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Senator Andrew Bragg
Chairman, Select Committee on Financial Technology and Regulatory Technology
Department of the Senate
PO Box 6100
Parliament House
Canberra ACT 2600

Via email: senator.bragg@aph.gov.au
cc: fintech.sen@aph.gov.au.

Dear Senator Bragg

Response to Interim Report and Second Issues Paper – Blockchain Technology

We write to provide a submission to the Senate Select Committee on Financial Technology and Regulatory Technology ('Committee') following the tabling of the Committee's Interim Report and the publication of the Second Issues Paper.

Our submission focuses on blockchain technology. This submission in our personal capacities. However, as we all are researchers affiliated with the RMIT Blockchain Innovation Hub, this submission begins by presenting some background information on this award-winning research centre. Next, the submission provides an explanation of the economic significance of blockchain technology and details a number of blockchain use cases as regulatory technologies. Finally, the submission will consider regulation as a particular challenge for blockchain technology.

1. About the RMIT Blockchain Innovation Hub

The RMIT Blockchain Innovation Hub ('RMIT BIH') is the world's first research centre on the social science of blockchain technology. Established in 2017 at RMIT University in Melbourne, the RMIT BIH brings together academic researchers in the fields of economics, communications, finance, history, law, sociology, and political economy. The directors of the RMIT BIH have made a significant contribution to the Australian Government's National Blockchain Roadmap.[1] The RMIT BIH received a 2018 OpenGov Asia Recognition of Excellence Award and in 2019 was ranked as the third best research university on blockchain and cryptocurrencies in the world. Leveraging its research and industry expertise, RMIT BIH staff have led the development of Australia's first undergraduate and postgraduate courses on blockchain and emerging technologies and programs in blockchain-enabled business — skilling graduates for the blockchain economy. Australia can rightly be proud of its leadership in impactful and engagement-led research and higher education in this field.

[1] 'The National Blockchain Roadmap: Progressing towards a blockchain-empowered future', Department of Industry, Science, Energy and Resources, February 2020. Available online: <https://www.industry.gov.au/sites/default/files/2020-02/national-blockchain-roadmap.pdf>.

2. Blockchain technology and its opportunities

Blockchain technology is a distributed ledger technology that underpins cryptocurrencies — such as Bitcoin and Ethereum. Blockchains not only facilitate decentralised digital payments and finance, they more generally aid the coordination of shared trusted data on the internet. That data is critical to the productivity of key Australian industries including supply chains (e.g. provenance data), public infrastructure (e.g. ownership registries, voting), the health system (e.g. health records), labour markets (e.g. educational credentials), through to creative industries (e.g. copyright records).

Blockchain can be defined as "a type of distributed digital database, or ledger, with two critical properties: decentralisation and immutability".[2] Focusing on these properties helps to understand blockchain's value proposition. Blockchain is a technology for industrialising trust in the digital economy (i.e. the ability to trust information and data).[3] The cost of trust in modern economies is significant, recently estimated at 35 percent of GDP.[4] The work of Nobel Prize-winning economists Ronald Coase and Oliver Williamson have shown that organisational hierarchies (firms, governments) or relational contracting (markets) are institutions for reducing transaction costs and avoiding opportunism. On this basis, blockchain provides a new way of governing economic exchange — particularly in low-trust environments.[5]

Blockchains are a combination of complementary technologies (e.g. the characteristics of the Bitcoin blockchain illustrated in Table 1). There is a design choice, when developing or implementing blockchain solutions, between utilising a public open-source blockchain and utilising proprietary blockchains that innovate along these margins in different ways. Blockchain is an innovative way of structuring and governing data but other distributed ledger technologies may well be developed in the future. It is important that policy and regulatory responses bear this in mind so that the current state of the industry is not "locked in".

Table 1 - The Bitcoin blockchain combined five complementary technologies[6]

Technology	Property
Peer-to-peer networking	Decentralisation
Append-only ledgers	Immutability
Cryptography	Security
Game Theory	Incentive Compatible
Consensus algorithms	Consistency

[2] Chris Berg, Sinclair Davidson and Jason Potts, *Understanding the Blockchain Economy: An Introduction to Institutional Cryptoeconomics* (Edward Elgar 2019), p. 3.
[3] Chris Berg, Sinclair Davidson, and Jason Potts (2020), 'Proof of work as a three sided market', *Frontiers in Blockchain*, vol. 3, no. 2, pp 1–5.
[4] Mikayla Novak, Sinclair Davidson and Jason Potts (2018), 'The cost of trust: a pilot study', *Journal of the British Blockchain Association,* vol. 1, no. 2, pp. 1-7.
[5] Sinclair Davidson, Primavera De Filippi, and Jason Potts (2020), 'Blockchains and the economic institutions of capitalism', *Journal of Institutional Economics,* vol. 14, no. 4, pp. 639 - 658.
[6] Adapted from discussion in Chris Berg, Sinclair Davidson and Jason Potts, *Understanding the Blockchain Economy: An Introduction to Institutional Cryptoeconomics* (Edward Elgar 2019).

