The Rise of the Internet of Value (IoV)

How Blockchains are About to Disrupt Industries, Governments and People's Lives

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Most people are familiar with the trajectory of digital evolution to date from Web 1.0 (a one way content distribution net) to Web 2.0 (interactive / social net) and possibly Web3.0 (where smart applications monitor data and make decisions as Human's agents and in doing so interact with both Humans, other Apps or IoT-enabled Machines).

What might be less well-understood is the disruptive power of a new wave of digital capabilities enabled by cryptocurrencies (e.g., Bitcoin) and the underlying distributed ledger technology enabling the P2P exchange of digital value (e.g., Blockchain).

They represent a major catalyst to the emergence and the seamless exchange of new forms of digital value.

In fact, the capabilities that cryptocurrencies and nextgen distributed ledgers (enabling smart contracts) bring to the table have the potential to impact business evolution in a way that is likely to dwarf the impact of Web 1.0 and Web 2.0. It will be a key building block in the current digital evolution i.e., Web3.0 or constitute in itself the basis for Web 4.0.

Today over 800 hundred cryptocurrency startups (and over a billion dollars in related VC investments) are actively targeting pockets of value waiting to be unlocked, addressing the limitations of the technology and making it more user-friendly, secure and robust. Early startup Blockchain companies focused on Bitcoin with the goal of providing much needed infrastructure and the ability to convert fiat into cryptocurrency. More recent startups are expanding the Blockchain space beyond currency and into more complicated financial instruments. Looking forward, a new trend of startups looms is emerging aimed at pushing Blockchain outside of financial applications and into other industries.

There is abundant literature on how Bitcoin and the Blockchain work from a Technology perspective. This article is focused on the Business implications of this new phase of digital evolution and presents a framework to identify and assess opportunities as well as recommendations for Industry, Governments and Individuals.

The rise of Cryptocurrencies and distributed ledgers - The evolution of Blockchain

Most have heard of Bitcoin, a high profile example and the first of an emerging category of cryptocurrencies (built upon peer to peer distributed ledger systems) that share some of the properties of fiat currencies in terms of non-repudiation, non-duplication, potential for universal acceptance and to some extent, anonymity … yet without the nationalistic constraints and central banks' oversight over the

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money supply with strong incentives to mint/print currency 'on demand', and in doing so increasing the risk of currency devaluation.

The most interesting aspect of cryptocurrencies is not the currency itself. It is the underlying mechanism by which value is transferred, this mechanism is called the 'Blockchain'.

Blockchain technology enables different parties (people, companies/gov'ts, machines) to exchange value between each other in a decentralized way (i.e., without the need for an enabling third party / custodian) yet with certainty about the outcome. The integrity of the decentralized ledger (record of all published transactions) is maintained through replication across a very large number of 'nodes' (think individual computers) around the globe making it very difficult for an intruder to hack, alter, control or destroy an account or a transaction.

And with the emergence of nextgen Blockchain (sometimes referred to as Bitcoin 2.0) capabilities such as the ones offered by Ethereum.org, exchanged value does not have to be limited to cryptocurrencies anymore.

Using networks like Ethereum one can extend the ability to exchange value to more complex commercial transactions that can be expressed in the form of a contract – a.k.a. smart contracts (expressed as small snippets of code) – where the exchange of value/payment is conditional upon a 'cryptographic proof' based on the occurrence of an event (i.e., pay for work only when it is delivered).

Think for instance of a contract for the sale of a vehicle, real estate property or securities that can happen without the intervention of a third party custodian / title company, yet preserve all the security provided by such parties.

Note that such concepts are not completely new. In the recent past, innovation networks such as Swift/Innotribe tried developing similar capability to create and trade digital value called 'Digital Asset Grid' that proved too early for its time

A framework to assess the potential for Business disruption

The obvious question is what use cases could benefit from such technology. The answer can be derived by thinking through the lens of evaluation criteria linked to the underlying Blockchain capabilities. Those include,

1. Commerce transactions where enabling 'middlemen' are exacting high transaction costs in settling trades without sufficient value add in return
2. Single point of failure situations where important information can be corrupt if someone hacks a central server
3. Situations where players are wary of censorship or information control (or visibility) that could be easily enforced/obtained in a centralized exchange system
4. Loosely structured, de-centralized collaboration schemes where multiple participants (Humans or Machines), possibly using different standards of work or communications, need to collaborate on an ad-hoc/project basis

