How to Assess Blockchain Value for Your Organization

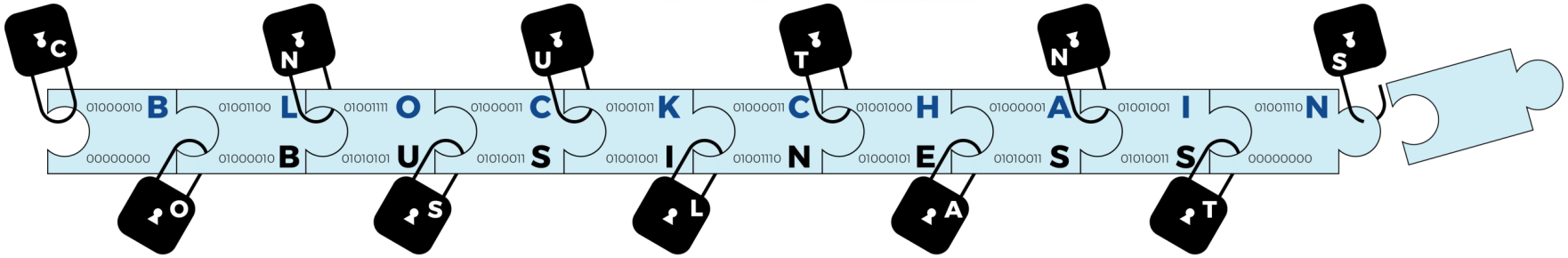
Harvard Business Review

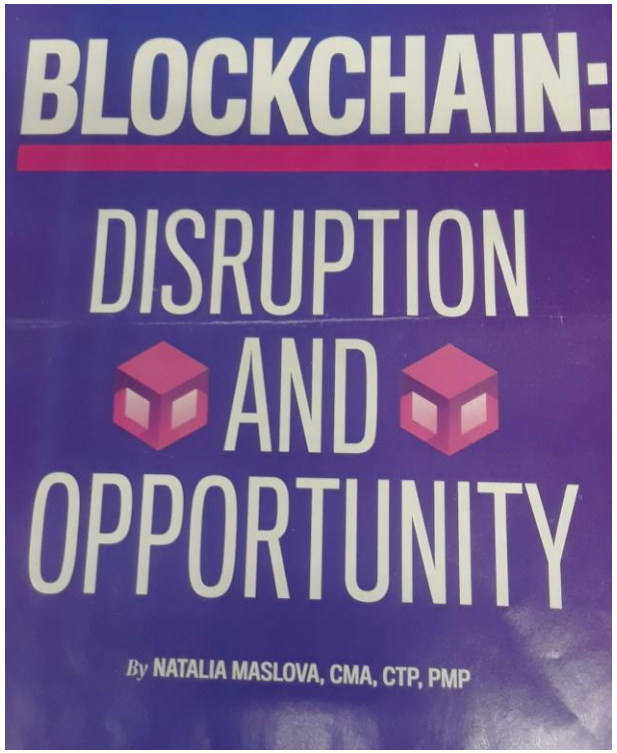
TECHNOLOGY

The Blockchain Will Do to the Financial System What the Internet Did to Media

by Joichi Ito, Neha Narula, and Robleh Ali

MARCH 08, 2017 **UPDATED** MARCH 09, 2017





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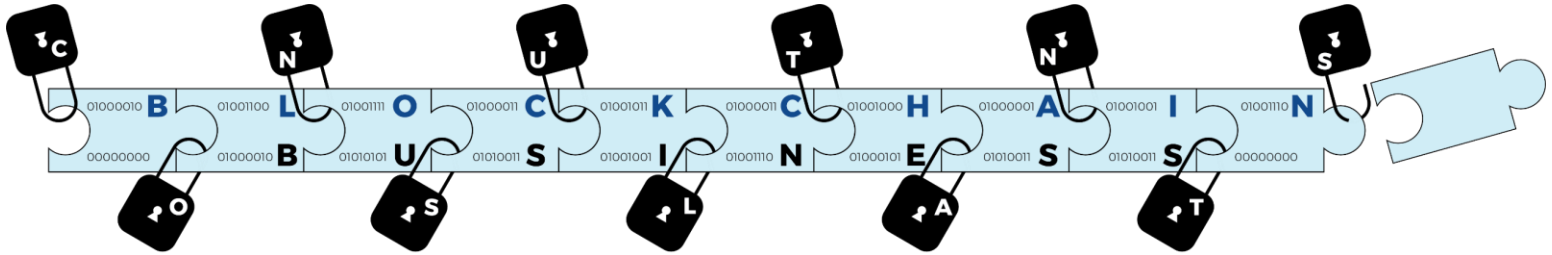
OVERVIEW



1. Show how BC technology can be used to safely share information and help integrate business partners
2. Understand how to evaluate feasibility, net benefit, ROI of blockchain applications for your organization
3. Explain use of multi-criteria decision analysis for blockchain assessment and decision-making

Welcome to email with questions

Understanding Blockchain Technology and its Capabilities

If you do not understand the basics of how Blockchains work—best to take this Illumeo course before continuing with Supply Chain course

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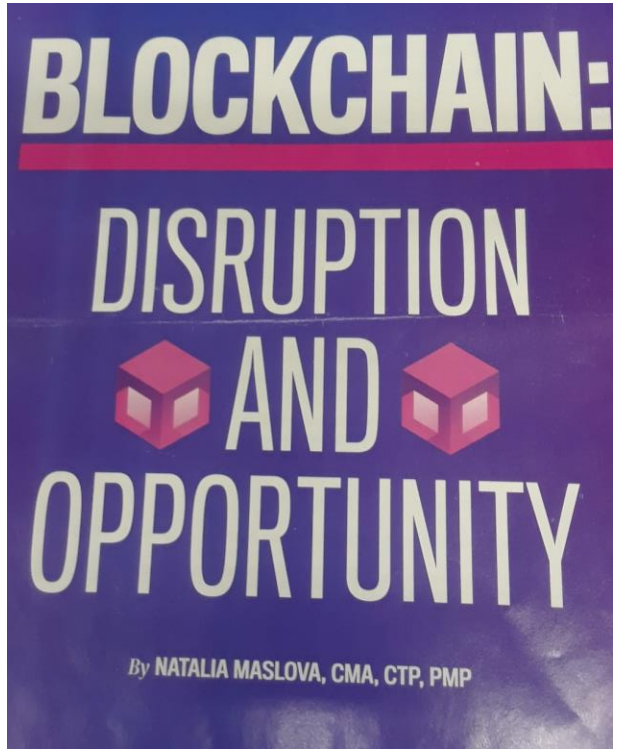

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Qualifications: Dr. Drew Miller

- Managing Director, Blockchain Business Consultants
- 20 years management consulting in process redesign, strategy, operations, IT
- Certified Management Accountant, Certified M&A Advisor, Certified Financial Planner, Certified Due Diligence Professional
- Manager, Corporate Planning and Development ConAgra Inc
- Vice Pres Business Development Securities America
- Investment Banking: Global Vantage Securities and H Roark & Associates
- CEO, Fortitude Ranch
- County Commissioner, Univ of Nebraska Regent
- Senior Executive Service, Dept of Defense
- USAF Academy graduate, intelligence officer, retired Colonel, USAFR
- Masters Degree and PhD, Harvard University

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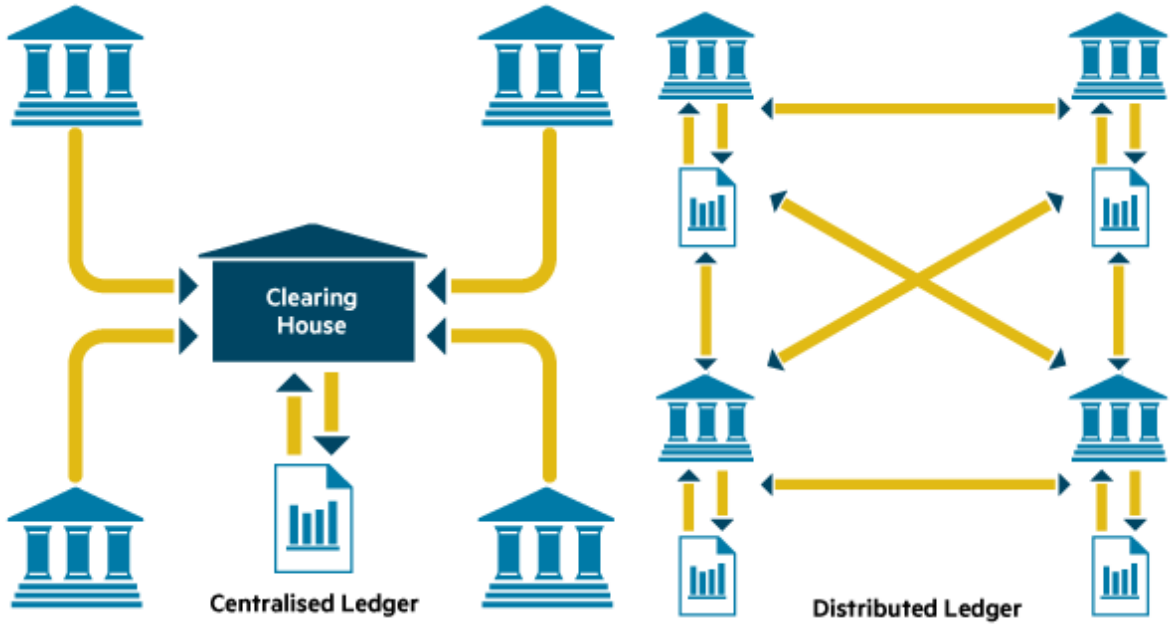
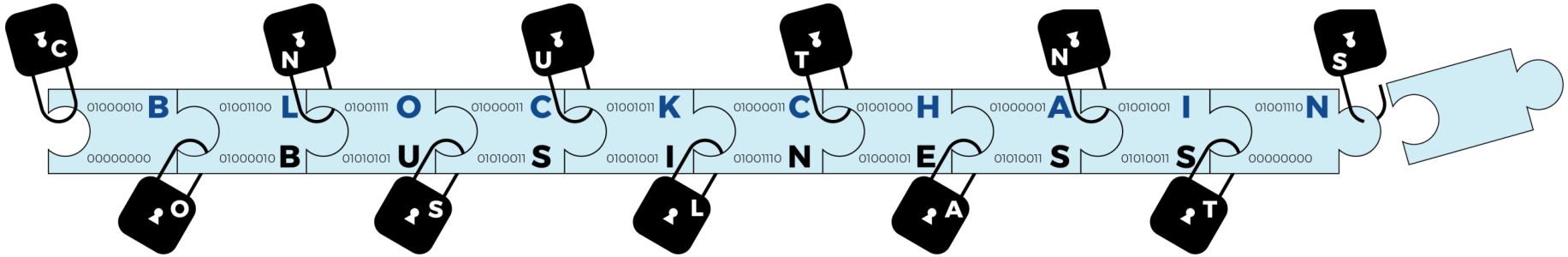
Blockchain Qualifications: Dr. Drew Miller

- Managing Director, Blockchain Business Consultants
- Certified Hyperledger Developer
- Certified Ethereum Developer
- Conducted Initial Coin Offering (ERC20 token, Ethereum blockchain)
- Hyperledger Blockchain for Business Certificate
- Consulting with businesses on supply chain applications of BC and assessing BC costs/benefits/risks/likely ROI/impact on competitive advantages
- 20 years management consulting in process redesign, strategy, operations, IT
- ERP and IT Architecture work for Dept of Defense huge IT systems, Senior Executive Service, Dept of Defense

Blockchain allows processing transactions without central control, more secure from hacking, ideal for sharing information reliably with business partners