Blockchain and distributed ledger technologies are a foundational part of the technology stack of the future digital economy. Blockchains as digital economic, social and political infrastructure have clear complementarities with a suite of other frontier technologies including smart contracts, artificial intelligence and machine learning, the internet of things (IoT), and modern communications networks like 5G. As one example, a blockchain provides new economic infrastructure for smart contracts being those "agreements — or parts of agreements — that are coded to operate within a decentralized or distributed blockchain network, and that can be automatically executed by that network when specific conditions are validated."[7] Smart contract functionality underpins many of the use cases discussed in the next section of the submission.

3. Blockchain use cases

In this section we outline four blockchain use cases to demonstrate the opportunities of implementing this new institutional technology as a regulatory technology.

3.1 Agriculture and supply chains

Supply chains do not just carry physical products, they must also carry information about those products as they move (e.g. provenance, transport conditions, trade finance, and insurance). Rather than storing supply chain data within supply chain participant organisations, blockchain has the potential to act as a trusted digital trade infrastructure. Consumers, producers and governments are able to selectively view that supply chain data in a tamper-resistant blockchain-based ledger. We have undertaken research into blockchain technology and trade. Most generally, lowering the costs of trade will expand opportunities for globalisation, as more mutually beneficial trade becomes possible. Blockchain-based supply chains have the potential to increase the value captured by primary producers by disrupting the way that supply chain data is governed.[8] We anticipate a shift from hierarchical governance to a new type of platform-based governance.[9] Blockchain-based supply chains are likely to generate policy coordination problems, particularly relating to standards and integration within existing systems, such as customs authorities.[10]

3.2 Water markets

One of the primary roles of government is to act as a trusted third party to facilitate exchange. This role includes the facilitation of property registries. The RMIT BIH is currently undertaking research on the potential for blockchain-based digital infrastructure to trade water rights.[11] Rather than the rights to water allocations being recorded in a centralised ledger controlled by

[7] Darcy W. E. Allen, Aaron M. Lane and Marta Poblet (2020), 'The governance of blockchain dispute resolution', *Harvard Negotiation Law Review,* vol. 25, no. 2, p. 78.
[8] See: Darcy W. E. Allen, Alastair Berg, and Brendan Markey-Towler (2019) 'Blockchain and Supply Chains: V-form Organisations, Value Redistributions, De-commoditisation and Quality Proxies.' *The Journal of the British Blockchain Association* vol. 2, no. 1, p. 1-8.
[9] Ibid.
[10] Darcy W. E. Allen, Chris Berg, Sinclair Davidson, Mikayla Novak, and Jason Potts (2019) 'International policy coordination for blockchain supply chains.' *Asia & the Pacific Policy Studies,* vol. 6, no. 3, p. 367-380.
[11] See: James Eyres, 'ASX tech behind Civic Ledger's water trading platform', *The Australian Financial Review*, 13 May 2020. Available online: <https://www.afr.com/technology/asx-tech-behind-civic-ledger-s-water-trading-blockchain-20200512-p54s53>.

a scheme operator (often on paper), water rights can be recorded and traded using distributed ledger technologies and smart contracts. New digital water market infrastructure is an opportunity for lower-cost and more transparent water markets that directly support key Australian industries such as agriculture. The RMIT BIH — together with partners including Civic Ledger, Far North Queensland Growers, Sunwater, Griffith University, and the Queensland government — is currently part of a research project with the CRC for Developing Northern Australia on digital water markets in Queensland.[12] The pilot project develops a distributed ledger technology platform that aims to improve the efficiency of the scheme by coding water trading rules (an example of what the Issues Paper describes a "rules as code"). The opportunity here is more efficient water trading markets at lower costs to users and authorities, supporting Australian industry and economic growth.

3.3. Health data

The health care system faces substantive trust costs in the management and coordination of data, such as personal health records. Blockchains are currently being trialled as a way to provide patients with property rights in their health record data. The RMIT BIH is undertaking research on blockchain-based health records through the Victorian Government Medical Department of Health and Human Services Victorian Medical Research Acceleration Fund. This pilot research project was a collaboration with leading digital consultancy DB Results to incorporate blockchain into patient medical records through a new digital platform, including a consideration of regulatory conditions. To the extent that hierarchical organisations (firms and governments) exist to solve trust problems, the implementation of blockchain technology will re-organise the structure of the healthcare industry. That is, we propose "... that the impact of blockchains is to de-hierarchialise the healthcare industry, pushing data governance towards digital platforms."[13]

