

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

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Blockchain is an ideal systems integrator, connecting 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 or more important: blockchain's unique features make it safer and more feasible to connect a wide variety and large number of business partners together. Blockchain (BC) as a secure distributed ledger is the 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 applications. The power of BC as an integrator is rarely mentioned, but probably the most valuable application of this technology.

The vast majority of business IT systems are designed for company use, not interactions with outside systems. Despite the widespread use of ERP systems, many or most companies still have lots of stove piped data within the firm. Many have customized their ERP systems, which sometimes makes use of standardized API¹ to share data problematic.

BC "Distributed Ledger" contrasted with traditional centralized database

Centralised Ledger

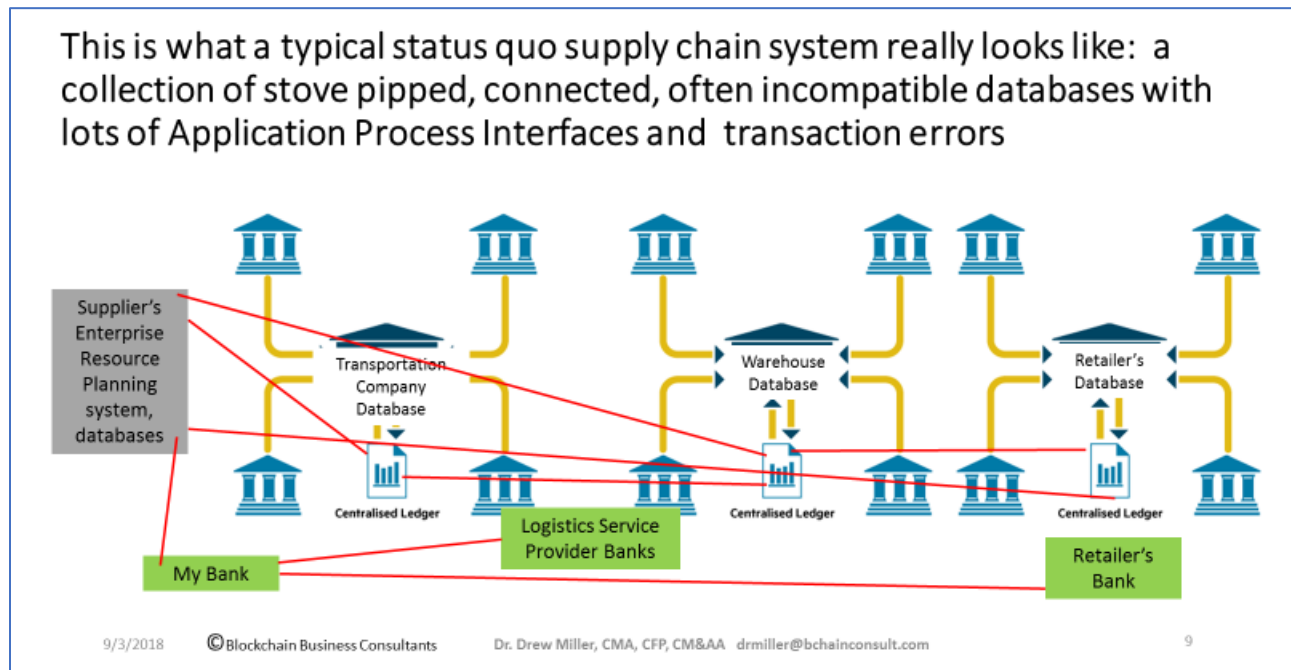
Distributed Ledger

- 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 majority agreement on correct block of transactions that is then locked into the blockchain

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¹ An API (Application Programming Interface) is a software-to-software interface that enables two applications to exchange data

In explaining BC technology, BC consultants often use a diagram of one central, simple shared database like the one above. This is grossly misleading. Few business processes are so simple and isolated that they have one database or IT system to use. Most companies have multiple databases—and information is needed from suppliers and other business partners.



The reality of information sharing is much more complicated and convoluted than one central database that all share. For a supply chain or other business process you need to access many ERP systems, databases and sources of information—controlled by lots of different parties, many you may not know or trust, including competitors.

