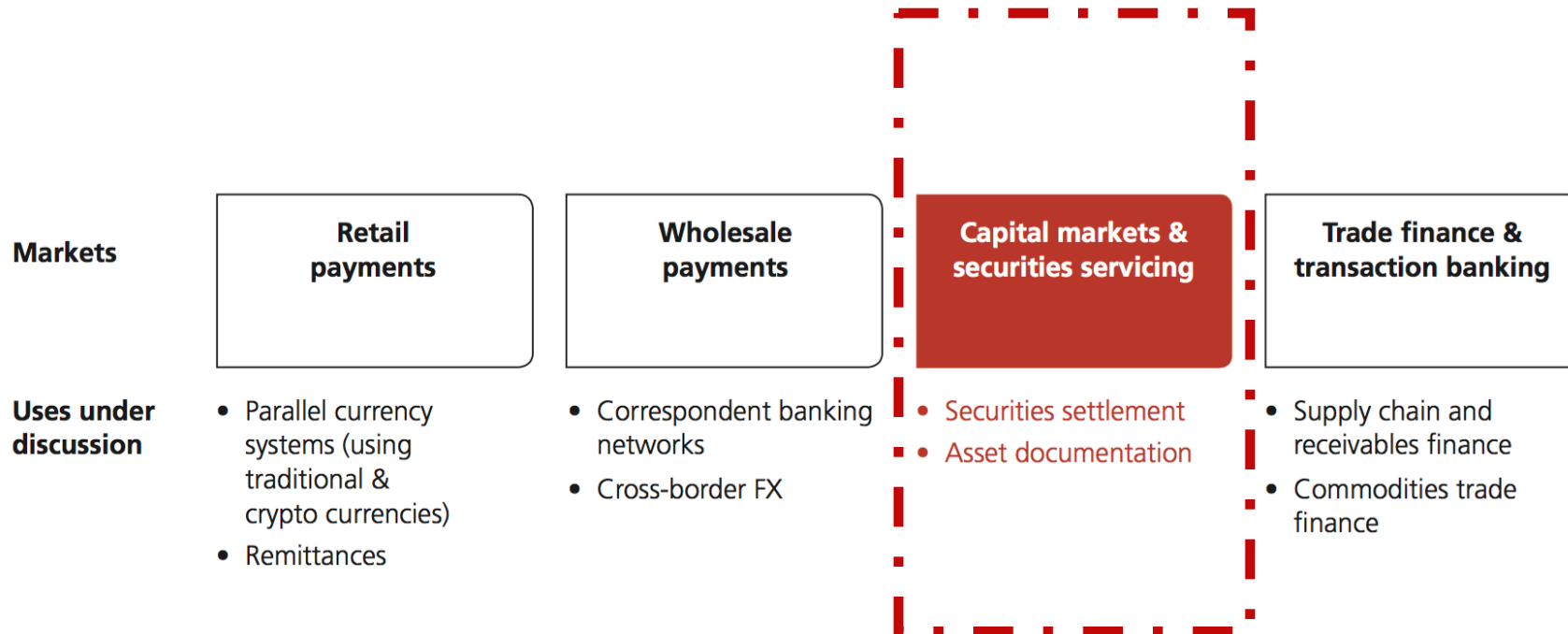
認許區塊鏈架構實施策略

帳聯網營運架構示意圖



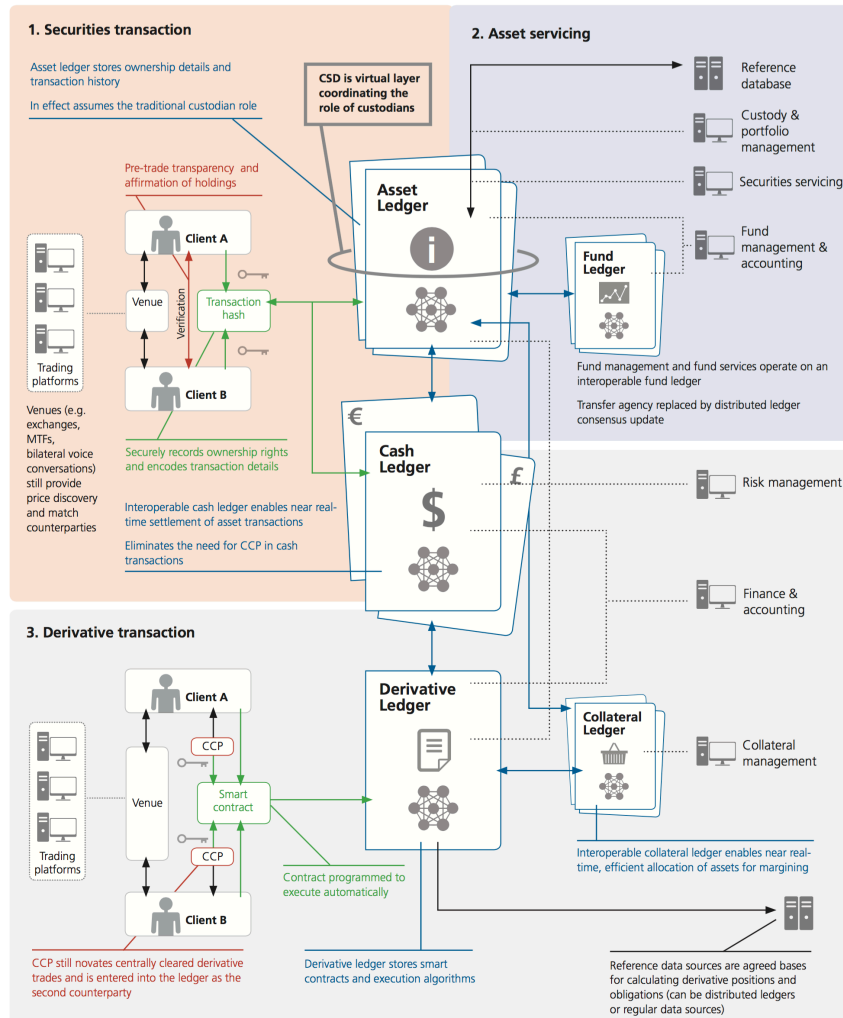
區塊鏈技術在資本市場的潛在應用

帳聯網信用基礎建設平台能力的自然延伸



區塊鏈技術在資本市場的潛在應用（續）

帳聯網2.0：數位資產交易結算大平台

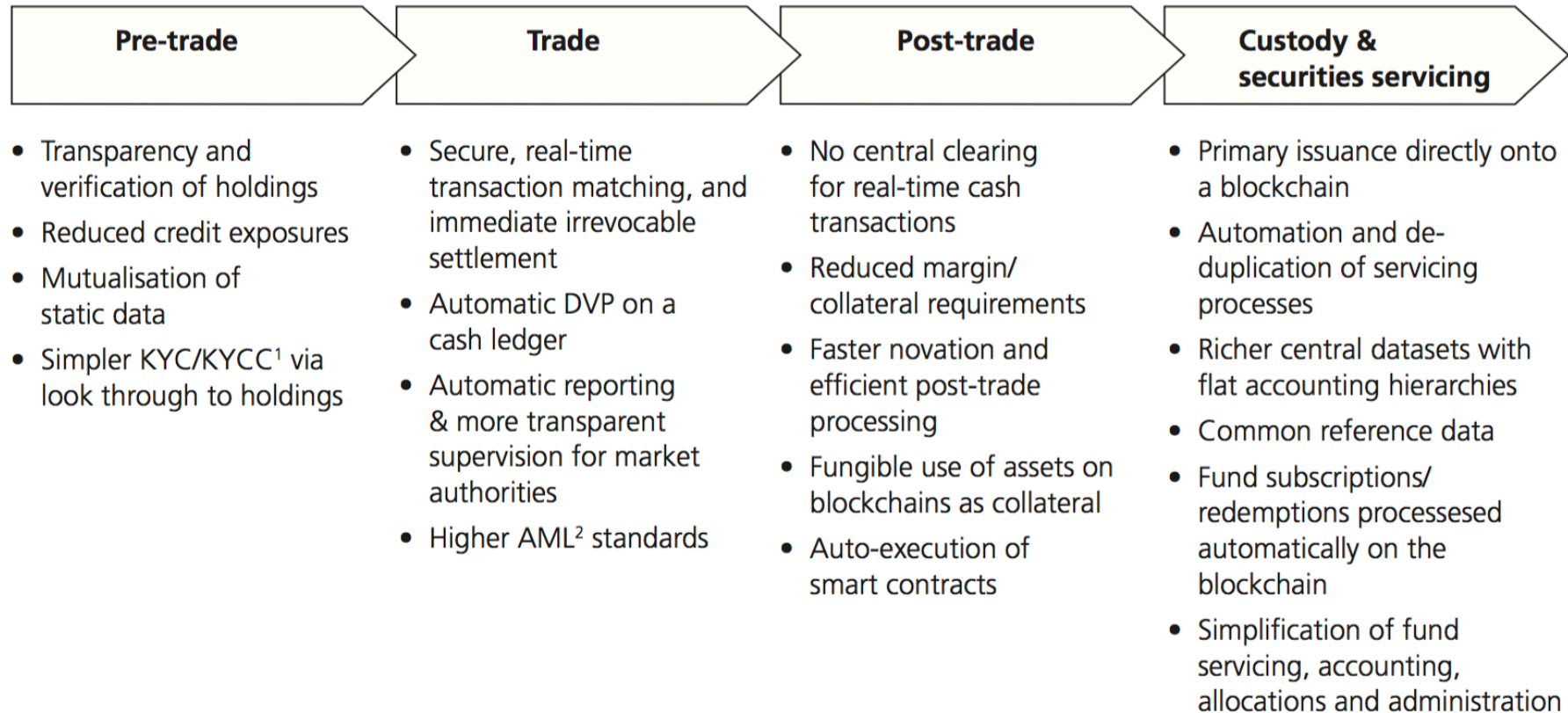


- **Assets digitally natively created and/or registered on a decentralized ledger via blockchain technology.**
 - 5 private blockchains to implement vital functions of the existing market utilities.
- **Settlement is a ledger update confirmed by the permissioned network participants.**
 - *Almost instantaneous trade settlement that significantly reduces capital cost and operating risk.*
- **Financial intermediaries that create little value-add in the trade lifecycle might become redundant.**
 - *However, links to existing trading systems and market infrastructure shall be preserved.*
- **A trusted central authority continues to provide critical clearing and depository functions.**
 - *Centralized & Decentralized systems serve as back-up capacity with respect to each other.*

Source: Euroclear

