



Blockchain in Action - Data61 Blockchain R&D

Dr. Shiping Chen
Senior Principal Research Scientist, Data61
Conjoint Professor, UNSW
Fellow of IET
shiping.chen@data61.csiro.au



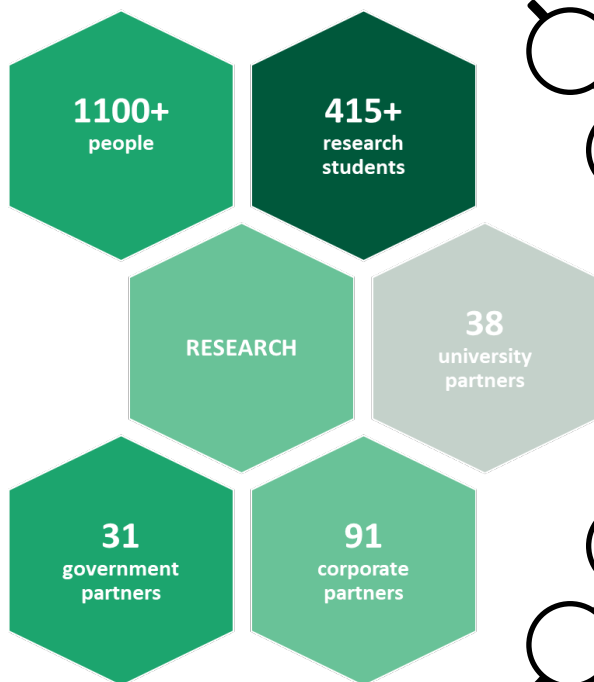
Invited Talk for 83rd IFIE 10.4 WG, Melbourne 2022



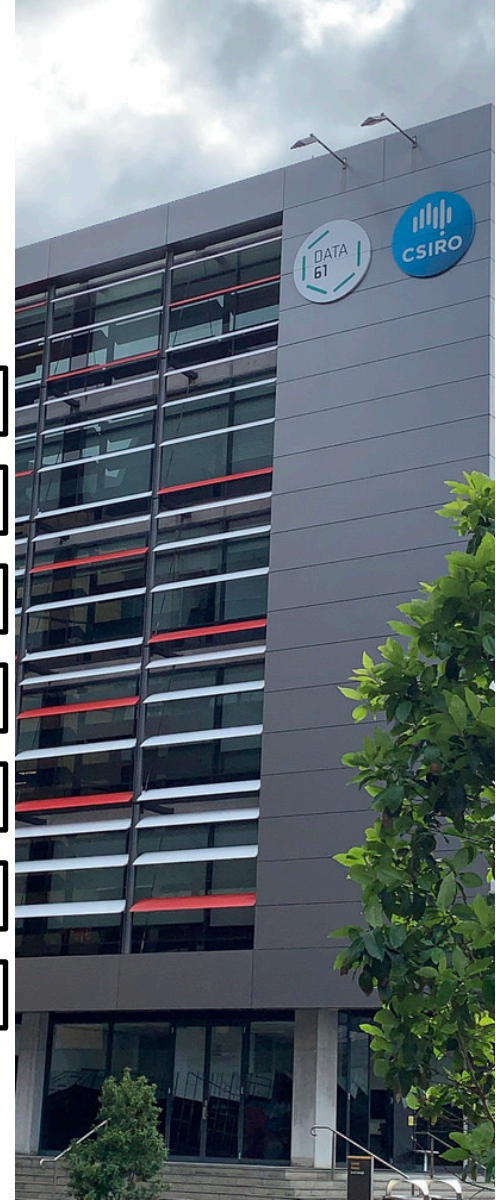
Outline

- Introduction to Data61 & The Blockchain Team
- Data61 Approach to Blockchain R&D
 - Assisting Australia Government
 - Training Australia Students
 - Blockchain Community Involvement
 - Blockchain R&D
 - Blockchain Projects
- Summary

Data61 – Australia Digital Innovation



- Data capture
- Communications & networks
- Hardware & software
- Cybersecurity
- Data, statistics, ML
- Decision sciences, AI
- Behavioral economics & cogsci



Blockchain R&D Capabilities at Data61



Personnel

- 7 Research Scientists
- 3 Software Engineers/PosDocs
- 10+ PhD students
- 10+ Master / thesis student projects per year



Collaborations

- Sydney University (Red Belly)
- Monash (Blockchain in Energy)
- Swinburne (Blockchain Centre)
- ANU (Metaverse)
- UNSW (ML, Program Analysis)
- UTS (ML Model Verification)
- Macquarie (Blockchain + IoT)



Domains

- Energy
 - Smart Grid, Hydrogen
- Supply Chain
 - Mineral
 - Agriculture & Food
 - Transportation & Logistics
- Fintech
 - Bank, Capital market
 - DF-CRC

- Research

- Design of blockchain systems
- Trustworthy blockchain
- Uses of smart contracts
- Blockchain platforms

- Government & Education



- Community

- ISO/TC 307
- IT-041
- IETF RFC on Blockchain Interoperability



- Projects & Innovations





**Government &
Education**

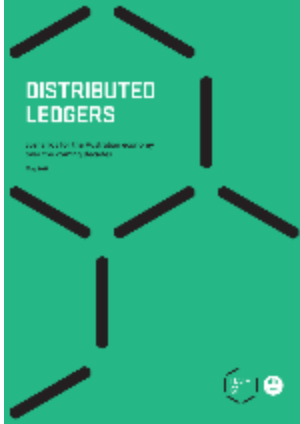
**Blockchain
Community
Involvement**



Assisting Australian Governments

Distributed Ledgers: Scenarios for the Australian economy over the coming decades

What might plausibly happen, across society & economy?