Blockchain is being used to not just achieve the standard BC benefits of a trusted distributed ledger, but a better way to integrate data from across multiple business partners. Brigid McDermott, VP of Blockchain Business Development at IBM, explains that BC provides a “trust system of record between disparate companies.”² Using BC to integrate ERP systems with other data sources lets you tightly control who the data is shared with along with great security and reliability of the data. Eighty percent of corporate data resides in silos, according to McDermott. BC as an integrator doesn’t just share the data, but solves the confidence and trust problems. Again citing McDermott, “Permission blockchain gives you that confidence that you can control your information and grant access only to those you want to grant access to.”³

² Lucas Mearian, “Blockchain integration turns ERP into a collaboration platform: The combo yields a trusted system of records that can be shared between disparate partner companies,” Computerworld, Jun 9, 2017

³ Lucas Mearian, “Blockchain integration turns ERP into a collaboration platform: The combo yields a trusted system of records that can be shared between disparate partner companies,” Computerworld, Jun 9, 2017

Private blockchains, plus advances in BC technology enable protecting information privacy. The diagram below shows how the IBM-Maersk ocean shipping BC logistics and integration service (now called “TradeLens”) limits different parties’ access to view information and to input data.

BLOCKCHAIN NETWORK ASSETS (SHIPMENTS) STATUS & PERSONAS								
Network Collaborators (Personas)	CREATED	EXPORT DECLARED	BOOKED	DEPARTED	ARRIVED	IMPORT SUBMITTED	IMPORT APPROVED	CLEARED
SHIPPER	V	V	V	V	V	V	V	V
EXPORT BROKER	V D S	V	X	X	X	X	X	X
SOURCE LOGISTICS PROVIDER	V D	V D S	V D S	V	X	X	X	X
DESTINATION LOGISTICS PROVIDER	X	X	X	V D S	V	X	X	X
IMPORT CUSTOMS AGENT	X	X	X	X	V D S	V D S	V D S	V

PERSONAS' PROFILE CAPABILITY

- V VIEW Asset
- D DATA Update
- S STATUS Update

Source: IBM briefing to Blockchain Business Consultants, Jan 2018

Aircraft, many military systems, and, due to inherently expanding government regulations and legal risks, more products and services must record origin and proof of inputs, records of maintenance, inspections, and other data. The “immutable” property of BC means that once data is entered, it can never be erased and you have a verifiable, trusted record of every transaction. These conditions drive interest in BC as a systems integrator, as does most companies desire for better “supply chain visibility,” near real time information on inventories of key suppliers, shipment status, and other data that comes from business partner’s systems. Airbus has to integrate company and supply chain and customer data amongst 180 of company locations, 12,000 direct suppliers, and dozens of customers. They are developing a BC system to provide this information sharing and systems integration service.

Airbus implementing blockchain to control the many complex parts that come together to make a jet plane and other BC applications



- Sensitive design data could be sent via BC to guarantee quality and security standards and exploit smart contracts

- Airbus sees BC as way to overcome compliance issues, high overhead cost for data reconciliation with multiple parties they must share data with
- Applying BC technology to pilot certification so confident they have “immutable data” they can trust
- Airbus using a Linux Foundation-backed Hyperledger blockchain

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In theory you could link together or access information from all the suppliers of parts, manufacturers, maintenance firms, operating companies, government regulators, and other parties involved. But trying to integrate not just separate, but constantly changing traditional IT systems controlled and altered by lots of different companies is extremely costly and error prone.

I had the misfortune of working with Department of Defense efforts to add huge ERP systems and use IT information architecture approaches to try and link together or replace thousands of different DoD IT systems. I estimated that duplicative DoD IT systems and massive efforts, most of which failed, to try and integrate them, wasted about \$3 billion annually.

According to Norman Katz of Katzscan Inc, an expert on ERP and EDI systems, data mapping and integration – whether across silo systems or during systems migrations – is an inherent challenge in every project. The data mapping exercise in which the data fields between the two systems is compared for likeness is the problem. One system’s attribute will be another system’s characteristic, and a data field’s content often does not match what the data field was originally intended to be. Katz, who is a Blockchain Business Consultant associate, warns that both creating links between ERPs and databases can be difficult, and they will often yield errors later when changes to the IT systems are made.

Efforts to link together lots of traditional IT systems are costly, error prone—and unnecessary if you can use a blockchain system for a shared business process. Using a BC system to integrate, share data, get approvals needed, reliably documenting actions and transactions, is a far better approach in many applications than trying to connect together IT systems using traditional methods. This is especially so when working with lots of business partners who may not trust

each other, or don't want to let outside IT systems connect to theirs. Some BC systems to do this business process integration are in operation now, and many more will be coming soon, eventually in all industries. BC can ensure that information is only released to trusted parties and can control the set of data released to those parties.

