

How technology is reshaping the housing market



Australian Housing
and Urban Research Institute

Based on AHURI Final Report No. 308:

The potential of new technologies to disrupt housing policy

What this research is about

This Inquiry examined disruptive digital technologies, investigating their potential for reshaping housing markets and reconfiguring housing policy. It provides housing policy makers and practitioners with a nuanced understanding of how technology is already restructuring housing markets and affecting housing assistance programs, as well as insights into likely future developments.

The context of this research

The emergence of new digital and disruptive technologies means government policy makers and practitioners in not-for-profit organisations and businesses now find themselves facing new opportunities and challenges.

Today, the terminology of 'disruption' is used generally to describe situations where technology drives significant changes to existing practices, whether that of an industry, a market or a regulatory structure.

The key findings

The research identified four main fields of technological advancement likely to disrupt the housing sector in the near term: matching markets; big data; GIS mapping software; and blockchain.

The research also examined the impact of Airbnb, the most prominent case of technological disruption in Australia's housing market, to-date, in Sydney and Melbourne.

Matching market platforms

Matching markets are markets in which agents (such as aspiring marriage

partners) seek to be paired with someone or something, with the criteria for matching often highly specific and requiring reciprocity. In this regard they are unlike commodity markets, where price plays the role of connecting buyers and sellers. The need to pair means in many matching markets finding a match can be very difficult and/or prohibitively expensive, with high search and transaction costs. For these reasons, many matching markets traditionally have not functioned well.

Matching market platforms facilitating short-term letting (STL)—like Airbnb, Booking.com and HomeAway—are potentially impacting the equitable distribution of housing in the long term private rental market. The improved online technology has enabled a vast expansion of the reach and popularity of these short-term letting matching markets. While this is a cause of concern with regard to private rental impacts, the improved performance of matching markets also offers significant opportunities in the housing sector, which are yet to be exploited.

The adoption of matching market platforms is a means by which governments can harness efficiencies to deliver better social, economic and environmental outcomes, including:

- social housing swaps and transfers could provide greater housing choice to social housing tenants and better stock utilisation;
- create a national inventory of accessible housing, and marketplace for accessible housing, providing the means for people living with disability to discover accessible market housing;
- increase the access by the lowest income households to the lowest-cost private rental housing at relatively little public cost;
- improve the affordability, quality and supply of new apartments for owner-occupation by matching developers with aspiring owner-occupiers;
- provide the coordination required to facilitate the renewal of greyfield suburbs by identifying and aggregating fragmented land parcels in these areas to enable precinct level redevelopment to deliver environmental, social and economic benefits.

Concerns with growth of matching markets are:

- negative spillover impacts, e.g. the conversion of long let housing to

STL (e.g. through Airbnb). Research suggests Airbnb has removed over 6,000 properties from Sydney's long-term rental market and over 8,000 from Melbourne's;

- tendency for the market to form a monopoly as many potential partners on the site drives platforms to combine;
- the characteristics of certain housing consumers may mean finding matches will be difficult, regardless of technology to aid searching. For example, certain consumers may be of such low income or engage in challenging behaviours that mean matching becomes difficult without forms of subsidy;
- without adequate monitoring and regulation, there is a risk of inequities arising as the kinds of connections facilitated by matching market platforms can in practice favour those with power, education and know-how;
- privacy and consumer protection—matching market platforms collect and aggregate data which they may onsell to others.

ways. In the US, there are examples of automated systems that coordinate between users and suppliers of housing services. For instance, 'Coordinated Entry' and 'Homeless Management Information Systems' projects automate needs-based identification, assessment, referral and assistance for homeless persons. There are also a significant—and growing—number of automated decision-making systems in Australian administrative governance. Data61 at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) runs the 'Regulation as a Platform' project, which allows government entities to have legislation or policy documents translated into automated decision-making systems. Enabling legislation is generally required to allow the use of such automated decision-making tools.

Big data sets are also increasingly being created through the international movement towards 'open data'. A long established example of such open data is the Australian Bureau of Statistics' (ABS) Census, an extremely rich data product which underpins a significant body of housing research and analytics.

Three key opportunities may facilitate more efficient and informed planning decisions:

- Data swap-shops: digital 'marketplaces' or data swap-shops like data.gov, data.vic and data.nsw are clearinghouses for a wide range of government data. There is great potential for these clearinghouses to act as the centralised repository for all government data, which could mitigate duplication and provide access to those who need the information.
- Semantic analysis is a method of data extraction based on machine learning algorithms, and is arguably sophisticated enough to start automating parts of the statutory land use process. Capacity now exists for digital planning systems to do initial assessments of planning proposals, particularly for smaller developments, which—with the proper oversight in place—could vastly improve the efficiencies of the planning process.
- Machine learning and advanced spatial modelling techniques are being applied on remotely sensed imagery acquired through satellites