區塊鏈技術在資本市場的潛在應用（續）

帳聯網數位資產交易結算大平台的架構效益



¹ KYC – Know Your Customer, KYCC – Know Your Customer's Customer

² AML – Anti-Money Laundering

區塊鏈技術在資本市場的潛在應用（續）

帳聯網數位資產交易結算架構的建議實施策略

Type	Use case	Capital markets examples	Other industry examples	Rationale for adoption
First order adoption – works as standalone	<ul style="list-style-type: none"> Tokenising assets not currently on a common ledger (new blockchains or tokens on Bitcoin) 	<ul style="list-style-type: none"> Pre-IPO equities Syndicated loans Depository receipts 	<ul style="list-style-type: none"> Physical objects e.g. diamonds, paintings 	<ul style="list-style-type: none"> Proof of ownership/ provenance Settlement efficiency
	<ul style="list-style-type: none"> New blockchains to share data between participants 	<ul style="list-style-type: none"> KYC data sharing Collateral ledger to support efficient margining Reference and market data 	<ul style="list-style-type: none"> Supply chain data invoicing Trade finance 	<ul style="list-style-type: none"> Efficiency of information collection
	<ul style="list-style-type: none"> New blockchains to process transactions 	<ul style="list-style-type: none"> Corporate finance bookrunning Fund portfolio management 	<ul style="list-style-type: none"> Inter-bank blockchain to support cross-border banking payments Intra-bank blockchain to support cross-bank accounting 	<ul style="list-style-type: none"> Disintermediation of actors Simplified data and infrastructure
Second order adoption – reliant upon critical mass of assets on blockchains	<ul style="list-style-type: none"> Monitoring of richer datasets 	<ul style="list-style-type: none"> Concentration monitoring Market surveillance Pricing data 	<ul style="list-style-type: none"> Trade flows, transit data 	<ul style="list-style-type: none"> Powerful understanding of data
	<ul style="list-style-type: none"> Processing using blockchains 	<ul style="list-style-type: none"> Securities servicing Regulatory reporting 		<ul style="list-style-type: none"> Efficient processing capabilities

