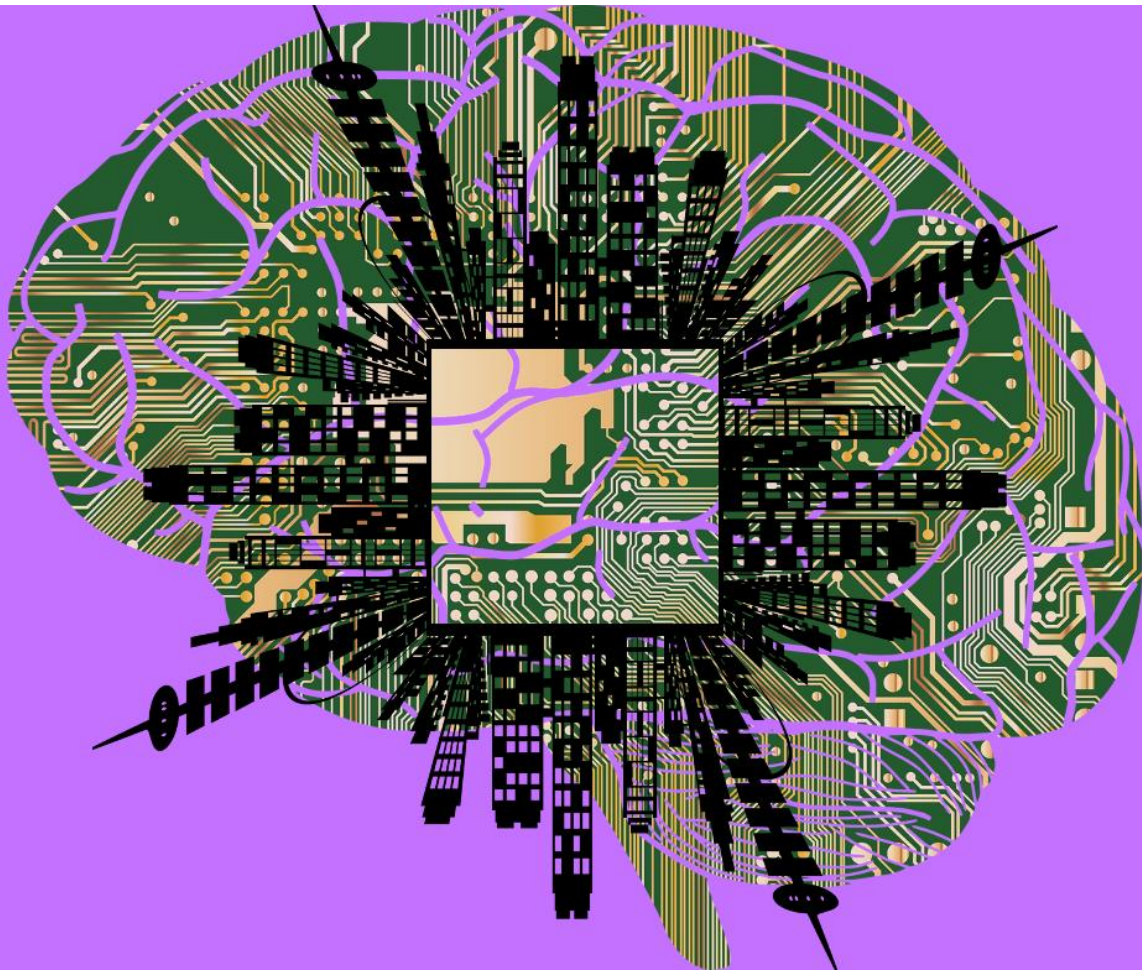




Smart Jurisdictions Index



November 2018



CARDANO
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The Z/en Group



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Smart Jurisdictions Index

November 2018

Greg Williams
Z/Yen Group

Foreword

Smart Ledger technology has been in use for many years, although it has come to prominence in recent times due to the rise of cryptocurrencies. Increasingly, governments are addressing the issues that arise from this technology, whether from a legal or regulatory perspective; or in addressing the delivery of services to citizens.

The extent to which different jurisdictions across the world are embracing or holding back the use of Smart Ledger technology is a key factor in the development of applications. Some are exploring the way in which this technology can assist in assuring identity and documentation, for example in anti-money laundering systems or the issuance of passports. Others are looking to this technology to improve the efficiency of transactions across a range of financial and other services.

For countries and regions with a commitment to the development of high tech and fintech industries, managing their approach to Smart Ledgers is key. They wish to ensure that whether their focus is on home grown start-ups or attracting inward investment, they provide an environment across business, regulation and infrastructure which supports new technology. They are supporting the development of their human capital through investment in training and education which supports a high level of expertise in their workforce.

The Smart Jurisdictions Index is a novel approach to tracking the relative preparedness of jurisdictions at national and state levels in welcoming Smart Ledger technology in business, finance and government operations. It is intended to provide a starting point for potential investors to examine where they might wish to explore business opportunities; and for governments and regulators to explore their competitiveness and the stance which they wish to take in welcoming or balancing the opportunities that this technology has to offer.

The index will require refinement and development as the field of Smart Ledgers is moving on at pace. We look forward to engaging with all those interested in the impact of Smart Ledgers on our future.

Mike Wardle

Financial Centre Futures Programme

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1. Why Did We Embark On The Smart Jurisdictions Index?