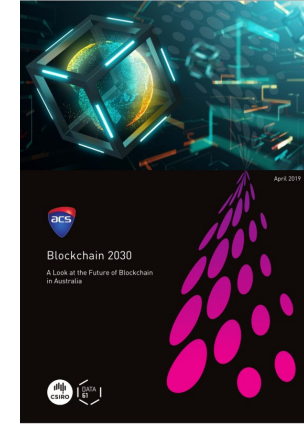
Risks and Opportunities for Systems Using Blockchain and Smart Contracts

What are technical risks & opportunities for use cases?



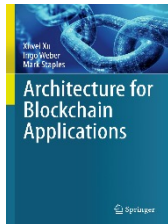
Blockchain 2030: A Look at the Future of Blockchain in Australia

What is the industry profile, skills, trends, & future scenarios?



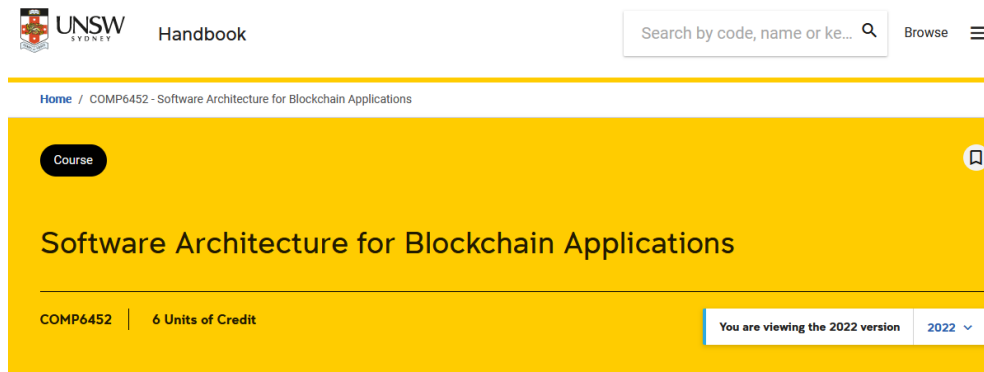
Training Blockchain Workforce for Industry

- Write textbook on Architecture for Blockchain Applications



63k Accesses | 98 Citations | 20 Altmetric

- Deliver blockchain course for UNSW students



- Co-supervise PhD & Master/Honour students to do blockchain research

- International Conferences/Journals on Blockchain
 - General Chair of IEEE ICBC-2021
 - PC Chair of ICBC 2022 and ICBC 2018
 - Guest Editor of MDPI Algorithm Special issue on Blockchain Technology
- Blockchain Standards
 - [ISO/TC 307](#): Blockchain and distributed ledger technologies (DLT)
 - [IT-041](#): Australia leading blockchain standardization activities of ISO
 - a) AS ISO 22739:2020 - Vocabulary
 - b) SA TR ISO 23244:2020 - Privacy and personally identifiable information protection
 - IETF RFC on Blockchain Interoperability with MIT *et. al.*





Blockchain Research



- Performance & Scalability
- Energy Consumption/waste
- Data Privacy vs. Transparency
- Freedom vs. Governance (Reg. & Compliance)
- Blockchain System Security, exp. smart contract security
- Blockchain Data Storage, e.g.,
 - BTC: ~390 GB by April 2022†
 - Eth: ~718 GB by May 2022 ‡
- **Lack of killer blockchain applications!**

† From <https://www.statista.com/statistics/647523/worldwide-bitcoin-blockchain-size/>

‡ From <https://etherscan.io/chartsync/chaindefault>

The Red Belly Blockchain Experiments

Concurrent Systems Research Group, University of Sydney, Data61-CSIRO

Abstract

In this paper, we present the largest experiment of a blockchain system to date. To achieve scalability across 1000 servers in more than 10 countries located on four different continents, we drastically revisited Byzantine fault tolerant blockchains and verification of signatures.

The resulting blockchain, called the *Red Belly Blockchain (RBBC)*, commits more than a hundred thousand UTXO transactions issued by permissionless nodes. that are grouped into blocks within

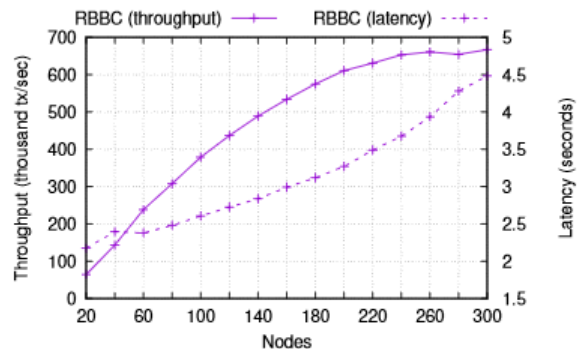
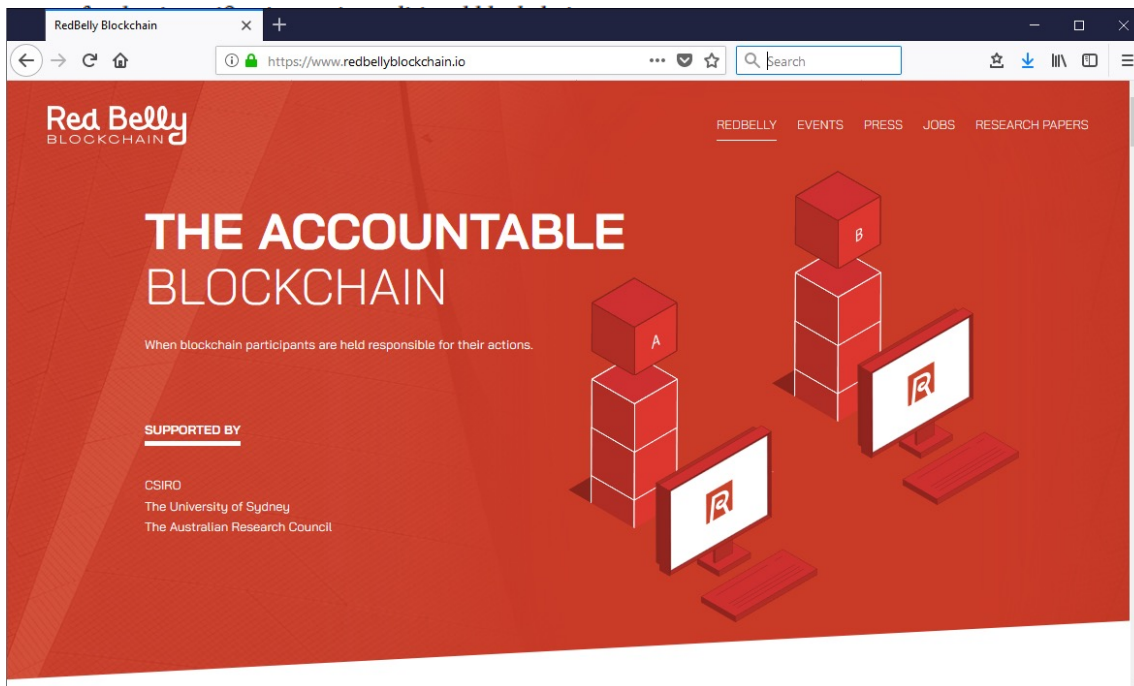