3.4 Creative industries

The internet has disrupted the creative industries. Downloading, peer-to-peer file sharing, and digital content streaming have presented challenges by making it trivially easy to illegally reproduce and distribute copyrighted content. However, business model innovation in online stores and streaming platforms has opened up new revenue streams. The RMIT BIH has a research program examining blockchain for the governance copyright.[14] RMIT BIH research — in research for the Australia Council for the Arts, Screen Australia and the Australian Film, Television and Radio School — has advanced the possibility of a blockchain-enabled "industry utility" for Australia's creative industries to drive efficiency, fairness for creative practitioners, and new business and funding models.[15]

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[12] See: Civil Ledger, 'Improving water markets and trading through new digital technologies' (2020). Available online: <https://www.crcna.com.au/resources/publications/improving-water-markets-and-trading-through-new-digital-technologies>.

[13] Darcy W. E. Allen, Chris Berg, Mikayla Novak, Anastasia Pochesneva and Jason Potts (2020), *Blockchain and the New Economics of Healthcare.* Industry report partnered with DB Results.

[14] See: Aaron M. Lane and Christina Platz (2021), 'The other side of the ledger: blockchain makes a new entry in the historical record of copyright law and technology', *European Intellectual Property Review,* vol. 43, no. 2, pp. 82-96.

[15] Ellie Rennie, Jason Potts, Ana Pochesneva (2019), 'Blockchain and the creative industries'. Available online: <https://apo.org.au/node/267131>.

4. Regulation as a particular challenge for the blockchain economy

A consistent theme uncovered by our engagement-led research projects is that the rapid pace of digital innovation and adoption generates regulatory tensions. New business models do not necessarily fit tightly or neatly within existing frameworks. Institutional innovations require a different approach to policy.[16] Frontier decentralised digital platforms, such as those enabled by blockchain, are not easily controlled or even easily conceived by regulations designed for markets, hierarchical firms, and bureaucratic governments.

To realise the benefits of a digital economy Australia needs ongoing and deep regulatory reform. Ultimately the reason for the tension between innovation and regulation is obvious: regulations are backward-looking rules designed for a static economy; innovation is a dynamic and unpredictable process. Economic evolution necessitates policy evolution. And so policymakers seek changes in existing legislation and regulation to facilitate the innovative business models evolving in a digital economy. But regulatory reform is hard, and the regulatory state continues to grow.[17]

Regulatory reform is hard for two main reasons. First, deep and enduring uncertainty over the costs and benefits of particular regulations. We can never know the precise costs and benefits of a particular regulatory intervention because those costs are fundamentally subjective, and because a cloud of uncertainty exists over how different regulations will interact with innovation. This often places regulatory reforms in gridlock. Second, incumbents rent-seek. Innovation has enemies, and people will seek to block it through regulatory privilege in their own interests.[18] As we understand from public choice economics, governments can supply regulatory privileges in return for other actions, such as voter support. These two drivers — uncertainty and incentives — hamper the regulatory reform process. As we will see below, these challenges are even more prevalent in the face of digital platform innovation using frontier technologies such as blockchain.

In *Understanding the Blockchain Economy: An Introduction to Institutional Cryptoeconomics*, RMIT BIH scholars argued that blockchain is an institutional technology, in that it is a technology that is used to reduce the costs of economic, social and political exchange. Blockchains enable new types of business models, organisations and contracts, which were previously implausible because of transaction costs and the cost of trust in a more analogue world. Old institutional technologies include the joint stock company and the nation state; today frontier institutional technologies solve trust problems in a decentralised way.

Institutional innovation is more complex than industrial innovation — such as a new type of drone or 3D printer — where governments decide on which margins to regulate. Institutional innovation disrupts the very institutional structure of an economy. We are moving from an economy of centralised firms and centralised platforms towards a decentralised platform ecosystem. By creating new types of unforeseen business models and types of economic

[16] Darcy W. E. Allen, Chris Berg, Brendan Markey-Towler, Mikayla Novak, and Jason Potts. 'Blockchain and the evolution of institutional technologies: Implications for innovation policy.' *Research Policy*, vol. 49, no. 1, p. 103865.
[17] See Darcy W. E. Allen and Chris Berg (eds.) (2018) *Australia's Red Tape Crisis: The Causes and Costs of Over-regulation*. Australia: Connor Court Publishing.
[18] Calestous Juma (2016). *Innovation and its enemies: Why people resist new technologies*. Oxford University Press.

organisation, regulatory tensions are exacerbated. These new business models have the potential to solve trust problems — such as registries and contract enforcement — more effectively than governments and hierarchies. And because our existing regulations have been crafted (and expanded) based on a set type of organisational types (namely hierarchical companies, and the markets they trade in) and a set of diagnosed market failures (such as monopoly power that stems from their hierarchies), they are no longer fit-for-purpose.