Many people have asked us to apply to Smart Ledger technology the same thinking that we have used to construct our long-running Global Financial Centres Index and our Global Green Finance Index. Investors, entrepreneurs, advisory firms, regulators, and those generally interested in the development of business-facing technology are keen to understand how and where Smart Ledger technology is being developed.

In response to this demand, we held summer workshops with practitioners, to probe what form this interest took. We also embarked on detailed desk research to further identify the likely initial jurisdictions of interest.

Initially, we looked at just the regulatory environment, examining the variance in legislation and surveying the technology standards in a range of jurisdictions. Currently the level of common agreed standards for performance and interoperability of Smart Ledgers is currently quite low and specific standards are barely emerging. Some global standard groups are at work, for example on ISO TC307, and a country's level of participation in that ISO working group has been captured as an indicator.

As we tried to clarify, for example, the differences between Switzerland and Denmark, or Singapore and Estonia, it became obvious that while the technical media is full of plans and projects, taskforces, visions and announcements, it is harder to pin down reality - in particular because what constitutes a 'law' varies so much from jurisdiction to jurisdiction. In some cases, it might be the existence of a detailed, enforceable regulation, but in others little more than a statement of intent. Even detailed regulations that do exist are regularly revised.

So, for this pilot index, we concentrated on two avenues: a) desk research into piloted and deployed government services, as a handy proxy indicator for jurisdictional readiness in the Smart Ledger field, and b) a detailed bespoke index that attempts to gather a range of instrumental factors driving this sort of technology, especially around the common themes of Identity, Documentation, Legal Status, and Payments.

The first avenue is important because governments which are serious about enabling Smart Ledger technology will themselves be keen to use it to deliver

services. They will also be encouraging the take-up of the new technology among their own citizens.

The second avenue mirrors the approach we have taken in our existing Indices, such as the Global Financial Centres Index and the Global Green Finance Index, with the important caveat that the evolving field of Smart Ledgers is highly dynamic and the utility and usability of our pilot Smart Jurisdictions Index will depend greatly on future input from users.

The biggest issue to consider is the speed at which Smart Ledger technology is evolving, the constant blurring of the lines between terminologies, and, in the case of some key areas like payments, the fact that many jurisdictions are crossed. Indeed, some key practitioners say they are choosing to base their new projects across several or many jurisdictions as a hedge against sudden changes in some local rulebook or political environment.

There is a lot of noise and wasted effort, as always when a new technology is emerging in a disruptive way. In general, the inexpert needs to be cautious about the gaps between what appears as news on a website - even a government website - and what is actually happening. These discrepancies are hard to spot if you or your enterprise has little knowledge of how the technologies work in detail, or if you are unaware of the wider business and political context.

2. Who Is The Smart Jurisdictions Index For?

Regulators, investors and many other finance and business innovators are keen to get a clear view of how mutual distributed ledger (MDL) technology is developing across the world. Although elements of the technology date back to the 1980s, their use post-Bitcoin is evolving fast and keeping up with what is happening - and where it is happening - is a challenge.

Many entrepreneurs, governments, central banks, finance ministries, and service providers (such as banks, law firms, insurers, and logistics companies) are now working with MDLs, embedded programs, smart contracts and smart sensing to automate the exchange of business-critical data, usually without the need for a third-party register. The technology promises to steadily transform the way business and finance is done and services are delivered, and perhaps how societies are organised.

As experts on factor-based Indices (including the world-renowned Global Financial Centres Index, the Global Green Finance Index, and the Taylor Wessing Global Intellectual Property Index), we have built a pilot Smart Jurisdictions Index, to help highlight how and where in the world Smart Ledger technology is being developed and incorporated into systems of law, documentation, payment and identity.

This pilot is a direct response to requests for a tool for investors, entrepreneurs, regulators and experts as they seek clarity about what is happening, where, and why.

In this short report and in the Smart Jurisdictions Index Pilot itself, we look beyond the cryptocurrency sector and instead seek to address other factors involved in the spread of Smart Ledger technology.

We outline, here, our design considerations when mapping the instrumental factors behind MDL development across the globe. We also detail the ways in which we have charted how particular jurisdictions have piloted or deployed MDL-based government services.

The key issues of Identity, Documentation, Legal status and Payments are constantly being debated and we have used these four as our touchstones throughout.

We have also included some micro case-studies on jurisdictions, including pointers to things to read and people and organisations to look up. These give a flavour of the range of activity and knowledge already available.

Throughout, we have purposefully not overused the term 'blockchain', because key technologies such as smart contracts, encryption and distributed ledgers (which are often encompassed in the term 'blockchain' by commentators) are, of course, independent and can be deployed variously, with or without each other, depending on the optimal solution desired.

The index can be found at SmartJurisdictionsIndex.net.

3. What Makes The Smart Jurisdictions Index Work?

Our expertise in constructing Indices of global importance is based around identifying the driving instrumental factors to any phenomena and grouping them to establish a meaningful numerical rating.

As the word 'Jurisdictions' makes clear, the Smart Jurisdictions Index is based on national or state jurisdictions (rather than, say, cities) as a category because of the strong role played by the law and formal regulation, not only in the contested area of cryptocurrency, of course, but also in the more general areas of national standards and skills for future-facing technology and business. Services for citizens, an important sector for Smart Ledgers, are also usually delivered at scale on the national level.