Figure 8. The performance (latency and throughput) of RBBC in a single datacenter



Blockchain Design Patterns

Patterns Collection

Data Management Patterns →

Patterns that manage data on and off the blockchain

Interact with External World Patterns →

Patterns to send data between external world and blockchain

Security Patterns →

Patterns that concern security aspect of blockchain-based applications

Smart Contract Patterns →

Patterns that concern smart contract design

Self-Sovereign Identity (SSI) Patterns →

Patterns for blockchain-based self-sovereign identity applications

Data Migration Patterns →

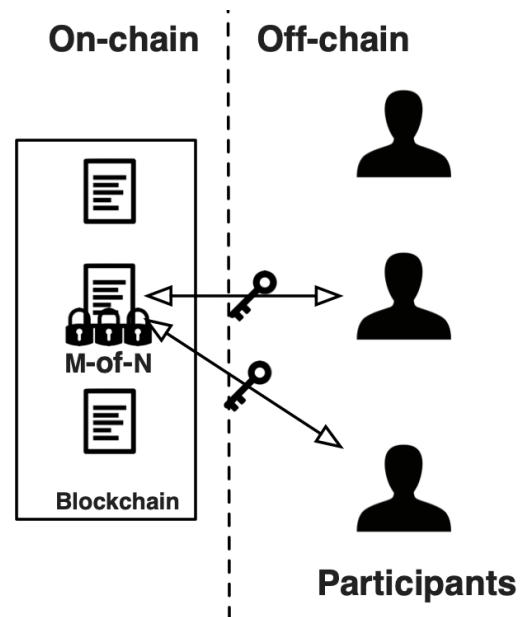
Patterns for migrating/copying data between blockchains

Deployment Patterns →

Patterns for deploying blockchain-based applications

Payment Patterns →

Patterns for state transitions of a token in blockchain-based payment applications



Problems/Motivations


- A Blockchain network is large and complex
- Deployment and running of blockchain is expensive
- It is difficult to reproduce a specific attack/exception within a highly concurrent system.

Shiping Chen
Harry Wang
Liang-Jie Zhang (Eds.)

LNCS 10974

Blockchain – ICBC 2018

First International Conference
Held as Part of the Services Conference Federation, SCF 2018
Seattle, WA, USA, June 25–30, 2018, Proceedings



Springer

[International Conference on Blockchain](#)
..... ICBC 2018: [Blockchain – ICBC 2018](#) pp 18-31 | [Cite as](#)

A Simulation Approach for Studying Behavior and Quality of Blockchain Networks

Authors [Authors and affiliations](#)

Bozhi Wang , Shiping Chen, Lina Yao, Bin Liu, Xiwei Xu, Liming Zhu

Conference paper
First Online: 22 June 2018

5

Citations

1

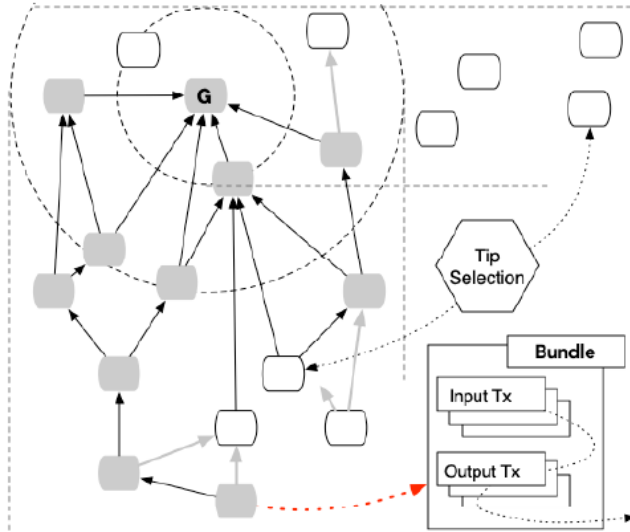
Mentions

3.7k

Downloads

Part of the [Lecture Notes in Computer Science](#) book series (LNCS, volume 10974)

Blockchain Security Analysis



a) Tangle

Table 1: Unit Action

<i>Action A</i>	<i>Action B</i>	<i>Action C</i>
Valid Tx [A_1]	Random Selection [B_1]	Valid Pool [C_1]
Invalid Tx [A_2]	Selfish Selection [B_2]	Invalid Pool [C_2]

Table 3: The Performance of Increased User Size

Attack Types	Decision Principle	Feasible Behavior	Attack Strategies
	(a,-) (d,e,f,-) (b,e,-) (c,f,-)		
PS	(a, -) - - (c)	c,f	c,ac (2)
DS	(a,-) (d,e) (b,e) -	b,d,e,f	e,ae,bd,de,abd, ade,bde,abde (7)
HB	(a,-) (d,e,f) (b,e) (c,f)	f	ce,bf,ef,cef,bcf,bef,bce,def,cde, bdf,bcd,ae,acef,abf,abcf,ace, abef,abce,adef,acde,abdf,abcd (22)