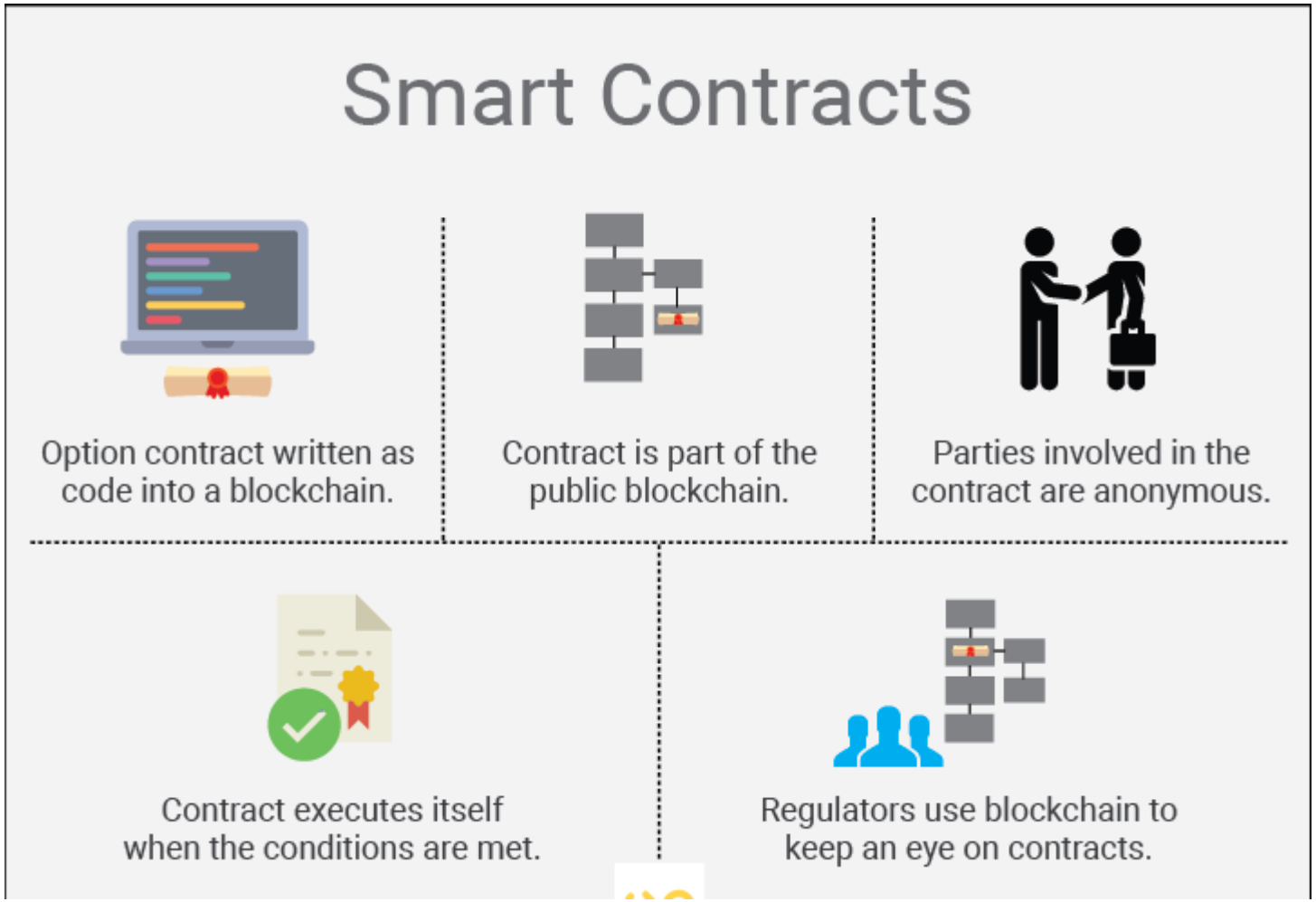




- A blockchain is:
  - A secure distributed ledger (database) where past “blocks” of entries are “locked in” so securely that you cannot alter them
  - Run by network of computers working together and competing to collect pending transactions, solve crypto problems to develop the “hash” to verify and lock in next block, and then reach agreement on correct block of transactions that is then locked into the blockchain

Smart Contracts that run on BC are a fantastic tool for business applications, cutting expenses

- Another extremely valuable feature of blockchain (developed by the "Ethereum" blockchain) is the ability to use "smart contracts"
  - Programs that run in the blockchain to execute assignments like sending out information, making payments, transferring ownership when the programmed conditions of the smart contract are met
- Smart Contracts can notify parties of goods arrival, automate invoicing and payments
- Being used to disintermediate banks and middlemen and administrative personnel in shipping and logistics process, saving money and lowering costs
- For businesses, Smart Contracts may be more valuable than traditional blockchain advantages



Source: Codebrahma

While BC started in finance (cryptocurrency) it is particularly valuable for Integrating IT Systems and Business Partners

1. BC is a “distributed database” – every user (or just authorized if private BC) on the BC has the data—not a collection of stove pipped databases
2. There is no “Central” controlling computer or company that owns and can alter the database on its own
3. As a result of this decentralized, distributed nature of BC:
   - Very hard to alter/hack/cheat the system
   - No single point of failure (many, most “nodes” can go down and BC still works)
   - May be able to get parties who don’t trust each other (including competitors) to share and use the same BC to have both better sharing of information and less IT cost and complications
4. Blockchains allow for greater traceability of transactions—and confidence that the data is correct
   - “immutable” (unchangeable) entries, complete history of all transactions
   - Great for avoiding counterfeit goods
5. Disintermediation of intermediaries like banks, lawyers, any company/authority that is now relied on as “trusted party” or controller of an information system
   - In Blockchain—it is computer networks and software systems that control and are trusted
   - “Smart contracts” that are locked into the blockchain system and executed by the computer network when agreed upon conditions are met—not lawyers
   - Unhackable digital currency to pay for online transactions (cryptocurrency—like Bitcoin, Ether, others) without banks or their big fees

Having one source of data that all parties can trust is extremely valuable

- Blockchain technology enables one shared database with all the information, versus siloed databases that must be connected or accessed—and may not be trustworthy if controlled by another party or vulnerable to hackers and data theft or alteration
- Can lock documents into the asset digital record on a blockchain so customs, other forms are easy to find and can't be tampered with
- With blockchain, all the parties involved, sometimes competitors don't have to trust each other, can share the same system and share (or not if private information) data
- If a shipping delay, problem with payment, anything out of what is planned, "Smart contracts" (programmed instructions) can immediately notify all relevant parties of the change and execute agreed contract terms
- In sum, blockchain ideal for sharing information amongst business partners (and government regulators where appropriate), and automating many administrative and payment functions with smart contracts

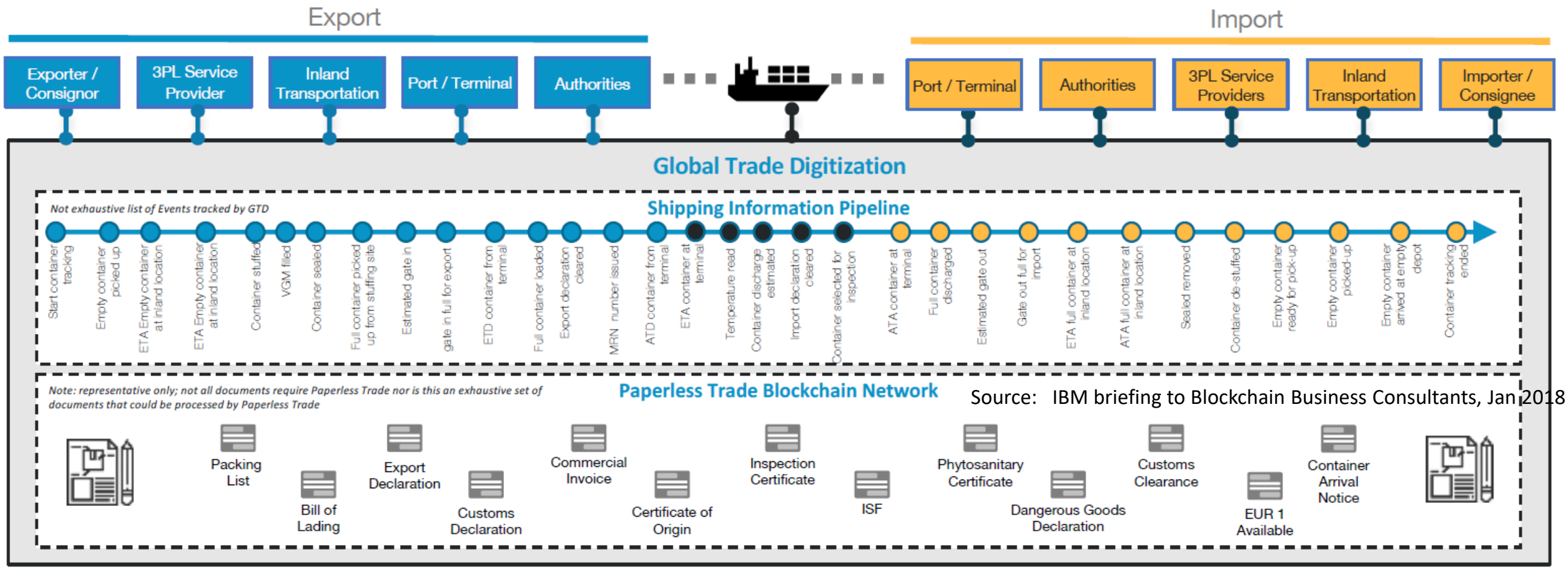
Blockchain's underappreciated, greatest application is Integration: IT Systems and Business Partner Integration

Dr. Drew Miller
Sep 28 · 13 min read

While most know about blockchain as the foundation of cryptocurrencies, even blockchain enthusiasts seem to be overlooking perhaps the most important capability of blockchain: an ideal systems integrator. Blockchain (BC) can be used to connect together siloed databases across multiple organizations and business processes, exploiting the IOT and Smart Contract billing and administrative cost reduction advantages while protecting confidentiality. Just as important is Blockchain's security and reliability which make it a much safer and more feasible means to connect a wide variety and large number of business partners together. BC as a secure distributed ledger is a key feature we all know of, but it is the specific capability of BC technology to allow integration and limited/trusted/secure sharing of data across not just multiple IT systems and companies but even competing parties and government regulators that really yields significant advantage for business

IBM and Maersk Shipping's Global Trade Digitalization project (now called "TradeLens") already a proven SC system

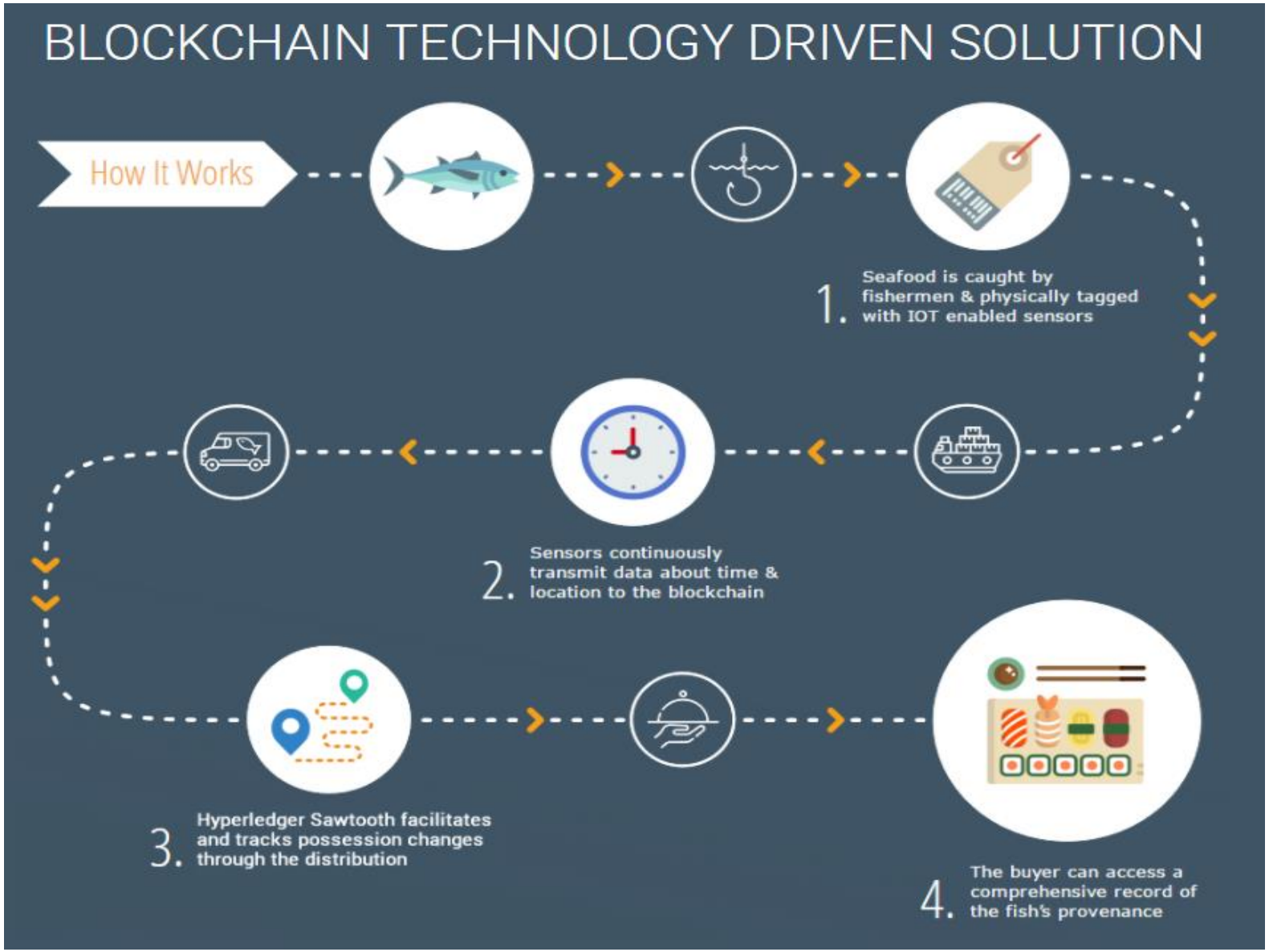
- This blockchain system keeps track of all documents for an ocean shipping container, notifies all parties of its movement, changes in status
- Government approvals and all information needed for a transaction and shipment are securely locked into the blockchain so all who are authorized can see it, but only legitimate, authorized entries can be made.