Multiple opportunities for capital market leaders to initiate pilot programs before disruption occurs

Source: Euroclear

區塊鏈技術在資本市場的潛在應用（續）

案例研究：NASDAQ Private Markets with Linq



Certificates

CERTIFICATES VERIFIED BY NASDAQ
VIEW WALLET & TRANSACTIONS

Search by participant

SERIES
✓ Seed
✓ Series A
✓ Series B

CLASSES
✓ Class B
✓ Common Class
✓ Class A

SORT: MOST RECENT LEAST RECENT MOST SHARES LEAST SHARES NAME (A-Z)

ISSUER	MORN	ISSUER	EZRI DAX
4,997,264 SEED Common Class	199,525 SEED Common Class	9,044,870 SERIES B Class B	12,968 SERIES B Class B
1/12/15	1/12/15	10/21/14	10/21/14
JADZIA DAX	WORF, SON OF ...	FEMALE CHANGE...	BRUNT
14,577 SERIES B Class B	48,355 SERIES B Class B	18,428 SERIES B Class B	48,382 SERIES B Class B
10/2/14	8/2/14	8/7/14	8/7/14

- The first platform from an established financial services firm to demonstrate how digital asset trading on blockchain-based platforms.
 - Part of Nasdaq's product suite of services for entrepreneurs and venture investors.
- Potential to remove operational pain points (mostly due to human errors) by providing immutable recordkeeping and a chain of custody for users.
- Cap table management dashboard with equity funding timeline monitoring toolkits.
 - Big implications for corporate finance and M&A activities.
- Startups using the platform can also view stock certificates by date of issuance and by overall ownership, drilling down into which investors hold the most shares in the company with a single click.
 - Look-through transparency offers multiple benefits.

區塊鏈技術在資本市場的潛在應用（續）

案例研究：Smart Contract via Ethereum



- Just as assets can be represented on blockchain ledgers, so can business logic enforcing contracts.
- These smart contracts, once embedded into a blockchain through consensus, cannot be modified.
- With a blockchain protocol such as Ethereum, the full range of logic that can be represented by a Turing-complete programming language, can also be embedded into a blockchain.
- Profound implications for security lending, cross-margining collateral provisioning, portfolio risk management, exotic financial derivatives structuring & execution, asset securitization, regulatory compliance monitoring, etc.