Bas de Vos, Director of Industrial and Financial System's in-house technology think tank, has promoted this high value application of BC as a safer and simpler way to integrate IT systems:

"It could create a single version of truth where all...the underlying IT systems go through a simplified integration through the blockchain, getting a transcript of the asset history into the blockchain to make sure all the systems instead of talking to each other talk through blockchain. . . . That leads to much simpler integration between IT systems."⁴

Blockchain won't replace ERP systems and big private company databases, though it may allow elimination of many databases and lots of APIs currently used to patch together different IT systems. Using a BC to access and share limited data from ERP systems (including those from fiercely competitive firms) and reliably document shipments and transactions is a far better approach for many applications—one that can greatly improve information access and security while cutting IT expenses. BC technology simplifies access to data by companies in order to encourage collaboration on enterprise projects.

If you're seeking low cost providers, adding new products and suppliers, or just have a huge number of business partners to deal with, you can't evaluate their integrity and probably must assume they are not too trustworthy. If a BC system is used to share information and automate paperwork and payments, you don't need to have as much trust. You can further reduce the risk of less reliable business partners attempting to cheat the system by requiring a deposit to use the private BC that is forfeited if you fail to fulfil BC contract requirements.

Indeed, a huge appeal of BC for business use, not written about very openly in publications, but trumpeted by early Bitcoin and BC pioneers, Libertarians who dislike both Big Government and Big Business, is the ability of BC to bypass our constipated, costly, legal system. With Smart Contracts, the terms of the deal are laid out precisely, executed by the blockchain when conditions are met, and payments can also be automated and forced. So you don't have to go through the slow, costly legal process to enforce the terms of the contract if the other party fails—the contract executes on the blockchain. Business clients have privately told us they see this is a big advantage of blockchain technology—the ability to bypass courts.

Some states have enacted laws declaring smart contracts legal, more are preparing to do this, and it is very likely that they are perfectly enforceable contracts in court now without such legislation.

If there is a shipping delay, a problem with a payment, anything out of what was promised, "Smart contracts" (programmed instructions) can immediately notify all relevant parties of the

⁴Bas de Vos, quoted in "Blockchain integration turns ERP into a collaboration platform," Lucas Mearian, Computerworld, June 9, 2017

change and execute agreed contract terms. As I explained in a recent article in a logistics journal, “smart contracts are every bit as important as blockchain.” “You put your contract terms on the blockchain and the platform executes those terms as it receives confirmation that tasks are completed and meet the contract terms.”⁵ For example, if a truck delivers a shipment, and meets the contractual service level agreement, the smart contract automatically issues payment. No waiting for payment, no invoicing, no administrative costs.

Some companies have been building supply chain “control towers,” a central IT hub to capture and supply chain data for better information and decision making. In some client work, Blockchain Business Consultants have found that using a BC integrated supply chain system is a more valuable approach than building a supply chain control tower.

Five BC experts writing in a 2018 article argued that BC “offers a more decentralized approach to data management and sharing” with better transparency, speed, and responsiveness.⁶ BC is ideal for IOT interactions and integration. For example, time-stamping and logging arrival at a specific location, recording temperatures, are not just easy to do with a BC, but less subject to falsification and cheating than in a non-BC IT system. Blockchains are certainly not more efficient than centralized data systems or simple APIs that connect two separate, stable databases. They do require additional computing power and a separate BC system. But the advantages they bring in reliable data sharing, smart contracts to execute payments, trustworthy IOT data feeds, with an immutable record of transactions, yields huge advantages. As MIT BC analysts believe, BC is “a game-changer for companies that need more agile supply chains to keep up with changing customer demands, or that are making the transition from market player to platform provider.”⁷

Moog, which makes precision parts for the US Department of Defense and the aerospace industry, is developing a blockchain platform to securely share computer-aided design specs of plane parts with suppliers and trace and audit the deployment and life cycle of each input.⁸

Growth in 3D printing, better referred to as “additive manufacturing,” is likely to promote BC use because it is so easy to digitally send a complete digital part or product design, have it