Source: IBM briefing to Blockchain Business Consultants, Jan 2018

All Industries will end up using BC for many different applications

- The ability to have a virtually hack proof shared database is relevant to almost all businesses
- Smart Contracts are incredibly valuable for automatically doing sends of information, authorizing or making payments, etc.
- The ability to use cryptocurrency (which could be a digital fiat currency as well) facilitates automated payments and cutting out middleman banks
- The tremendous amount of data from the **"Internet of Things"** is readily accessed, used and reliably recorded in a BC (example at right: time and location)
- Every industry involves some kind of sourcing; so at a minimum supply chain BC applications are relevant



Source: Hyperledger

Blockchain a powerful tool for safely sharing data and integrating business partners

Blockchain advantages for Business Applications

1. Safely sharing reliable data with business partners—secure, immutable, trustworthy
2. No central party that controls the database
3. Can limit access to data to specific authorized parties (private blockchain)
4. System and information very resistant to hacking and unlikely to be lost since multiple computer nodes controlled by different parties maintain the distributed data
5. Can leverage cryptocurrencies and digital payments rather than using a bank or invoicing
6. Smart Contracts on blockchain can automate contract execution and cut administrative costs
7. Save money and time by disintermediating middlemen like banks, brokers, databases
8. Well suited to use Internet Of Things data
9. The "traceability" and "immutability" of blockchain data is great for product safety, recalls, avoiding counterfeit goods
10. Can give final consumers access to BC data so they can check, be confident of product's ethical and quality standards
11. Use ICO to fund anew blockchain business or new product/service
12. Create new business that leverages BC technology in new, disruptive manner

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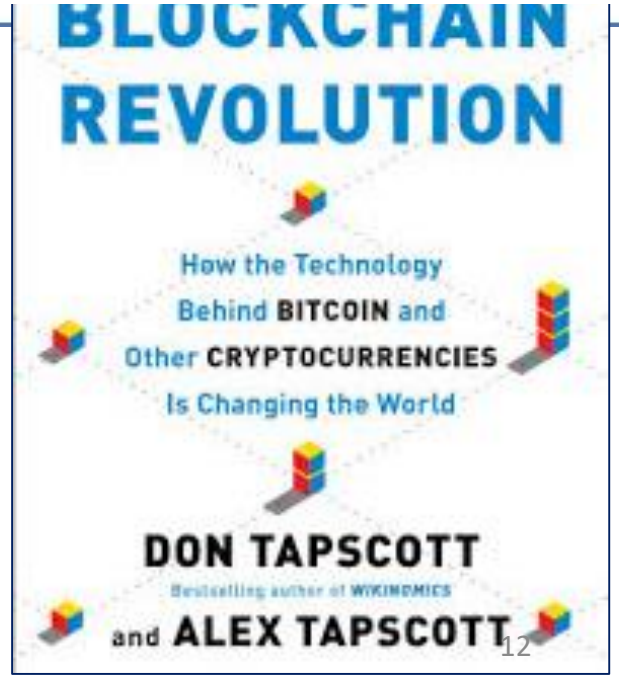

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INTERNATIONAL BUSINESS

Global Supply Chains Are About to Get Better, Thanks to Blockchain

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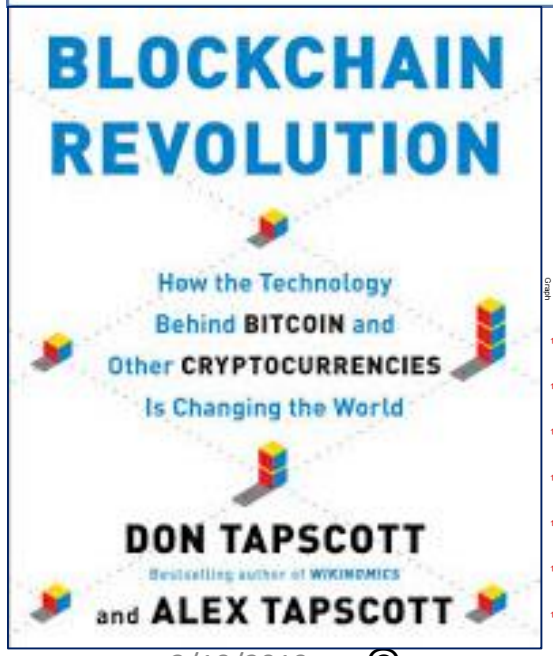

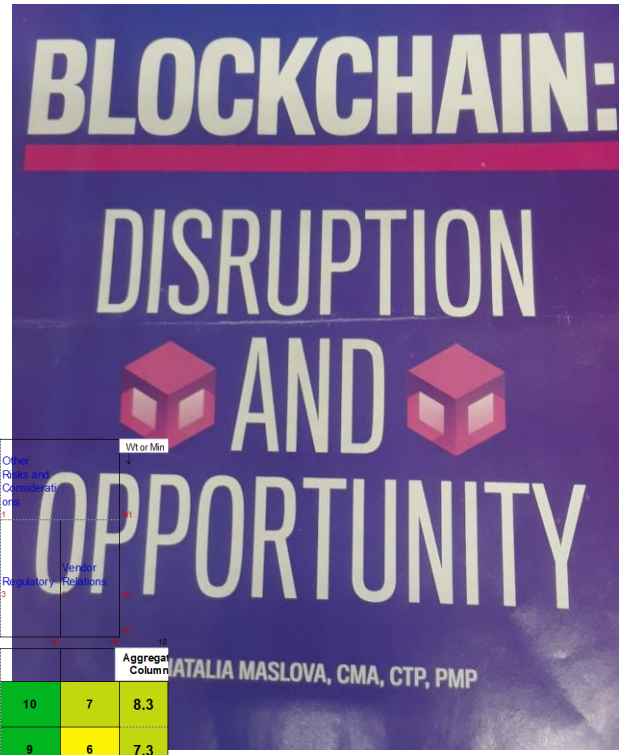

Color Bank Cells

High

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Low Color

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CF Cost

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Blockchain Application Assessment Scorecard

Order	No.	Option Type	Option	Flag	Impact on Competitive Advantages (2)			Business Processes (2)					Blockchain Tech and IT Capacity (1)				Costs and ROIC (2)				Probability of Success (1)			Other Risks and Considerations (1)		Wt or Min	Aggregate Column
Top Level Measures ->																											
Mid Level Measures ->					Low Cost Producer (3)	Reliable Delivery (1)	Brand & Customer Loyalty (2)	Information Importance (1)	Ability/ Value of Cutting out Intermediaries (1)	Degree of Control & Leverage (1)	Financing (1)	Product Delivery (1)	Software Capability (1)	Processing Speed (1)	Transaction Volume (1)	Security (1)	Cost to Develop (1)	Operate & Maintain (1)	Expense Savings/ Sales+ (1)	ROIC over 5 years (4)	Development (1)	Partner/ Market Acceptance (1)	Regulatory (3)	Vendor Relations (1)		
Base Level Measures ->					10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
Goal ->					Base case row																						
1	1	Overseas Manufacture & Shipping Data	Manufacturer	1	10	9	8	10	8	8	6	9	8	8	6	8	6	7	7	8	9	7	10	7		8.3
1	2	Anti-counterfeiting	Manufacturer	1	8	8	10	9	5	7	5	6	7	8	6	7	6	7	7	7.5	8	4	9	6		7.3
1	3	Health Records Business	Health Care Services	1	5	5	10	10	5	2	5	9	7	6	4	8	3	4	6	4	6	2	7	3		5.6
1	4	Hyperledger blockchain trade finance	Retail Store	1	7	5	5	7	10	8	10	5	8	8	5	7	6	7	8	8	8	8	7	9		7.3
1	5	Customer Loyalty Cryptocoin	Retail Store	1	5	6	10	5	6	10	6	5	9	4	4	8	4	4	8	7	8	10	10	9		7.1
1	6	Accepting Bitcoin and Ether for payment	Retail Store	1	5	5	10	5	8	10	5	5	7	4	3	6	5	6	6	5	9	9	9	6		6.6
1	7	Developing country direct food buy	Non Profit	1	6	10	7	9	10	9	5	8	8	6	5	7	4	3	5	6	6	10	10	10		7.2

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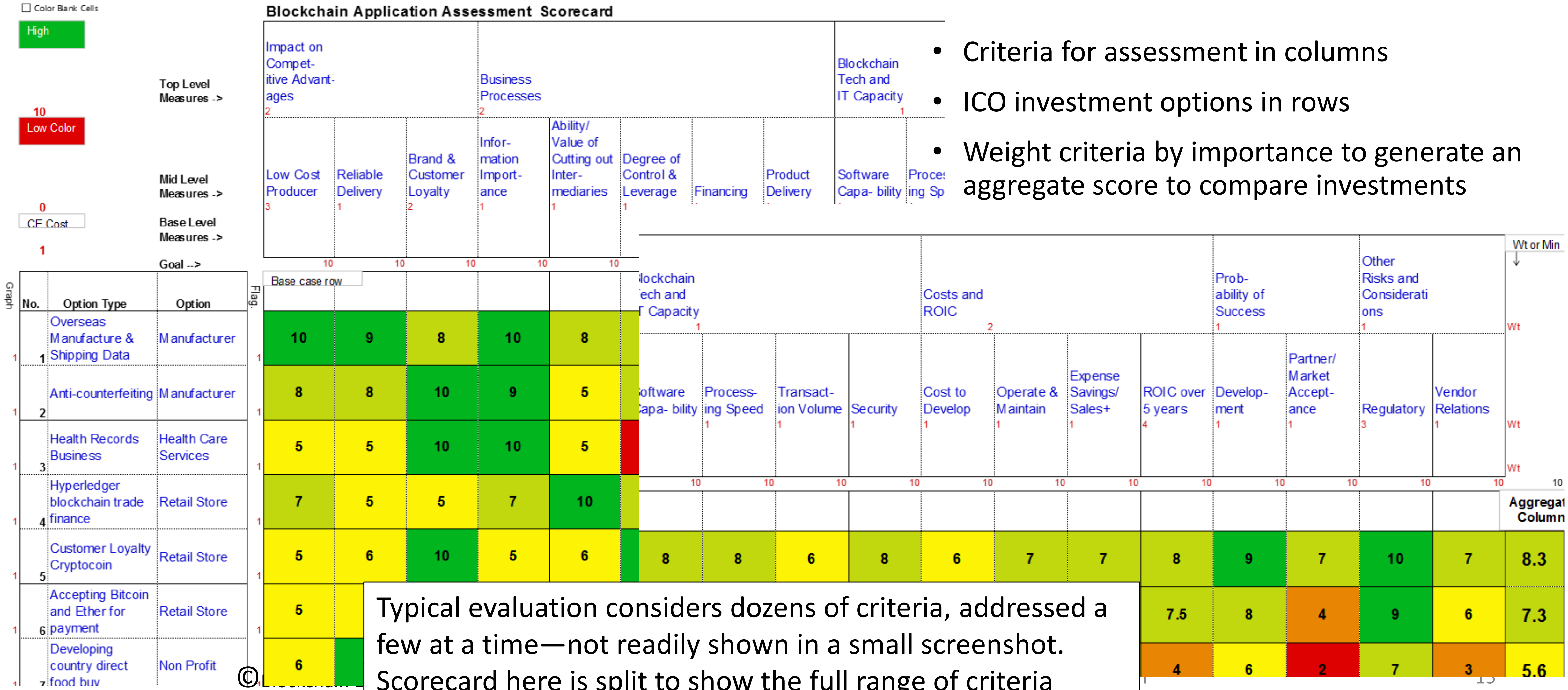
Dr. Drew Miller, CMA, CFP, CM&AA drmiller@bchainconsult.com

How to evaluate feasibility, net benefit, ROI of blockchain applications?

1. Should you be investigating BC applications now?
2. If your competitors adopt blockchain applications to disintermediate expensive middlemen and cut financing costs would you be cost competitive?
3. Are there business processes with outside groups that could operate faster and with less administrative cost by exploiting blockchain technology?
4. How do you know that items in your supply chain are not counterfeit?
5. Would a means of proving that your product complies with humane, environmentally sustainable, legal production requirements give you a competitive advantage, help you displace competitors who cannot?
6. Would you profit by accepting Bitcoin and other cryptocurrencies for payment?
7. Use someone else's system—or develop/operate your own?
8. Do you want organization like Walmart or Amazon to control a SC blockchain, charge you for its use, dictate terms of operation?
9. Opportunity to develop a BC system that others could use, you sell or control?
10. Is an Initial Coin Offering worth pursing for raising funds for a new blockchain—or new product or service?
11. What is the best way to assess blockchain applications risks and benefits for your organization?