- Bozhi Wang, Qin Wang, Shiping Chen, Yang Xiang: Security Analysis on Tangle-Based Blockchain Through Simulation. ACISP 2020: 653-663
- Qin Wang, Jiangshan Yu, Zhiniang Peng, Van Cuong Bui, Shiping Chen, Yong Ding, Yang Xiang: *Security Analysis on dBFT Protocol of NEO*. Financial Cryptography 2020: 20-31 (10 citations)
- Runchao Han, Zhimei Sui, Jiangshan Yu, Joseph K. Liu, Shiping Chen: *Fact and Fiction: Challenging the Honest Majority Assumption of Permissionless Blockchains*. AsiaCCS 2021: 817-831



Publications on Blockchain (2022-2021)

1. Ankur Lohachab, Saurabh Garg, Byeong Kang, Muhammad Bilal Amin, Junmin Lee, Shiping Chen, Xiwei Xu: Towards Interconnected Blockchains: A Comprehensive Review of the Role of Interoperability among Disparate Blockchains. *ACM Comput. Surv.* 54(7): 135:1-135:39 (2022)
2. H. M. N. Dilum Bandara, Shiping Chen, Mark Staples, Yilin Sai: Modeling Multi-Layer Access Control Policies of a Hyperledger-Fabric-Based Agriculture Supply Chain. *TPS-ISA 2021*: 355-364
3. Ji Liu, Zheng Xu, Ruiqiang Li, Hang Zhao, Hongbo Jiang, Jinhui Yao, Dong Yuan, Shiping Chen: Applying blockchain for primary financial market: A survey. *IET Blockchain* 1(2-4): 65-81 (2021)
4. Qin Wang, Shiping Chen, Yang Xiang: Anonymous Blockchain-based System for Consortium. *ACM Trans. Manag. Inf. Syst.* 12(3): 26:1-26:25 (2021)
5. Laizhong Cui, Ziteng Chen, Shu Yang, Zhongxing Ming, Qi Li, Yipeng Zhou, Shiping Chen, Qinghua Lu: A Blockchain-Based Containerized Edge Computing Platform for the Internet of Vehicles. *IEEE Internet Things J.* 8(4): 2395-2408 (2021)
6. Weishan Zhang, Qinghua Lu, Qiuyu Yu, Zhaotong Li, Yue Liu, Sin Kit Lo, Shiping Chen, Xiwei Xu, Liming Zhu: Blockchain-Based Federated Learning for Device Failure Detection in Industrial IoT. *IEEE Internet Things J.* 8(7): 5926-5937 (2021)
7. Minfeng Qi, Ziyuan Wang, Fan Wu, Rob Hanson, Shiping Chen, Yang Xiang, Liming Zhu: A Blockchain-Enabled Federated Learning Model for Privacy Preservation: System Design. *ACISP 2021*: 473-489
8. Runchao Han, Zhimei Sui, Jiangshan Yu, Joseph K. Liu, Shiping Chen: Fact and Fiction: Challenging the Honest Majority Assumption of Permissionless Blockchains. *AsiaCCS 2021*: 817-831
9. Qinghua Lu, Xiwei Xu, H. M. N. Dilum Bandara, Shiping Chen, Liming Zhu: Patterns for Blockchain-Based Payment Applications. *EuroPLoP 2021*: 28:1-28:17
10. Zhiyu Xu, Tengyun Jiao, Ziyuan Wang, Sheng Wen, Shiping Chen, Yang Xiang: AC2M: An Automated Consent Management Model for Blockchain Financial Services Platform. *SMDS 2021*: 33-41 (**Best Paper Award**)



Publications on Blockchain (2019-2020)

11. Bozhi Wang, Qin Wang, Shiping Chen, Yang Xiang: Security Analysis on Tangle-Based Blockchain Through Simulation. ACISP 2020: 653-663
12. Qin Wang, Jiangshan Yu, Zhiniang Peng, Van Cuong Bui, Shiping Chen, Yong Ding, Yang Xiang: Security Analysis on dBFT Protocol of NEO. Financial Cryptography 2020: 20-31
13. Chengzu Dong, Ziyuan Wang, Shiping Chen, Yang Xiang: BBM: A Blockchain-Based Model for Open Banking via Self-sovereign Identity. ICBC 2020: 61-75
14. Qinghua Lu, Mark Staples, Hugo O'Connor, Shiping Chen, Adnene Guabtani: Software Architecture for Blockchain-based Trade Certificate Systems. IEEE ICBC 2020: 1-3
15. Zhiyu Xu, Lin Yang, Ziyuan Wang, Sheng Wen, Rob Hanson, Shiping Chen, Yang Xiang: BHDA - A Blockchain-Based Hierarchical Data Access Model for Financial Services. TrustCom 2020: 530-538
16. Yue Liu, Qinghua Lu, Hye-Young Paik, Xiwei Xu, Shiping Chen, Liming Zhu (2020): Design Pattern as a Service for Blockchain-Based Self-Sovereign Identity. IEEE Softw. 37(4): 30-36 (2020)
17. Wang, Q., Huang, L., Chen, S., & Xiang, Y. (2020). Blockchain Enables Your Bill Safer. IEEE Internet of Things Journal, 1. doi:10.1109/jiot.2020.3016721
18. Xiwei Xu, Ingo Weber, Mark Staples: Architecture for Blockchain Applications. Springer 2019, ISBN 978-3-030-03034-6, pp. 1-307
19. Xiwei Xu, Qinghua Lu, Yue Liu, Liming Zhu, Haonan Yao, Athanasios V. Vasilakos: Designing blockchain-based applications a case study for imported product traceability. Future Generation Comp. Syst. 92: 399-406 (2019)
20. Christopher Klinkmüller, *et al.* Mining Blockchain Processes: Extracting Process Mining Data from Blockchain Applications. **The Best Paper Award on BPM-2019**



Publications on Blockchain (2016-2018)