The 48 jurisdictions incorporated in this pilot were selected during a series of workshops and survey sessions conducted with practitioners over the last six months. Our intention is to add to the range of jurisdictions as we refine and build the Smart Jurisdictions Index. The current list contains some anomalies. For example, we list a number of active U.S. states individually. Also, the European Union as a block could be considered as one unit but we have considered its member countries individually. It should be noted that the pan-national United Nations has ambitions to use Smart Ledgers in tackling the issue of undocumented and stateless people.

There are some countries, for example China, which have taken a firm view on cryptocurrencies and sought to control them - or ban key activity such as exchanges - but which are obviously far from blind to the advantages of the underpinning technology.

The current list of jurisdictions is shown in Section 4, but can also be found in the dropdown menu at SmartJurisdictionsIndex.net.

4. The Results

The overall ranking and score of jurisdictions in the pilot index is shown in the table below:

Jurisdiction	Overall Rank	Overall Score
USA - Delaware	1	57.13
USA - Indiana	1	57.13
USA - Iowa	1	57.13
USA - Nevada	1	57.13
USA - New York	1	57.13
USA - Utah	1	57.13
USA - Wyoming	1	57.13
USA - Texas	8	56.52
USA - Connecticut	9	55.63
France	10	55.12
Canada	11	54.82
Netherlands	12	54.73
UK - England	13	54.64
UK - Scotland	13	54.64
USA - Arizona	15	54.36
Germany	16	53.48
Sweden	17	52.42
Switzerland - Zug	18	51.47
Denmark	19	49.72
Australia	20	49.04
Finland	21	47.03
Singapore	22	46.97
Japan	23	46.54
China - Hong Kong	24	46.18
Estonia	25	46.02
Ireland	26	45.04
Luxembourg	27	44.48
South Korea	28	42.32
China - not Hong Kong	29	41.46
Russian Federation	30	40.71
Israel	31	39.05
Brazil	32	38.54
Portugal	33	37.56
Malta	34	34.56
UAE	35	34.37
India	36	24.64
Indonesia	37	20.17
Kazakhstan	38	19.97
Liechtenstein	39	19.11
Isle of Man	40	17.46
Jersey	41	16.81
Aldemey	42	15.90
Guernsey	43	12.98
San Marino	44	9.81
Gibraltar	45	9.48
Cayman Islands	46	8.87
Puerto Rico	47	8.28
Bermuda	48	7.82

5. How Is The Pilot Smart Jurisdictions Index Built?

In designing the Smart Jurisdictions Index, we took 136 instrumental factors as a base, covering business environment, human capital, infrastructure, financial sector development and infrastructure. We then stripped out a number of measures that related purely to cities, rather than jurisdictions, leaving 104 instrumental factors. The full list, including reputational, infrastructure, financial service and human capital instrumental factors is shown in the Appendix.

Beyond these base factors, we identified a further set of instrumental factors more specific to Smart Ledger technology. To source these (15 so far) we invited feedback via the workshops. The factors so far adopted are set out in the table below.

Instrumental Factor	Source	URL (where applicable)
Legal		
Government attitude to Bitcoin	Desk Research	
Legal status of Bitcoin	Coin Dance	https://coin.dance/poli#legalitybycountry
Countries testing pilots for blockchain for voting, then actually using for voting	<ul style="list-style-type: none"> • Deloitte University Press • Blockchain in Government Tracker 	
Level of Internet Censorship		
Documentation		
Ratification of UN Convention on Contracts for International Sale of Goods	United Nations	https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=X-10&chapter=10&clang=_en
Participating country in ISO TC307	International Organisation for Standardization	https://www.iso.org/committee/6266604.html
Use of blockchain for land title registry	<ul style="list-style-type: none"> • Wallet Weekly • Deloitte University Press • Blockchain in Government Tracker 	

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Healthcare using blockchain	<ul style="list-style-type: none"> • The Medical Futurist • Blockchain in Government Tracker 	
Environmental Performance Index	Yale	https://epi.envirocenter.yale.edu/epi-topline
Logistics Performance Index	The World Bank	https://lpi.worldbank.org/
Identity		
E-participation Index	UN E-Government Knowledgebase	
Maturity of E Government	European Commission	
Use of blockchain technology for passport/immigration		
Payments		
Number of daily Bitcoin trades on local exchanges	Coindance	
Banks that have launched blockchain trade finance	Blockchain in Government Tracker	

With all such, some might say, ‘subjective’ instrumental factors, it is important to note that there are (as always) areas for which apparent indicators are not currently available, and it is also possible that individual instrumental factors are deficient, skewed, or misleading in some way. The value of the index will only fully emerge as users provide further feedback and trends emerge in the direction of travel of individual jurisdictions.

As the second layer of instrumental factors were added, we considered the direction we had been given at the workshops, namely that we examine closely four areas of potential Smart Ledger impact in particular: those involving Identity, Documentation, Legal, and Payments. Thus, we grouped factors around these four, each of which is measured individually in the Smart Jurisdictions Index dashboard for each jurisdiction.