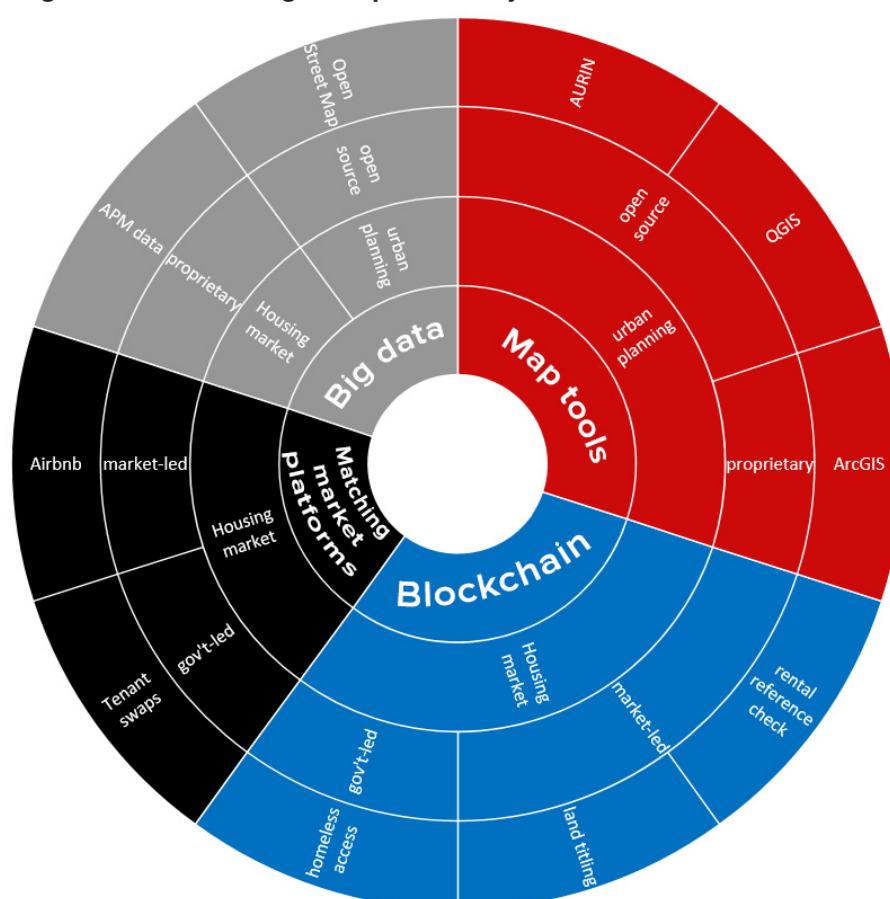
Big data and data infrastructure

Big data are large datasets, mined in bulk from modern electronic devices, that can be analysed to extract patterns of behaviour at both the macro and micro level.

A growing 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 could be used for automated decision-making in urban planning, utility provision, housing market analysis, housing assistance and more. However, much of this data exists in formats that make it incompatible for use in these other contexts. To address this issue, data workflow systems are software machines that make data from one system readable and useable by another system.

Such automation may influence the provision of housing services in various

Figure 1: The Housing Disruption Ecosystem



and airborne sensors, resulting in higher resolution datasets across cities. Such rich data products offer the potential to better inform urban analytics platforms including machine learning algorithms.

Key threats associated with the development of big data sets and associated data infrastructure relate to commercialisation (restricting access to data), privacy, complexity and inaccuracy.

“In most cases, blockchain reduces transactions costs, such as by eliminating the fees associated with purchasing property through smart contracts.”

Locational intelligence tools for urban planning (GIS mapping software)

The broad acceptance of geographical information systems (GIS) applications such as Google Maps indicates the accessibility, cultural normalisation and power of map-based tools. The use has also grown within organisations, with the vast majority of large businesses now compiling and managing spatial data along with traditional business data. This has led to the creation of multiple bespoke, industry-specific locational intelligence systems.

University-led portals, such as the Australian Urban Research and Infrastructure Network (AURIN), provides access to over 3,500 datasets and 100 spatial statistical tools for analysing Australia's cities and regions. AURIN provides aggregate access to public and private sector datasets including property data from the Australian Property Monitor (APM), which has been used by academics in undertaking housing studies related to affordability. AURIN also comprises an Application Program Interface (API) where industry, government and academics can access and integrate datasets into GIS and software packages.

A suite of university-developed, GIS-based Planning Support Systems (PSS) now exist to perform various bespoke operations:

- ENVISION allows government planners to identify sites that will undergo transformative change and assess the future outcomes.
- Envision Scenario Planner (ESP) supports fine scale urban precinct analytics, facilitating collaborative decision-making of in-fill development in cities, intended to support redevelopment scenario preparation and exploration Rapid Analytics.
- Rapid Analytics Interactive Scenario Explorer (RAISE) allows planners to assess the value uplift of housing based on the addition of new infrastructure.
- What if? runs future city scenarios driven by population and employment projections to forecast future housing growth based on planning and policy considerations.