Blockchain Business Consultants uses a Multi-Criteria Assessment Scorecard to evaluate and compare ICO investments



- Criteria for assessment in columns
- ICO investment options in rows
- Weight criteria by importance to generate an aggregate score to compare investments

Typical evaluation considers dozens of criteria, addressed a few at a time—not readily shown in a small screenshot. Scorecard here is split to show the full range of criteria

©Blockchain B

Dozens of criteria to consider in assessing BC applications for your organization

- 20 criteria used in example—could have 50 or more
  - The scorecard gets more unwieldy and difficult to see, but use as many as needed
- Adjust to specifics of the type of BC application and business processes, key concerns of your organization
  - For example: processing speed critical for a retail store considering accepting cryptocurrency for payment in retail store, unimportant for a slow moving supply chain database
- There is no “right” or “wrong” set of criteria
- Organize (group) in hierarchies so easier to keep track of criteria
- Sometimes can measure a criteria in more than one way—can break down further into third, “base level” measures
- Add more “weight” to more important criteria

Measurement Categories		
(Columns of Scorecard)		
Top Level Measures	**Mid Level Measures**	**Base Level Measures**
Impact on Compet- itive Advant- ages	Low Cost Producer	
	Reliable Delivery	
	Brand & Customer Loyalty	
Business Processes	Infor- mation Import- ance	
	Ability/ Value of Cutting out Inter- mediaries	
	Degree of Control & Leverage	
	Financing	
	Product Delivery	
Blockchain Tech and IT Capacity	Software Capa- bility	
	Process- ing Speed	
	Transact- ion Volume	
	Security	
Costs and ROIC	Cost to Develop	
	Operate & Maintain	
	Expense Savings/ Sales+	
	ROIC over 5 years	
Prob- ability of Success	Develop- ment	
	Partner/ Market Accept- ance	
Other Risks and Considerations	Regulatory	
	Vendor Relations	

Blockchain scalability, processing speeds have been a constraint in past, need to be carefully examined, but less of a constraint now

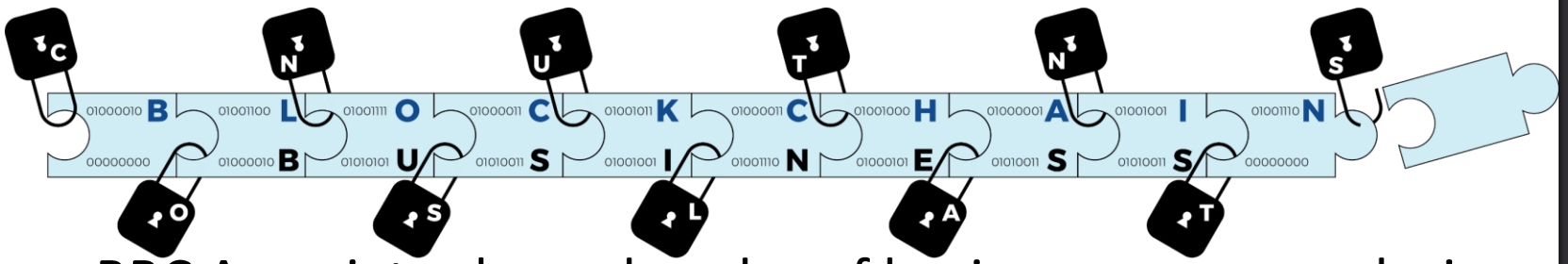
- For financial applications, real time financial transactions, this has been a key limiting factor for BC
  - Usually not critical for Supply Chain applications
  - Less constraining now as blockchain processes and speeds improve
- While Bitcoin and Public Blockchains may be slow—private BCs like Hyperledger Fabric can do several thousands transactions per second

Major Developments in Blockchain Technology					
				Transactions per second	**Block Settlement Time**
	Development	**Functionality**	**Blockchain Name**		
Blockchain 1.0	First Blockchain	cryptocurrency only	Bitcoin	7	10 minutes
Blockchain 2.0	Smart Contracts	executing wide variety of transactions	Ethereum	15	15 sec to several min
Blockchain 3.0	Private Blockchains		Hyperledger Fabric (& others)	15,000	1 sec (variable)

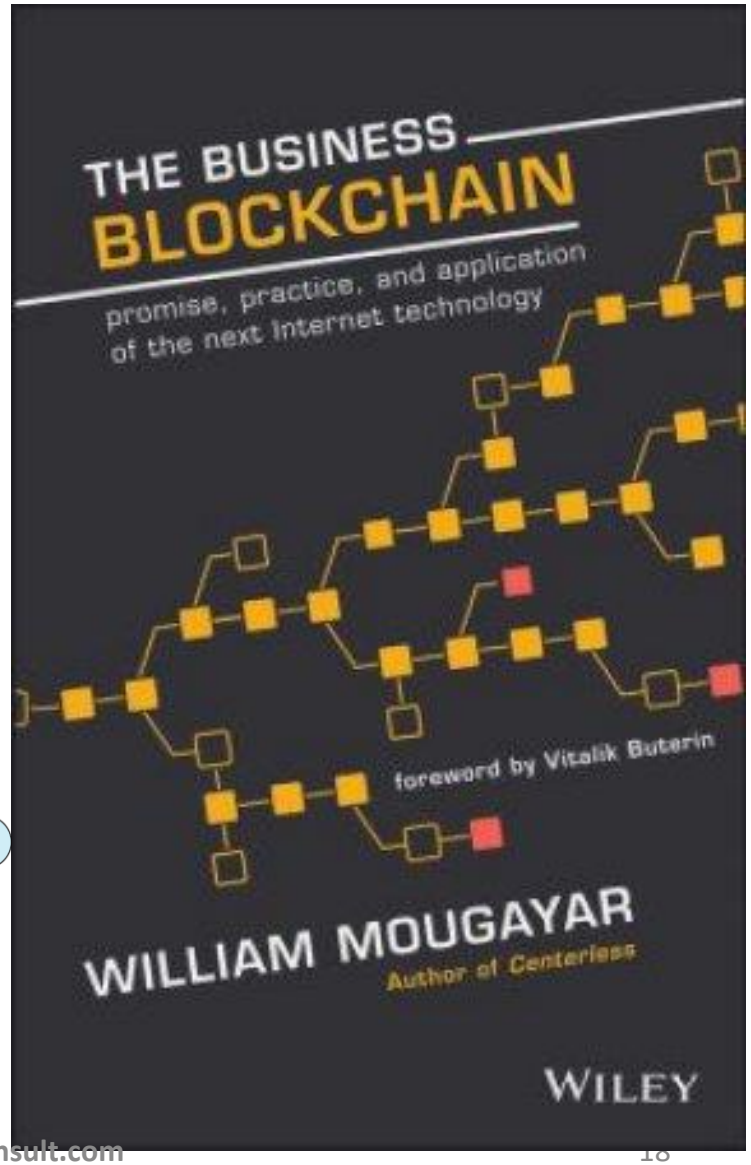
Blockchain implementations are largely process redesign work—not software/programming

> **"I have long argued that implementing the blockchain is 80% about business process changes and 20% about figuring out the technology behind it."**
> --William Mougayar, The Business Blockchain, Wiley, 2016

- You can't reap benefits blockchain offers by simply replacing a normal database with a BC Secure Distributed Ledger
  - Some or all of your business partners, suppliers, customers probably need to use the system too
  - Interfaces between BD ledger and other systems and databases (Enterprise Resource Planning System for example) also must be adjusted
  - IT infrastructure and software changes likely needed to support the blockchain, work optimally with the distributed ledger



- BBC Associates have decades of business process redesign work in a variety of industries



A key criteria for assessing private blockchain feasibility is whether or not you can persuade other companies to cooperate and join your system

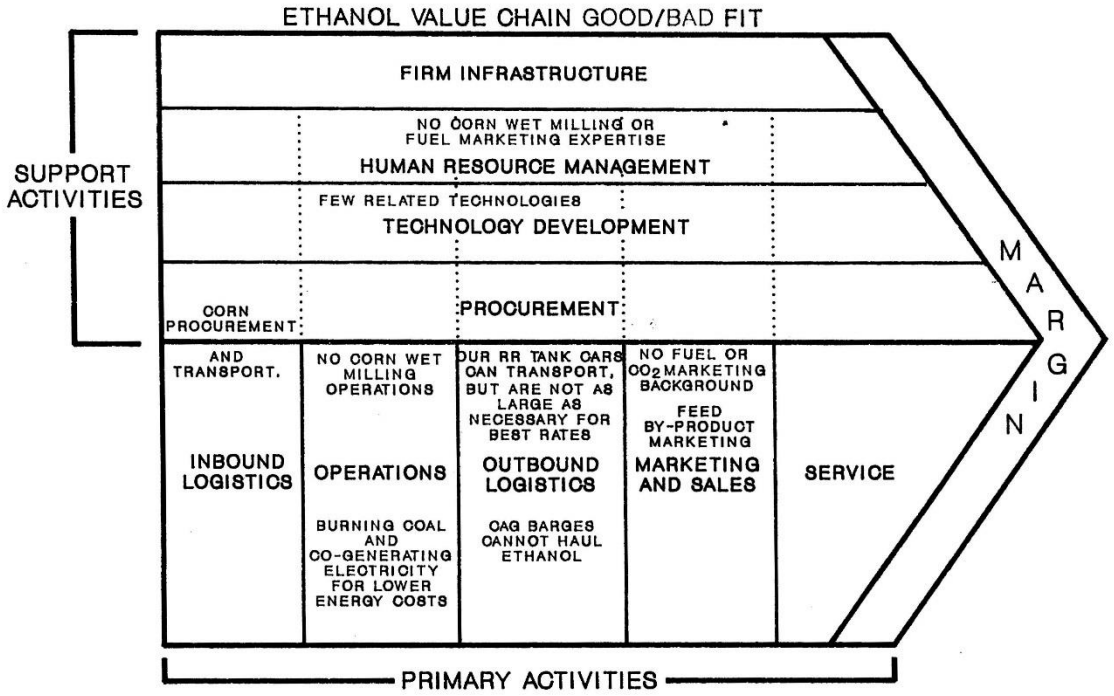
- Contrary to the bitcoin blockchain, which requires no trust or cooperation, many or most distributed ledgers using a private blockchain system will need cooperation and some trust
- An IBM VP for payments industry and blockchain, believes the success of Distributed Ledger Technology (blockchain) will hinge on the willingness of the different players in the ecosystem to collaborate: “It involves a level of sharing that hasn’t really existed before”
- Good reason to suspect that middlemen who face disintermediation won’t cooperate, and competitors, some suppliers and customers may also resist
  - Essential to determine what organizations will be needed, and explore feasibility of getting their cooperation and participation

Source: Wallis quoted in Andrew Deichler, Association for Financial Professionals, Update On Blockchain And Beyond: The Future Of Distributed Ledgers, May 8, 2017

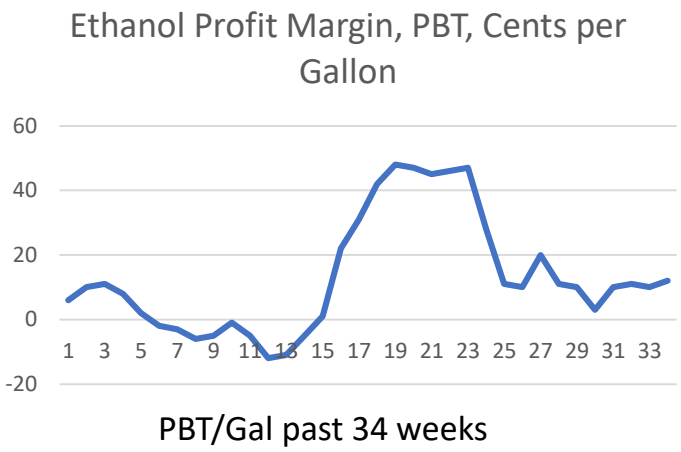
Often helpful to look at your company's Value Chain to be sure all business process aspects and potential impacts on competitive advantages are considered in assessment . . . .

Ethanol Industry Evaluation

WHILE SOME PARTS OF ETHANOL BUSINESS FIT, SEVERAL KEY AREAS OF EXPERTISE AND OPERATIONAL SYNERGIES ARE ABSENT, AND [redacted] HAS A RELATIVELY POOR FIT WITH ETHANOL BUSINESS COMPARED TO ADM.



- **ADM explains that their "network" of related businesses and technologies gives them the lowest possible cost. [redacted] does not have the network or technological fit that ADM has.**



- Value Chain great tool for estimating value of savings or additional revenues from contemplated blockchain applications

. . . If your organization does not have explicit competitive advantages, can use "Porter's Model" to identify areas where a blockchain application may offer good value or not be that important

OVERALL, THE RISKS IN THE ETHANOL INDUSTRY ARE VERY LARGE AND THE COMPETITIVE ENVIRONMENT IS NOT VERY FAVORABLE FOR [redacted]

DETERMINANTS OF ETHANOL INDUSTRY PROFITABILITY

THREAT OF NEW ENTRANTS

— NO BARRIERS TO SMALL PRODUCERS, SUBSIDIES ENCOURAGE ENTRY.
— FULLY COMPETITIVE LONG TERM OPERATIONS REQUIRE HEAVY CAPITALIZATION (WELL OVER $100 MILLION)

+ CORN GROWERS

BARGAINING POWER OF SUPPLIERS

RIVALRY AMONG EXISTING COMPETITORS

—MAJOR OIL COMPANIES PREFER MTBE.
— CO_2 MARKET DIFFICULT TO ENTER *

BARGAINING POWER OF BUYERS

— ADM PROBABLY CANNOT BE MATCHED AS LOW COST PRODUCER.
— CARGILL AND STALEY ALSO LIKELY TO HAVE BETTER FIT/LOWER COST THAN [redacted]

THREAT OF SUBSTITUTE PRODUCTS OR SERVICES

— MTBE
— ETHANOL IMPORTS
— METHANOL
— HYDROGEN, NATURAL GAS, PROPANE-POWERED VEHICLES
— ELECTRIC CARS

Three national companies sell 90% of the CO_2 in the U.S. The CO_2 market is described as "closely controlled" and "difficult to break into". Only 15 ethanol plants in the U.S. recover and sell the CO_2 released in fermentation.

OTHER FACTORS:

— DEPENDENT ON TAX SUBSIDIES AND POLITICS FOR PROFITABILITY.

— EPA MAY DELAY CLEAN AIR ACT IMPLEMENTATION OR RULE AGAINST ETHANOL ON OZONE ISSUE.