In addition, we have researched and introduced several new factors which we believe to be significant. One, for example, is a categorisation of jurisdictions

according to how far their governments managed to deploy a range of about 20 citizen services, listing each according to the levels of activity, ranging from 'No Announcement', through 'Pilot Announced', 'Pilot Done', 'Service Deployed', etc. These types of indicators are ones on which we are actively seeking feedback, both from practitioners and governments, as information is still relatively scarce and unevenly spread. We are particularly keen to learn of new potential instrumental factors, or indeed, arguments against those chosen for the pilot.

Another factor that we incorporated, and one that is much more easily determined, is the level of country involvement in the global standards development process for MDLs. Under this we have categorised jurisdictions according to the status of: 'No Involvement', 'Observer Status' and 'Participant Member'. The process under the International Organisation for Standardisation (ISO) is currently dealing with ten standards for blockchain and distributed ledger technologies and details of their work will be found (when published) under the TC307 section of www.iso.org.

All the instrumental factors in the index engine were converted into scores on a 100-point averaged scale. This means that it will be possible, in future, to re-score factors as we gain additional feedback and identify anomalies.

We used the results to generate average scores across five general areas of competitiveness: Business Environment, Human Capital, Infrastructure, Financial Sector Development, and Human Capital. We applied the same method to produce average scores for Identity, Documentation, Legal, and Payments among the Smart Ledger specific factors and then summarised these results into an overall score, to produce an overall score, which drives the index ranking.

6. What Are The Next Steps?

This pilot Smart Jurisdictions Index will be, we believe, a useful navigational aid for investors, entrepreneurs, regulators and others, but it needs further data and development which only those stakeholders can provide.

Therefore, the key next steps are for us to:

1. Gather feedback on what we have done so far;
2. Use this feedback to develop the Smart Jurisdictions Index further;
3. Check future results against reality to ensure the Smart Jurisdictions Index becomes increasingly useful in identifying trends and developments.

We welcome feedback and support from individuals and institutions, far and near, to sustain and improve this project - and help make us all smarter.

7. Micro Case-Studies

Estonia (ranked 25th in the pilot Index): Since its re-independence in 1991 this small Baltic country wedged between the Gulf of Finland and Russia has leapt to the forefront in the implementation of smart solutions for banking, health records, transport, etc. While many jurisdictions talk about blockchain-based services, Estonia has actually moved rapidly in the last decade to test and deploy resilient technology based on a form of blockchain, often using KSI by Guardtime. The official e-estonia.com website is frank and informative, occasionally using handy phrases like ‘digital defence dust’ to explain how it is using blockchain. Currently the technology is used in Estonian registries for residency, national health records, courts, parliament, security, with plans for more. EU member Estonia has a strong e-skills base among its 1.3m people, is home to many e-start-ups and has benefited from a very young political class. Estonian officials like Kaspar Korjus, who heads the e-residency scheme (which is also available to non-Estonians), believe in debating new ideas – even to the extent of drawing fire from the European Central Bank over a recent proposal to launch an ‘estcoin’ crypto token. Numerous commercial tech firms come from Estonia, including Transferwise and Skype.

Canada (ranked 11th in the pilot Index): If Toronto has become a hub for Smart Ledger technologies, and in particular blockchain, then one key factor is low energy cost for computing. Ethereum co-founders Vitalik Buterin and Anthony Di Iorio are Canadians (as is COO Joe Lubin) and the country also has a robust start-up community, a dependable legal system, an established financial-services industry and both regulators and a political class who are open to innovation and aware that the country needs to move beyond being a producer of primary resources. As you should read for yourself in Buterin’s seminal 2013 Ethereum White Paper (below), a key development he sought was the ability to embed smart contracts into a register. Politicians and officials seem determined to keep Canada at the centre of the technological wave and one result is the freedom offered for public debate among officials. An example of this is Hanna Halaburda’s March 2018 paper (see below) entitled ‘Blockchain Revolution Without the Blockchain’ in which she teases out the differences between encryption, mutual distribution and smart contracts and points out how they each can be used separately.)

<https://github.com/ethereum/wiki/wiki/White-Paper>

<https://www.bankofcanada.ca/2018/03/staff-analytical-note-2018-5/>

China (ranked 29th in the pilot Index): China has now moved to suppress speculation in cryptocurrencies, ban new ICOs, etc., while at the same time investing a reported \$3.6 billion in smart ledger technology over the last two years, often in designated locations such as Nanjing and Gui'an. As part of a plan to establish a lead in 21st technologies, blockchain was explicitly mentioned in the 2016-2020 5-Year Plan, and the technology has been praised by President Xi. China is a leader in sector patents filed, mostly by the Central Bank, and citizen services are said to be using the technology in ID, social services, tax invoicing and keeping track of parolees. In July 2018 Xin Guobin, of the Ministry of Industry and Information, emphasised the utility of the new technology in the credit system, anti-forgery, finance, e-commerce, smart medical care, social security, the Internet of Things, energy, etc. Meanwhile Tencent is working on logistics platforms with local government. Catherine Li of TheKey (said to have previously implemented a previous non-blockchain ID scheme in 66 cities covering 200m people) says a new project uses blockchain with biometric and other data to establish identity of citizens in social and health care.

