30 November 2017

Digital Economy Strategy Team
Department of Industry, Innovation and Science
GPO Box 2013
CANBERRA ACT 2601
By email: digitaleconomy@industry.gov.au

Dear Senator Arthur Sinodinos AO,

Digital Economy Strategy

Thank you for the opportunity to contribute ideas for the development of a new Digital Economy Strategy.

Improving access to new and emerging technologies such as blockchain technology would benefit the productivity and competitiveness of our nation. Ensuring all Australians can understand and/or engage with blockchain technology means targeting blockchain education and experiential learning at all levels -- students through to business executives and government leaders -- from now.

The purposes of this submission are to:

1. provide a brief explanation of blockchain and smart contracts;

2. highlight some of the actions that other leading countries are taking in relation to the development and implementation of blockchain technology and national digital currencies; and

3. to suggest some of the ways that blockchain technology could impact government and the types of education and skills needed in the next 5 years, using the tax system as an illustrative example.

Based on the above, I have listed some recommendations regarding how blockchain might be included in more detail in the new Digital Economy Strategy.

Should you have any queries, please contact me on the details below.

I look forward to the outcomes of the consultation.

Yours faithfully

Joni Pirovich
joni.pirovich@live.com.au
+61 450 958 749

Submission

1 Recommendations

1.1 The Australian Government should commission a feasibility study to either rule out blockchain-based systems of government administration or to determine:

(a) how blockchain-based solutions could supplement or replace existing technology;

(b) how to best incorporate interoperability and/or compatibility standards and/or systems architecture that is compatible with blockchain technology; and

(c) how a blockchain-based system of government might deliver efficiency gains (or net economic benefit), including how the tax mix and bases of taxation could change in the medium to longer term.

1.2 Host an inter-government event, similar to the USA, to develop a roadmap for evaluation, prioritisation and implementation of blockchain prototypes and projects.

1.3 Provide training and workshops to promote understanding of blockchain and its potential and to identify where blockchain solutions are most appropriate.

1.4 Consider whether a tax incentive is appropriate for blockchain projects that promote interoperability (or compatibility) with government systems (blockchain-based and otherwise).

2 Introduction

Blockchain technology is relatively new and there are multiple approaches being taken to resolve its issues. As with any development of technology, there are many different ways of writing code, dealing with faults or vulnerabilities of the code and maintaining functionality as use increases.

Unlike the internet that had almost 20 years to improve before significant investment and mass uptake, the market capitalisation of blockchain projects (largely cryptocurrencies) was already $158.5 billion at August 2017 at less than 10 years since the Bitcoin blockchain was launched in 2009.[1]

This level of capitalisation suggests the need for regulatory bodies to invest in understanding the technology and to put appropriate measures in place that protect business and consumers while encouraging innovation.

China, Japan and Russia are just some of the countries that have announced goals to implement blockchain-based government administrations and some form of central bank issued cryptocurrency by 2020. Other countries such as the USA are well underway with digitisation, data and e-invoicing initiatives that could be just as effective (if not more effective) as blockchain-based solutions.

Once implemented, blockchain-based or digitised government administrations could be much more effective to administer and also boast the ability to generate higher levels of trust in the government and tax systems. These factors alone could attract mobile talent, capital and intellectual property.

[1] https://www.forbes.com/sites/cbovaird/2017/08/27/cryptocurrencys-total-market-cap-has-risen-nearly-800-this-year/#19032b5967c7

3 What is blockchain?

A public blockchain is an online, open-source database of transactions that is managed by a network rather than just one entity, authority or consortium. Blockchain technology is also referred to as distributed ledger technology or as being a decentralised network because of its reliance on a network of "miners" to verify transactions in a block.

Reliance on a network, rather than a single entity, to manage the database is a defining feature of public blockchain technology. The network exists to ensure that transactions on a blockchain are not vulnerable (or as easily vulnerable) to threats such as central point of failure or collusion, which is a criticism often directed at banks.

The network is made up of "miners" (or nodes). Miners share the responsibility for verifying transactions through a consensus (or proof of work) process, which is based on cryptography. Alternatives to proof of work such as proof of stake and proof of authority are the subject of great discussion for their ability to address some inefficiencies and costs of obtaining consensus by proof of work.

Cryptography is another defining feature of blockchain technology. Cryptography is most simply explained as a process that requires a mathematical equation to be solved before transactions are recorded on a blockchain.

Using cryptography, miners compete against each other to find the mathematical equation that successfully verifies the block of transaction data. The first miner to solve the mathematical equation is generally rewarded for its effort and the transactions are recorded as another block on the blockchain.

The lack of any single or central authority makes regulation of a public blockchain difficult.

Private and permissioned blockchains are very attractive for business and industry application. A private blockchain is managed by a central authority, which can be one person or organisation or a private consortium. Private blockchain technology might contradict the founding and defining feature of public blockchain technology (which requires transactions to be verified by a decentralised network) however represents a private testing ground for businesses and private consortiums to experiment with the technology.

China's GACHAIN (Government Affairs Chain), discussed later in this submission, is one application of private or centralised blockchain technology. Deloitte has proposed a permissioned blockchain solution for customer loyalty rewards programs that could allow cross-company and cross-industry participation.[2] Deloitte's proposal relies on proof of authority protocols whereby loyalty rewards are issued by an organisation within a defined network of organisations rather than having loyalty rewards issued generally and verified by an unknown network of miners.

