2020

RETHINKING HOUSING:
Actor-network analysis for digital collaboration

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6/2/2020

PROJECT AIM

The project aims to understand persistent housing sector supply problems through analysis of digital collaborative practices. This project expects to generate new knowledge for an emerging housing digital economy using actor network theory. The housing sector has long been criticised for shortcomings in affordability, efficiency, quality, social and environmental responsiveness and appropriateness of offerings. Expected outcomes include developing a theoretically informed digital collaborative practice model, enhanced housing supply professionals' capability, improved knowledge among public/private sector decision-makers responsible for housing supply and development of new digital collaborative behavioural and practical frameworks for the sector.

PROJECT OBJECTIVES

OBJECTIVE 1	•To understand and analyse barriers and enablers of emergent digital collaborative practices in housing supply networks through innovative case study exemplars using actor network theory.
OBJECTIVE 2	•To contribute to theoretical development of inclusive digital collaborative practices models, linked to the complex ecologies of housing sector outcomes.
OBJECTIVE 3	•To inform policy and practice innovation by evaluating and communicating the digital collaborative practice model and typologies through a series of housing industry and government stakeholder workshops.

RETHINKING HOUSING:
ACTOR-NETWORK ANALYSIS FOR DIGITAL COLLABORATION

INTRODUCTION

In April 2017, a developer with a vacant three-story hotel awaiting development approval announced that it would make 42 affordable, fully-furnished rooms available to 16- to 25-year-olds for at least twelve months. Each room would have a bathroom and a kitchenette, and would be available at a nominal rental rate of AUS $180 per week. This was Case Study 1, Australia's first pop-up shelter. A pop-up shelter is a dwelling that is temporarily set up on vacant land or within a vacant building for a short-period while awaiting development approval. The managing director of the development firm obtained the services of a youth housing organisation to operate the residence. Finding an operator with interest was surprisingly difficult.

The original vision of the developer was to provide temporary dwellings for people sleeping rough on streets. However, given the limited lease, the youth organisation advised a recrafting of this vision and suggested instead that the focus should be on residents who were expected to transition with ease into other housing arrangements at the end of the lease. During their time at the hotel, renters would have access to free "rescued" food, second-hand clothing and free laundry facilities. A certain number of rooms is also allocated to clients of the Department of Family and Community Services, which provides a revenue stream that supports operations. Because of planning regulations, the structure was classified as a service apartment, thus a service component had to be embedded in its operations.

The Managing Director of the development company expressed enormous pride in the project, encouraging other developers to consider using vacant properties for a similar purpose. "Making our building available during a time in the development cycle to meet a community need has made a difference to hundreds of people who have stayed, " he stated. "We hope that this will inspire other property owners to consider purposeful 'meanwhile uses' that can contribute to their communities." The Housing Provider said the success demonstrated how such collaborations can work: "For me it was a no-brainer, we have a housing crisis so why leave a building sitting empty when so many people can benefit from the space, even if it's only for a limited time".

DIGITAL COLLABORATION

The project involved intense collaboration during the planning stage, usually through face-to-face meetings led by the developer, and the use of digital collaboration was minimal, at least inter-organisationally. Within individual organisations, however, digital collaboration was quite pronounced. The rescued food operation, for example, was driven by a sophisticated IT-based logistical system that allowed its people to monitor food deliveries and modify the routes of its transport resources, almost in real time. The second hand clothing store also made use of digital inventory systems to collaborate across its different stores.

The developer had begun using social media as a tool to communicate its corporate social responsibility initiatives. Once the pop-up was established, however, collaboration became more routine, and since then the network of participants (developer, clothing retailer, rescued food operator, laundry provider, youth organisation) has begun collaborating using IT tools such as Zoom. The hotel, which was supposed to run for a year, is now in its third year, and development approval remains pending. The developer has put in mechanisms that allow the operator and the service providers to have comfortable lead times for lease renewal.

> "We...just said [to the housing provider director], 'Look, we've got this place… there's kids here, everywhere sleeping under the bridges and they're homeless... There are all beds free. We want to help young people.' Her eyes popped out of her head and said, 'Look, that sounds fantastic. It's exactly what we do. But how much is it going to cost us?' [Our manager] just looked at her and said nothing, 'It's all yours.'" — Development and construction manager of developer/owner

HOUSING INNOVATION: Pop up shelter	HOUSING CHALLENGES: Supply, affordability, appropriateness
COLLABORATIVE NETWORK: Upstream. Developer + Youth Housing + Planning + Hotel Service Providers	ROLE OF TECHNOLOGY: Supported maintenance of networks, not the creation of new ones
RELATIONSHIP TO COLLABORATIVE PRACTICE MODEL: Confirms nine elements. Expanded understanding of the element "Expertise", which in this case included considerable skills and attitudes linked to organisational citizenship behaviour.	

RETHINKING HOUSING – ACTOR-NETWORK ANALYSIS FOR DIGITAL COLLABORATION

INTRODUCTION

In February 2019, a national developer launched a new tablet-based application, Qual Track, to be used by construction project teams for dwellings at all project sites in NSW and VIC. The executive team's expectation was that the app's implementation would lead to improvements in quality. Qual Trak had three main features: a set of standardised checklists for all stages of construction, a contractor portal that facilitated communication between trades and the construction supervisor, and QR codes that would allow users to instantly provide trades with a list of open defects for a particular dwelling. Qual Trak was not a radical new technology, since a web-based version of the system had been available for five years. However, the previous system had been limited to quality control at the final project stages, right before handover to homebuyers. Construction teams had thus been conducting quality checks based on tacit knowledge and informal, cumbersome paper-based systems. Qual Trak was developed as a tool that would extend quality to control to the early project stages, and that would capture data that would eventually support rich analytics.

