



EXECUTIVE SUMMARY

Understanding the disruptive technology ecosystem in Australian urban and housing contexts: a roadmap

From the AHURI Inquiry

Potential of new technologies to disrupt housing policy

FOR THE

**Australian Housing
and Urban Research Institute**

PUBLICATION DATE

October 2018

DOI

10.18408/ahuri-7115101

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Title	Understanding the disruptive technology ecosystem in Australian urban and housing contexts: a roadmap—Executive Summary				
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ISBN	978-1-925334-68-5				
Key words	Big data, blockchain , open data, disruptive technology, digital technologies, housing assistance, smart cities, urban planning, city analytics, geographical information systems, share economy				
Series	AHURI Final Report	Number	304	ISSN	1834-7223
Publisher	Australian Housing and Urban Research Institute Limited Melbourne, Australia				
DOI	10.18408/ahuri-7115101				
Format	PDF, online only				
URL	http://www.ahuri.edu.au/research/final-reports/304 (full report)				

Recommended citation

Pettit, C., Liu, E., Rennie, E., Goldenfein, J. and Glackin, S. (2018) *Understanding the disruptive technology ecosystem in Australian urban and housing contexts: a roadmap*, AHURI Final Report No. 304, Australian Housing and Urban Research Institute Limited, Melbourne, <http://www.ahuri.edu.au/research/final-reports/304>, doi:10.18408/ahuri-7115101.

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The Inquiry Panel are to provide guidance on ways to maximize the policy relevance of the research and draw together the research findings to address the key policy implications of the research. Panel members for this Inquiry:

Michael Comminos	Astrolabe Group Pty Ltd
Brendan Fitzgerald	Infoxchange
Sam Headberry	Infoxchange
Paul McBride	Department of Social Services (Commonwealth)
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Emma Ogilvie	Department of Housing and Public Works (QLD)
Lynden Pennicott	Department of Health and Human Services (TAS)
Sandi Phalen	Department of Housing and Public Works (QLD)

Glossary

Not-for-profit sector	Community organisations providing a broad range of social services, including in relation to homelessness, housing, education, health, conservation and recreation.
Social housing	Rental housing that is provided and/or managed by government or non-government organisations, including public and community housing.

A list of definitions for terms commonly used by AHURI is available on the AHURI website www.ahuri.edu.au/research/glossary.

Executive summary

Key points

- The sharing or ‘gig’ economy, with the likes of Airbnb, is already disrupting the housing sector.
 - Digital planning tools are on the cusp of systematic adoption by councils and metropolitan planning agencies to support data-driven city planning.
 - Whilst much work has been done in opening up property data assets across governments, significant work is required on data standards, interoperability and data sharing across government, industry and the non-profit sectors.
 - Blockchain is considered a new and emerging technology with numerous potential benefits across the housing sector.
 - The Smart Cities movement offers opportunities to undertake pilots and consider new and disruptive technologies.
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This project maps the ‘disruptive technology ecosystem’ to show how new digital technologies might reshape housing provision and assistance. It is part of a wider evidence-based Policy Inquiry into the impacts of disruptive technologies on different housing markets across Australia, and how policy makers, providers and consumers can engage productively with emerging digital and disruptive technologies. This report specifically provides a critical review of how different emerging digital and disruptive technologies are being incorporated into the housing and planning systems and how they might facilitate greater efficiencies and new opportunities broadly across the housing sector. Through a qualitative approach, the outcomes of a detailed literature review of such innovations are complemented by two technology workshops with stakeholders (social housing providers, local councils, advocacy groups, peak bodies, and technologists) to collaboratively explore implementation options. The literature review and workshop discussions inform the project’s research question:

Which emerging digital and disruptive technologies present the greatest opportunities and threats for more efficient, effective and equitable housing provision and assistance, and what are the likely risks and rewards associated with these technologies?

Key findings

Two competing trends are emerging in relation to Australia’s housing and urban planning processes: one that involves the centralising of data, another that seeks to use distributed technologies that enact processes across a network without the need for central intermediaries. Both arise from attempts to solve critical coordination problems, yet may produce vastly different outcomes in relation to privacy, the accessibility of publicly and privately held information, and the subsequent possibilities for innovation. In this report, we consider how these trends are unfolding across industries and within individual organisations, and the policy and regulatory frameworks that are emerging in response.