ANZ, Westpac, IBM and Scentre Group recently released a whitepaper on distributed ledger technology and bank guarantees for commercial property leasing. The whitepaper highlights the need for agreement from multiple stakeholders (i.e. bank, tenant and landlord) before a blockchain solution can be implemented.[3] Inevitably, other regulatory bodies might get involved in further consultation and eventual implementation such as the Residential Tenancies Bond Authority and Consumer Affairs Victoria.

4 What are smart contracts?

In simple terms, smart contracts are self-executing programs that sit alongside a blockchain and rely on variable factual inputs from the blockchain or other third party sources.

[2] https://www2.deloitte.com/us/en/pages/financial-services/articles/making-blockchain-real-customer-loyalty-rewards-programs.html
[3] https://bluenotes.anz.com/content/dam/bluenotes/documents/whitepaper%20_bank_guarantees_dlt_poc.pdf

Broad business and commercial application of blockchain technology could be enabled through smart contracts however writing and enforcing smart contracts is still an emerging area of technology.

Some of the issues with smart contracts include:

- the many different and emerging types of smart contract code and models;
- how to incorporate dispute resolution mechanisms;
- whether the self-executing code is legally binding for cross-border transactions in the present environment without standard international rules and acceptance of blockchain technology.[4]

5 Country by country summary of digitisation and blockchain initiatives

Key points

- *Efforts at both the international and domestic levels are occurring, but not in unison, to develop blockchain standards due to the anticipated and extensive application of blockchain technology by government, industries, business and payment platforms*
- *Fintech hubs and regulatory sandboxes are increasingly being established with support of a country's central bank, to help inform financial policies to promote stability of financial systems*
- *Single sign-on access to all government services is a widespread government digitisation initiative and will promote enhanced access to and ownership of private data in a secure way - is a blockchain-based solution appropriate for identity management?*
- *Bipartisan political support will assist with sound and time sensitive policy development*
- *Central-bank issued cryptocurrencies are on the increase due to the perceived and/or actual impact of cryptocurrencies on financial systems*

Digital change is happening more quickly than ever before. Whilst we have had the benefit of linear progression -- a steady pace of change -- we are experiencing and will continue to experience an unprecedented pace of change because technology and data do not learn and progress linearly, they progress exponentially. The competitiveness of countries to become the most attractive destination for talent, capital and intellectual property is fuelling the speed of change.

The timing at which real and disruptive change happens will be led by the pace for progress of initiatives already being undertaken by countries like China, Japan, Russia and the UK. Some of the digitisation and blockchain initiatives being undertaken by these leading countries have aggressive timeframes for completion. The timeframes for completion give a broad indication of when Australia's productivity and competitiveness, relative to other countries, is likely to come under pressure.

With these countries moving quickly to learn, assess feasibility and implement blockchain technology, it can only be a matter of time before our system of government administration must follow suit to remain internationally competitive. For example, if the costs of administering Australia's government and tax system mean that the income tax borne by individuals and companies is much higher relative to other countries, Australia would not be an attractive destination for capital, talent and intellectual property.

[4] http://www.nortonrosefulbright.com/files/norton-rose-fulbright--r3-smart-contracts-white-paper-key-findings-nov-2016-144554.pdf

As a percentage of GDP, public sector employees working in Commonwealth, State and Local Government account for approximately 20% of the Australian workforce, which makes up about $146,830.5 million in cash wages and salaries.[5] Efficiencies achieved through blockchain-based government administrations could mean the labour costs of government can be shifted towards more competitive and productive uses (either within government or in industry).

5.1 China

China is well ahead of the rest of the world in its understanding, investment and timeline to implement blockchain technology.

Key to China's leading position is the active push for the development of new technologies such as blockchain as well as the support of fintech innovation by the Chinese Government and China's central bank, the People's Bank of China (**PBoC**).[6] In China's thirteenth national strategic plan (renewed every 5 years), China's goal to build world-leading financial infrastructure with the latest technology is made clear.[7]

China's recent banning of initial coin offerings (projects that raise funds via digital currency) and digital currency exchanges was made largely to maintain the integrity of China's financial system rather than to slight the potential of blockchain technology.[8]

(a) Government administered by blockchain technology

China has already tested its blockchain platform for government services, GACHAIN (or Government Affairs Chain). The GACHAIN is being developed by Shenzhen ChainHold Technology Investment Co. Ltd and is expected to launch in late 2017.[9]

By 2020, the Chinese Government intends to transfer the business of most government agencies, institutions, and social activities onto its GACHAIN by writing smart contract algorithms to migrate existing policies, laws and regulations.

Unlike a standard, decentralised public blockchain, GACHAIN will be centralised to ensure that control of the system remains in government hands. Whilst citizens will have control over their digital assets within the GACHAIN, decision making and regulatory rights would remain under government control. As such, blockchain projects and initial coin offerings (**ICOs**) would be controlled by the Chinese government.

Recently, Miaocai Network announced that it will launch a GACHAIN-based tax electronic invoice system and tax collecting service to simplify the business and tax reporting process, increase transparency and reduce fraudulent reporting.[10] The development and use of blockchain technology for taxation was supported by the National Strategic Plan, to better organise, manage and enhance revenue collection.