Alderney (ranked 42nd in the pilot Index): Many know that we have worked with this self-governing British Crown Dependency in the Channel Islands to deploy the MetroGnomo MDL technology as an open-source time-stamp - as a way of providing a proof of existence service for general use, for example in contracts, medical records creative works, images, TV footage, etc. Since this project launched in mid-2016 the island has reconfirmed, in 2017, its intention of amending company law to more fully account for blockchain. Many small jurisdictions that have roles in finance, insurance, gaming, off-shore services, etc, are making announcements of intent re Smart Ledgers and related technology but Alderney is one of the first to deploy a service.)

https://www.zyen.com/media/documents/MetroGnomo_Press_Release.pdf

Malta (ranked 24th in the pilot Index): Few countries have a political leadership more determined to talk loudly about DLT, blockchain and cryptocurrency than Malta: its current Prime Minister recently told the 73rd UN General Assembly that blockchain made cryptocurrencies the inevitable future of money. Malta has just introduced three parliamentary acts: The Virtual Financial Assets Act, The Digital Innovation Authority Act, and The Innovative Technology Arrangements and Services Act, all billed as underpinning Malta's self-declared status as 'blockchain island'. Certainly, Malta has raced to put in place what it

calls the first-ever comprehensive legal framework to welcome and support crypto and blockchain players, and major entities such as Binance have located and re-located there. ICOs, exchanges, crypto-brokerages and crypto-asset managers appear to be the target audience, although the island has also signed up with middleware provider Omnitudo to build a blockchain base for transport and logistics data and services on the crowded island. Given corruption allegations and revelations in the Panama Papers, Maltese politicians are sensitised to the potential of distributed ledger technology for enhancing trust. Other island hubs, such as the Caymans and Bermuda are also keen on welcoming the business (and reputation) that the new technology might bring.

Switzerland – Zug (ranked 18th in the pilot Index): Mark Branson, CEO of Swiss regulator FINMA, said last year the body was as passionately anti-crime as it was pro-innovation, and this sums up the country’s approach to blockchain and related tech. Taking 2017, before several major countries banned ICOs, Switzerland was second only to the USA in terms of coin issuances, followed by Singapore, Russia, China. Switzerland’s long financial history, its cluster of wealthy investors and financial/technical expertise and the political approach exemplified in Branson’s comments above, has seen it become home to 500+ start-ups in the field, many in Zug’s ‘Crypto Valley’ (with its own association headed by Oliver Bussmann). Serious working groups (including a new one due to report before year end and involving both the International Finance Ministry and the Justice Ministry) have been detailing how the country can stay/become a blockchain and fintech leader and the regulators regularly issue guidance to remove obstacles to innovation. Zug and Chiasso accept coin for some local government services and there has also been a test of blockchain voting. Global initiatives part-based out of Switzerland include UBS’s international partnership with Deutsche, BNY Mellon, Santander and ICAP to develop a Utility Settlement Coin, a digital cash equivalent of the major currencies, run on a permissioned blockchain and supported by London-based Clearmatics, a firm involved in a number of interesting projects worldwide. More locally, Switzerland (and in particular, Zug) is host to many initiatives, including the Crypto Valley VC incubator. Projects abound: one is Marc Degen’s Modum, a blockchain for pharma shipments. All this implies a cultural change to the formerly conservative banking world, as Jan Seffinga of Deloitte’s details in several videos about the new experimentalism brought by blockchain. And note: Liechtenstein (a micronation that uses the Swiss franc) is just a short drive away from Zug to the east on the scenic A3 toll road. There, entities like Bank Frick specialise in servicing companies in the blockchain and crypto world.)

USA (ranked 1st to 9th, by State, in the pilot Index): The USA is bubbling over with innovation in the field and many individual states have been rushing out laws, first to manage crypto and now to harvest the potential of blockchain and attract new investors. But as MIT's fortnightly 'Chain Letter' update points out, such laws can be unnecessary and may be counter-productive if they sow confusion. As Andrew Hinckes, of NYU Stern School of Business, says: "Laws should not attempt to define technologies that do not have a widely held definition in their relevant technical communities". The USA will surely be among world leaders in the field, based on its capacity to innovate in tech, its huge research & education sector, its hub function for global financial services, and its large defence and security industries. Individual states are competing for profile, but Delaware and Illinois remain pioneer states, with Colorado and Wyoming also pushing to use the technology in government services. Good summaries of the evolving landscape are produced by The Brookings Institution, while another reliable source on both USA-wide and global blockchain matters is the Library of Congress; its Global Legal Monitor is quick to highlight new developments and Jenny Gesley is an assiduous technical author there. The USA's higher education sector is particularly rich in relevant communities with a global outlook: just one is Cornell's 'IC3', which includes École Polytechnique Fédérale de Lausanne, ETH Zurich, UC Berkeley, University College London, University of Illinois at Urbana-Champaign and Technion.)

Some Terms Explained

Mutual Distributed Ledger: A database or registry that eliminates the need for a central counter-party to act as a third party to transactions, relying instead on a decentralised peer-to-peer network secured by advanced cryptography.

Blockchain: A chain of blocks of calculations, each one of which depends on its predecessors, forming the basis of the Mutual Distributed Ledger so that anything recorded on the ledger is preserved in an immutable sequence which every user can see.

Permissioned Ledger: A blockchain ledger that requires users to be white or black-listed through some kind of Know Your Customer (KYC) process.

Smart Contracts: A computer protocol that seeks to automate the negotiation and performance of a contract. Nested inside a distributed ledger they are tracked immutably. Like anything 'smart' they depend on the data they are fed and the definitions their computer code use.

Mining: The process of adding transaction records to a public ledger (for example for Bitcoin) held on a blockchain, with new coin as a reward.