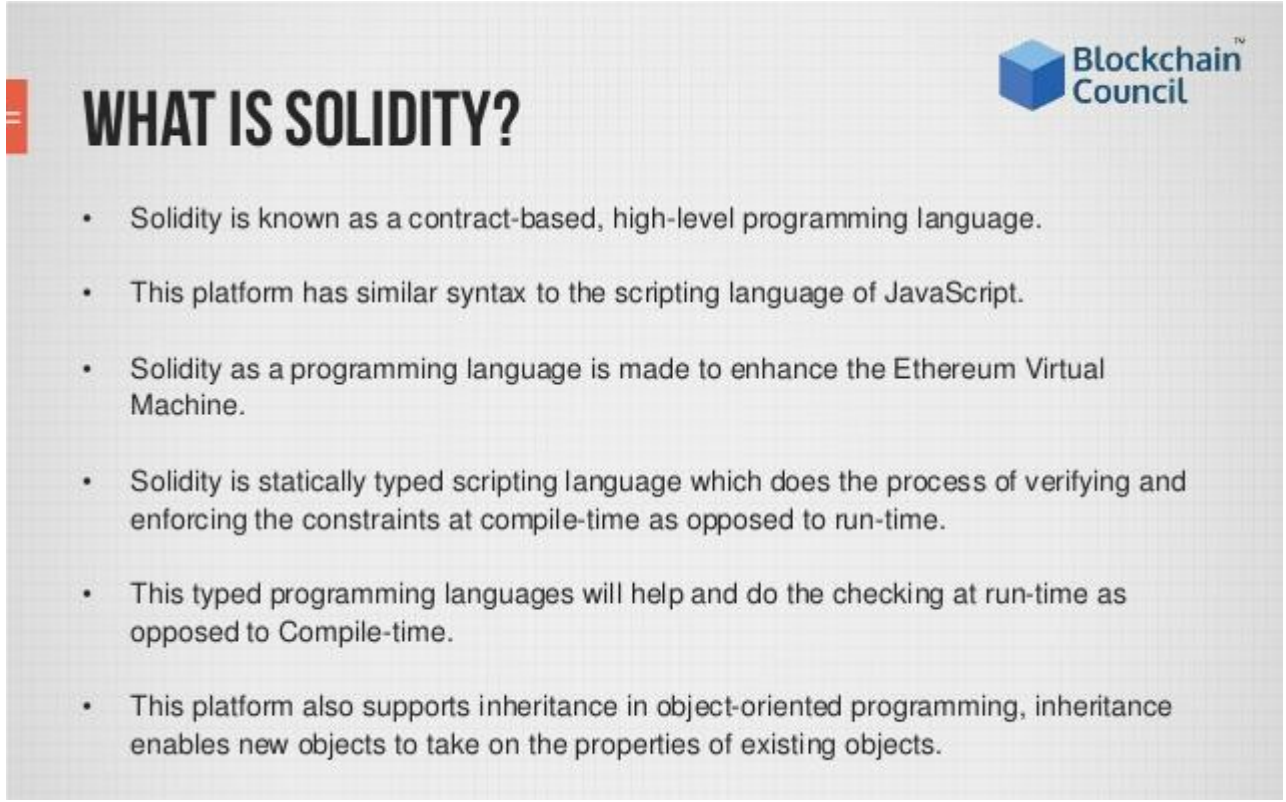
— WITHOUT WET CORN MILLING BUSINESS, ETHANOL IS A POOR FIT WITH [redacted]

Implementation Feasibility Estimation is another critical, and often poorly considered aspect of BC application assessment

- Since 80% of blockchain project implementation is likely to be process redesign work; essential to have involvement of operators and process owners in estimating the feasibility, likely cooperation of outside parties involved, and difficulty of process redesign
- Consultants with experience in BC applications very useful on team to help guard against tendency to underestimate all the implementation difficulties and risks

Great news for Blockchain development: the languages and scripts are similar to already popular ones, not hard to learn

- While building new languages and scripts and programs for the Internet was a major task, blockchain as a “second internet revolution” benefits from using not just the Internet, but existing languages
- If your developers know JavaScript or C++ or Python, learning Ethereum, Hyperledger, other blockchain programming systems is relatively quick and easy
- Thousands of trained programmers out there now (though may be scarce in your area, expensive)
- Lot of on line courses for current programmers to spin up on new blockchain languages and programming



Blockchain Business Consultants maintains database of BC Business Applications

- Proliferation of BC systems and companies, new applications offers rapidly expanding array of applications
- Time consuming to keep up with the daily announcements, news of new BC applications in business
- Useful in helping clients evaluate BC applications that may fit with them—and examples to study for lessons learned

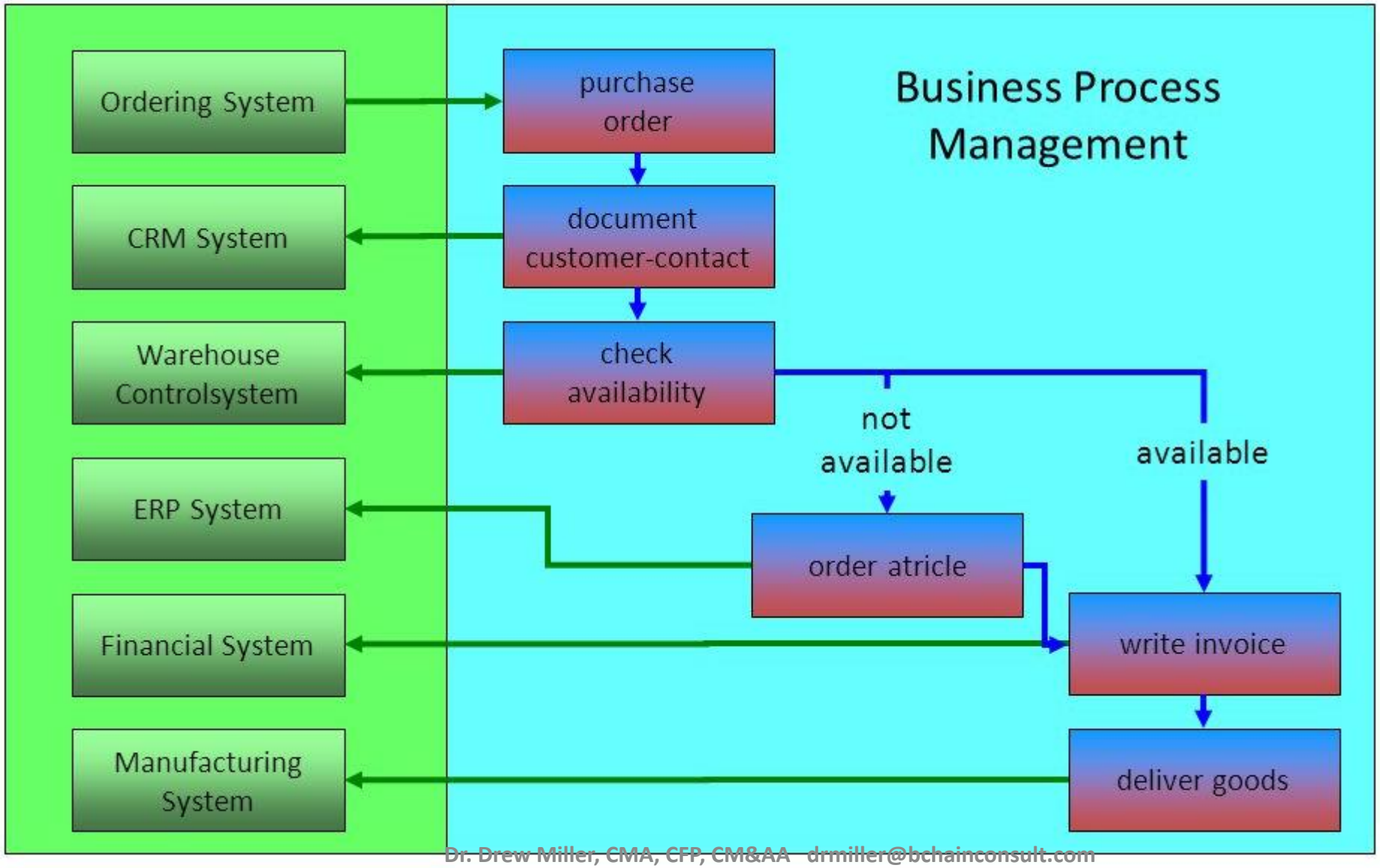
		# Cos if more than 1	**Companies pursuing Blockchain, and Applications They are Developing**				
ICO?			**Company**	**Application**	**Blockchain, Software Used**	**Their Industries**	**Notes**
	1	1	21	The Machine Payable Web	Bitcoin	FinServ	enable pec
	2	1	21.co	Enables people to be paid in digital currency for replying to emails		Mkt Research	
	3	1	Airbus	working on Hyperledger projects	Hyperledger	Manufacturing	
ICO	4	1	Adel	BC technology incubator	many BCs	Blockchain	
	5	1	AdEx Network	Advertising	Ethereum	Advertising	they are fo
ICO	6	1	ALIS	social media where many individuals	Ethereum	Social Network	ERC token
	7	1	AlphaPoint	White Label Digital Asset Exchange		Blockchain	
	8	1	Amazon	Amazon Web Services blockchain partner ecosystem		IT	AWS is inve
	9	1	American Express	working on Hyperledger projects	Hyperledger	FinServ	
ICO	10	1	Aragon	Business governance system		Blockchain	
	11	1	Australian Stock E	Stock trade clearing and settling	Digital Asset Holdings developed di	FinServ	
ICO	12	1	Axoni	global capital markets technology	Hyperledger	Ethereum	specializes
	13	1	BAE Systems, the British defense contractor, is exploring sharing cybersecurity threat data on a blockchain. Pokitdok and Ger				
	14	1	Banco Santander	Digital payments		FinServ	
ICO	15	1	Bancor	Token Exchange	Ethereum	Blockchain	ERC20 tok
	16	1	Barclays	Letters of Credit, all types of finanical applications		FinServ	

Example of client project: Assessing likely success, ROI, of an integrated circuit SC using BC to avoid counterfeit chips

Key issues covered in Assessment:

1. What is the value of being able to buy/sell IC chips that you know are not counterfeit, really were produced by a reputable foundry due to secure blockchain record of chip's origin and shipping?
2. From your company's perspective, would it be better to have a decentralized database that you and customers can use without the costs/loss of power of having a trusted intermediary controlling the database? Can you disintermediate a competitor or costly supplier who now controls this data?
3. Would you gain additional sales to Dept. of Defense, other buyers who insist on absolute assurance of chip's origins and trustworthiness?
4. While blockchain secures changes to database, preventing unauthorized access is different, doesn't necessarily need a blockchain. To have both change and access security, can store a hash of the content on the blockchain, which acts as a pointer to encrypted data stored elsewhere since storing the data itself on-chain can be cost prohibitive and forces all nodes to hold that data indefinitely
5. Can you gain the cooperation via trade association or other group, or your company as lead, to set up and migrate to this blockchain, secure distributed ledger?
6. How much would it cost to create? Feasible to share costs? How long would it take?

Adding BC won't eliminate the complex IT system your organization has—but can make the information, database sharing with outside organizations much better



Cybersecurity Risks: While Blockchain has great security, participating in blockchain networks/systems can entail risks

Potential blockchain cybersecurity risks need to be assessed:

1. A “Sybil attack” where bad actor creates large number of pseudonymous identities to gain a disproportionately large influence
2. A blockchain’s software client on your computers connected to network opens you up to potential cyber security risks
3. Websites, digital wallets accessing blockchain (but not part of it) open to normal cyber security vulnerabilities

- These potential risks vary greatly by type of blockchain and cybersecurity systems and processes associated with particular implementations
  - Again, a private BC, especially with Hyperledger’s thoroughness and testing, should be less vulnerable than a custom BC designed on public Ethereum BC

Regulatory and Legal Issues need to be considered

- So far regulator interest in blockchain and DLT is limited to digital currencies
  - Regulators have yet to address distributed ledger as a book of record
- Potential legal quandary: Is settlement that happens on a BC ledger final and legally binding?
- Some countries are championing BC technology and recruiting companies with a promise of a BC friendly regulatory climate
  - Dubai, Estonia, Singapore, Switzerland
- Some doubt whether Smart Contracts can be legally binding—but as an explicit written agreement it very likely is
- **Blockchain Business Consultant's Assessment: we believe that U.S. and vast majority of developed country regulators will accept blockchain and Smart Contracts as legal and enforceable**

Funding and profit from an Initial Coin Offering may be appealing

- Stratis token issued at 1 cent, and even after spectacular fall in 2018, still up 1,000% over ICO issue price
- Stratis a blockchain-as-a-service platform that allows enterprises to develop customized blockchain applications
- Stratis IOC in June 2016, raised $600,000
- Stratis' token issued at a price of $0.007 per token

©Blockchain Business Consultants

ICOs issuing tokens offering equity features face regulatory problems, but "utility tokens" that are a pre-sale of products and services may avoid securities regulation requirements

- Fortitude Ranch issued utility token for a Survival Community and Country Club Membership style Recreational Facility
- The "Fortitude" cryptocurrency utility token offers a discounted, fixed price to join and provides priority to join when membership wait lists form