What does this mean for creating an environment within which these technological innovations can flourish? How can governments solve this deep regulatory reform problem? How do governments create a regulatory system that remains or tends towards fit-for-purpose regulation in the face of economic evolution?

There are several potential paths for regulators to regulate the transition to a digital economy. Rather than identifying specific reforms relating to fintech and regtech, we recommend that governments should have two focuses for solving regulatory reform problems and ameliorating regulatory costs:

1. Design and implement new regulatory reform tools to assist in the ongoing process of regulatory evolution (e.g. RegData, regulatory sandboxes); and
2. Facilitating the development and integration of regulatory technology (regtech) as a way to embed rules within digital platforms.

We recommend that innovation policy for institutional innovations such as blockchain and distributed ledgers include the more general problem of regulatory reform.

Blockchain policy must go beyond innovation policy. The conventional innovation policy approach to the development of new technologies has been to focus on stimulating invention through the direct funding of public science, research and development tax credits, and intellectual property. But more generally, innovation in institutional technologies such as blockchain is hindered by a lack of regulatory reform. And so the notion of regulatory reform must be more deeply embedded in what would conventionally be thought of as innovation policy. In particular, the pace and nature of digital platform innovation exacerbates the ‘pacing problem’: where regulatory responses lag behind innovative change, inhibiting the process of economic evolution.

Policymakers should adopt a position of permissionless innovation: a principled position to avoid the precautionary principle when regulating innovation.[19] Adopting a stance of permissionless innovation involves enabling innovation by default, rather than precautionary preventing their experimentation.[20] Permissionless innovation is a recognition that regulators tend to simultaneously overestimate the harms of innovation while underestimating the long-term benefits. But to effectively regulate institutional technologies such as blockchain, regulators must do more than adopt a position of permissionless innovation. They must create new regulatory reform tools.

[19] Darcy W. E. Allen, Chris Berg, Sinclair Davidson, Aaron M. Lane and Jason Potts (2020). *Unfreeze: How to Create a High Growth Economy After the Pandemic*. American Institute for Economic Research.
[20] Adam Thierer (2016) *Permissionless innovation: The continuing case for comprehensive technological freedom*. Mercatus Center at George Mason University.

In recent decades governments have developed and applied a suite of regulatory reform tools (including regulatory sandboxes, 1-in-1-out regulation rules and sunset clauses) and measurements (such as page counts and standard cost measurements) as ways to aid regulatory reform and evolution.[21] These tools were developed primarily to deal with problems of regulatory accumulation rather than the problem of regulatory evolution in the face of innovation.

We commend the government's funding for a pilot program to demonstrate the application of blockchain technology to reduce regulatory compliance, as identified in the Issues Paper. However, Australia needs new regulatory reform tools to deal with the challenges of rapid digital platform innovations. In this regard we recommend that governments consider developing frontier tools for both identifying and incentivising regulatory reform. Regulators should seek to develop new measurements of regulatory burdens, such as RegData, to facilitate new types of regulatory analytics.[22] Complementary to this are new ways to incentivise regulatory evolution, such as the use of sunset clauses and regulatory budgets. New ways to institutionalise the links between the stock and flow of regulation can encourage the updating of regulatory framework in response to innovation. We also recommend that governments consider developing spaces where entrepreneurs are able to experiment with new technologies to reveal regulatory challenges, such as the use of regulatory sandboxes and special jurisdictions.[23]

In conclusion, the problem of regulating new institutional technologies such as blockchain must be understood within the wider frame of regulatory reform.

5. Further information

We appreciate the opportunity to provide the Committee with a written submission responding to the Interim Report and the Second Issues Paper. If Committee members would like us to elaborate on any aspect of this submission, or have any questions, we would be happy to appear in a hearing. We are also happy to address the Committee on wider questions of financial technology and regulatory technology.

Yours faithfully

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[21] Darcy W. E. Allen, Chris Berg, Aaron M. Lane and Patrick A. McLaughlin (2020) 'The Political Economy of Australian Regulatory Reform' *Australian Journal of Public Administration*.
Patrick A. McLaughlin, Oliver Sherouse, and Jason Potts. (2019) 'RegData: Australia.' *Mercatus Research Paper* (2019).
[22] Darcy W. E. Allen, Chris Berg, Aaron M. Lane and Patrick A. McLaughlin (2020) 'The Political Economy of Australian Regulatory Reform' *Australian Journal of Public Administration*.
Patrick A. McLaughlin, Oliver Sherouse, and Jason Potts. (2019) 'RegData: Australia.' *Mercatus Research Paper* (2019).
[23] Darcy W. E. Allen and Aaron M. Lane (2020). 'Cryptodemocratic Governance of Special Economic Zones', *Journal of Special Jurisdictions*, vol. 1, no. 1, pp. 83-111.