China's Chan Cheng District in Canton province also recently announced the launch of its Intelligent Multifunctional Identity (**IMI**) platform, which is based on blockchain technology.[11] The IMI platform provides a simple and secure process for storing and sharing personal information required by multiple departments with the Chan Cheng District government. Personal information is provided once so that local residents avoid having to fill out the same personal information for access to different public services such as tax, pension, healthcare or utility services.

[5] http://www.abs.gov.au/ausstats/abs@.nsf/mf/6248.0.55.002
[6] https://www.coindesk.com/chinas-central-bank-vows-push-blockchain-five-year-plan/
[7] http://www.gov.cn/xinwen/2017-06/27/content_5205951.htm
[8] https://www.cnbc.com/2017/09/04/chinese-icos-china-bans-fundraising-through-initial-coin-offerings-report-says.html
[9] http://www.coinfox.info/novosti/7335-blockchain-will-be-used-by-chinese-government-for-taxation-and-electronic-invoices-issuance
[10] http://www.coinfox.info/novosti/7335-blockchain-will-be-used-by-chinese-government-for-taxation-and-electronic-invoices-issuance
[11] https://www.coindesk.com/local-government-china-trials-blockchain-public-services/

In June 2017, the China Banking Regulatory Commission (**CBRC**) published a paper recommending several areas in which blockchain technology could streamline and reduce costs for China's securities market, including initial public offerings, security deposits and transactions. The paper also recommended the central government should take the lead in building a blockchain industry standard instead of letting companies and organisations do so independently.[12]

Wanda, the world's largest private property developer, is working with China's Ministry of Industry and Information to draft domestic blockchain standards and a Chinese blockchain white paper.[13]

(b) National digital currency

The PBoC Digital Currency Institute was created to specialise in digital currency technology and its applications.[14]

In December 2016, the PBoC, in conjunction with China's major domestic commercial banks, completed a trial of a prototype blockchain-based digital currency.[15] Findings from the trial indicated that a blockchain may not be best to process the volume of expected transactions (due to the yet unresolved scalability issues with blockchain technology) but the PCoB could conceivably issue digital currency (alongside their national fiat currency) to realise peer to peer digital currency transactions and periodically check digital currency ownership.[16]

In addition, or alternatively, the digital currency could be connected to the Shanghai Commercial Paper Exchange (a centralised platform for trading "commercial papers", or financing instruments, used by small businesses in China to meet short-term financing needs, which is overseen by the PCoB and valued at around 100 trillion yuan (approx. AUD 19.2 trillion)).[17]

5.2 United Kingdom

In a speech about digital transformation in government and blockchain technology, the Minister for Cabinet Office and Government Digital Service Matt Hancock has said that transformation can only occur if there is trust across the government and that one of the greatest benefits of blockchain is its ability to build trust in data:

> *Blockchains -- distributed ledgers, shared ledgers -- are digital tools for building trust in data. Rather than a single central authority demanding trust and declaring: "I say this data is correct," you have the distributed consensus of everyone in the chain, saying in unison: "we agree that this data is correct"…*
>
> *…the fact that data held in the blockchain comes with its own history, and that history is a fundamental part of proving its integrity, this fact is enormously powerful.*

The UK Government Digital Service works closely with all areas of the UK Government to redesign service delivery, push for digitisation of the government and improve the capture and use of data.

(a) Government administered by blockchain technology

A report on distributed ledger technologies released in January 2016 by the UK Government Chief Scientific Advisor recommended that the UK Government establish blockchain trials and convene a ministerial leadership group to consider governance, privacy, security and standards.[18] Since then,

[12] https://www.coindesk.com/chinas-banking-regulators-push-blockchain-securities-rules/
[13] https://bitcoinmagazine.com/articles/chinas-blockchain-invasion/
[14] http://finance.ifeng.com/a/20170629/15497372_0.shtml
[15] https://www.coindesk.com/chinas-central-bank-testing-blockchain-backed-digital-currency/
[16] https://www.technologyreview.com/s/608088/chinas-central-bank-has-begun-cautiously-testing-a-digital-currency/
[17] https://www.coindesk.com/chinas-central-bank-opens-new-digital-currency-research-institute/; https://www.reuters.com/article/china-exchange-cp/china-launches-exchange-for-fast-growing-commercial-paper-market-idUSL4N1E24OX
[18] https://www.gov.uk/government/news/distributed-ledger-technology-beyond-block-chain

testing has occurred for tracking welfare payments and testing the disbursement of student loan funds.[19]

In terms of other digitisation initiatives, the UK Government has already built and is expanding its Government as a Platform -- an initiative of the Government Digital Service to make government services easier to create and cheaper to run by sharing data, hosting, designs and platforms across government services.[20] As part of this program of work, the UK Government is developing standards, design and service patterns, data registers and the skills and capability of the public servants who carry out the business of government.

The Government Digital Service has combined all individual government department websites into a single site - gov.uk. Once it did this, it worked on developing technology that could be rolled out across all the different departments, including Notify, Verify and Pay. Notify is a digital system that separate departments can use to send emails, texts and letters to users.[21] Verify is a digital identity verification solution that service providers can apply to integrate their systems with.[22] Pay is a single online government payment system that has replaced the number of individual systems that preceded it.[23] Following the successful implementation at a national level, Notify has now been rolled out to local government bodies. Pay and Verify are still in trial phase.