©Blockchain Business Consultants

Fortitude Token

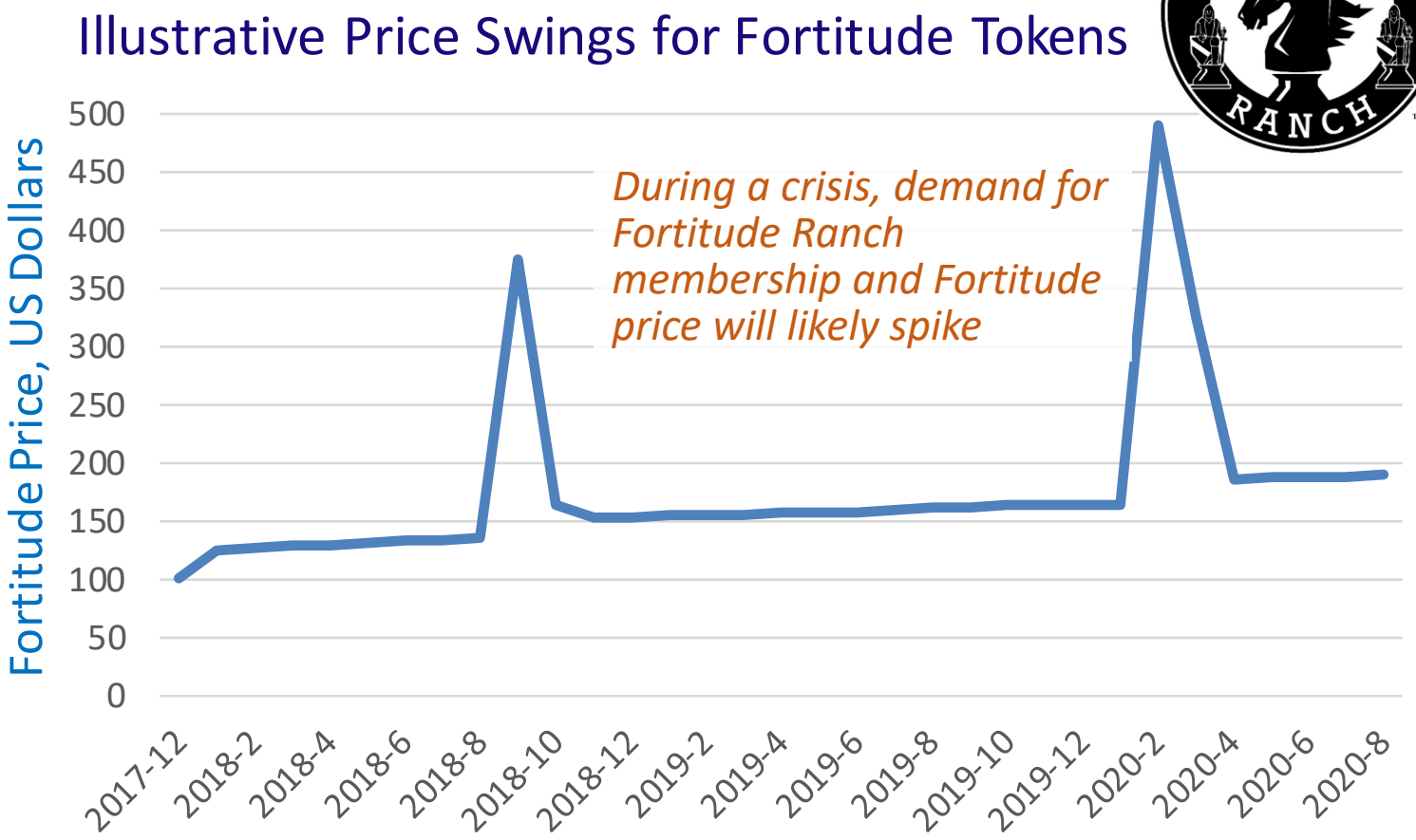
- An ERC20 Token
- Pure “Utility token”: value in purchasing membership in Fortitude Ranch, no profit share, ownership or voting rights
- 1 Fortitude = 100 USD (ETH price set to equate to $100 on Dec 6, 2017)
- Maximum Sale: 150,000 Fortitudes
- Add’l Fortitudes Coined for future company use: 20%
- Fortitudes issued to staff and owners: None
- Maximum Fortitude issue: 180,000
- Tokens not sold destroyed, Fortitudes used to purchase membership destroyed, no further issue

©Blockchain Business Consultants

A cryptocurrency utility token for expanding an established business entails less risk than typical ICO investment—with upside potential for token based on value of real underlying asset, not cryptocurrency speculation

Fortitude Ranch ICO pitched these risk advantages:

- A startup has to first develop the application, then get users to adopt it, then grow the program to sufficient scale to generate profit — but *Fortitude Ranch already an operating business, doing an advance sale of membership tokens to expand*
- Since Fortitudes let you buy Fortitude Ranch membership at fixed price, as prices rise over time, value and price of Fortitudes also likely to rise
- Periodically, world crisis or major news report on threats will spike demand for Fortitude Ranch membership
  - ➢ Since Fortitudes give priority to join when wait list forms, people desperate to save family may bid up price of Fortitudes
  - ➢ As investors realize upside price potential, premium for Fortitudes should rise over time
- Fortitude a pure utility token, no equity features, avoiding securities regulatory risk of most ICOs



While Initial Coin Offerings fell out of favor in 2018, issuing new cryptocurrencies as pure utility tokens may grow

©Blockchain Business Consultants

Many additional factors not addressed here to consider in BC fit and ROI assessment

- Blockchain Business Consultants maintains and continually updates a list of issues, questions for assessing blockchain requirements and features to consider
- Many other issues may be important to your company
  - Often start with over 50 factors
  - Usually narrow down to < 25 as assessment progresses

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Blockchain Application Assessment Scorecard

Top Level Measures ->																							Wt or Min ↓
	Impact on Competitive Advantages 2			Business Processes 2					Blockchain Tech and IT Capacity 1				Costs and ROIC 2				Probability of Success 1			Other Risks and Considerations 1		Wt
Mid Level Measures ->																						Wt
Base Level Measures ->	Low Cost Producer 3	Reliable Delivery 1	Brand & Customer Loyalty 2	Information Importance 1	Ability/ Value of Cutting out Intermediaries 1	Degree of Control & Leverage 1	Financing 1	Product Delivery 1	Software Capability 1	Processing Speed 1	Transaction Volume 1	Security 1	Cost to Develop 1	Operate & Maintain 1	Expense Savings/ Sales+ 1	ROIC over 5 years 4	Development 1	Partner/ Market Acceptance 1	Regulatory 3	Vendor Relations 1		Wt
Goal ->	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		10
Base case row																						Aggregat Column
No. / Option Type / Option																						
1 Overseas Manufacture & Shipping Data / Manufacturer	10	9	8	10	8	8	6	9	8	8	6	8	6	7	7	8	9	7	10	7		8.3
2 Anti-counterfeiting / Manufacturer	8	8	10	9	5	7	5	6	7	8	6	7	6	7	7	7.5	8	4	9	6		7.3
3 Health Records Business / Health Care Services	5	5	10	10	5	2	5	9	7	6	4	8	3	4	6	4	6	2	7	3		5.6
4 Hyperledger blockchain trade finance / Retail Store	7	5	5	7	10	8	10	5	8	8	5	7	6	7	8	8	8	8	7	9		7.3
5 Customer Loyalty Cryptocoin / Retail Store	5	6	10	5	6	10	6	5	9	4	4	8	4	4	8	7	8	10	10	9		7.1
6 Accepting Bitcoin and Ether for payment / Retail Store	5	5	10	5	8	10	5	5	7	4	3	6	5	6	6	5	9	9	9	6		6.6
7 Developing country direct food buy / Non Profit	6	10	7	9	10	9	5	8	8	6	5	7	4	3	5	6	6	10	10	10		7.2

Common Mistakes in Blockchain Application Assessments

- Focusing on BC technology benefits rather than likely impacts on business processes, costs, sales, customer reactions—Return On Investment
- Not considering all areas of Business Processes that will be impacted
- Over optimistic benefit and cost assumptions
- Not having a diverse team with all areas of operations and support needed
- Bad, untested assumptions about whether parties needed will cooperate
- Using consulting firm that is selling BC design and programming services—biased towards pursuing BC

Explain use of multi-criteria decision analysis for blockchain assessment and decision-making

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Blockchain Application Assessment Scorecard

Top Level Measures ->				Impact on Compet-itive Advant-ages 2			Business Processes 2					Blockchain Tech and IT Capacity 1				Costs and ROIC 2				Prob-ability of Success 1		Other Risks and Considerati ons 1		Wt or Min ↓
Mid Level Measures ->				Low Cost Producer 3	Reliable Delivery 1	Brand & Customer Loyalty 2	Infor-mation Import-ance 1	Ability/ Value of Cutting out Inter-mediaries 1	Degree of Control & Leverage 1	Financing 1	Product Delivery 1	Software Capa- bility 1	Process-ing Speed 1	Transact-ion Volume 1	Security 1	Cost to Develop 1	Operate & Maintain 1	Expense Savings/ Sales+ 1	ROIC over 5 years 4	Develop-ment 1	Partner/ Market Accept-ance 1	Regulatory 3	Vendor Relations 1	Wt
Base Level Measures ->																								Wt
Goal -->																								Wt
				10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Graph	No.	Option Type	Option	Flag	Base case row																			Aggregat Column
1	1	Overseas Manufacture & Shipping Data	Manufacturer	1	10	9	8	10	8	8	6	9	8	8	6	8	6	7	7	8	9	7	10	7	8.3
1	2	Anti-counterfeiting	Manufacturer	1	8	8	10	9	5	7	5	6	7	8	6	7	6	7	7	7.5	8	4	9	6	7.3
1	3	Health Records Business	Health Care Services	1	5	5	10	10	5	2	5	9	7	6	4	8	3	4	6	4	6	2	7	3	5.6
1	4	Hyperledger blockchain trade finance	Retail Store	1	7	5	5	7	10	8	10	5	8	8	5	7	6	7	8	8	8	8	7	9	7.3
1	5	Customer Loyalty Cryptocoin	Retail Store	1	5	6	10	5	6	10	6	5	9	4	4	8	4	4	8	7	8	10	10	9	7.1
1	6	Accepting Bitcoin and Ether for payment	Retail Store	1	5	5	10	5	8	10	5	5	7	4	3	6	5	6	6	5	9	9	9	6	6.6
1	7	Developing country direct food buy	Non Profit	1	6	10	7	9	10	9	5	8	8	6	5	7	4	3	5	6	6	10	10	10	7.2

© B

Blockchain Business Consultants uses a Multi-Criteria Assessment Scorecard to evaluate and compare BC applications

- Criteria for assessment in columns
- ICO investment options in rows
- Weight criteria by importance to generate an aggregate score to compare investments

Blockchain Application Assessment Scorecard

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Top Level Measures -> | Mid Level Measures -> | Base Level Measures -> | Goal -->

No.	Option Type	Option	Flag	Low Cost Producer (3)	Reliable Delivery (1)	Brand & Customer Loyalty (2)	Infor-mation Import-ance (1)	Ability/ Value of Cutting out Inter-mediaries (1)
				Impact on Compet-itive Advant-ages (2)			*Business Processes (2)*	
				10	10	10	10	10
				Base case row				
1	Overseas Manufacture & Shipping Data	Manufacturer	1	10	9	8	10	8
2	Anti-counterfeiting	Manufacturer	1	8	8	10	9	5
3	Health Records Business	Health Care Services	1	5	5	10	10	5
4	Hyperledger blockchain trade finance	Retail Store	1	7	5	5	7	10
5	Customer Loyalty Cryptocoin	Retail Store	1	5	6	10	5	6
6	Accepting Bitcoin and Ether for payment	Retail Store	1	5				
7	Developing country direct food buy	Non Profit	1	6				

Further criteria: Degree of Control & Leverage (1), Financing, Product Delivery (Business Processes); Software Capa- bility, Process-ing Speed (Blockchain Tech and IT Capacity, 1)

Software Capa- bility (1)	Process-ing Speed (1)	Transact-ion Volume (1)	Security (1)	Cost to Develop (1)	Operate & Maintain (1)	Expense Savings/ Sales+ (1)	ROIC over 5 years (4)	Develop-ment (1)	Partner/ Market Accept-ance (1)	Regulatory (3)	Vendor Relations (1)	Aggregate Column
Blockchain Tech and IT Capacity (1)				*Costs and ROIC (2)*				*Prob-ability of Success (1)*		*Other Risks and Considerations (1)*		Wt or Min
10	10	10	10	10	10	10	10	10	10	10	10	10
8	8	6	8	6	7	7	8	9	7	10	7	8.3
							7.5	8	4	9	6	7.3
							4	6	2	7	3	5.6

Typical evaluation considers dozens of criteria, addressed a few at a time—not readily shown in a small screenshot. Scorecard here is split to show the full range of criteria

©Blockchain B...