21. Xiwei Xu, Cesare Pautasso, Liming Zhu, Qinghua Lu, Ingo Weber: A Pattern Collection for Blockchain-based Applications. EuroPLOP 2018: 3:1-3:20
22. Yue Liu, Qinghua Lu, Xiwei Xu, Liming Zhu, Haonan Yao: Applying Design Patterns in Smart Contracts - A Case Study on a Blockchain-Based Traceability Application. ICBC 2018: 92-106
23. Bozhi Wang, Shiping Chen, Lina Yao, Bin Liu, Xiwei Xu, Liming Zhu: A Simulation Approach for Studying Behavior and Quality of Blockchain Networks. ICBC 2018: 18-31
24. Qinghua Lu, Xiwei Xu, Yue Liu, Weishan Zhang: Design Pattern as a Service for Blockchain Applications. ICDM Workshops 2018: 128-135
25. Runchao Han, Vincent Gramoli, Xiwei Xu: Evaluating Blockchains for IoT. NTMS 2018: 1-5
26. Bin Liu, Xiao Liang Yu, Shiping Chen, Xiwei Xu, Liming Zhu: Blockchain Based Data Integrity Service Framework for IoT Data. ICWS 2017: 468-475
27. Qinghua Lu, Xiwei Xu: Adaptable Blockchain-Based Systems: A Case Study for Product Traceability. IEEE Software 34(6): 21-27 (2017)
28. An Binh Tran, Xiwei Xu, Ingo Weber, Mark Staples, Paul Rimba: Regeator: a Registry Generator for Blockchain. CAiSE-Forum-DC 2017: 81-88
29. Sin Kuang Lo, Xiwei Xu, Yin Kia Chiam, Qinghua Lu: Evaluating Suitability of Applying Blockchain. ICECCS 2017: 158-161
30. Xiwei Xu, Ingo Weber, Mark Staples, Liming Zhu, Jan Bosch, Len Bass, Cesare Pautasso, Paul Rimba: A Taxonomy of Blockchain-Based Systems for Architecture Design. ICSA 2017: 243-252
31. Paul Rimba, An Binh Tran, Ingo Weber, Mark Staples, Alexander Ponomarev, Xiwei Xu: Comparing Blockchain and Cloud Services for Business Process Execution. ICSA 2017: 257-260
32. Xiwei Xu, Cesare Pautasso, Liming Zhu, Vincent Gramoli, Alexander Ponomarev, An Binh Tran, Shiping Chen: The Blockchain as a Software Connector. WICSA 2016: 182-191 ([Google Scholar Citation: 329+](#))



Blockchain Innovation



Patent – Energized Identity Powered Blockchain

- Problems to address
 - Energy Waste
 - Fairness
 - Data Privacy & Security



- Benefits & Features
 - No PoW energy is wasted;
 - Easy to participate in the consensus, e.g., even mobiles;
 - You have full controls of your data!



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)
 (19) World Intellectual Property Organization
 International Bureau

(43) International Publication Date
 27 August 2020 (27.08.2020)

WIPO | PCT

(10) International Publication Number
WO 2020/168389 A1

(51) International Patent Classification:
H04L 9/00 (2006.01) *G06Q 99/00* (2006.01)

(21) International Application Number:
 PCT/AU2020/050150

(22) International Filing Date:
 21 February 2020 (21.02.2020)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
 2019900586 21 February 2019 (21.02.2019) AU

(71) Applicant: **COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION** [AU/AU]; Clinics Ross St, Acton, Australian Capital Territory 2601 (AU).

(72) Inventors: **LIU, Dongxi**; C/- Clinics Ross St, Acton, Australian Capital Territory 2601 (AU). **CHEN, Shiping**; C/- Clinics Ross St, Acton, Australian Capital Territory 2601 (AU).

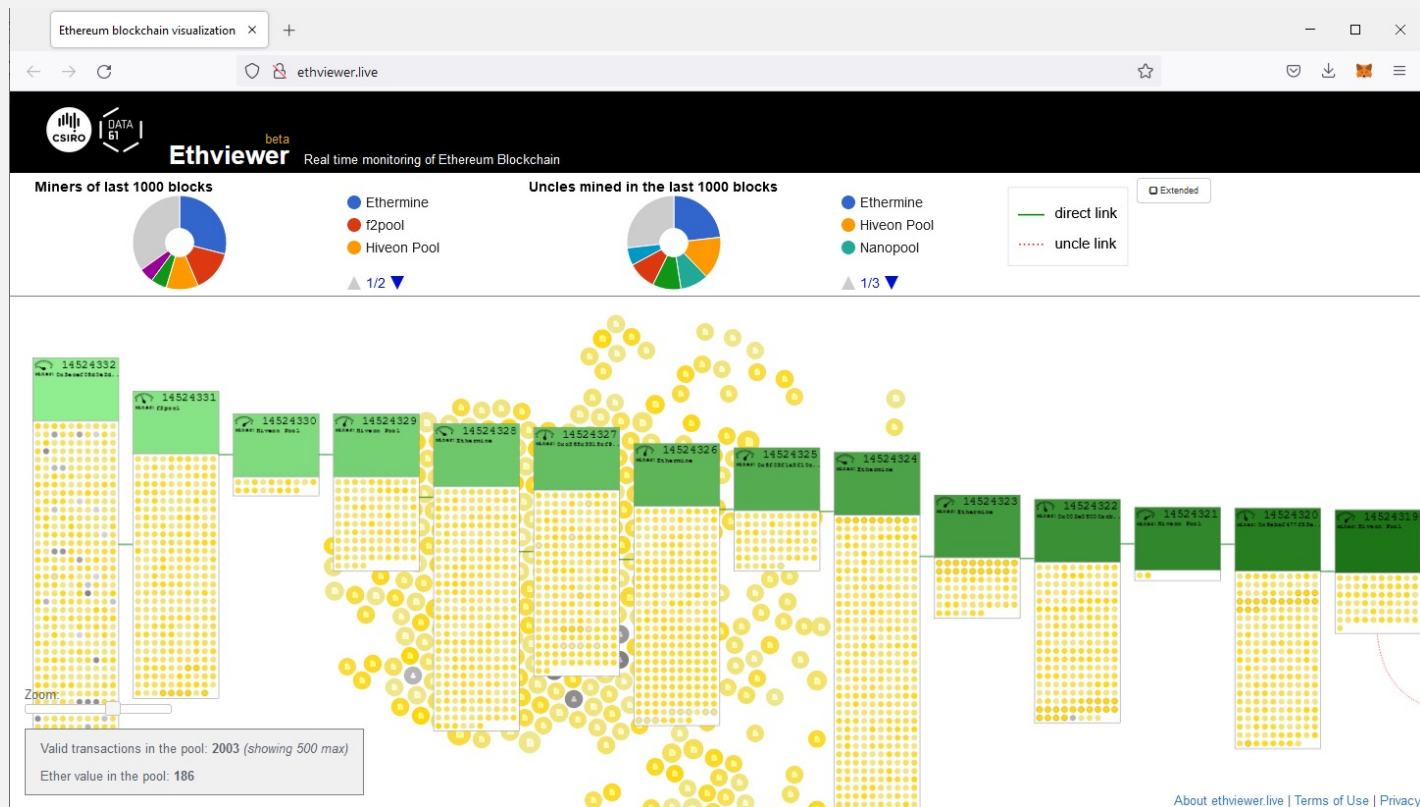
(74) Agent: **FB RICE PTY LTD**; Level 23, 44 Market St, Sydney, New South Wales 2000 (AU).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