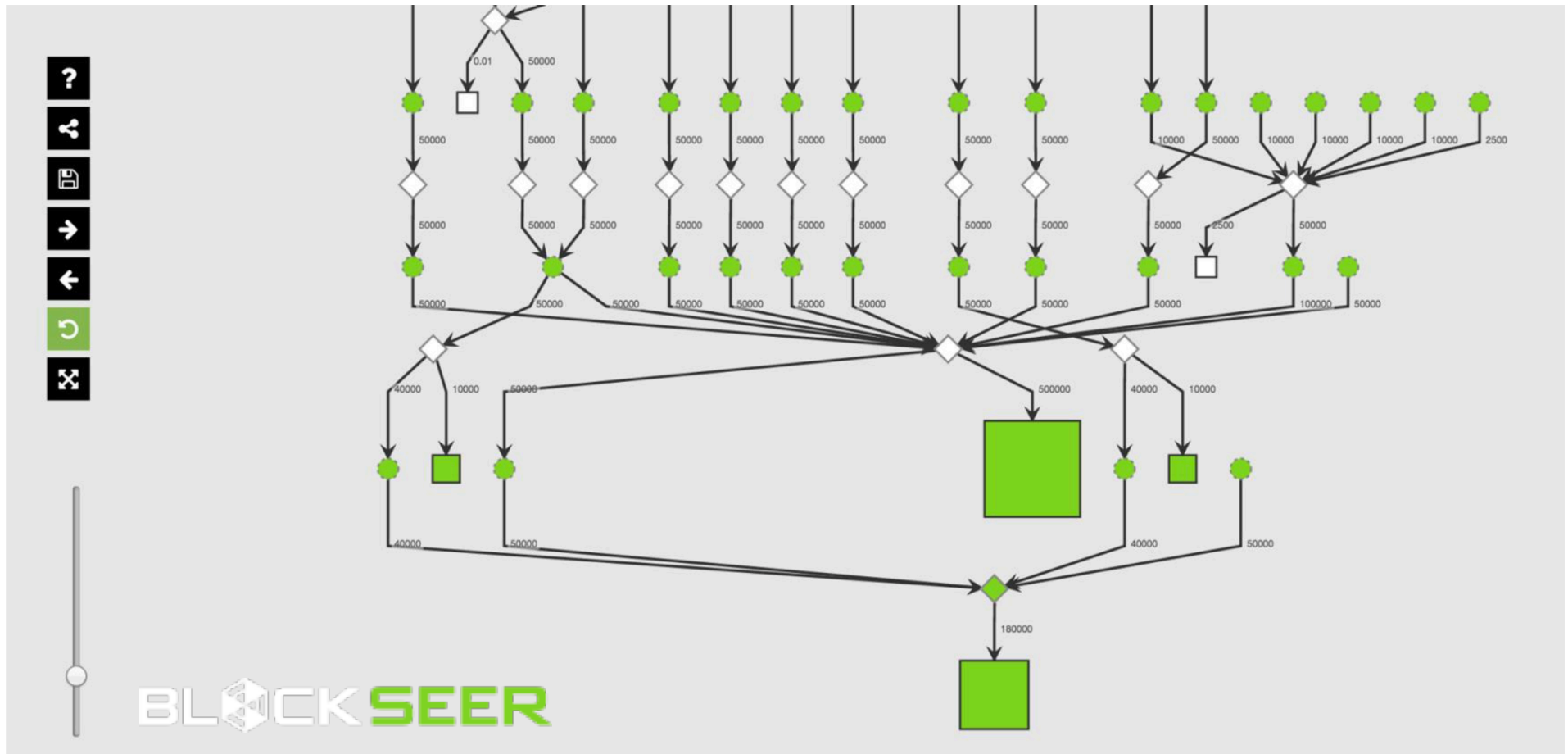
區塊鏈技術在資本市場的潛在應用（續）

案例研究：Crowdfunding via Smart Contract

```
contract token { mapping (address => uint) public coinBalanceOf; function token() {} function sendCoin(addr  
  
contract Crowdsale {  
  
    address public beneficiary;  
    uint public fundingGoal; uint public amountRaised; uint public deadline; uint public price;  
    token public tokenReward;  
    Funder[] public funders;  
    event FundTransfer(address backer, uint amount, bool isContribution);  
  
    /* data structure to hold information about campaign contributors */  
    struct Funder {  
        address addr;  
        uint amount;  
    }  
  
    /* at initialization, setup the owner */  
    function Crowdsale(address _beneficiary, uint _fundingGoal, uint _duration, uint _price, token _reward)  
    {  
        beneficiary = _beneficiary;  
        fundingGoal = _fundingGoal;  
        deadline = now + _duration * 1 minutes;  
        price = _price;  
        tokenReward = token(_reward);  
    }  
  
    /* The function without name is the default function that is called whenever anyone sends funds to a con  
    function () {  
        uint amount = msg.value;  
        funders[funders.length++] = Funder({addr: msg.sender, amount: amount});  
        amountRaised += amount;  
        tokenReward.sendCoin(msg.sender, amount / price);  
        FundTransfer(msg.sender, amount, true);  
    }  
  
    modifier afterDeadline() { if (now >= deadline) _ }
```