⁵ Lisa Harrington, “A Blockchain Reality Check,” Inbound Logistics, July 16, 2018, <https://www.inboundlogistics.com/cms/article/a-blockchain-reality-check/>

⁶ Amit Ganeriwala Et Al, “Does Your Supply Chain Need a Blockchain?,” MIT Media Lab, March 16, 2018, <https://www.media.mit.edu/articles/does-your-supply-chain-need-a-blockchain/>

⁷ Amit Ganeriwala Et Al, “Does Your Supply Chain Need a Blockchain?,” MIT Media Lab, March 16, 2018, <https://www.media.mit.edu/articles/does-your-supply-chain-need-a-blockchain/>

⁸ Hans Casteels, “Blockchain for Supply Chain - Is it Worth It - and Where Even To begin?,” LinkedIn article, July 29, 2018

competitively bid, contract for production, and then use the BC and smart contracts for the order, shipping and execution of payments.⁹

Many blockchain applications are already in use, with many more coming, to more reliably track and verify supply inputs and avoid counterfeit goods. A report commissioned by the International Trademark Association and International Chamber of Commerce estimated global economic value of counterfeiting and piracy in 2015 at \$1.7 trillion. Counterfeiting is forecast to reach \$2.3 trillion by 2022.¹⁰ Counterfeiting is so widespread, even small suppliers are victims, not just the largest brands or high value items.

You can't reap the benefits blockchain offers by simply replacing a normal database with a BC Secure Distributed Ledger. Getting your business partners, suppliers, customers to use the system is often the most difficult aspect of the effort.

One of the best books on blockchain's applications, by William Mougayar, argues that BC projects are overwhelmingly business process redesign efforts, not blockchain IT challenges.

“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

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

With companies like Airbus, FedEx, Goldman Sachs, IBM, Maersk, SAP, Walmart, using BC, there should be no doubt that this technology has powerful business applications—and opportunities to generate significant competitive advantages.

Cryptocurrency payments can add more value in business applications, particularly for automated payment from Smart Contracts running on the blockchain. But BC technology delivers tremendous value, especially in integrating IT systems and business partners, with or without cryptocurrency use. It is a foolish mistake indeed to think of BC as Bitcoin and cryptocurrency and Initial Coin Offerings—its applications for systems and business partner integration may be the biggest payoff of BC technology. While we still help companies consider if they should accept cryptocurrency payments and do an Initial Coin Offering, we find that the BC integration applications are usually those that yield the highest Return On Investment and improvement in Competitive Advantages.

⁹ Drew Miller, Ed Morris, Greg Colvin, “Metals Additive Manufacturing: Great Promise in Mitigating Shortages, but Some Risks Remain,” Defense AT&L, Dec 2016, <https://www.dau.mil/library/defense-atl/DATLFiles/Nov-Dec2016/Miller%20et%20al.pdf>

¹⁰ International Chamber of Commerce, <https://iccwbo.org/media-wall/news-speeches/global-impacts-counterfeiting-piracy-reach-us4-2-trillion-2022/>