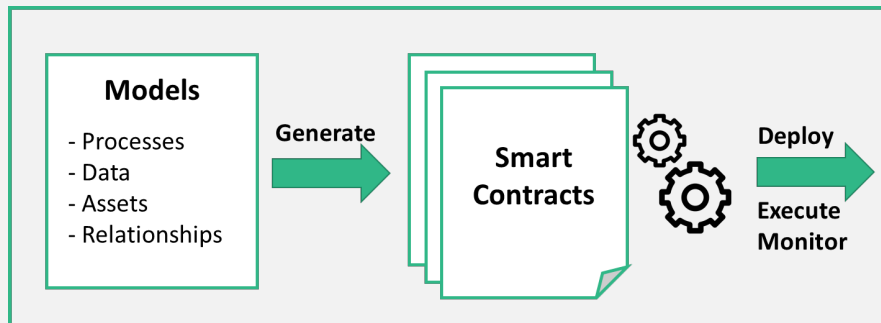
(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW); Eurasian (AM, AZ, BY, KG, KZ, RU, TD, TJ, TM, UZ, VC, VN); European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LT, LU, LV, MA, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR); African (BF, BI, BJ, BN, BS, GQ, GN, GU, GW, IL, IN, IR, IS, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW); Asian (JP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW); Latin American and Caribbean (AR, BO, BR, CL, CO, CR, CU, CY, EC, ES, FI, FR, GB, GR, GT, GU, HN, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW); OAPI (BF, BI, BJ, BN, BS, GQ, GN, GU, GW, IL, IN, IR, IS, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW).

(54) Title: ENERGIIZED IDENTITY POWERED BLOCKCHAIN

Ethviewer – A Real-time Ethereum monitor/visualization Tool/Service



Lorikeet - Automatic mode - driven smart contract generator

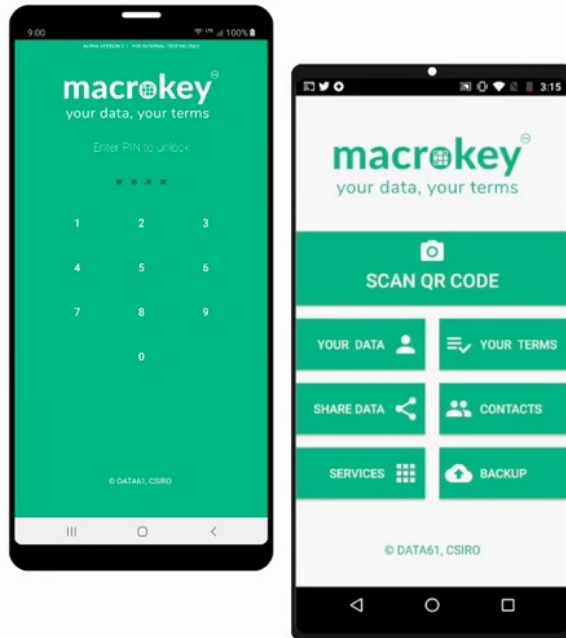


Understandable, Correct, Fast Prototyping

The screenshot shows the Lorikeet software interface. The top navigation bar includes 'Lorikeet Home Design Manage' and a user ID 'Welcome 0x180434b760a9005782e345e82e2b1e9a'. The main workspace is titled 'Edit BPMN Design' and shows a BPMN diagram for a 'Business Process Name: GrainSupplyChain'. The diagram includes tasks like 'Truck is weighed', 'Grain dropped into silo', 'Truck is weighed again', 'Quality sample taken', 'Quality assessment from sample', 'Create grain title', 'Buyer wants to buy title', 'Sell title to Buyer and get paid', and 'Request loan from bank'. A 'Grain Title Registry' database icon is also present. Below the diagram, there is a 'RegistryReference_03z5kar' section with tabs for 'General', 'Listeners', and 'Extensions'. On the right side, the 'Smart Contract Output' panel displays Solidity code for a 'GrainTitleRegistry' contract and a 'ProcessMonitor' contract. A colorful lorikeet parrot is perched on the top right corner of the screenshot.