DIGITAL COLLABORATION

The newest version of Qual Trak was designed by a team with IT specialists, two construction managers who were content experts on the checklists, a business analyst, and the customer strategy director, who had developed the business case based on feedback from homebuyers about housing quality and their buyer experience. Fortnightly meetings were held in NSW, with Victorian participants using Zoom to participate. Meetings involved IT providing progress reports on application development, and presenting screen shots for discussion. In parallel with these meetings, the content experts and the construction strategy initiatives manager worked to increasingly streamline a large volume of state-specific checklists. The developers' construction supervisors were trained to use the app, and were expected to train their own trades. Some resistance was encountered from trades and even from the developer's own supervisors, but the hurdles were managed, with supervisors at times handholding their trades as they worked through the learning curve.

At present, the app is fully deployed, but while the checklists are useful, areas for improvement have been noted and the QR codes and contractor portals remain underutilised. Construction managers have noted that its main benefit is the efficiency of invoicing, since the app allows information to be aggregated in ways that quickly show complete/ incomplete tasks, which aid the payment decision. End users have indicated that the app has not led to an increase in quality, which is driven by many factors, but they do say that quality-related tasks have become easier to fulfil. Another version of the application is expected to be launched, this time at sites involving externally built apartments. Resistance is stronger to this version, mainly because the dwellings are externally built and construction teams perceive this as "having to check other people's work".

"So what the guys do is they walk into a house and they use the little round red dots to stick on where the issues are and the room became like it was a measles looking house… a diseased sort of house, where you walk in and red dots everywhere. It was just inefficient because there's lots of paperwork and people had to carry lots of paper with them, got the customer to sign on paper and everything was just paper and handwritten notes, which was quite illegible sometimes and it was just cumbersome. So then they decided at that point everything was going digital… then [we] decided, okay, let's just see if we can do something on a tablet, or on an iPad."" – Business analyst involved in app development and training

HOUSING INNOVATION: Tablet-based application to improve construction quality	HOUSING CHALLENGES: Quality, efficiency	COLLABORATIVE NETWORK: Downstream. IT + Business Analysis + Customer Service + Construction + Trades	ROLE OF TECHNOLOGY: Initially the outcome of the project network. Later, the it was the stabilising force for construction networks.

LINK TO COLLABORATIVE PRACTICE MODEL: Confirms nine elements. Early findings on the element "Leadership" indicate that the Qual Trak initiative was heavily centralised and top-down, but that the locus of leadership was from an unexpected place in the hierarchy. Findings also suggest that "Organising Mechanisms" were largely reinforced by the introduction of new technology, unlike in other case studies where formal roles were often redefined.

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INTRODUCTION

Case Study 3 is a twenty-storey, 35,500m2 mixed-use building in Adelaide, South Australia that was developed by and for a community services organisation (CSO). The project commenced in 2015 and was completed in September 2019 with a final budget of $100Million. The project consolidated CSO's footprint by bringing together services that had historically operated from a number of largely non-purpose-built facilities across the Adelaide CBD and inner suburbs. The project aimed to create a new model for a vertical community, integrating a highly complex services suite with commercial office space, a function centre, specialist disability accommodation, supported independent living units, and retirement apartments. There are few precedents for the project and as such there were a number of interesting challenges that emerged throughout the process. These included the integration of the complex range of social programs that are present in the building; satisfying the requirements of a range of funding bodies including state and federal governments as well as commercial banking requirements; and, the integration of technological systems that had not previously been combined together in a single building. This research has focused on understanding the collaborative processes involved in delivering a building of this complexity. This is important because it is assumed that these types of buildings will be increasingly required to meet a diverse range of housing needs.

DIGITAL COLLABORATION

The project was delivered through a design & construct contract, and was managed using a range of digital tools including Oracle Aconnex, and Autodesk BIM 360. The client and consultants were primarily located in Adelaide, South Australia so much of the communication took place in face-to-face meetings. A number of interstate and international consultants, for example specialised services related to sustainability and disability services, were also involved.

The case describes the importance of the time spent on collaborative brief formation, development and communication because of the increased complexity of the program; the role of digital technologies in managing the flow of information, and the way traditional AEC industry practices continue to inform digital workflows; and, the blending of virtual and physical collaboration both in terms of collaborative environments and collaborative testing and prototyping of ideas.

> *"…the owners talked really clearly about the fact that they felt that they were representing the people in society who were most vulnerable to future impacts of climate change and therefore they should be the ones that have the best access to sustainable buildings and to knowledge about how to reduce their impact on the environment. And so to me on this project, the social and environmental were really closed tied together and that doesn't normally happen." – Director, environmental sustainability consultant*

HOUSING INNOVATION: Multi-use high rise with ambitious social and environmental goals

HOUSING CHALLENGE: Appropriateness

COLLABORATIVE NETWORK: Upstream + Downstream

Developer + Engineers + Builders + Planners + Disability support + Environmental consultants

ROLE OF TECHNOLOGY: Supported elements of co-design

LINK TO COLLABORATIVE PRACTICE MODEL: Confirms nine elements. Expanded understanding of shared virtual space, particularly through the use of 2D and 3D environments as collaborative devices.