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5. Cryptocurrency as a media to create a proxy for hard to trade assets – a way to issue 'equity' linked to any source of value
6. Situations where the exchange of value is dependent on the validation of an outcome (product delivered, code created, etc.) that can be expressed as a contract
7. Asset or information tracking schemes where a large number of assets (physical or virtual) need to be monitored/accounted for across a wide array of players, different geographies and a variety of IT systems – in an efficient manner
8. Access control, for everything from streaming media to live physical events
9. Hierarchical structures where control over value needs to be: transparent, rule-based, and strictly enforced (e.g., hierarchical deterministic wallets)
10. Identity management across multiple platforms and even industries

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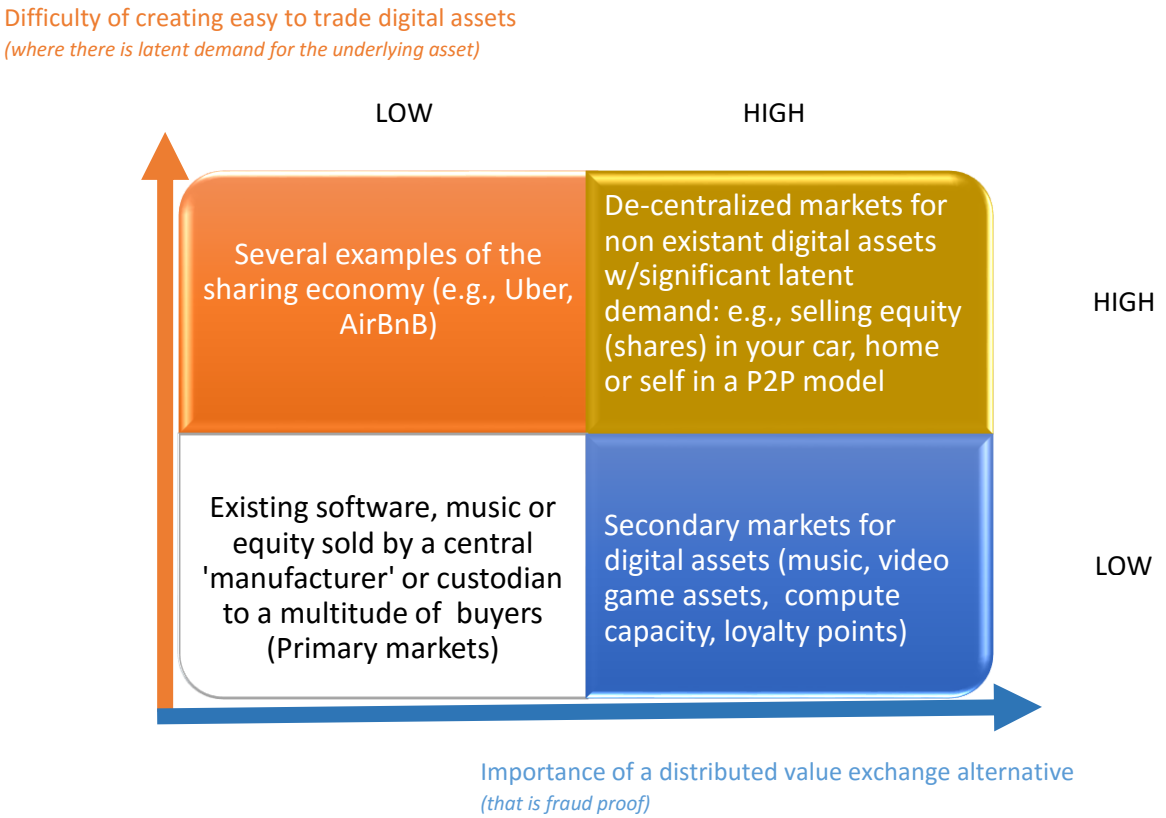
The 2 dimensional matrix below offers a simple alternative to a laundry list of evaluation criteria when trying to identify potential opportunities that would benefit from cryptocurrencies and distributed ledgers:



The way to read this matrix is that the value of the use of cryptocurrencies and distributed ledgers increases when:

1. The difficulty to trade an asset digitally is high: this is the case if an asset with potential latent demand has no easily tradeable digital proxy (i.e., it is not easy to sell shares linked to ones' house/car, private business or project, ideas or perhaps ones' identity). In such situations, the ability to generate a cryptocurrency linked to the underlying asset that can be easily traded is a major plus. Trading Card Games Software developer EverdreamSoft offers such an example in its approach to building its anticipated Game Spells of Genesis.
2. The need for a de-centralized way of exchanging value is high: examples include, safe local storage repository for digital assets ('be your own bank'), more cost effective P2P value exchange mechanism (e.g., remittances), anonymity, censorship-resistance, redundancy and collaboration across multiple standards, and the ability to tap into excess capacity at the individual scale (financial or otherwise).