The move towards centralised data is most critical in urban planning and social services. A significant portion of government and market processes related to housing are now conducted

via digital technologies. Large quantities of data are collected and stored in the process, creating reservoirs of information that may be used for automated decision making, reputation tracking, and auditing across varied domains: advanced urban planning, utility provision, market signals, welfare eligibility, tenancy applications and more. Digital technologies may, therefore, dramatically transform the built environment and the social and private housing markets over the coming decades. However, these data stores are not necessarily complete or connected, potentially leading to uneven social outcomes. The platforms and applications that utilise data are not always transparent in their design, leaving citizens unaware of how or on what basis decisions are made.

On the government front, national plans and recommendations are developing in the context of smart cities, data ecosystems and state-based regulation, but not necessarily in keeping with the pace of technological advancements and disruptions. Open data access is often promoted by policy makers, as well as the development of digital 'marketplaces' or data swap-shops. For instance, data.gov, data.vic and data.nsw (among others) are clearinghouses for a wide range of government data. Though they currently contain a limited range of information, these systems, and their predecessors, were designed to act as repositories for all government data, which, in companion with data workflow systems, would mitigate duplication and provide access to those who need the information.

The use and protection of personal data is of crucial concern. In the context of social housing allocation, workshop participants expressed a desire for a common waitlist-type vacancy listing—already in place in the private rental sector—so that potential social tenants may be better matched with available properties not managed by the provider (or their immediate professional network) through which they applied. To facilitate this, state level policies and client and property management databases would need to be updated to allow for the creation and sharing of such real-time vacancy listings. Protocols would also need to be developed to ensure data security—potentially with the assistance of blockchain technologies—of both the applicants and the providers. Currently, state agencies and private entities are limited in terms of how they deal with data through national and state data protection legislation, some of which have yet to catch up with the evolving nature of emerging technologies and the data that they create, access, manipulate etc. Additionally many datasets are kept in organisational silos under cloaks of commercial-in-confidence. While the possibilities for better housing services should be explored, automation and machine learning technologies that rely on government data stores also raise ethical and legal questions, particularly if applied to services for vulnerable groups such as social housing tenants.

In the private sector, the growth of digital transactions, combined with the capability to generate and access data markets based on consumer behaviour, creates market advantages for companies that develop digital capabilities. This has led to an increase in the need for specialist data firms, many of whom have generated privately owned and highly commercialisable datasets. In many cases, these commercial enterprises are able to offer better quality and more complete data than public clearinghouses. There are, however, significant reasons to hold back the sale of government datasets and data stores (which is already occurring with land title registries), as technological change may produce alternatives to privatisation of public assets, including new forms of public-private partnerships, that yield greater long term public benefit.

Further, the use of personal data by public or private entities needs to take account of existing legal structures governing the collection, retention, disclosure and analysis of personal information, as well as emerging open data and data sharing frameworks intended to capture public benefit from large existing datasets. The introduction of automated decision making systems operating on personal data can affect the rights of persons. It also raises new legal risks and difficulties, as well as potential efficiencies. Other forms of automation like contract automation also have potentially dramatic legal consequences. These issues require assessing

the adequacy of Australia's data protection offices and infrastructures to ensure certain goals are achievable but with minimum harm to persons.

At the level of individual entities, the amount of data and ability to analyse digital information (such as through Geographic Information Systems (GIS)) hold significant possibilities for better planning of our cities. Technologies for data visualisation and spatial analysis are continually advancing, such as through the development of bespoke tools like ENVISION, ESP, RAISE and What if? and in 2D and 3D modelling to facilitate more detailed and specific analytical functions and forecasting. There are, however, limitations in the internal capacity of organisations to afford regular upgrades and maintain a workforce with a relevant (and constantly changing) skill set to operate these systems. This can create an uneven market so that only entities with the financial means (e.g. larger companies in the private sector or better resourced local councils) to invest in upgrades can benefit, while others (e.g. small to medium-sized specialist housing providers) lag behind, potentially compromising the quality of decision making and client outcomes.

Developments in blockchain and other automation represent a shift away from centralised data and coordination. The blockchain protocol—a ledger of transactions that operates and updates simultaneously across a multitude of participating 'nodes' using peer-to-peer communication protocol—enables the transfer of value without the need for intermediaries. The distributed nature of the technology enhances data security as it cannot be attacked at a central point. While still at an early stage, it can be applied to housing functions such as title registration, co-ownership options (including in reverse mortgages), tenancy management and utilities maintenance, to ensure data integrity. These may reduce the risks and costs of manual entry and expand the capacity of current record-keeping by linking up relevant datasets.