BBC's multi-criteria decision analysis "scorecard" very easy to build in Excel: enter options, criteria, then program creates scorecard

Label for Scorecard	2nd Label
Blockchain Application Assessment	

Options (Rows of Scorecard)

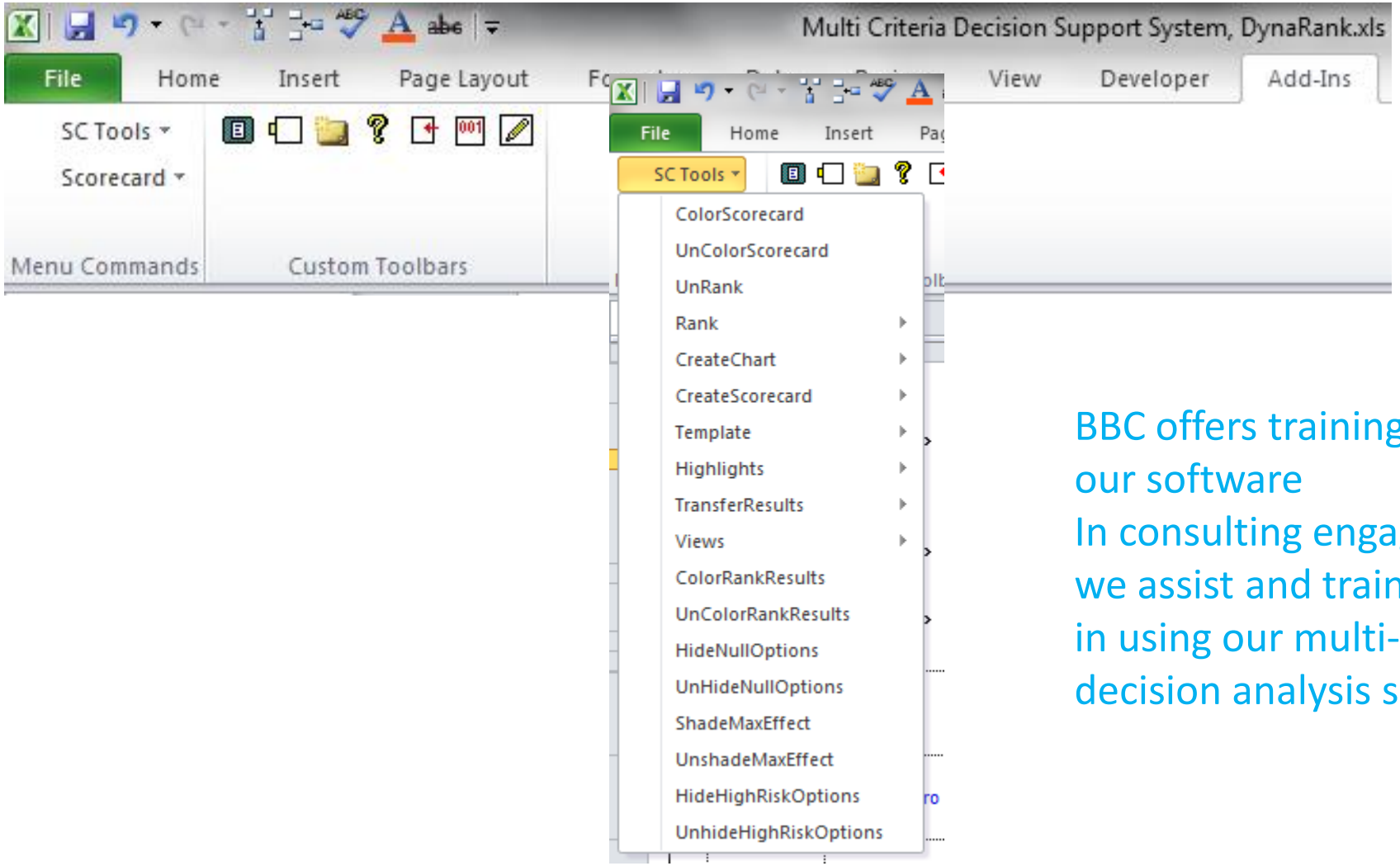
Note: First blank row ends list

Option No.	Option Type	Option
1	Overseas Manufacture & Shipping Data	Manufacturer
2	Anti-counterfeiting	Manufacturer
3	Health Records Business	Health Care Services
4	Hyperledger blockchain trade finance	Retail Store
5	Customer Loyalty Cryptocoin	Retail Store
6	Accepting Bitcoin and Ether for payment	Retail Store
7	Developing country direct food buy	Non Profit
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Measurement Categories (Columns of Scorecard)

Top Level Measures	Mid Level Measures	Base Level Measures
Impact on Compet- i	Low Cost Producer	
	Reliable Delivery	
	Brand & Customer Loyalty	
Business Processes	Infor- mation Import- ance	
	Ability/ Value of Cutting out Inter- mediaries	
	Degree of Control & Leverage	
	Financing	
	Product Delivery	
Blockchain Tech and	Software Capa- bility	
	Process- ing Speed	
	Transact- ion Volume	
	Security	
Costs and ROIC	Cost to Develop	
	Operate & Maintain	
	Expense Savings/ Sales+	
	ROIC over 5 years	
Prob- ability of Succ	Develop- ment	
	Partner/ Market Accept- ance	
Other Risks and Cor	Regulatory	
	Vendor Relations	

Multi-Criteria Decision Analysis program used by Blockchain Business Consultants is Macros and Visual Basic Program running in Excel



BBC offers training in using our software
In consulting engagements we assist and train clients in using our multi-criteria decision analysis scorecard

Criteria to Consider in Assessing Investment Options are in Columns: in a "hierarchy"

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Blockchain Application Assessment Scorecard

Top Level Measures ->	Impact on Compet- itive Advant- ages 2			Business Processes 2					Blockchain Tech and IT Capacity 1			
Mid Level Measures ->	Low Cost Producer 3	Reliable Delivery 1	Brand & Customer Loyalty 2	Infor- mation Import- ance 1	Ability/ Value of Cutting out Inter- mediaries 1	Degree of Control & Leverage 1	Financing 1	Product Delivery 1	Software Capa- bility 1	Process- ing Speed 1	Transact- ion Volume 1	Security 1
Base Level Measures ->												
Goal -->	10	10	10	10	10	10	10	10	10	10	10	10

- Some criteria are more important than others
- Can apply more weight to more important considerations
- Number in red is weight
  - Default is 1

With scorecard built, each alternative is assessed (rated) by each criteria

- Each option is evaluated by criteria using a consistent scale
- In this case it is 100 point scale (default)
- Can change to 10 point or 5 point (Likert) scale
- Highest value must always be best
- Should specify the scales and use consistently

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Blockchain Application Assessment Scorecard

			Top Level Measures ->	Impact on Compet-itive Advant-ages 2							Business Processes 2							
			Mid Level Measures ->	Low Cost Producer 3	Reliable Delivery 1	Brand & Customer Loyalty 2	Infor-mation Import-ance 1	Ability/ Value of Cutting out Inter-mediaries 1	Degree of Control & Leverage 1	Financing 1								
			Base Level Measures ->															
			Goal -->	10	10	10	10	10	10	10								
Graph	**No.**	**Option Type**	**Option**	Base case row														
1	1	Overseas Manufacture & Shipping Data	Manufacturer	10	9	8	10	8	8	6								
1	2	Anti-counterfeiting	Manufacturer	8	8	10	9	5	7	5								
1	3	Health Records Business	Health Care Services	5	5	10	10	5	2	5								

Flag

Each blockchain application option is assessed (rated) by all relevant criteria (fit with your business processes, costs and returns, risks, etc.)

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Blockchain Application Assessment Scorecard

Criteria weights (importance)

More criteria; scorecard continues to right -→

	Top Level Measures ->	Impact on Compet-itive Advant-ages			Business Processes					Blockchain Tech and IT Capacity			
		2			2					1			
	Mid Level Measures ->	Low Cost Producer	Reliable Delivery	Brand & Customer Loyalty	Infor-mation Import-ance	Ability/ Value of Cutting out Inter-mediaries	Degree of Control & Leverage	Financing	Product Delivery	Software Capa- bility	Process-ing Speed	Transact-ion Volume	Security
		3	1	2	1	1	1	1	1	1	1	1	1
	Base Level Measures ->	10	10	10	10	10	10	10	10	10	10	10	10
	Goal -->												
Graph	No.	Option Type	Option	Flag									
					Base case row								
1	1	Overseas Manufacture & Shipping Data	Manufacturer	1	10	9	8						
1	2	Anti-counterfeiting	Manufacturer	1	8	8	10						
1	3	Health Records Business	Health Care Services	1	5	5	10						
1	4	Hyperledger blockchain trade finance	Retail Store	1	7	5	5						
1	5	Customer Loyalty Cryptocoin	Retail Store	1	5	6	10						
1	6	Accepting Bitcoin and Ether for payment	Retail Store	1	5	5	10						
1	7	Developing country direct food buy	Non Profit	1	6	10	7						

Scales	Essential to be consistent in average/neutral and higher/better ratings
10	Huge Profit Opportunity
9	
8	Major upside potential
7	
6	Small benefit
5	Neutral/Average
4	Small downside
3	
2	Large downside risk
1	
0	Catastrophic, huge loss potential

- Can use Likert (5 point), any scale you want as long as consistently applied
- We prefer 10 point scale so can differentiate smaller differences

Scales need to be consistent, but not necessarily precise

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Blockchain Application Assessment Scorecard

		Top Level Measures ->	Impact on Compet-itive Advant-ages						Blockchain Tech and IT Capacity		
			2						1		
		Mid Level Measures ->	Low Cost Producer	Reliable Delivery	B C L				Software	Process-	Transact-
			3	1	2						
		Base Level Measures ->									
		Goal -->	10	10							
Graph	**No.**	**Option Type**	**Option**	Base case row							
1	1	Overseas Manufacture & Shipping Data	Manufacturer	10	9						
1	2	Anti-counterfeiting	Manufacturer	8	8						
1	3	Health Records Business	Health Care Services	5	5						

Scales	General Rating
10	Huge Profit Opportunity
9	
8	Major upside potential
7	
6	Small benefit
5	Neutral/Average
4	Small downside
3	
2	Large downside risk
1	
0	Catastrophic, huge loss potential

Scales	Specific metrics for some criteria do not have to have linear scales
10	8% reduction in delivered product cost
9	4% reduction in delivered product cost
8	2% reduction in delivered product cost
7	1% reduction in delivered product cost
6	1/2% reduction in delivered product cost
5	No change in product cost
4	1/2% higher delivered product cost
3	1% higher delivered product cost
2	2% higher delivered product cost
1	3% higher delivered product cost
0	4% higher delivered product cost

A typical BC assessment project will consider dozens of criteria and dozens of potential applications

For this client: 7 potential blockchain applications assessed by 20 performance, ROIC, cost, risk criteria

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Blockchain Application Assessment Scorecard

Top Level Measures ->					Impact on Competitive Advantages 2				Business Processes 2				Blockchain Tech and IT Capacity 1				Costs and ROIC 2				Probability of Success 1		Other Risks and Considerations 1		Wt or Min ↓
Mid Level Measures ->					Low Cost Producer 3	Reliable Delivery 1	Brand & Customer Loyalty 2	Information Importance 1	Ability/ Value of Cutting out Intermediaries 1	Degree of Control & Leverage 1	Financing 1	Product Delivery 1	Software Capability 1	Processing Speed 1	Transaction Volume 1	Security 1	Cost to Develop 1	Operate & Maintain 1	Expense Savings/ Sales+ 1	ROIC over 5 years 4	Development 1	Partner/ Market Acceptance 1	Regulatory 3	Vendor Relations 1	Wt
Base Level Measures ->																									Wt
Goal -->					10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	Wt 10
Graph	No.	Option Type	Option	Flag	Base case row																				Aggregat Column
1	1	Overseas Manufacture & Shipping Data	Manufacturer	1	10	9	8	10	8	8	6	9	8	8	6	8	6	7	7	8	9	7	10	7	8.3
1	2	Anti-counterfeiting	Manufacturer	1	8	8	10	9	5	7	5	6	7	8	6	7	6	7	7	7.5	8	4	9	6	7.3
1	3	Health Records Business	Health Care Services	1	5	5	10	10	5	2	5	9	7	6	4	8	3	4	6	4	6	2	7	3	5.6
1	4	Hyperledger blockchain trade finance	Retail Store	1	7	5	5	7	10	8	10	5	8	8	5	7	6	7	8	8	8	8	7	9	7.3
1	5	Customer Loyalty Cryptocoin	Retail Store	1	5	6	10	5	6	10	6	5	9	4	4	8	4	4	8	7	8	10	10	9	7.1
1	6	Accepting Bitcoin and Ether for payment	Retail Store	1	5	5	10	5	8	10	5	5	7	4	3	6	5	6	6	5	9	9	9	6	6.6
1	7	Developing country direct food buy	Non Profit	1	6	10	7	9	10	9	5	8	8	6	5	7	4	3	5	6	6	10	10	10	7.2

Every company and BC application has different issues/opportunities/risks that need to be carefully considered in assessment and comparison process

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Blockchain Application Assessment Scorecard

			Top Level Measures ->	Impact on Compet-itive Advant-ages 2			Business Processes 2					Blockchain Tech and IT Capacity 1		
			Mid Level Measures ->	Low Cost Producer 3	Reliable Delivery 1	Brand & Customer Loyalty 2	Infor-mation Import-ance 1	Ability/ Value of Cutting out Inter-mediaries 1	Degree of Control & Leverage 1	Financing 1	Product Delivery 1	Software Capa- bility 1	Process-ing Speed 1	Transact-ion Volume 1	Security 1
			Base Level Measures ->												
			Goal -->	10	10	10	10	10	10	10	10	10	10	10	10
				Base case row											
Graph	No.	Option Type	Option												
1	1	Overseas Manufacture & Shipping Data	Manufacturer	10	9	8	10	8	8	6	9	8	8	6	8
1	2	Anti-counterfeiting	Manufacturer	8	8	10	9	5	7	5	6	7	8	6	7
1	3	Health Records Business	Health Care Services	5	5	10	10	5	2	5	9	7	6	4	8