Payments: This issue spans jurisdictions and is one where there is competition between disruptors and existing giants in the financial sector, many of whom are now testing out the capabilities of blockchain and associated technologies.

For example, JP Morgan (which now calls itself a tech company) has 75+ other global banks signed up to its Interbank Information Network, so they can all use the Ethereum-based permissioned distributed ledge. Initially they are using the system to speed up those interbank payments which get slowed down because of issues with compliance, or with missing or faulty data. Elsewhere, the Korean Banking Federation's has deployed the ID-verifier BankSign (based on NextLedger) while Mizuho has a trade finance tool and UBS has developed the Utility Settlement Coin, a collateral-backed system for fast payment in major currencies and purchase of securities. IBBVA has a pilot for corporate loans, while Santander is offering its One Pay FX to retail customers. In India, YESBank is using Cateina/IBM Watson for vendor financing, ICICI is using Stellar for transfers and the Shipping Corporation of India uses BankChain for smart contracts and Know Your Customer.

Principal Author



Greg Williams is a writer and media expert with nearly four decades of experience, first as a journalist and then as a communications professional with brands such as John Lewis and the City of London Corporation. Having worked a newspaper reporter and a production journalist at the end of hot metal, he moved to in-house communications roles and helped open the John Lewis Partnership to the public scrutiny and engagement. At the City of London Corporation he worked widely, both overseas and at home, to promote UK-based financial services and, after the Credit Crunch, led the Corporation into the new un-mediated world, developing 80+ Twitter feeds across a wide range of staff teams and producing 200+ staff-fronted videos. At Aldersgate Communications he now specialises in helping individuals and entities craft their narrative for the modern world.

Appendix – Base Instrumental Factors

Business Environment		
Business Environment Rankings	EIU	http://www.eiu.com/public/thankyou_download.aspx?activity=download&campaignid=bizenviro2014
Ease of Doing Business Index	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=doing-business
Operational Risk Rating	EIU	http://www.viewswire.com/index.asp?layout=homePubTypeRK
Real Interest Rate	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators
Global Services Location	AT Kearney	https://www.atkearney.com/digital-transformation/gsli
Corruption Perception Index	Transparency International	http://www.transparency.org/policy_research/surveys_indices/cpi
Corporate Tax Rates	PWC	http://www.doingbusiness.org/reports/thematic-reports/paying-taxes/
Personal Tax Rates	OECD	http://www.oecd.org/tax/tax-policy/tax-database.htm
Tax as Percentage of GDP	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators
Bilateral Tax Information Exchange Agreements	OECD	http://www.oecd.org/ctp/exchange-of-tax-information/taxinformationexchangeagreementstieas.htm
Economic Freedom of the World	Fraser Institute	http://www.freetheworld.com/release.html
Government Debt as % of GDP	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2186rank.html
OECD Country Risk Classification	OECD	http://www.oecd.org/tad/xcred/crc.htm
Global Peace Index	Institute for Economics & Peace	http://www.visionofhumanity.org/
Financial Secrecy Index	Tax Justice Network	http://www.financialsecrecyindex.com/
Government Effectiveness	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home
Open Government	World Justice Project	http://worldjusticeproject.org/rule-of-law-index
Regulatory Enforcement	World Justice Project	http://worldjusticeproject.org/rule-of-law-index
Press Freedom Index	Reporters Without Borders (RSF)	http://en.rsf.org/
Currencies	Swiss Association for Standardization (SNV)	http://www.currency-iso.org/en/home/tables/table-a1.html
Commonwealth Countries	The Commonwealth	http://thecommonwealth.org/member-countries
Common Law Countries	CIA	https://www.cia.gov/library/publications/the-world-factbook/fields/2100.html

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Inflation, GDP Deflator	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators
Rule of Law	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home
Political Stability and Absence of Violence/Terrorism	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home
Regulatory Quality	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home
Control of Corruption	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home
Best Countries for Business	Forbes	http://www.forbes.com/best-countries-for-business/list/#tab:overall
Global Cybersecurity Index	ITU	http://www.itu.int/en/ITU-D/Cybersecurity/Pages/GCI.aspx
Open Budget Survey	International Budget Partnership	http://survey.internationalbudget.org/#download
Crude oil input to refineries	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/
Share of wind and solar in electricity production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/
Energy Intensity of GDP	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/
Share of renewables in electricity production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/

