



RMIT Blockchain Innovation Hub
RMIT University
440 Elizabeth St, Melbourne 3000

19 September 2018

Committee Secretary
Senate Standing Committees on Community Affairs
PO Box 6100
Parliament House
Canberra ACT 2600

Submission to Senate Standing Committee Inquiry into My Health Record System

Authors: Dr Darcy Allen, Alastair Berg, Dr Chris Berg, Professor Sinclair Davidson, Aaron Lane, Dr Mikayla Novak, and Professor Jason Potts

Contact Author: Dr Darcy Allen, Postdoctoral Research Fellow, RMIT Blockchain Innovation Hub,

Dear Committee Secretary,

We are writing to you regarding the Senate Standing Committee on Community Affairs Inquiry into the My Health Record System. Please find below a submission from members of the RMIT University Blockchain Innovation Hub addressing the terms of reference. In particular our submission focuses on how blockchain technology relates to the terms of reference on 'privacy and security'. We have extensive academic and policy experience in blockchain technology, are currently working on health related applications of blockchain, and have successfully received Victorian Government funding to further examine the opportunities and challenges in applying blockchain within the health records space.¹ The central contention of our submission is that the Committee should recommend further

¹ See RMIT University, "Blockchain to Transform Healthcare Models," *RMIT University* 2018.



analysis of the potential of blockchain technology as a mechanism to ameliorate the problems of interoperability and privacy over the governance of health records. As a technology for providing secure decentralised governance of ledgers of data—including health records—blockchain holds great potential to overcome many challenges of interoperability while maintaining or even improving security. We would welcome the opportunity to appear before the Committee or provide any additional information relating to blockchain and the healthcare records system.

About the RMIT Blockchain Innovation Hub

The RMIT Blockchain Innovation Hub (BIH) is the world's first social science research centre into blockchain technology. Founded in 2017 at RMIT University, we are an interdisciplinary team of researchers in economics, political economy, organisational theory, law, sociology politics and communications. The RMIT BIH is developing the foundational theory of institutional cryptoeconomics, business strategy and adaptation to blockchain technologies, mapping the blockchain economy and identifying the public policy challenges that will hold back or accelerate this economic revolution.² We are working across a range of blockchain applications including supply chains, civil society and health records.

Blockchain and the My Health Record System

The central problems that My Health Record is attempting to solve are legitimate. Provision and storage of information relating to medical care is currently fragmented and siloed. This situation brings problems of health data interoperability, creates persistent inefficiencies within the healthcare system, and ultimately harms patients. There is a real and urgent need to improve the coordination of healthcare through the timely and secure availability of data related to the healthcare recipient. Better solving this information governance and management problem will improve the provision and suitability of treatment.

My Health Record attempts to ameliorate these problems through *data centralisation*. A centralised system might appear to have significant efficiency gains, in particular by partially

² For a brief overview of institutional cryptoeconomics please see Chris Berg, Sinclair Davidson, and Jason Potts to Cryptoeconomics Australia, 27 September, 2017, <https://medium.com/cryptoeconomics-australia/the-blockchain-economy-a-beginners-guide-to-institutional-cryptoeconomics-64bf2f2beec4>.



ameliorating questions of interoperability between different parties. However, there is an inherent trade-off in centralisation: the system becomes vulnerable to unauthorised access and abuse. Centralisation can make a system less robust to attacks. Particularly in the sensitive area of health records, this can create significant privacy issues for both patients and practitioners.

Rather than centralising healthcare data—such is the approach of My Health Record—it may be preferable to *decentralise healthcare data*. What would this mean in practice? Individuals would be provided control access—that is, property rights—over their own health records, providing permission to others to access that data. This represents a fundamental shift in data rights.

The implementation of any decentralised approach to managing healthcare data, however, is highly constrained by technologies available. Individuals need tools to manage their data. Blockchain technology has recently gained attention as a potential solution to this problem. Blockchain provides the foundations for a system where an individual's healthcare data is cryptographically secured, giving the individual ownership, as well as graduated permissioning control over that data.