(b) National digital currency

In February 2017, the UK's central bank, the Bank of England, announced its membership to the Hyperledger project, led by the Linux Foundation.[24] Hyperledger incubates a range of business blockchain technologies, including distributed ledger frameworks and smart contract engines to enable rapid innovation.[25]

The Bank of England is undertaking a multi-year research programme into the implications of a central bank issuing a private digital currency.[26] The Bank of England first raised the possibility of a central bank-issued digital currency in its research agenda in February 2015 and has since released a more detailed selection of research questions on the topic.[27]

The Central Bank of England's FinTech Accelerator works in partnership with firms to explore how fintech innovations could be used in central banking and to better understand fintech trends and inform policy objectives. The Bank offers the firms a chance to demonstrate their solutions to real issues, particularly financial stability.[28]

In April 2017, the Bank of England announced that the new version of its real-time gross settlement system -- the transfer of about £500 billion worth of money or securities from one bank to another, daily -- will be compatible with distributed ledger technology.[29]

5.3 USA

Amongst a number of initiatives, the US State Department has formed an internal working group focused on blockchain, with an intern to track developments and prepare bi-weekly briefings.[30]

[19] https://www.coindesk.com/uk-government-blockchain-trials-in-new-digital-strategy/
[20] https://www.gov.uk/government/policies/government-as-a-platform
[21] https://www.gov.uk/government/publications/govuk-notify/govuk-notify
[22] https://govuk-verify.cloudapps.digital/
[23] https://www.gov.uk/government/publications/govuk-pay/govuk-pay
[24] https://www.coindesk.com/central-banks-hyperledger-blockchain/
[25] https://www.hyperledger.org/projects
[26] http://www.bankofengland.co.uk/research/Pages/onebank/cbdc.aspx
[27] http://www.bankofengland.co.uk/research/Documents/onebank/cbdc.pdf
[28] http://www.bankofengland.co.uk/Pages/fintech/default.aspx
[29] https://www.coindesk.com/bank-england-next-gen-settlement-system-will-dlt-compatible/; http://www.bankofengland.co.uk/publications/Documents/speeches/2017/speech974.pdf
[30] https://www.coindesk.com/us-state-department-forms-new-blockchain-working-group/

In talking about the General Services Administration's (**GSA**) next pilot program to bring blockchain into the federal government space, Justin Herman, leading the GSA's Emerging Citizen Technology Program Office, states that:

> *…technologies are evolving faster than the current collaboration processes used to discuss and vet them.*[31]

(a) Government administered by blockchain technology

In February 2017, the Congressional Blockchain Caucus was launched to foster bipartisan advancement of sound public policy toward blockchain-based technologies and digital currencies.[32] The Caucus aims to educate, engage and provide research to assist policymakers with regulatory approaches to the particular issues raised by blockchain-based technologies and networks.

Also in February 2017, the Federal Reserve Bank of Boston announced its membership to the Hyperledger project, along with the Bank of England.[33]

In July 2017, the US government hosted an inter-agency blockchain event where federal government agencies were asked to submit potential uses for blockchain technology.[34] The goal of the event was to develop a roadmap for the following 6 months on evaluating and implementing blockchain technology.[35]

The US Food and Drug Administration has partnered with IBM to determine whether blockchain could be used as a way to secure the efficient and scalable exchange of health data and the US Department of Health and Human Services is partnering with private entities to develop blockchain solutions.[36]

The US Department of Commerce's Internet Task Force held a conference in December 2016 on how blockchain technology could be applied to digital copyright. The event was supported by the US Patent and Trademark Organization, the National Telecommunications and Information Administration, the International Trade Administration and the National Institute of Standards and Technology.[37] In addition, the Department of Defence sees benefit in using blockchain to help protect intellectual property when using 3-D printing to make repairs on aircraft carriers.[38]

(b) National digital currency

In March 2017, Federal Governor Jerome Powell gave a speech on Innovation, Technology and the Payments System, stating that the full range of the payments system and other policy issues need to be considered alongside the potential benefits of a central bank issued digital currency.[39]

5.4 Russia

Russia is firmly in the race to be the first to implement a blockchain-based system of government administration.

Both Russia and China are in unique positions to innovate quickly because of the level of control their governments and central banks have over their citizens and regulation of transactions and data flow.

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[31] https://gcn.com/Articles/2017/07/11/blockchain-forum.aspx
[32] https://polis.house.gov/news/documentsingle.aspx?DocumentID=398291; https://www.technologyreview.com/s/603820/congress-takes-blockchain-101/
[33] https://www.coindesk.com/central-banks-hyperledger-blockchain/
[34] https://www.coindesk.com/us-government-organizes-federal-blockchain-forum-july/
[35] https://www.digitalgov.gov/event/in-person-u-s-federal-blockchain-forum/
[36] https://www.coindesk.com/why-the-us-department-of-health-just-couldnt-ignore-blockchain/
[37] https://www.coindesk.com/us-commerce-department-discuss-blockchain-copyright/
[38] https://gcn.com/Articles/2017/07/11/blockchain-forum.aspx
[39] https://www.federalreserve.gov/newsevents/speech/powell20170303a.htm; https://www.bloomberg.com/news/articles/2017-08-30/cryptocurrencies-are-new-barbarians-at-the-gate-of-central-banks

(a) Government administered by blockchain technology

Unlike China, there has been no public announcement from Russia suggesting that the government will be administered by blockchain technology. However, a number of announcements indicate Russia's keen understanding and implementation of blockchain technology amongst other digitisation initiatives.

