

A DLT Regulatory Control Framework for Decentrally Governed DLT Systems in the Australian Financial System

by Conrad Gayan Benedict

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the degree of

Doctor of Philosophy

under the supervision of Associate Professor Dr Asif Gill
and Associate Professor Dr Farookh Hussain

University of Technology Sydney
Faculty of Engineering and Information Technology

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I, Conrad Gayan Benedict declare that this thesis, is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Computer Science, Faculty of Engineering and Information Technology at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

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“We reject: kings, presidents and voting. We believe in: rough consensus and running code.”

David Clark, 1992

“The faith that technology can redeem all of our sins and fix all of our problems is the ultimate hubris.”

Siva Vaidhyanathan, 2011

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Research of this nature would not be possible without the significant support and contribution of many important others.

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Note from the Researcher

Consider a financial regulator faced with the rapid adoption by consumers of a new online financial system. The system is based on DLT-based blockchain technology and allows participants to exchange value without declaring their identities or affiliations. It's not clear who is operating the system, what transactions are being conducted, or even who its users are and where they are based. Regulated entities start complaining about the new system competing with their regulated business even as participants clamour onto the increasingly popular platform. Other similar systems start emerging and the regulator becomes increasingly concerned about the systemic risks being introduced into the financial system. Suddenly the cryptography that secures several of these platforms is compromised and public confidence in the integrity of their transactions evaporates. Participants lose significant value and businesses which accepted payment from these platforms are left with a worthless digital currency. In the near future, this is how a financial crisis precipitated by a loss of regulatory control over DLT systems may begin...

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Abstract

Distributed ledger technology (DLT) has recently emerged as a disruptive innovation with an expanding range of applications. Distributed ledger and associated blockchain systems use cryptography and incentives to ensure the integrity of distributed systems by establishing trust among unknown parties. In regulated systems such as the financial system however, the use of distributed governance to promote trust among participants risks displacing the conventional role of financial intermediaries as a control point for regulatory supervision. Therefore, the challenge for financial regulators is to understand the risks presented by decentrally governed DLT systems and to implement appropriate regulatory controls to treat these risks. To address this research need, this research adapts a participatory action design research (ADR) to incorporate regulatory practitioner expertise into the development of a practically relevant and theoretically grounded DLT Regulatory Control Framework (DRC Framework) for the Australian financial system. This research method is supplemented by additional theory generating qualitative research techniques to increase the theoretical contribution of the developed framework. The framework was co-designed with Australian DLT experts from the DLT Working Group of the Australian Council of Financial Regulators and is intended to inform Australian regulatory responses to DLT systems.

The developed DRC Framework has five main components: DLT participants and providers, DLT risks, regulatory control treatments, residual risk improvements, and regulatory control design principles. DLT participants partake in financial activities enabled by DLT systems provided by DLT application, platform and infrastructure providers. DLT risks, regulatory control treatments and residual risk improvements are categorised according to whether they impact specific DLT participants, providers or system risks. Finally, the DRC Framework incorporates regulatory control design principles to guide regulators in the ongoing development and adaption of regulatory controls to treat fast-evolving DLT risks.

The developed DRC Framework was iteratively co-developed and evaluated using knowledge, insights and reflection from participating DLT regulatory experts. Later stage evaluation was extended to include international DLT industry experts and a UK financial regulator to support the generalisability of the developed research artefact to global regulatory contexts. Evaluation of the research indicates the developed DRC Framework can effectively support the identification and implementation of regulatory controls by Australian financial regulators to address the risks presented by decentrally governed DLT systems.

It is important to note that this research study is largely limited in its development focus to the Australian financial system context and was not developed to be applied to non-financial, non-Australian regulated contexts without further contextualisation. While steps were taken to mitigate the effects of these limitations, these should be considered when interpreting the theoretical and practical applications of the research. Future research could apply the developed framework to broader regulatory contexts.