區塊鏈技術在資本市場的潛在應用（續）

案例研究：AML/KYC視覺化即時監控平台



區塊鏈技術平台投資策略

支持帳聯網新創企業可協助台灣金融業開創新藍海

■ 帳聯網技術架構可以更有效地實現金融科技創新的發展願景：

➤ **Regulated Interoperability, Cyber Security & Consumer Protection**

➤ 加強推動Bank 3.0革新方案，實現互聯互通、可管可控的用戶體驗。

➤ 整合跨領域資源，讓台灣成為亞太區領先的區塊鏈金融商品與服務創新的研發與投資平台。

➤ 發揮台灣既存優勢，掌握領先全球的關鍵契機，提升台灣金融業的全球競爭力。

➤ 創造經濟新動能與新希望，立足亞洲，進軍全球。

區塊鏈技術平台投資策略（續）

支持帳聯網新創企業可協助台灣金融業開創新藍海

■ 帳聯網技術架構可為台灣金融業帶來的利益：

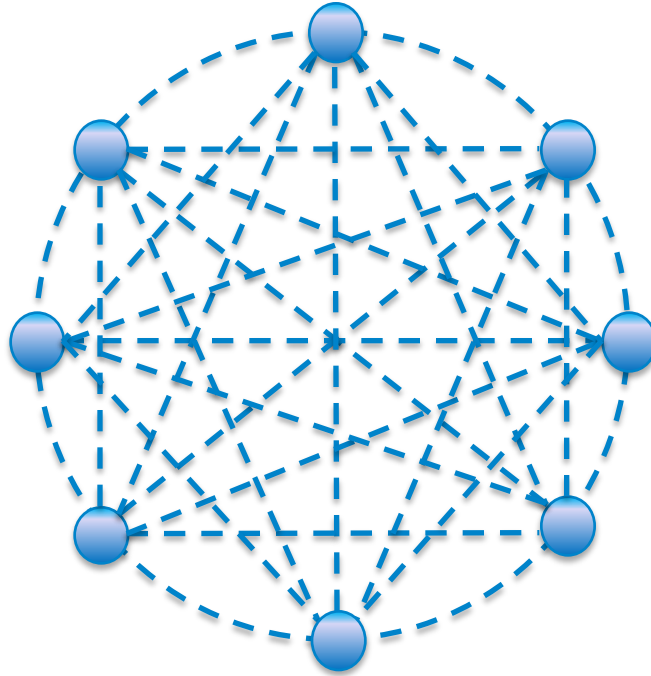
- 移動社群支付平台：創造互聯互通、可管可控的移動支付體驗，讓消費者與商家「信」而樂「用」。
- 信用評級機構：全行業共享底層用戶大數據，提升信用風險預警及控管能力。
- 商業銀行：自主創建信用卡/現金卡結算網絡，無須支付境外網絡服務費即可跨境支付，有利打「亞洲盃」。
- 證券承銷商與投資銀行：提升中後台跨資產級別的交易與清算能量，提升資本運用效率。
- 保險公司：從帳聯網到金融物聯網的自然演進，增強風險定價能力與管理水平。
- 基金管理公司：資產數位化創造具流動性的多元投資工具，實現金融商品大市集。
- 法律會計服務業：文件託管、公證、記帳等傳統業務的服務模式革新。
- 其他：食品安全認證機制，跨國企業金流即時監控、新型金融資訊犯罪預防服務，網絡聲譽防護。

區塊鏈技術平台投資策略（續）

以帳聯網打造金融科技開放市集大未來



Q & A



We Build the Internet of Value With You.