MacroKey[®] - Digital-identity & key management

What is macrokey?



macrokey is;

- A mobile application
- A self-sovereign identity
- A cryptographic service
- A simpler, more secure way to authenticate
- An access control engine
- An encrypted personal data vault
- A communication tool
- A query-able data graph
- An enabler of trust
- Extensible

[Explainer video](#)

i-Certificate – A Smart Certificate System

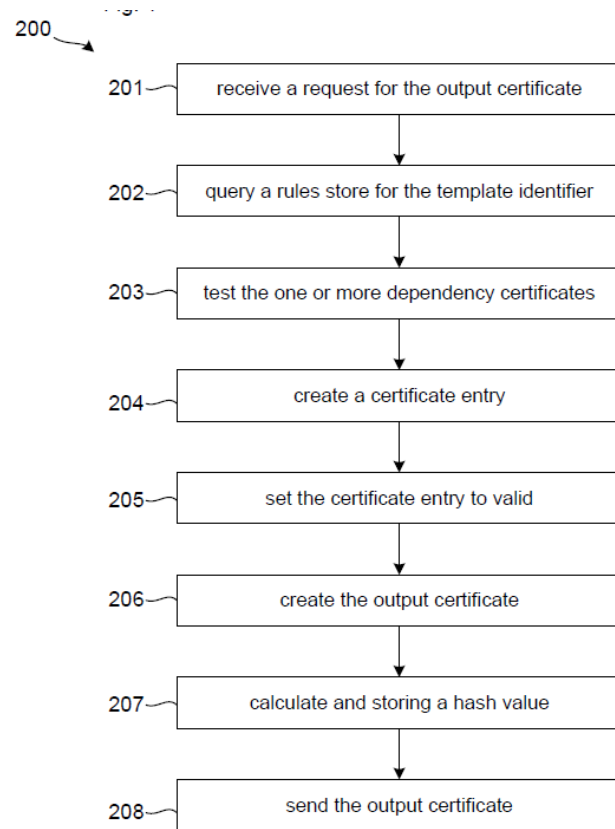
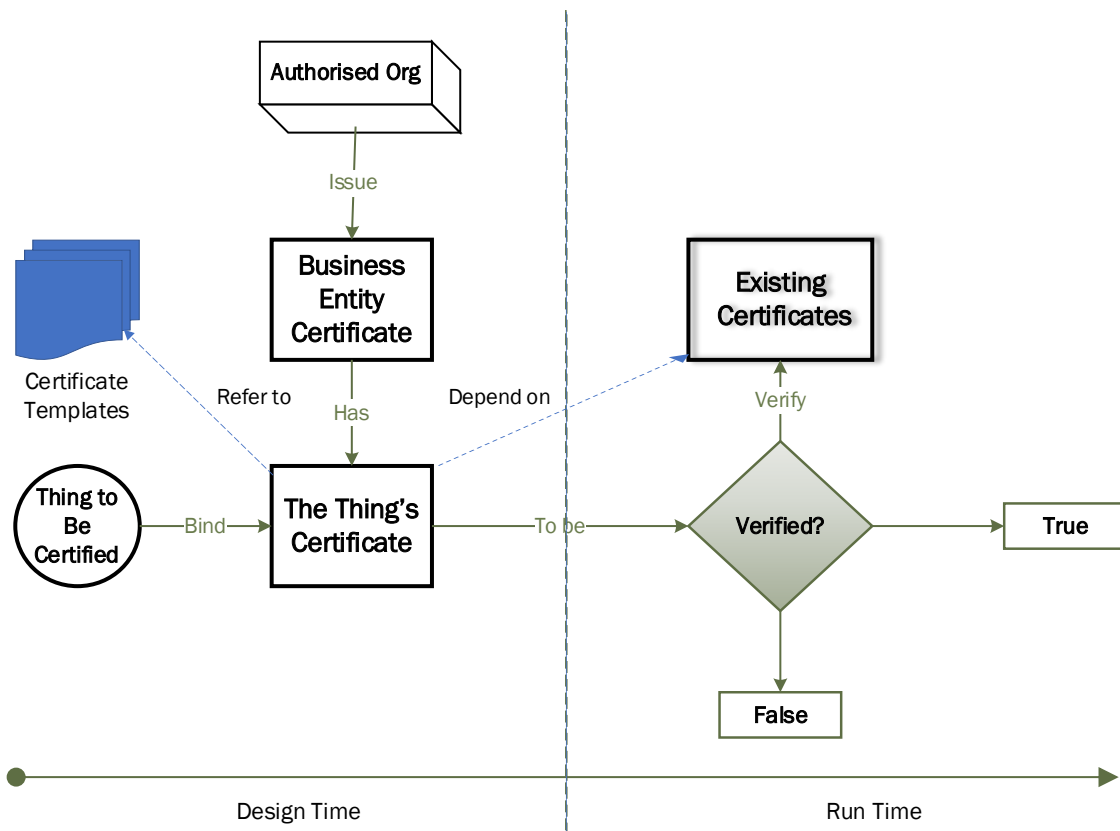