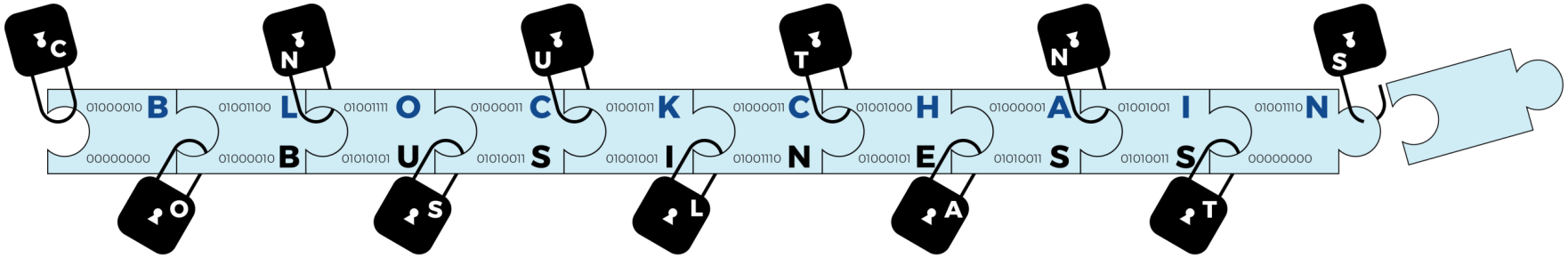
Weighted average aggregate score indicates which application scores best

Additional criteria here, with weighted average total score

			Costs and ROIC (2)				Prob-ability of Success (1)		Other Risks and Considerations (1)		Wt or Min ↓
			Cost to Develop (1)	Operate & Maintain (1)	Expense Savings/ Sales+ (1)	ROIC over 5 years (4)	Develop-ment (1)	Partner/ Market Accept-ance (1)	Regulatory (3)	Vendor Relations (1)	Wt / Wt / Wt
			10	10	10	10	10	10	10	10	10
No.	Option Type	Option									Aggregate Column
1	Overseas Manufacture & Shipping Data	Manufacturer	6	7	7	8	9	7	10	7	8.3
2	Anti-counterfeiting	Manufacturer	6	7	7	7.5	8	4	9	6	7.3
3	Health Records Business	Health Care Services	3	4	6	4	6	2	7	3	5.6
4	Hyperledger blockchain trade finance	Retail Store	6	7	8	8	8	8	7	9	7.3
5	Customer Loyalty Cryptocoin	Retail Store	4	4	8	7	8	10	10	9	7.1
6	Accepting Bitcoin and Ether for payment	Retail Store	5	6	6	5	9	9	9	6	6.6
7	Developing country direct food buy	Non Profit	4	3	5	6	6	10	10	10	7.2

Blockchain Business Consultant's blockchain application assessment scorecard very valuable for doing “sensitivity analysis” to see what is the most “robust” portfolio of applications to pursue

- There is no answer, there is no right or wrong set of criteria to consider
- Adjust the weights on criteria, see how that changes the ratings of investment options
- Look at a wide variety of criteria, different ratings when there is uncertainty, and see if you can identify BC applications a that are “robust”—rate and likely to perform well under wide variety of conditions
- Collaborate, get feedback, “red team” your ratings and assumptions
- When CEO reviews: if he/she disagrees you can immediately change the criteria rating or weight to see how that changes overall weighted score
  - Great news: most of the time with dozens of criteria, you can usually make big changes to a rating and overall score won’t move much—the top rated option likely to still rate best



Another big advantage of using BC assessment scorecard: fantastic way to convince CIO/CTO/CEO that you did a through assessment

- Important to show you've done your homework, can estimate potential value, cite risks, make impressive case for the assessment
- Especially valuable for blockchain because there is so much hype and risk—top decision maker wants to be very sure that you are not proposing a project based on hope or excitement
- Even if Manager/CEO says no; the fact that you did your homework, made a very reasonable, well researched proposal should be a plus for you

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CE Cost

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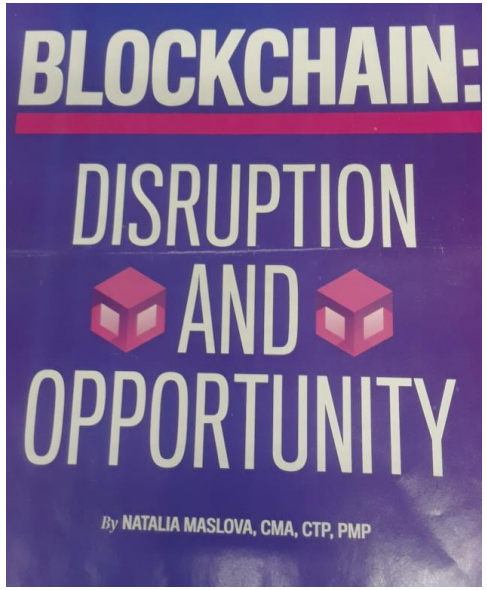
Blockchain Application Assessment Scorecard

			Top Level Measures ->	Impact on Compet-itive Advant-ages			Business Processes							Blockchain Tech and IT Capacity				Costs and ROIC				Prob-ability of Success		Other Risks and Considerati ons		Wt or Min ↓
				2			2							1				2				1		1		Wt
			Mid Level Measures ->	Low Cost Producer	Reliable Delivery	Brand & Customer Loyalty	Infor-mation Import-ance	Ability/ Value of Cutting out Inter-mediaries	Degree of Control & Leverage	Financing	Product Delivery	Software Capa- bility	Process-ing Speed	Transact-ion Volume	Security	Cost to Develop	Operate & Maintain	Expense Savings/ Sales+	ROIC over 5 years	Develop-ment	Partner/ Market Accept-ance	Regulatory	Vendor Relations	Wt
			Base Level Measures ->	3	1	2	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	3	1	Wt
			Goal -->	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Graph	**No.**	**Option Type**	**Option**	Base case row																				**Aggregate Column**
1	1	Overseas Manufacture & Shipping Data	Manufacturer	10	9	8	10	8	8	6	9	8	8	6	8	6	7	7	8	9	7	10	7	8.3
1	2	Anti-counterfeiting	Manufacturer	8	8	10	9	5	7	5	6	7	8	6	7	6	7	7	7.5	8	4	9	6	7.3
1	3	Health Records Business	Health Care Services	5	5	10	10	5	2	5	9	7	6	4	8	3	4	6	4	6	2	7	3	5.6
1	4	Hyperledger blockchain trade finance	Retail Store	7	5	5	7	10	8	10	5	8	8	5	7	6	7	8	8	8	8	7	9	7.3
1	5	Customer Loyalty Cryptocoin	Retail Store	5	6	10	5	6	10	6	5	9	4	4	8	4	4	8	7	8	10	10	9	7.1
1	6	Accepting Bitcoin and Ether for payment	Retail Store	5	5	10	5	8	10	5	5	7	4	3	6	5	6	6	5	9	9	9	6	6.6
1	7	Developing country direct food buy	Non Profit	6	10	7	9	10	9	5	8	8	6	5	7	4	3	5	6	6	10	10	10	7.2

Key Findings and Recommendations

- BC has many great advantages for business operations, safely sharing information and better integrating business partners
- Assessing what BC applications to use and when depends on dozens of criteria that need to be carefully assessed based on your industry, company, business processes and competitive strategies
- Multi-criteria decision analysis a good approach to assessing blockchain applications and deciding if worth pursuing

HYPERLEDGER



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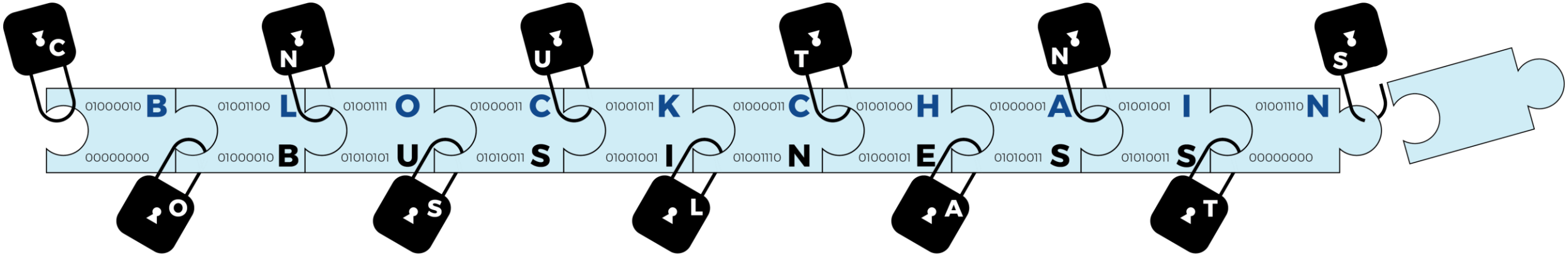
Blockchain Application Assessment Scorecard

			Top Level Measures ->	Impact on Compet-itive Advant-ages 2			Business Processes 2					Blockchain Tech and IT Capacity 1			
			Mid Level Measures ->	Low Cost Producer 3	Reliable Delivery 1	Brand & Customer Loyalty 2	Infor-mation Import-ance 1	Ability/ Value of Cutting out Inter-mediaries 1	Degree of Control & Leverage 1	Financing 1	Product Delivery 1	Software Capa- bility 1	Process-ing Speed 1	Transact-ion Volume 1	Security 1
			Base Level Measures ->												
			Goal -->	10	10	10	10	10	10	10	10	10	10	10	10
Gain	No.	Option Type	Option	Base case row											Risk
1	1	Overseas Manufacture & Shipping Data	Manufacturer	10	9	8	10	8	8	6	9	8	8	6	8 1
1	2	Anti-counterfeiting	Manufacturer	8	8	10	9	5	7	5	6	7	8	6	7 1
1	3	Health Records Business	Health Care Services	5	5	10	10	5	2	5	9	7	6	4	8 1
1	4	Hyperledger blockchain trade finance	Retail Store	7	5	5	7	10	8	10	5	8	8	5	7 1
1	5	Customer Loyalty Cryptocoin	Retail Store	5	6	10	5	6	10	6	5	9	4	4	8 1
1	6	Accepting Bitcoin and Ether for payment	Retail Store	5	5	10	5	8	10	5	5	7	4	3	6 1
1	7	Developing country direct food buy	Non Profit	6	10	7	9	10	9	5	8	8	6	5	7 1

Other Illumeo Blockchain Courses Available

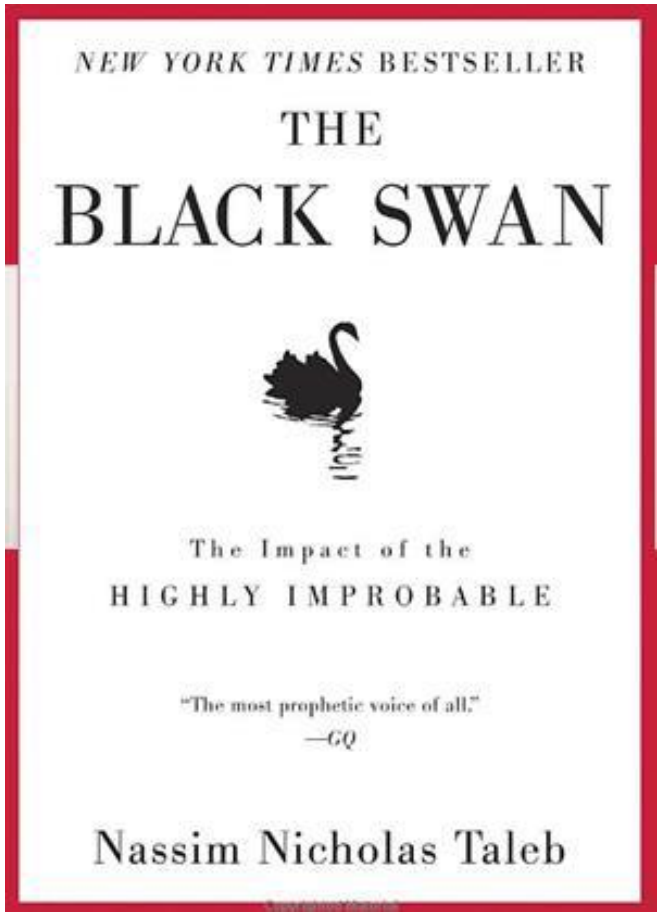
Course	Date Available
Understanding Latest Blockchain Business Applications	Nov 2018
Blockchain Use in Supply Chains and Systems Integration	Nov 2018
Blockchain Use in Financial Services	Dec 2018
How to Assess Blockchain Value for Your Firm	Nov 2018
Understanding Initial Coin Offering Benefits, Risks and Process	Dec 2018
Due Diligence for Cryptocurrency and Initial Coin Offering Investments	Dec 2018



Questions?

Feel free to email:

drmiller@bchainconsult.com

If interested in most valuable book I've ever read, Taleb's "The Black Swan" email and ask for copy of "Cliff's Notes" I wrote up for this very valuable, important book

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