In April 2016, the World Bank released its report on Russia's prospects for a digital government by 2020.[40] The report makes no reference to blockchain but concludes that substantial progresses made by Russia show that the country has clearly expressed the political will to radically improve the system of public administration using technology.

In August 2017, as part of the broader digital initiatives being undertaken by the Russian government, a Russian state-owned development bank and several other government offices established a new research centre focused on blockchain and other technologies.[41]

Recently the Russian Quantum Center, whose primary source of funding is the Russian government, developed and successfully tested quantum blockchain technology – a method of distributed storage and verification of financial, commercial, and other data protected by quantum cryptography.[42]

Russia's FinTech Association, a group formed in 2017 under the governance of the Russian Central Bank, completed an initial working version of their Masterchain blockchain software.[43] Masterchain will be used to help create minimum viable products for association members, including projects for peer-to-peer insurance and mortgage tracking and issuance. By mid-2018, Russia's FinTech Association wants to begin commercial application of a blockchain-based system for mortgages.[44]

Russia's Department of Information Technologies is exploring how to apply blockchain to voting to eliminate voting fraud,[45] and Russia's Ministry of Health has also recently announced the launch of its blockchain pilot.

(b) National Digital Currency

The Deputy of Russia's central bank has stated that, 'Regulators of all countries agree that it's time to develop national cryptocurrencies."[46]

The Russian Central Bank has been undertaking cryptocurrency pilot programs to process online payments and verify customer data and will develop its own national cryptocurrency within its Masterchain after the trials are complete.[47]

Latest announcements suggest that Russia's state-issued cryptocurrency - the cryptoruble - will be developed and issued quickly.[48] Where the owner is unable to declare the source of cryptorubles a flat tax of 13% will be imposed upon conversion of cryptorubles to Russian rubles and the 13% tax rate will also apply to gains involved in buying and selling a cryptoruble.

5.5 Japan

[40] http://documents.worldbank.org/curated/en/562371467117654718/Digital-government-2020-prospects-for-Russia
[41] https://www.coindesk.com/russias-vnesheconombank-unveils-new-blockchain-research-centre/
[42] http://www.rqc.ru/news/?ELEMENT_ID=1270&sphrase_id=3842; http://www.rqc.ru/about/
[43] https://www.bloomberg.com/news/articles/2017-08-01/russia-s-banks-prepare-to-hit-the-gas-on-digital-currency-use
[44] https://www.bloomberg.com/news/articles/2017-08-01/russia-s-banks-prepare-to-hit-the-gas-on-digital-currency-use
[45] http://www.computerweekly.com/news/450416621/Going-mobile-in-Moscow-city-digitisation-the-Russian-way; https://www.coindesk.com/moscow-russia-government-blockchain-voting/
[46] https://futurism.com/china-becomes-first-countrchina-becomes-first-country-in-the-world-to-test-a-national-cryptocurrencyy-to-test-national-cryptocurrency/
[47] https://www.bloomberg.com/news/articles/2017-08-01/russia-s-banks-prepare-to-hit-the-gas-on-digital-currency-use
[48] https://www.cryptocoinsnews.com/putins-orders-russia-will-national-cryptocurrency-cryptoruble/

Japan's Ministry of Internal Affairs and Communications has been testing a blockchain-based system for processing government tenders. Instead of applicants collecting the tax payment certificates and other necessary documents from various government offices, for example, the agency issuing the tender would be able to gather the information electronically. Following completion of the testing in early 2018, the Japanese government plans to draft a roadmap to integrate blockchain technology in other e-government systems.[49]

A fintech testing hub is being established by the Financial Services Agency as a precursor to a regulatory sandbox that the government is planning to introduce. The testing hub is expected to last from 6 months to 2 years and will cover such technologies as blockchain as well as potential issues posed by money laundering.[50]

(a) Government administered by blockchain technology

Japan's digitisation strategy, Society 5.0, was announced in January 2017 to prepare the Japanese economy and society for digitisation.[51]

The Japanese Government is looking to use blockchain technology to consolidate the land ownership registries maintained by justice and land ministries, databases maintained by real estate companies and separate records kept for farmland and forested areas.[52] In Japan, a significant number of land ownership records are out of date and are not being updated correctly. As a result of the blockchain project, it is expected that municipalities will require less effort to confirm information needed for fixed-asset, land-type taxes.

(b) National Digital Currency

With the support of Japan's central bank and regulators, a consortium of Japanese banks propose to launch a Japanese digital currency, J-Coin, by 2020.[53]

This announcement follows efforts from a consortium of 47 domestic Japanese banks formed to experiment with fund transfers using virtual currencies to lower costs of a 24-hour electronic fund transfer service.[54]

5.6 Dubai

Worthy of mention, Dubai launched its Global Blockchain Council in early 2016 and since then has experimented with a number of applications for blockchain technology.[55]

(a) Government administered by blockchain technology

Dubai's goal of becoming the world's first blockchain-powered government to use the technology for all transactions by 2020 is ambitious but not without competition from other countries.[56] In evidence of Dubai's commitment to achieving this goal, the Smart Dubai Office will educate private and public sectors about the potential of blockchain and conduct workshops with stakeholders to identify services that can be best enhanced by blockchain.[57]