Fig. 2



Blockchain Projects

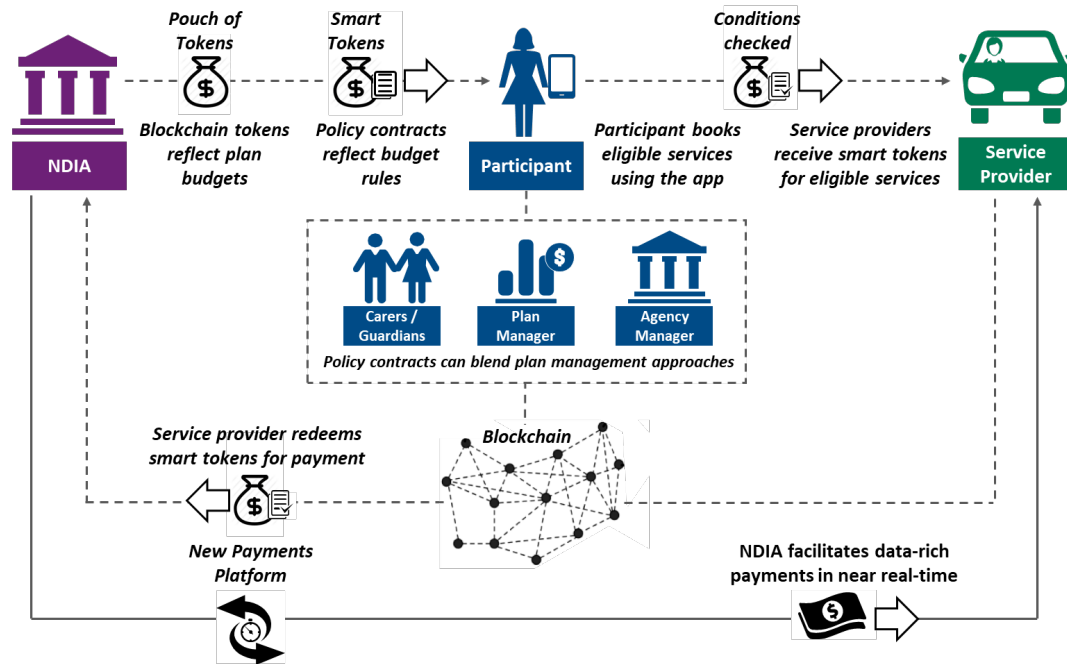


Project 1. Smart Money with CBA (2018)

• Background: NDIS – National Disability Insurance Scheme

The blockchain-based system enables:

- Cashless with a digital wallet
- Coding policies into money
- Help better budgeting
- Accountability



Details: <https://data61.csiro.au/en/Our-Research/Our-Work/SmartMoney>

Project 2. Electronic Phytosanitary Certification with DFAT (2019)

- Background: Funded by DFAT to improve import/export product certificate exchanging & sharing for efficient international trading.



The screenshot shows the ePhyto web interface. At the top left are the CSIRO and DATA 61 logos. On the top right, there is a link for "Login with IOKEEPER". Below the logos, the text "Start with certificate lookup" is displayed. A file selection area shows a button "Pick a certificate file" and a message "Selected file: ePhyto.xml". Below this, a section titled "Certificate found!" contains a table of certificate details.

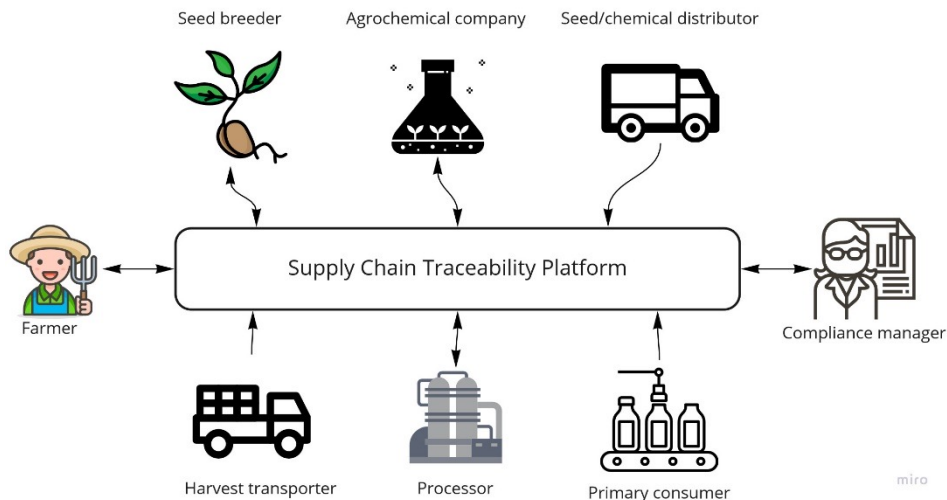
Hash	0x37305f8882f136e71ab054fed49149e1e20dd6f9c66e027dc201d03fac84e71d
ePhytoCertificateNumber	278964
originState	STATE_CREATED
targetState	STATE_ACCEPTED
ePhytoOriginCode	61
ePhytoTargetCode	685
instanceId	6
Supporting documents	0xeed38333ccce0680e292a8e3d9dac97f4aa3432050118a11e6044403ff082f5

At the bottom right of the certificate details section, there are two buttons: "Retract certificate" and "Reject certificate".

- Publication: Qinghua Lu, Mark Staples, Hugo O'Connor, Shiping Chen, Adnene Guabtni: Software Architecture for Blockchain-based Trade Certificate Systems. IEEE ICBC 2020: 1-3.

Project 3. AUS-Cotton Supply Chain Project (2021-22)

- Background: There is an increasing need for regulatory compliance in stewarded trials of new cotton products in Australia.



The blockchain-based system enables:

- Multi-party data collection
- Multi-party data-Sharing
- Real-time end-to-end compliance monitoring and checking
- Non-deniable persistent data 24H x 7D ready for auditing

- Blockchain/DLT has opened the gateway to the next generation of internet:
 - US\$175 billion by 2025 and in excess of US\$3 trillion by 2030 – from “Australian National Blockchain Roadmap”
- However, there are still many regulation & technology challenges:
 - Smart contract security
 - Dependency of smart contracts
 - Blockchain Interoperability
 - Blockchain Ethetic
 -
- We are open for collaboration.



NATIONAL BLOCKCHAIN ROADMAP:

Progressing towards a
blockchain-empowered
future.

There are opportunities across our economy which can be seized and enabled by the use of blockchain technology: to create jobs, to create new economic growth, to save businesses money, and to improve our overall productivity.

The combination of blockchain technology with other technologies, and the digital data underpinning blockchains, can add enormous additional economic value. Blockchain technology is predicted to generate an annual business value of over US\$175 billion by 2025 and in excess of US\$3 trillion by 2030.

The Australian Government is proactively addressing challenges and leveraging opportunities across a range of sectors to make this a reality. The National Blockchain Roadmap sets out the strategy for this across three key areas:



REGULATIONS
& STANDARDS



SKILLS, CAPABILITY
& INNOVATION



INTERNATIONAL
INVESTMENT &
COLLABORATION



Welcome to collaborate



Shiping.Chen@data61.csiro.au