

# Institutions, Complexity, and the Land

Spike BOYDELL, Australia

**Key words:** Institutions, Complexity, Land Administration, Property Theory.

## SUMMARY

The importance of the institutional and organisational development of land administration has been recognised by the establishment of a FIG Presidential Task Force. This paper develops aspects of property theory and institutional analysis through the lens of complexity, to support and contextualise the work of the Task Force. The institutions associated with land administration are living evolving systems that require a different approach in order to model their intricacies. The concept of institutions and good governance is introduced through an explanation of the 'rules' influencing human behaviour. The debate surrounding the individualisation of land titles in a developing country land administration system is challenged. Critical to dealing with the complexity of the institutions surrounding land administration is an appreciation of the multiple stakeholders, together with an understanding of their respective aspirations and the framework of social definitions.

The notion of complexity is contextualised from the perspective of small island developing states (SIDS) in the Pacific. The foregoing highlights the need for the development, and acceptance, of a robust theory of the institutional change process. The significant contribution of this paper is provided by evolving a hybrid model applicable to institutional development and change. The model draws on the work of Smajgl and Larson, and synergises it with the volitional pragmatism offered by Bromley. The paper concludes this short theoretical grounding by highlighting the need for a 'shared imagination' for institutional change in land administration that can inform and underpin the FIG Presidential Task Force on Institutional and Organisational Development.

# **Institutions, Complexity, and the Land**

**Spike BOYDELL, Australia**

## **1. INTRODUCTION**

There are many examples of well-intentioned (as well as politically motivated) donor aid projects that have failed to meet expectations of ‘building a sustainable national land administration infrastructure’ (Greenway and Enemark, 2007, p.4). Such failure is often attributable to the complexity of the institutional arrangements and the aspirations of multiple stakeholders. Often, such land administration projects have been driven by a narrow focus on access to land and security of land tenure. The politics behind them is often an expression that the system in a donor country (or more broadly, the West) ‘works’ and can be transported to differing institutional arrangements with minimal adaptation.

The institutions associated with land administration are living evolving systems that require a different approach in order to model their intricacies. The concept of institutions and good governance is introduced in section 2. An explanation of the ‘rules’ influencing human behaviour is provided and the debate surrounding the individualisation of land titles in a developing country land administration system is challenged. Critical to dealing with the complexity of the institutions surrounding land administration is an appreciation of the multiple stakeholders, together with an understanding of their respective aspirations.

A preliminary overview of stakeholder analysis is presented in section 3, leading into a reminder about social definitions in section 4. The notion of complexity is contextualised in section 5 from a Pacific perspective. The foregoing highlights the need for the development, and acceptance, of a robust theory of institutional change process. This is provided in section 6 by evolving a hybrid model applicable to institutional development and change that draws on the work of Smagl and Larson, and synergises it with the volitional pragmatism offered by Bromley. Section 7 concludes this short theoretical grounding by highlighting the need for a ‘shared imagination’ for institutional change in land administration that can inform and underpin the FIG Presidential Task Force on Institutional and Organisational Development.

## **2. INSTITUTIONS AND GOOD GOVERNANCE**

‘Institutions are the humanly devised constraints that structure human interaction. They are made up of formal constraints (rules, laws, constitutions), informal constraints (norms of behaviour, conventions, and self-imposed codes of conduct), and their enforcement characteristics. Together they define the incentive structure of societies and specifically economies’ (North, 1993).

Institutional arrangements can be defined as the ‘rules’ influencing human behaviour – and these rules can be further broken down into two categories, formal (which tend to be enforceable) and informal (which are in many cases unenforceable; see Table 1).

Institutions are made up of components that are also attributes of individuals and societies (Greif, 2006, p.23). It is important to bridge the divide between understanding institutions as rules or contracts (as is common in economics) and understanding them as cultural phenomena (as is common in other social sciences).