(b) Digital Currency

[49] https://asia.nikkei.com/Politics-Economy/Policy-Politics/Japan-looks-to-blockchains-for-more-secure-e-government-systems
[50] https://asia.nikkei.com/Politics-Economy/Policy-Politics/Japan-to-establish-fintech-testing-hub
[51] http://www.cebit.de/en/news-trends/news/society-5-0-japans-digitization-779
[52] https://asia.nikkei.com/Markets/Property/Japan-to-tidy-up-scattered-property-records
[53] https://www.businessinsider.com.au/japan-plans-new-digital-currency-j-coin-2017-9?r=US&IR=T
[54] https://asia.nikkei.com/Business/Trends/Japan-banks-to-test-blockchain-based-money-transfers
[55] https://www.cryptocoinsnews.com/dubai-museum-future-foundation-launches-global-blockchain-council/
[56] https://www.cryptocoinsnews.com/dubai-set-achieve-goal-becoming-first-blockchain-government-by-2020/
[57] https://futurism.com/the-city-of-the-future-is-one-step-closer-to-a-blockchain-based-economy/

The Smart Dubai Office has partnered with Avanza Solutions, a fintech consulting and development firm, to implement a citywide payments platform based on blockchain technology.[58]

5.7 Australia

E&Y's 2017 Tax Function survey of 170 private and public Australian companies has revealed that:

- 40% of internal tax functions are still using excel,
- 68% of tax function effort is devoted to compliance, and
- 18% of tax return amendments are required due to human error.[59]

Considering these results, Geoff Blaikie, E&Y's Oceania Tax Leader says:

> *While in the past, tax functions controlled the data, soon revenue authorities will be able to reach into organisational systems, secure data from third parties such as banks and suppliers and automatically populate tax returns and calculate tax obligations. Already in Brazil, the government has cut human interaction out of the entire tax process for both individuals and corporates. In the five years to the end of 2015 this has raised an additional 12.46% in federal taxes without raising the tax rate.*

Late in 2016, ASIC released its fintech regulatory sandbox to allow eligible fintech business to test innovative financial services without having to incur the costs and time involved in obtaining regulatory licensing.[60]

Liberal party Senator Jane Hume and Labor Party Senator Sam Dastyari launched Parliamentary Friends of Blockchain, a bipartisan group to champion the use of blockchain technology within government and private industry.[61]

CSIRO's Data61 has released two reports into blockchain: the first focuses on four possible scenarios for blockchain adoption in Australia; the second discusses the opportunities and risks of applying the technology in several areas including government and agricultural supply chains.[62]

Australia is leading the development of international standards on blockchain technology. In April 2016, Standards Australia submitted a New Field of Technical Activity proposal on behalf of Australia for the International Organisation for Standardisation (**ISO**) to consider making standards to support blockchain technology. Since then, the ISO approved the proposal for new international blockchain standards and Standards Australia:[63]

- was appointed manager of the Secretariat of ISO/TC 307 Blockchain and electronic distributed ledger technologies;
- hosted the first international blockchain standards meeting;
- prepared a Roadmap report to inform the development of ISO/TC 307.[64]

No further updates have been provided by Standards Australia regarding when draft and/or final standards will be released.

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[58] https://www.cryptocoinsnews.com/dubai-government-greenlights-citywide-blockchain-payments-system/
[59] http://www.ey.com/au/en/newsroom/news-releases/news-ey-tax-functions-frozen-in-time
[60] http://asic.gov.au/for-business/your-business/innovation-hub/regulatory-sandbox/ ; http://download.asic.gov.au/media/4112096/licensing-exemption-for-fintech-testing-infographic.pdf
[61] https://www.itnews.com.au/news/meet-australias-parliamentary-friends-of-blockchain-470386
[62] http://www.data61.csiro.au/en/Our-Work/Safety-and-security/Secure-Systems-and-Platforms/Blockchain
[63] https://www.iso.org/committee/6266604.html
[64] http://www.standards.org.au/OurOrganisation/News/Documents/Roadmap_for_Blockchain_Standards_report.pdf

(a) Government administered by blockchain technology

In developing this new Digital Economy Strategy, the consultation paper makes reference to blockchain as an emerging technology but without much further detail.[65] The strategy will be launched in the first half of 2018 and it is hoped that more detail will be provided about the potential for blockchain with reference to the recommendations made in this submission.

Data matching and data sharing already allows the ATO to pre-fill tax returns and further development is in progress to expand the ATO's capabilities. The Australian Government is already investing in whole-of government data initiatives to concurrently make government functions more efficient and provide opportunities for business and researchers.[66]

Arguably, data analytics tools and technology is easier to understand and implement than blockchain technology and may be a more cost effective means of achieving trust in the tax system.

Standard business reporting (**SBR**) and e-invoicing are already well progressed data initiatives. SBR is the standard approach to digital record-keeping set by government and built into business/accounting software to simplify business reporting obligations.[67] SBR allows pre-filling of government reports such as tax returns and business activity statements. In simple terms, a single piece of standard information can easily be used across a number of different reports and avoid the need for duplication in a business's compliance effort. EInvoicing or electronic invoicing is the sending, receipt and storage of invoices in electronic format without paper-based invoices.[68]

The Australian Digital Business Council's initial and primary focus is eInvoicing, largely because it is a solution that requires minimal investment compared to other technology solutions. For this reason, the Council predicts that eInvoicing will increase the speed of adoption and business participation in the digital economy.

The ATO is committed to supporting the Council's development of eInvoicing standards and adoption of eInvoicing within and outside the government.[69] In 2015, the ATO commissioned a report and recommendations to implementing eInvoicing on a broad scale.[70] The report found that eInvoicing could achieve savings of up to 80%, or $3 billion per year, compared to paper-based processing.