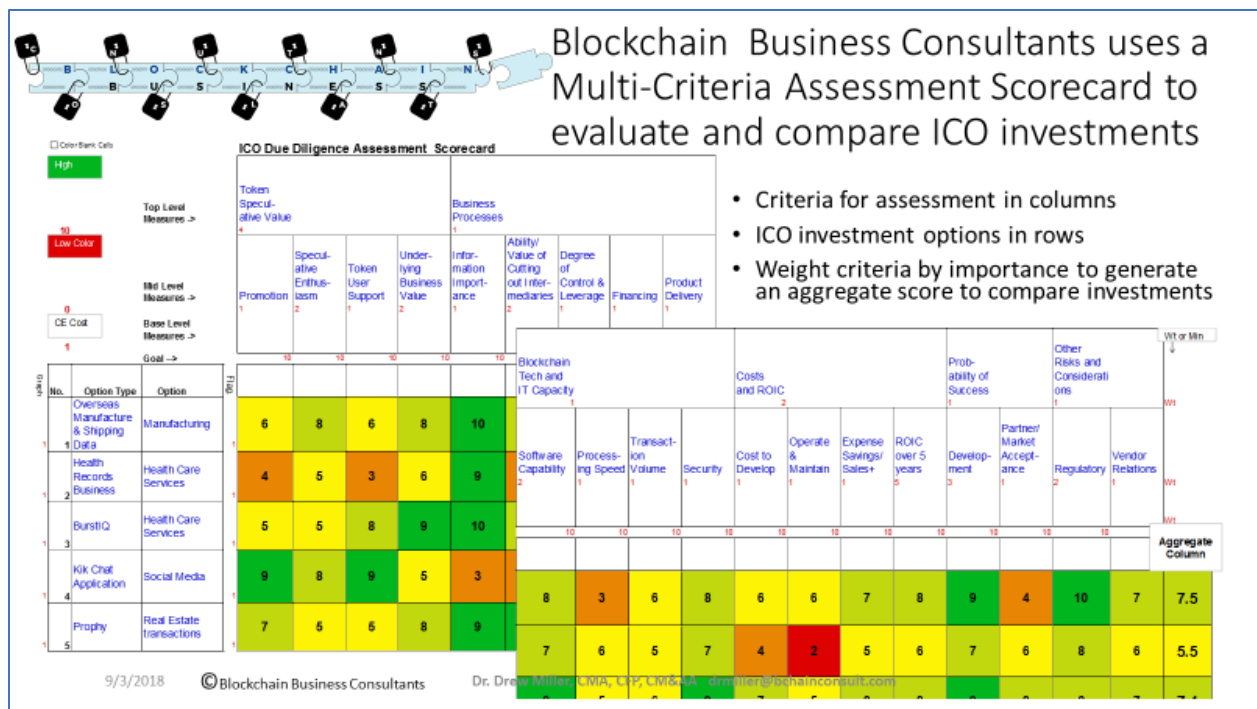
We have advised companies on whether to be a member of an existing blockchain consortium or design and promote their own. It's relatively easy for Walmart and Amazon to force their suppliers to use their BC system, but others have to persuade and incent business partners to use them. But for the reason Maersk and IBM had to rename and alter their joint venture to form TradeLens--to overcome Maersk competitor's fears that the system would be misused by Maersk to disadvantage them--there are advantages to having a small company, without big market or industry power (but with expertise) forming and owning or leading the BC integration system. The smaller, non-dominating company may be more trusted and successful in designing and operating a BC integration system, and getting large numbers of competing companies to use it.

If the BC integration system is running on a public BC no one controls it. More common for business applications will likely be private BCs, controlled by a single company or consortium, but still distributed databases, with immutable data, not vulnerable to hacking or a single point of failure, and capable of running Smart Contracts, leveraging the other advantages and growing capabilities of BC.

We suspect the vast majority of BC integration systems for business will be private blockchains, not public. They might be run by an association, it might be "owned" or controlled by individual token holders and users, it might be run by a single company (anathema to the original spirit of blockchain). Blockchain Business Consultants suspect that most companies will end up using several blockchain systems. There will be BC systems that dominant suppliers or customers force them to use (Walmart or Amazon for example). But firms will also voluntarily use BC integrating systems with great functionality and reasonable terms. More BC integrating systems with good functionality and use terms will arise, and some may expand and link a wide scope of functions. For example, SharedChain, a new supply chain service that links together producers, warehouses and transportation firms, offers a system that handles supply chain and logistics from production through distribution to retail stores or final consumers.¹¹ Some big BC integration systems might acquire other blockchain systems that it could modify and fit/add to their system.

In our work to help companies assess whether they should pursue a BC application, Blockchain Business Consultants uses a multi-criteria decision analysis process to consider the wide range of criteria that must be considered:

¹¹ www.sharedchain.io



We find a lot of common errors in how companies approach a BC project. Most do not consider all the areas of Business Processes that will be impacted. We often see over optimistic benefit and cost assumptions and bad, untested assumptions about whether business parties needed will cooperate and use the new system. Not having a diverse team working on a BC project with all areas of operations and support needed is another common mistake.

Our BC application assessment methodology helps shift the focus from BC technology benefits to the likely impacts on business processes, costs, sales, customer reactions and of course, Return On Investment and impact on Competitive Advantages. Unlike consulting firms that are selling BC design and programming services, and often biased towards pursuing BC, Blockchain Business Consultants does not design or implement blockchain systems.

Blockchain applications with great business benefit are in use now, and many more are coming. Companies that make sensible BC investments stand to not just save expenses, but generate competitive advantages. Companies that can develop and grow a BC integration system that others can use may end up disrupting traditional industry practices and generate a very profitable new business.

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