**TABLE 1:**The 'Rules Influencing Human Behaviour (Boydell, 2007)

<b>Formal Institutional Arrangements</b>	<b>Informal Institutional Arrangements</b>
Constitutions	Relationships
Statutes	Social expectations
Regulations	Family
Plans	Firm
Policies	Community
Title	Traditional Laws and Customs

Appropriate systems need to be designed for local circumstances, given that “not only can institutions not easily be copied from one context to the other, the institutional arrangements might become ineffective over time as context, circumstances and desired outcomes change” (Smajgl and Larson, 2007, p.9)

Taking the example of economic development in less developed countries, when viewed from outside of the country or region there is a risk that those looking in will be influenced by (or are promoting/perpetuating) a particular *institutional footprint* based on their perception of institution-as-rules arrangements from a different society (their own). The transplantation of institutional arrangements was a key driver in the colonization process, where institutions appropriate to one (geographic and social) context were transplanted into a new context (Smajgl and Larson, 2007). As a result, colonisers supplanted systems that were developed from a different heritage onto, for example, Pacific societies that had different perceptions of interests, emotions, and values. There are many contemporary examples of perpetuating this approach (such as the external push for privatisation) through aid driven attempts to apply neo-liberal models onto emergent economies.

There is some benefit in developing this example. The external push for privatisation is largely being informed by what appears to be superficially attractive but simplistic solutions proposed by, amongst others, de Soto (2000). They tend to argue that the panacea for the world’s poor is to receive a title for an individual block of land that could then be mortgaged to finance other activities.

Though de Soto’s view on privatisation contains some interesting ideas, inherent in his argument is a move away from customary non-western systems towards individualism (Boydell and Holzknicht, 2003). It has also been criticised as too simplistic, grossly overestimating the cadastral and bureaucratic capacity of developing countries (Home and Lim, 2004). Thus, it is quite unsuitable to the currently existing and operating tenure systems in, for example, small island developing states (SIDS) across the Pacific. While the pro-privatisation literature correctly recognises problems with the quality of property rights in many developing countries, such as Pacific Island nations, its conclusion that privatisation

and individualisation of title is the best, or only practical, alternative is largely an unproven claim.

A version of the de Soto model underlies the ongoing Hughes-Fingleton debate of recent times over privatisation of interests in customary familial or tribal property (Gosarevski *et al.*, 2004b; Fingleton, 2004; Gosarevski *et al.*, 2004a; Fingleton, 2005b; Hughes, 2004; Fingleton, 2007; Curtin and Lea, 2006). The Gosarevski *et al.* argument follows a similar line to de Soto, suggesting that individualised property rights are the solution to development in the Pacific. In attempting to influence Australia's aid model to the Pacific they advocate the western individualised model that confuses land tenure and land use, conveniently overlooking the sacrosanct nature of customary institutional arrangements in the Pacific. Moreover, they add to the literature that inappropriately perpetuates the 'communal' myth (in this case in the context of Papua New Guinea). They demonstrate an unfortunate lack of understanding of property rights, and wrongly interpret leasehold arrangements as facilitating a transition to individual property rights.

The Hughes-Fingleton debate also approaches issues relating to customary tenure and possible ways to bring customary tenure into modern practice. Hughes comments on these through the narrow focus of strict economics, but without apparently engaging with the underlying features of customary systems or practice. Her argument is for replacement of customary tenure with the individualisation of land titles, preferably as individual freehold interests (Hughes, 2004). However, there is now increasing acceptance in development circles that whilst important, 'individual land titling often works against the needs and aspirations of ordinary people' in developing countries (see, for example, Lemmen *et al.*, 2007, p.3).

Fingleton on the other hand approaches these issues from a much broader base, with respect for and knowledge of customary tenure, systems and practices. He advocates a hybrid solution to the general problem (captured in the AusAID Pacific 2020 Land Output Paper; see Fingleton, 2005a; Fingleton, 2007), through the 'adaptation' of customary tenure. Organisations and people run the risk of becoming 'overconfident in how well-calibrated their strategies are' (Dekker, 2006, p.7). This view is recognised by Lemmen *et al.* who recognise the urgent need in developing countries for a land information system that operates very differently from the 'accepted' western model, such as in their developing Social Tenure Domain Model (Lemmen *et al.*, 2007).