Blockchain technology is a type of distributed database which was first developed for the cryptocurrency Bitcoin. Blockchains are themselves an amalgamation of several other technologies which allow for secure, distributed ledgers of information. They use asymmetric (public-key) cryptography, peer-to-peer networking and append-only databases to create distributed databases which do not rely on the authority of centralised hierarchies like firms or governments. Apart from its original use case in digital money, blockchain technology is currently being applied to applications including identity, voting, supply chains and property registries.³ We see the potential for such distributed digital ledgers in providing the information for a future in which individuals do not need to rely on centralised healthcare

³ See for instance our research in these areas: Alastair Berg et al., "Identity as Input to Exchange," (2018); Alastair Berg et al., "The Institutional Economics of Identity," *Available at SSRN 3072823* (2017); Darcy W E Allen et al., "Cryptodemocracy and Its Institutional Possibilities," *The Review of Austrian Economics* (2018); "The Economics of Crypto-Democracy" (paper presented at the Linked Democracy: AI for Democratic Innovation, 26th International Joint Conference on Artificial Intelligence, Melbourne, Australia, 19 August 2017); Darcy W E Allen et al., "Blockchain Tradetech," in *APEC Study Centres Consortium Conference (ASCCC)* (Port Moresby, Papua New Guinea 2018).



databases, and a more robust and resilient healthcare ecosystem with less potential for data breaches.

Proponents of using blockchain technology as a foundation for safely sharing personal data—such as healthcare data—often describe a *self-sovereign* future. Self-sovereign identity is a scenario where the individual is in control of their personal data, and is one which satisfies key principles including individual control, access, portability, and disclosure minimisation. In the context of healthcare, self-sovereign identity allows for individuals to contextually reveal information about themselves. This allows them to choose what information they share depending on if they are interacting with a surgeon, their GP, nurse, physiotherapist, or other healthcare professional.

Several blockchain enabled protocols are currently being developed to realise self-sovereign identity. In most cases identity attributes are not stored on a blockchain, rather a blockchain can be used to selectively reveal identity attribute claims to counterparties, or claims can be proven without revealing the exact nature of that claim using zero-knowledge proofs (a zero-knowledge proof allows an individual can prove some fact about themselves without revealing what that fact is.). This is important to note due to the public nature of some blockchains, where storing sensitive personally identifiable health record data would create serious privacy concerns for individuals.

There is significant private sector and government interest on the intersection of blockchain and healthcare records. Blockchain technology was only invented in 2008 and has had a meteoric rise since 2015. This means that its full potential is yet to be tested by entrepreneurs. We expect there to be a flourishing of entrepreneurial efforts over the coming months and years within the blockchain ecosystem. Many of these efforts will necessarily be attempting to create secure, decentralised and self-sovereign healthcare data solutions. In the public sector we note with interest the work the Digital Transformation Agency (DTA) has been asked to do in examining the potential applications of blockchain technology across government. The RMIT Blockchain Innovation Hub has been consulting with the DTA on this project. Due to its potential in a healthcare setting, we have obtained a grant from the Victorian Government to study the way in patients will be able to use the technology to own



their own healthcare data as well as make a meaningful choice on how that data is used. We are also examining the way in which such technology might be used to share data with medical researchers, and even sold for commercial use, allowing individuals to receive revenue for the use of their health data.

Given the multifaceted and complex questions on the intersection of blockchain and governing health records, we propose that the Committee recommends further inquiry into how blockchain technology may provide more decentralised and robust solutions to problems in the healthcare system.

The RMIT Blockchain Innovation Hub trusts that this submission has been of interest to the Committee. We would be pleased to answer any questions that you may have. We look forward to any opportunity you may have to investigate the use of blockchain in enabling the safe storage and sharing of the health data of Australians.



References

- Allen, Darcy W E, Chris Berg, Sinclair Davidson, Mikayla Novak, and Jason Potts. "Blockchain Tradetech." In *APEC Study Centres Consortium Conference (ASCCC)*. Port Moresby, Papua New Guinea, 2018.
- Allen, Darcy W E, Chris Berg, Aaron M Lane, and Jason Potts. "Cryptodemocracy and Its Institutional Possibilities." *The Review of Austrian Economics* (2018): 1-12.
- . "The Economics of Crypto-Democracy." Paper presented at the Linked Democracy: AI for Democratic Innovation, 26th International Joint Conference on Artificial Intelligence, Melbourne, Australia, 19 August 2017 2017.
- Berg, Alastair, Chris Berg, Sinclair Davidson, and Jason Potts. "Identity as Input to Exchange." *Available at SSRN 3171960* (2018).
- Berg, Chris, Sinclair Davidson, and Jason Potts. "The Blockchain Economy: A Beginner's Guide to Institutional Cryptoeconomics." In *Cryptoeconomics Australia*, 2017, <https://medium.com/cryptoeconomics-australia/the-blockchain-economy-a-beginners-guide-to-institutional-cryptoeconomics-64bf2f2beec4>.
- Berg, Alastair, Chris Berg, Sinclair Richard Davidson, and Jason Potts. "The Institutional Economics of Identity." *Available at SSRN 3072823* (2017).
- University, RMIT. "Blockchain to Transform Healthcare Models." *RMIT University* 2018, <https://www.rmit.edu.au/news/all-news/2018/jul/rmit-dbresults-blockchain>.