Investigating the feasibility of blockchain-based or blockchain compatible solutions may not require separate and standalone investment. There may be opportunities to leverage from existing investment in SBR and eInvoicing to determine compatibility with blockchain technology.

(b) National digital currency

The New Payments Platform is an Australian industry initiative by the RBA, the major banks and other key financial institutions to develop new infrastructure for Australian payments.[71] The NPP will allow payments to be made in near real time, will be available 24/7, will be data-rich (documents can be attached to transactions) and supports different ways to pay.

The RBA has formed its own research group focused on blockchain technology in payments, clearing and settlement.[72] However, the RBA has not made any official announcements about the

[65] https://www.industry.gov.au/innovation/Digital-Economy/Documents/Digital-Economy-Strategy-Consultation-Paper.pdf
[66] https://industry.gov.au/innovation/Digital-Economy/Documents/Digital-Economy-Strategy-Consultation-Paper.pdf
[67] http://www.sbr.gov.au/about-sbr/what-is-sbr
[68] http://www.sbr.gov.au/__data/assets/pdf_file/0006/42747/Billentis_Report_final_V3.pdf
[69] http://digitalbusinesscouncil.com.au/our-vision
[70] http://www.sbr.gov.au/__data/assets/pdf_file/0006/42747/Billentis_Report_final_V3.pdf
[71] http://www.nppa.com.au/more-information/frequently-asked-questions/
[72] https://bitconnect.co/bitcoin-news/523/reserve-bank-of-australia-shows-interest-in-bitcoin-and-blockchain-technology

issue of a national digital currency. There are calls from fintech start-ups for a Digital Australian Dollar, however at this stage the RBA has only expressed interest in observing the trials.[73]

The Australian Digital Commerce Association (**ADCA**) has pioneered the development of the Australian Digital Currency Industry Code of Conduct to help Australian consumers identify digital currency businesses that have best-practice standards in place.[74] Digital currency businesses that are certified by ADCA are listed on the ADCA website and must have met best-practice standards drawn from the laws that regulate a number of areas including corporations, privacy, sanctions and anti-money laundering.

6 How blockchain technology could impact government, particularly the tax system

Key points

- *Government-based blockchains could result in efficiency gains and increased trust*
- *In the absence of government-based blockchains or interoperability standards, we could see disparate industry, business and platform level blockchains*
- *Whether tax incentives should be provided for implementation of blockchain projects according to government standards?*

Blockchain technology represents a type of next-generation business process improvement software.[75]

Whilst there are a number of ways to understand how blockchain technology could impact the administration of government, particularly the tax system, the opportunities for blockchain technology must be balanced with advances already underway with eInvoicing and data-matching.

The features and potential efficiency gains from a tax system administered by blockchain technology are extensive and include:

- achieving trust in the tax system and in large businesses;
- more efficient collection and/or forecasting of tax revenue;
- ability to incorporate tax rules as “smart contracts”, which automatically determine the tax treatment of transactions (to an accepted degree of error);
- transparency of transactions, including data integrity (complete and accurate) and/or the ability to achieve “zero knowledge proof” status whereby the ATO has trust in the protocols so does not need to review the data;
- reduction of transaction fees, compliance and advisory costs; and
- the ability to share information selectively via permissioned access controls.

6.1 Government-based blockchains

Existing tax rules could be embedded within blockchain smart contracts to make government administration, particularly administration of the tax system, more efficient and effective. Tax rules would be maintained but traditional tax office reviews and audits to assess taxpayers’ historic compliance with tax rules would not be necessary because the correct tax treatment of transactions

[73] https://www.cryptocoinsnews.com/fintechs-push-central-bank-digital-australian-dollar-cryptocurrency/
[74] http://adca.asn.au/home-2/code-of-conduct/
[75] http://usblogs.pwc.com/emerging-technology/a-primer-on-blockchain-infographic/

would be coded into the government blockchain. We would move from data driven reviews to process or blockchain/smart contract protocol driven reviews.

Governments could achieve a granular data level of oversight via access to banking and payment data and/or via the issue of a national digital currency. However, this oversight would permit review of the data rather than permitting confidence in processes/protocols.

Where the tax rules leave room for discretion or difference of interpretation (i.e. incomplete smart contracts), then tax professionals/lawyers will continue to have a role in advocating for the tax office or the taxpayer. Traditional dispute resolution and appeal processes may change to require contentious issues to be resolved up front. These issues and opportunities would likely be replicated across more than just tax.

If Federal and State governments do not support blockchain (or other) technologies in the near to mid-term (either with a government-based blockchain, interoperability standards or systems that are near compatible with blockchain technology), the following could arise:

- Australia's tax rules become relatively more expensive for businesses to navigate and comply with and for the ATO to administer and enforce, compared to other countries that may have embraced blockchain and other technologies to streamline compliance and reduce costs. For example, China's GACHAIN (government-controlled blockchain for the administration of government affairs including taxation) should significantly reduce compliance, administration and enforcement costs and is expected to launch by 2020.

- Reduced administration and enforcement costs associated with embracing blockchain and other technologies could allow countries such as China to reduce their tax rates, with Australia's tax rates becoming uncompetitive by comparison.