### **3. STAKEHOLDER ANALYSIS**

Taking the above example of contention (political, social and economic) over institutional arrangements, there is a need to balance both the formal and informal institutional interests of traditional landowners and communities, investors, government and other stakeholders. Comprehensive stakeholder analysis is often overlooked in institutional arrangements, leading to the potential for conflict particularly where economic aspirations for customary land are concerned.

*Stakeholders* are those who have *rights* or *interests* in a system. They can include primary or secondary stakeholders; internal and external stakeholders; and interface stakeholders. In exploring the commercial use of customary land to achieve economic development, stakeholders can be identified through asking, amongst others, the following questions:

- > Who are potential beneficiaries?
- > Who might be adversely affected?
- > Who has existing rights?
- > Who is likely to be voiceless?
- > Who is likely to resent change and mobilise resistance against it?
- > Who is responsible for intended plans?
- > Who has money, skills or key information?
- > Whose behaviour has to change for success?

These questions can be refined by considering a range of parameters: *The basics* - men/women, rich/poor, young/old; *Location* - rural/urban dwellers, near to the issue/far away; *Ownership* - landowners/landless, managers, staff; *Function* - producers/consumers, traders/suppliers/competitors, regulators, policy makers, activists, opinion-formers; *Scale* - small-scale/large-scale, local/international communities; and *Time* - past, present, future generations (for an expanded overview on stakeholder analysis and related tools see, for example, IIED, 2005; Ramírez, 2002).

There are multiple stakeholders involved in any arrangement for the economic use of land. Each brings a different stake and level of power, and concern, to their relationship with other stakeholders (for an analysis of this see Vodoz, 1994; Walker and Daniels, 1996; Dubois, 1998)

#### **4. SOCIAL DEFINITIONS**

The institutions that underpin land tenure systems, whether customary or western, are manmade social definitions. Land tenure systems exist to serve the needs of the people (Crocombe, 1968), so the system adopted must accommodate the particular way of life of the people, their laws, and the physical environment. The institution has to be adaptable, evolving as it passes from generation to generation with efficient modification. Land tenure systems can only exist if a society is willing to enforce the institutions that they are grounded on (Marchak, 1998). Ongoing conflict that cites land as a causal factor implies that society is no longer willing to enforce the institutions.

#### **5. COMPLEXITY**

Land tenure arrangements are complex adaptive systems. They are complex in that they are diverse across the region, yet are made up of multiple interconnected elements (Waldrop, 1992). 'Complexity theory tries to understand how simple things can generate very complex outcomes that could not be anticipated by just looking at the parts themselves' (Dekker, 2006, p.6). They are adaptive, in line with Crocombe's (1968) view that they have the capacity to change to accommodate changed expectations and learn from experience. The essence of this complexity was perfectly encapsulated by Siwatibau (2002, p.2): "They say that land, like financial and human capital, is a factor of production, which helps drive economic and social

development, generates national income, wealth, jobs and government revenue, combats poverty, improves the standard of living of all and ultimately entrenches social and political stability in any country. Land tenure, like culture and tradition, stands to evolve organically over time within a society. As in all things, changes and solutions have to be made and formulated. Solutions must be formulated from within and must reflect national, family and individual needs and aspirations and the changing global, regional, national economic, social and political dynamics that determine our destiny”.

This explanation of land as part of a complex system does not benefit from a purely reductionist inquiry, as at each stage of evolution entirely new laws, concepts and generalisations are necessary. Such a challenge is not new. Research often isolates the different layers of a system and then analyses the impact of one institution in respect of, for example, a particular land resource in order to enhance the condition of that specific resource. This approach runs the risk of taking both the issue (resource) and the institution out of context. This is why we need a systems approach to examining land issues.