The promise of some of these emerging technologies is that they have the potential to simplify the processes involved in siting, constructing, tenancing, selling and maintaining of properties in cases where that might not necessarily entail substantial regulatory change. There are, however, institutional and structural blockages—in terms of policy, infrastructure, finance, data quality and other legal considerations—that may prevent broader adoption and housing market transformation.

Some of the technologies described in this report and with our workshop participants—blockchain, digital planning tools, automation—are at an early stage of development. While these are already showing promise in influencing the provision of housing products and in urban planning decisions, their real impacts may only be realised after key financial and legal issues are resolved, and when upskilling the relevant workforce has been addressed. Policy makers also need to consider the impacts of emerging technologies not directly related to housing services such as Uber and Deliveroo, which have the effects of destabilising vulnerable groups' financial positions through the casualisation of work and short term, 'gig'-based engagements. While offering flexibility, these can have lasting impacts on individuals' ability to sustain tenancies, access housing loans, and keep up with living costs, the outcomes of which may be far broader than any technological and policy interventions can anticipate.

Policy development options

Paramount for the realisation of many disruptive technologies is the ability to access fine scale data, whether it be property information or personal information. Digital platforms pertaining to the housing sector such as AskIzzy, Wattblock and Powerledger provide good examples of what is possible when data is made accessible. However, a key consideration with open data is the risk of compromising personal data that could result in negative outcomes including identity theft, inequitable treatment and the violations of citizen's civil rights and freedoms.

The key findings from this research highlight a number of areas requiring further consideration. First, there is an identified skills gap in agencies' ability to work with new emerging technologies. In relation to urban planning, GIS-based digital planning tools hold much promise for adoption into the strategic planning workflow. Relating to this is the paucity in policy and statutory regulations to enforce the use of digital planning tools to support the formulation of housing and city plan policies.

In the context of data, we are seeing increased momentum in industry to acquire and value-add to existing government data assets. These commercial data assets offer potentially significant benefits for the non-profit sector including Community Housing Providers, yet as it can be costly to purchase such commercial data, is often not fully utilised. Also, in the area of data, there are opportunities for policy to support better two-way flows between contributors and collators. For example, a housing provider might provide data to government agencies yet not receive access back in the forms of aggregated or value-added data products that might have been contributed by multiple providers and agencies.

This research has found there are barriers to technology uptake in certain sectors due to software licensing costs. Also, in a number of organisations there can be limitations on what software is supported which is another barrier to adoption. Policies and procedures that enable open source software are recommended. Open source software does not come with licensing costs and can support startups, non-profit organisations and government agencies to have access to a wider array of new and emerging technologies. As technology is increasingly made available through cloud services and hosted externally, policies and procedures need to be developed to support the utilisation of such digital platforms.

In an era of 'smart cities', there should be policies to support innovation, pilots and testbeds in exploring the potentials of new disruptive technologies. Blockchain has been identified as one such emerging technology. There are other new and emerging technologies including augmented and virtual reality, Internet of Things (IoT) and artificial intelligence (AI) that also hold potential promise and ability to disrupt the housing sector. Given the increasing digitisation of services and products and the wave of digital disruption which is impacting our cities, there is a need for more agile policy setting and review to ensure we mitigate negative impacts early and realise the positive potential of such technologies for the housing sector and society at large. As our study shows, there is potential for vulnerable communities to experience further isolation and disengagement if the emerging technologies are introduced without careful consideration.

The study

This research incorporates a review of academic and grey literature on emerging technologies with workshop discussions involving participants across the housing, technology, government, non-profit and academic sectors. The findings of these reviews provided important research and policy contexts to inform the research team in designing three case studies discussed at technology workshops held in Melbourne and Sydney in September 2017. The case studies involved real and hypothesised scenarios where emerging technologies may impact on the siting, development and managing of housing products and services, and the research team sought expert opinions from participants on the barriers to implementation and potential impacts. A rapporteur from each table summarised the discussions and reported back to the rest of the workshop for consideration. Recorded audios and rapporteur notes were used as the basis of analysis for this report.

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Acknowledgements

This material was produced with funding from the Australian Government and state and territory governments. AHURI Limited gratefully acknowledges the financial and other support it has received from these governments, without which this work would not have been possible.

AHURI Limited also gratefully acknowledges the contributions, both financial and in-kind, of its university research partners who have helped make the completion of this material possible.

The research team would like to thank the contribution of all our Melbourne and Sydney workshop participants. Special thanks go to the four technologists who attended our workshops and assisted us in demonstrating the potential of these emerging technologies.

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