You will note that I did not use the control over the monetary supply as a criteria given that volatility of cryptocurrencies to date has challenged the inflation-resistant model.

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Resulting Opportunities, Limitations and Threats: The Good, The Bad and The Ugly

The above criteria lead to a number of use cases: those beneficial to business and society (the Good), others that might have unintended adverse consequences to users due to the limitations of the technology (the Bad) and some that are designed, from the get go, for nefarious purposes (the Ugly).

The table below highlights key use cases including risks/limitations:

The Good (value adding)	The Bad (limitations)	The Ugly (nefarious)
- Digital payments and access to financing for the unbanked - Cheaper cross-border payments - Cheaper micro-payments - Cheaper security / commodity transactions - Decentralized clearing houses - Seamless monetization of digital content - Ownership and monetization of digital identity / footprint - Reputation and credential management schemes - Decentralized info dissemination immune to censorship from abusive Gov't controls - Wisdom of Crowd / Polling - Tracking of physical or digital assets - Secondary markets for digital assets - Crowdfunding (without a third party a la kickstarter) - New markets – possibly new currencies – linked to any underlying asset / value - Nextgen sharing economy: market for extra capacity in compute, storage network, transportation, real estate - Access control- owning a specific token gives the owner permissions, entry, or even rights - Decentralized Autonomous Organizations - Futarchy: wisdom of crowd based public governance and policy making - Government-issued digital currency	- Volatility: driven by Speculation, insufficient liquidity, uncertainty about currency survival - Non-repudiation: you have no recourse to fix an error once a contract or payment transaction has been made - Service providers create Single Points of Failure*: will manifest mainly in exchanges and public storage services - Command line interfaces: making it user-unfriendly to end users and business users - Capacity limitations: not economically viable conduit for exchange of large data volumes through ledger itself - Scaling limitations: currently the number of transaction per second is limited by block storage size - Anonymity constraints: imposed on exchanges and through in-network monitoring** - Advertising: P2P nature makes it harder to emulate centralized view of items offered by most commerce marketplaces (instead of trading like bid/ask table views) - Consolidation of mining / processing: economies of scale → risk of control from few large players	- Any type of illegal trafficking (e.g., weapons, drugs, Human) - Funding of criminal organizations - Exchange of illegal/immoral digital content e.g., child pornography - Money laundering activities - Cyber-Crime activities/ Hacking activities - Illegal exchange of copyrighted material (e.g., video /audio) – gone are the days where the Gov't could shut down Napster*** - Tax evasion*** - Pyramid schemes - Archaic taxation systems: treating cryptocurrency transactions as capital gain ones - Autonomous algorithms which operate outside the reach of law / policy with major economic power and the ability to disrupt Human labor markets - Liability of retroactive legislation significantly increases companies' risk exposure given unclear regulatory environments

*Mt. Gox hacking is a prime example

**It is important to note that, Governments are actively trying to limit anonymity: imposing on exchanges the need to verify clients' identity (link to an existing bank account) and monitoring the ledger. As a result unofficial 'local exchange services' and the use of harder to track cryptocurrencies (e.g., Dash and Darkcoin) have emerged as counter-tracking measures. 'Cat and Mouse' game dynamics are likely to continue

***Some would argue that those should be moved into The Good category:

- Music / video sharing… popular between growing number of proponents of 'information wants to be free'
- Tax evasion: key issue for Gov'ts globally. As they are inclined to increase taxes given massive public debt levels, unfunded non-discretionary spending, ageing of populations and expected risks of structural unemployment increases

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Implications for Governments, Industry and Individuals

Despite limitations and potential for use in illegal activities (or Governments bid to discredit cryptocurrencies/ distributed ledgers), de-centralized information and value exchange mechanisms are here to stay.

We have seen how resilient Bitcoin/Blockchain has been despite the Mt. Gox hack & bankruptcy (the largest Bitcoin to fiat currency at the time), elevated volatility and endless rumors of imminent collapse. Even though the price of a Bitcoin has fallen from a high over $1,200 to its current price around $230 –at the time of publication of this white paper, all the other metrics of growth remain very positive (i.e., # of new wallets, # of transactions, # of addresses holding more than $100, # of startups, startup investment, etc.). And although alt-coins (Blockchains other than Bitcoin) occupy only a small percentage of the market, in general they've shown surprising resiliency and ability to adapt (it doesn't harm to have a network of people invested in the cryptocurrency and reticent to leave value behind).