- The transparency of blockchain-based taxation systems in other countries (i.e. revenue and expenditure) might establish higher levels of trust and result in direct application of taxpayer dollars from a taxpayer to an entity/entities responsible for achieving socio-economic outcomes with taxpayer dollars, rather than those taxpayer dollars being routed through government. Direct application of tax dollars might mean more opportunity for organisations to be involved in the expenditure of tax dollars to causes relevant to their core business.

- These factors may lead Australian-based organisations to consider:

    - shifting, and to shift, their head offices to Asian or other global centres that more quickly adopt blockchain (or other) technology that makes government more efficient to administer; and/or

    - implementing their own blockchain (or other) technology solutions to make compliance more efficient, at their own significant investment but which might be made more attractive with tax incentive support from the Federal and State governments.

6.2 Industry, business and platform level blockchains

In the absence of government-based blockchains (or systems compatible with blockchain technology), we could see blockchain-based (or other) technologies being implemented at the following levels:

- Industry supply chains, to promote transparency in a supply chain and ensure that payment is released when goods and services are delivered. Tax rules could be coded into the blockchain and tax payments automatically calculated and remitted to the tax office when payment is received, or at the end of the month, quarter or year. Amongst other

commercial advantages, such an advance would permit reliability in forecasted tax expense (for businesses) and revenue (for the tax offices).

A number of joint ventures have already been announced. For example, Alibaba, PwC, Australia Post and Blackmores have recently joined forces to build a blockchain to enhance the integrity of food supply and food security.[76]

- Public and private businesses, to reduce the cost of compliance in a highly regulated Australian and international tax environment. An internal business blockchain could record transactions, automatically apply accounting and tax rules to classify those transactions and grant permissioned access to various revenue authorities to conduct spot checks on the accuracy of application of tax rules to transactions. Similar to industry supply chains, the codification of tax rules within a blockchain would allow tax payments to be automatically calculated and remitted and allow for reliable forecasting.

- Exchanges and market platforms. The ASX is expected to announce in December 2017, whether it will replace its CHESS system with a blockchain-based settlement and clearing function due to speed and efficiency of technology. Embedding accounting and tax rules within exchange transactions could remove the need to prepare tax returns to report and pay tax on those transactions. In this regard, the ATO is already accessing data through its data-matching program from a number of exchanges, including the ASX, and pre-filling tax returns with that data.

  As the technology becomes more advanced and the collection of tax becomes more efficient, there could be a case to tax exchange based transactions similar to consumption taxes - i.e. at a flat, low rate and per transaction.

6.3 Blockchains could allow implementation of more suitable tax rules in a digital and sharing global economy

In the short to medium term, the implementation of new tax rules could be facilitated by blockchain. For example, to better identify and impose tax on digital transactions and digital business models.

Going further, the disruption of traditional business models may mean that tax is levied upon ownerless companies. For example, Deloitte predicts that tomorrow's electric ridesharing car might not only be autonomous but it might also accept fares on its own and request and pay for its own recharging and servicing.[77]

Action 1 of the OECD's Base Erosion and Profit-Shifting (**BEPS**) project proposes to deal with tax rules in the digital economy but consensus has not been achieved and consultation is still ongoing.

6.4 Blockchains could allow the basis of taxation and redistribution to change

In the longer term, the basis of taxation in Australia could fundamentally change because of the efficient and effective collection of taxes through the use of blockchain technology. When tax officers and tax professionals are no longer relied upon as heavily to assist with compliance and advisory, and assuming other industries experience similar impacts, a tax system administered by blockchain may automatically divert taxes from taxpaying organisations to either or both of:

- a transitionary income support or welfare payment and eventually to payment of a universal basic income; and

- certain organisations where their core business capability is well-placed to apply taxpayer dollars to address social causes.

[76] https://www.forbes.com/forbes/welcome/?toURL=https://www.forbes.com/sites/jwebb/2017/08/31/alibaba-ey-ibm-and-microsoft-use-the-blockchain-to-create-a-transparent-supply-chain/&refURL=&referrer=#d0cef7e4b370

[77] Deloitte, "Bitcoin, Blockchain and distributed ledgers: Caught between promise and reality" (2016) at [7].

6.5 Why should we understand the basics of blockchain?

Deloitte's 2017 Tech Trends report predicts that over the next 18 to 24 months, entities worldwide will likely begin exploring blockchain opportunities.[78]

In all of the above scenarios, tax experts would be involved in developing, maintaining and updating tax rules embedded within blockchain technology. This factor alone points towards a shift in the types of skills that tax professionals must have to participate in tax technology projects. For example, instead of merely applying the tax law to the facts a tax professional would have to assist in writing a smart contract that deals with the process of obtaining relevant facts and from which reliable source/s, disregarding irrelevant facts, and applying the tax law in a way that also has reference to the relevant tax cases.

Similar training and skill development would be necessary for other areas of law. As more smart contracts are incorporated into blockchain technology, an increasing array of laws will become relevant to code into the smart contract to ensure relevant legal criteria are satisfied before a transaction can be processed.

In the same way that we do not need to understand computer code to benefit from the internet, we do not need to understand the detail behind blockchain technology to benefit from it. What we should understand is smart contracts - i.e. code that can be written into a blockchain that determines when elements of a contract can be fulfilled and paid and the classification of transactions for accounting and tax purposes.

Understanding how we can be involved in developing, maintaining and updating legal rules within or around blockchain technology and smart contracts could likely be one of the significant areas where professions may have to refocus efforts in the next few years.

[78] Deloitte 2017 Tech Trends at [94].