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Reputational Factor		
World Competitiveness Scoreboard	IMD	https://www.imd.org/wcc/world-competitiveness-center-rankings/world-competitiveness-ranking-2018/
Global Competitiveness Index	World Economic Forum	http://reports.weforum.org/global-competitiveness-index-2017-2018/competitiveness-rankings/
Foreign Direct Investment Inflows	UNCTAD	http://unctadstat.unctad.org/wds/tableViewer/tableView.aspx?ReportId=96740
FDI Confidence Index	AT Kearney	https://www.atkearney.com/foreign-direct-investment-confidence-index
GDP per Person Employed	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators
Global Innovation Index	INSEAD	http://www.globalinnovationindex.org/content.aspx?page=GII-Home
Global Intellectual Property Index	Taylor Wessing	http://www.taylorwessing.com/ipindex/
RPI (% change on year ago)	The Economist	https://www.economist.com/economic-and-financial-indicators/2018/06/21/output-prices-and-jobs
Number of International Association Meetings	World Economic Forum	http://reports.weforum.org/travel-and-tourism-competitiveness-report-2017/
Big Mac Index	The Economist	http://www.economist.com/content/big-mac-index
Sustainable Economic Development	Boston Consulting Group	https://www.bcg.com/en-gb/publications/2017/economic-development-public-sector-challenge-of-converting-wealth-into-well-being.aspx
Global Enabling Trade Report	World Economic Forum	http://www.weforum.org/issues/international-trade
Good Country Index	Good Country Party	http://www.goodcountry.org/overall
Legatum Prosperity Index	Legatum Institute	http://www.prosperity.com/#!/ranking
FDI Inward Stock(in million dollars)	UNCTAD	http://unctad.org/en/Pages/DIAE/World%20Investment%20Report/Annex-Tables.aspx
Quality of Nationality Index	Henley Partners	https://nationalityindex.com/#

Smart Jurisdictions Index

Infrastructure Factor		
JLL Real Estate Transparency Index	Jones Lang LaSalle	http://www.jll.com/greti/Pages/Rankings.aspx
ICT Development Index	United Nations	http://www.itu.int/net4/ITU-D/idi/2017/index.html
Telecommunication Infrastructure Index	United Nations	http://unpan3.un.org/egovkb/Data-Center
Quality of Domestic Transport Network	World Economic Forum	https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2017
Quality of Roads	World Economic Forum	https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2017
Roadways per Land Area	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2085rank.html
Railways per Land Area	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2121rank.html
Networked Readiness Index	World Economic Forum	http://reports.weforum.org/global-information-technology-report-2016/
Energy Sustainability Index	World Energy Council	https://trilemma.worldenergy.org/
Open Data Barometer	World Wide Web Foundation	http://opendatabarometer.org/?_year=2016&indicator=ODB
Environmental Performance	Yale University	http://epi.yale.edu//epi/country-rankings
Global Sustainable Competitiveness Index	Solability	http://solability.com/the-global-sustainable-competitiveness-index/the-index
Logistics Performance Index	The World Bank	http://lpi.worldbank.org/international/global
Water Quality	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI
INRIX Traffic Scorecard	INRIX	http://inrix.com/scorecard/
Protected Land Area % of land area	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=2&series=ER.LND.PTLD.ZS&country=
Forestry Area	World Bank	http://databank.worldbank.org/data/reports.aspx?source=2&series=AG.LND.FRST.ZS&country=
CO2 Emissions Per Capita	World Bank	https://data.worldbank.org/indicator/EN.ATM.CO2E.PC







Smart Jurisdictions Index

Financial Service Factor		
Capitalisation of Stock Exchanges	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports
Value of Share Trading	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports
Volume of Share Trading	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports
Broad Stock Index Levels	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports
Value of Bond Trading	The World Federation of Stock Exchanges	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports
Domestic Credit Provided by Banking Sector (% of GDP)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators
Percentage of Firms Using Banks to Finance Investment	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators
Total Net Assets of Regulated Open-End Funds	Investment Company Institute	http://www.icifactbook.org/
Islamic Finance Country Index	Islamic Banks and Financial Institutions	http://www.gifr.net/publications
Net External Positions of Banks	The Bank for International Settlements	http://www.bis.org/statistics/annex_map.htm
External Positions of Central Banks as a share of GDP	The Bank for International Settlements	http://www.bis.org/statistics/annex_map.htm
Liner Shipping Connectivity Index	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators
Global Connectedness Index	DHL	http://www.dhl.com/en/about_us/logistics_insights/studies_research/global_connectedness_index/global_connectedness_index.html
City GDP composition(Business/Finance)	The Brookings Institution	https://www.brookings.edu/research/global-metro-monitor/
Business Process Outsourcing Location Index	Cushman & Wakefield	http://www.cushmanwakefield.com/en/research-and-insight/2016/business-process-outsourcing-location-index-2016/
Financial system green alignment	Corporate Knights	Provided by Corporate Knights
Climate -aligned Bond	Corporate Knights	Provided by Corporate Knights
Green Bond	Corporate Knights	Provided by Corporate Knights

Smart Jurisdictions Index

Human Capital Factor		
Graduates in social Science, Business and Law (as % of total graduates)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics
Gross Tertiary Graduation Ratio	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics
Visa Restrictions Index	Henley Partners	http://www.henleyglobal.com/citizenship/visa-restrictions/
Human Development Index	UN Development Programme	http://hdr.undp.org/en/2016-report
Citizens Domestic Purchasing Power	UBS	http://www.ubs.com/1/e/wealthmanagement/wealth_management_research/prices_earnings.html
Number of High Net Worth Individuals	Capgemini	https://www.worldwealthreport.com/
Homicide Rates	UN Office of Drugs & Crime	https://data.unodc.org/
Average precipitation in depth (mm per year)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators
Global Skills Index	Hays	http://www.hays-index.com/
Linguistic Diversity	Ethnologue	http://www.ethnologue.com/statistics/country
Global Terrorism Index	Institute for Economics & Peace	http://www.visionofhumanity.org/
World Talent Rankings	IMD	http://www.imd.org/wcc/news-talent-report/
Household net adjusted disposable income	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI
Household net financial wealth	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI
Educational attainment	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI
Life expectancy	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI
Employees working very long hours	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI
Human Freedom Index	Cato Institute	https://www.cato.org/human-freedom-index