On the positive side, Blockchains can enable the creation of new jobs and labor models, unlock latent economic value, financially empower billions of unbanked consumers, address populations' yearning to freedom/civil rights and keep governments in check.

The key question is what should you do about it? The answer depends on who you are:

Governments:

- Stop fighting the trend and start embracing it – when will Gov'ts start issuing Digital Fiat Currency?
- Leverage its ability to get closer and more relevant to your constituencies – think about new service-based governance models (e.g., Futarchy)
- Use it as a tool to promote/expand democracy
- Focus your control resources on the truly illegal and dangerous activities (reign in your desire for total control: Wiki leaks is the new norm)
- Modernize rules on equity issuance and investment accreditation
- Reform your tax code to make tax evasion not worth the risks (muscling Swiss banks into opening their books is not the answer going forward)
- Understand the implications of machine intelligence magnified via the potential of distributed ledgers on long term structural unemployment and promote policies that shore up the role of Humans into the labor equation (as opposed to playing catch-up through tax-based wealth redistribution schemes)
- Clarify the ambiguous taxation model constantly evolving for cryptocurrencies (currency vs. property vs. commodity)

Industry:

- If you are exacting high transaction fees as a distribution intermediary (stock custodian, cross border remittances, etc.) rethink your business model to add value commensurate to your fees or get ready to exit
- If your business is dependent on the sale of easy to replicate digital content (Music, Video…) your business is at risk (getting the government to choke Napster won't be as effective in the future). Instead continue to leverage the mobile platforms (and discrete sales models – by the song) for music distribution and consider enabling a secondary market for your products

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- If you are a Financial Services institution: if you are a payment network/intermediary or custodian re-think your value proposition (reduce your costs or justify them through sufficient value add) or embrace distributed ledgers as a potential execution option. If you are an exchange, re-think the value of your centralized model, consider innovation into enabling a variety of new crypto-equity markets. If you are a retail bank, are you offering cryptocurrency-denominated deposit accounts / wallets? Or as alternative investments? Are you investing part of your balance sheet in distributed lending operations? Are you ready to help the emergence of de-centralized businesses and commerce models? Are you an open-platform institution or a proprietary product one?
- If your business is based on the leverage of your customers' digital identity/footprint (e.g., Facebook, Twitter, Instagram) re-think your value prop and consider offering options for your customers to monetize their digital profile and the content they create
- If you've made your mark riding the sharing economy wave (Uber, AirBnB) make sure the centralized service you enable is worth the extra cost that your sellers are paying to use it
- Consider the cost savings within your own internal processes. Santander InnoVentures recently released a study which found that Blockchain technologies could reduce banks' infrastructure costs by $15-20 billion a year by 2022
- Overall, re-think your org structure: from command and control to decentralized autonomous organizations with built-in incentives for broad, self-monitored, collaboration towards the achievement of a common goal

Individuals:

- Open a wallet, buy a little Bitcoin (Coinbase, Circle and others are good to start) and see how easy it is to send value to a friend in another country
- Try exchanging value between cryptocurrencies (Poloniex, Shapeshift and others specialize in this)
- If you are tech-inclined consider acquiring distributed ledger coding skills
- More broadly, make sure you know how to monetize your skills and knowledge by taking advantage of emerging disaggregated, project-based work models including decentralized autonomous orgs
- In general, leverage new capabilities at your disposal to monetize your creations, connections/network, blogs, digital footprints and other assets (you can even have people invest in you as a 'company of one' as a way perhaps to finance your college education)
- Potentially, invest in crypto assets as alternatives to traditional asset classes
- As a citizen, take advantage of the increased power to get your voice heard and keep your government and government officials accountable and given them a chance to live up to their promises

These are only some of the changes that we can expect going forward. The potential for disruption is real, the change is unavoidable and the promises numerous. Like every new technology, the final outcome is a function of the way Humanity uses it.

In the case of cryptocurrency and ledgers, the promise of de-centralization puts back the power in the hands of the end users, a trend that is badly needed in a world where past evolutions of technology have enabled, through centralization and increased visibility, overwhelming control for those with great political or economic power.

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For those interested in a perspective on Blockchain platforms or Blockchain startups and the unique value propositions they enable, stay tuned for follow-up articles on this topic.

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