Threats to GIS include:

- commercialisation and complexity;
- legacy hardware and software administration restrictions whereby technical limitations (such as outdated hardware) can present barriers for governments and not-for-profits organisations seeking to employ GIS and urban analytics software packages;
- the quality of data across Australian urban areas varies significantly, and there are different access policies across jurisdictions. Such data silos can lead to inferior analysis of the housing sector and barriers to replicating methods and testing results to ensure quality.

Blockchain platforms and applications

The blockchain protocol, unlike internet protocol, enables the transfer of value without the need for intermediaries. A blockchain is a secure transaction ledger that operates and updates simultaneously across a multitude of participating computers ('nodes', using peer-to-peer communication protocol). As a result, verified peer-to-peer

transactions can occur quicker and at much lower cost than when relying on institutions such as banks or brokers.

Opportunities of blockchain include:

- Efficiencies in property rights management, where blockchain reduces housing transaction costs by automating bureaucratic and banking processes. However, the Australian Torrens system already offers a secure, trusted and relatively efficient mechanism for managing ownership of real property. It is therefore difficult to see a blockchain-based real register taking off, instead the findings suggest that blockchain platforms are better suited to the recording of new categories of information.
- Efficiencies in private rental management, where automated property transactions encode rental rights and contracts on a blockchain for leases, licenses and long and short-term rentals. 'Smart tenancy products' are being developed that can hold bonds in escrow, automate rental payments, and manage maintenance workflows.
- Incentivising investment, such as creating greater liquidity in property by creating tradeable tokens that represent fractions of a property. The main difference between existing Real Estate Investment Trusts (REITs) and blockchain property tokenisation (other than reduced fees) is that it gives the buyer complete control over their purchases, as opposed to relying on the decisions of a portfolio manager.
- Transparency in property development during the contracting and building process. Companies are promoting blockchain as a means of crowdfunding development and attracting smaller investors, while providing investors with real-time information on the construction process to support investment decisions.

In most cases, blockchain reduces transactions costs, such as by eliminating the fees associated with purchasing property through smart

contracts. For now, they do not signify a major change in how property is bought and sold. For instance, start-ups facilitating fragmented ownership in property, or crowdsourcing funding for construction projects, still need to comply with Australian corporate legislation.

The promise of blockchain is that by simplifying the processes involved in selling property, or portions of property, shifts might occur even without substantial regulatory change. While this may benefit some investors, it also raises significant concerns. Fractional investment permits a larger number of investors to make far smaller investments, creating a serious risk of fuelling house price inflation, and potentially driving greater turnover as investors seek to withdraw their investment. This could lock more people out of home ownership and in turn add further pressure in the private rental sector.

Research into Airbnb

The findings suggest that STL platforms like Airbnb are probably not significantly worsening rental affordability at the metropolitan scale, given that commercial Airbnb listings represent between 1–2 per cent of total rental stock in Sydney and Melbourne. However, the findings suggest that these platforms are having an impact on the availability of rental properties in high-demand inner city areas with significant tourism appeal.

In Sydney, the eastern beaches suburbs, Darlinghurst and Manly, have been the focus of Airbnb activity, which accounts for between 11.2 per cent and 14.8 per cent of rental housing stock.

In Melbourne, central Melbourne, Docklands, Southbank, Fitzroy and St Kilda have been the focus of Airbnb listings, which account for between 8.6 per cent and 15.3 per cent of rental housing stock.

STL platforms have contributed to a cultural shift with the expansion of financially-focused attitudes towards housing beyond those already involved in housing investment. Two main findings support this with the large majority of hosts motivated to use STL because of the financial benefits and, in most cases, to provide discretionary income rather than to cover essential housing needs; and that many hosts are now factoring hosting into their thinking about future property choices.

The findings suggest that Airbnb provides the opportunity for existing participants to further monetise their housing assets while creating further barriers for those seeking to enter the market. While not the only factor, Airbnb is contributing to the inequitable nature of housing opportunity in Australia's largest cities.

These findings highlight the need for considered, informed regulation of matching market platforms focussing

on the nature of the economic activity occurring and its impacts, not simply on the technology involved.

What this research means for policy makers

There is a need for more critical and agile policy setting and review processes. This is to ensure that negative impacts are mitigated early and the positive potential of such technologies is realised, both for the housing sector and society at large. In addition, while embracing the opportunities that technology offers is important, it is essential this does not occur to the detriment of adopting critical perspectives. Instead, policy makers need to be equipped to understand the nature and the potential impact of new digital technologies in a way that is both enthusiastic and critical.

Methodology

This research reviewed local and international literature; workshops with policy makers and practitioners to examine and assess key technologies; mapping Airbnb listings at small geographies and comparing with census dwelling, demographic and rental affordability data; and an online survey of Airbnb hosts.

Further information

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