Other Long Finance Publications

Title	Authors	Year	Publisher	
	Smart Ledgers & Collective Defined Contribution Pensions	Iain Clacher, Con Keating, and David McKee	2018	Long Finance (July 2018), 47 pages.
	The Global Green Finance Index 2	Mike Wardle, Greg Ford, Professor Michael Mainelli, Simon Mills	2018	Z/Yen Group and Finance Watch (September 2018), 82 pages.
	The Global Financial Centres Index 24	Mark Yeandle, Mike Wardle	2018	Z/Yen Group and the China Development Institute (September 2018), 55 pages.
	Timestamping Smart Ledgers - Comparable, Universal, Traceable, Immune	Sam Carter	2018	Long Finance (June 2018), 55 pages.
	The Economic Impact Of Smart Ledgers On World Trade	Centre for Economics and Business Research	2018	The Worshipful Company of World Traders and Long Finance (April 2018) 78 pages.
	Get Smart About Scandals: Past Lessons For Future Finance	Professor Tim Connell and Bob McDowall	2018	Long Finance (March 2018), 102 pages.

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BIFC offers an attractive incentive package to global financial leaders and cooperation network of Busan Metropolitan City, Busan International Financial City Promotion Center, and Financial Hub Korea will support you to identify opportunities in Busan, one

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AIFC was established in 2015 to further develop the non-banking financial sector in Kazakhstan – a very timely establishment coinciding with a new wave of privatisation and review of asset allocation strategy of government funds. Based on Astana EXPO-2017 infrastructure, it also aims to promote FinTech and drive the development of niche markets such as Islamic and green finance in the region.

Located at the heart of Eurasia, AIFC provides unprecedented conditions for participants and investors: a legal system based on English law, an independent regulatory framework consistent with internationally recognised standards, tax exemptions for 50 years, simplified visa and labour regimes, English as a working language. AIFC will be fully operational from the beginning of 2018.

Kazakhstan's geography within the Eurasian Economic Union and its role in "One Belt, One Road"

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Finance Montréal's mandate is to promote Montréal as a world-class financial hub and foster cooperation among its member institutions to accelerate the industry's growth. With renowned research capacities in artificial intelligence and a booming fintech sector, Montréal offers an experienced, diversified and innovative pool of talent as well as a stable, low cost and dynamic business environment. For financial institutions searching for an ideal location to set up an intelligent service centre and operationalize their digital transformation, Finance Montréal can advise on the advantageous tax incentives aimed at facilitating the establishment and development of financial services corporations in the city.

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"When would we know our financial system is working?" is the question underlying Long Finance's goal to improve society's understanding and use of finance over the long-term. In contrast to the short-termism that defines today's economic views the Long Finance time frame is roughly 100 years. Long Finance is an initiative run by the Z/Yen Group. This report and its sister publications (including the [Global Green Finance Index](#)) are integral parts of Long Finance.

We cannot possibly cover the range of topics covered by the Long Finance initiative here— please visit the website to learn more.

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Distributed Futures is a significant part of the Long Finance research programme managed by Z/Yen Group. The programme includes a wide variety of activities ranging from developing new technologies, proofs-of-concept demonstrators and pilots, through research papers and commissioned reports, events, seminars, lectures and online fora.

Distributed Futures topics include the social, technical, economic, and political implications of smart ledgers, such as identity, trade, artificial intelligence, cryptography, digital money, provenance, FinTech, RegTech, and the internet-of-things.

www.distributedfutures.net



Financial Centre Futures is a programme within the Long Finance Initiative that initiates discussion on the changing landscape of global finance, seeking to explore how finance might work in the future. Financial Centre Futures comprises the Global Financial Centres Index, the Global Green Finance Index and other research publications that explore major changes to the way we will live and work in the financial system of the future.

www.financialcentrefutures.net



**CARDANO
FOUNDATION**

Cardano Foundation is a smart ledger and cryptocurrency organisation based in Zug, Switzerland. The Foundation is dedicated to act as an objective, supervisory and educational body for the Cardano Protocol and its associated ecosystem and serve the Cardano community by creating an

environment where advocates can aggregate and collaborate.

The Foundation aims to influence and progress the emerging commercial and legislative landscape for blockchain technology and cryptocurrencies. Its strategy is to pro-actively approach government and regulatory bodies and to form strategic partnerships with businesses, enterprises and other open-source projects. The Foundation's mission is the promotion of developments of new technologies and applications, especially in the field of new open and decentralised software architectures.

www.cardanofoundation.org



"When would we know our financial system is working?" is the question underlying Long Finance's goal to improve society's understanding and use of finance over the long term. Long Finance aims to:

- ◆ expand frontiers - developing methodologies to solve financial system problems;
- ◆ change systems - provide evidence-based examples of how financing methods work and don't work;
- ◆ deliver services - including conferences and training using collaborative tools;
- ◆ build communities - through meetings, networking and events.

www.longfinance.net



Z/Yen is the City of London's leading commercial think-tank, founded to promote societal advance through better finance and technology. Z/Yen 'asks, solves, and acts' on strategy, finance, systems, marketing and intelligence projects in a wide variety of fields. Z/Yen manages the Long Finance initiative.

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