Institutions need to be understood as a part of the institutional layer they are embodied within, as well as a part of. This includes the economic, ecological and social layers it might impact on or be impacted by (Smajgl and Larson, 2007). To achieve sustainable economic development, countries have to balance the layer(s) of economic efficiency (defined in monetary value) with the manifold and unknown (and usually unknowable in monetary terms) contributions of natural system layers (ecosystems) and complex layers of social structure (custom – social structure and process - and tradition). These multiple institutional layers evolve and adapt (often at a different pace) over time to contend with new scarcities, new tastes and preferences, new ethical premises, new technical opportunities, as well as aspirations of globalisation and societal expectation

## **6. THE NEED FOR A ROBUST THEORY**

What developing countries need is not so much a mechanism for economic development, but rather a robust theory of to explain institutions and underpin institutional change. Such a theory could build on the concept of what Bromley describes as prospective volition. Prospective volition is the human will to action, looking to the future, and deciding how the future ought to unfold for those who will inhabit that future, and for their descendents. The point here is that values and beliefs – some might even choose to call these the ruling ‘ideology’ – inform and shape the norms, rules, and entitlements (property relations) in an economy (Bromley and Yao, 2006). A hybrid of the process of institutional change is summarised in Table 2.

Institutional incoherence refers to a situation in which the legal foundations of economic transactions are degraded and dysfunctional. The central challenge in collective action is for the decision group to reconcile the multitude of expressions and imaginings that individuals in the group hold about their expectations for the future. The decision group can be operating at family, clan, tribe, provincial or national level. If the institutional tier of the decision group is sub-national, the aspirations of that group will have to be reconciled with other layers (to enable change in formal institutions).

**TABLE 2: Generic Institutional Change Process (Adapted From Smajgl And Larson, 2007, P.7 And; Bromley, 2004)**

<b>Institutional process</b>	<b>How individuals evolve changes</b>
1. Perception of change	<i>Impressions</i> - individuals perceive a change in conditions they operate in – a change in environmental, social, economic or institutional conditions.
2. Identification of causality	<i>Meanings</i> - depending on their behavioural tendencies and attitudes, some individuals compare the perceived change with their mental models of why it might have happened, what its impacts could be, and come up with their own explanations of these causal relationships.
3. Communication of the opinion on change	<i>Expressions</i> - depending on their behavioural tendencies and attitudes, some individuals communicate their opinion of causal relationships within their social network; this may cause diffusion processes, depending on the individual's position / power relations within the network, as well as perceived relevance of the change.
4. Alignment of opinions	<i>Abduction</i> - individuals align themselves, based on their opinion of causal relationships and motivation factors.
5. Decrease of fitness of the existing institution.	<i>Reality</i> - acceptance that existing institution is failing to meet individual and societal aspirations. Consensus (based on fact, expectation, or myth) that changes are needed.
6. Formation of new institutions.	<i>Imaginings</i> - can be societal (informally) or through government policy and supporting legislation (formal), rather than at an individual level. An individual is involved through their engagement with particular society or democratic process.
7. Replacement or modification of existing institutions.	<i>Expectations</i> - as with 6, can be societal (informally) or through government policy and supporting legislation (formal), rather than at an individual level. Again, an individual is involved through their engagement with particular society or democratic process.

‘Studying institutions sheds lights on why some countries are rich and others poor, why some enjoy a welfare-enhancing political order and others do not. Socially beneficial institutions promote welfare-enhancing cooperation and action. They provide the foundations of markets by efficiently assigning, protecting, and altering property rights’ (Greif, 2006, p.4).

## **7. MOVING FORWARD WITH SHARED IMAGININGS**

Within the institutional context of any developing country, the challenge is to explore and reach consensus on where people / citizens want to be located between the extremes of traditional customary ways (which promote and respect informal institutions) and Western

materialism (which relies on formal institutions)<sup>1</sup> (see S1. in Boydell *et al.*, 2002). The task is to focus on the various reasons for disparate expressions that cause disparate imaginings amongst the respective decision groups.

There are many examples in developing countries where formal and informal institutions often operate in parallel, this places the onus for institutional change on individuals – the people / citizens. External absolutism has not proven successful. Similarly, those leaders (of the various tiers of decision groups) who arrive at the question with their mind already made up tend to invoke *absolutes* where *reasons* are in order. Pragmatism enables individuals to do the hard analytical work of figuring out what seems the better course of action, at this moment in time, to take. ‘Pragmatists insist that those who advance absolutist claims share with us the reasons for their convictions’ (Bromley, 2004, p.83).

Broad participation and shared imaginings will achieve a level of consensus that will minimise the risk of future conflict over the ensuing adapted / new institutional arrangements. To progress the notion of shared imaginings, joint action must result in a single choice (coordinated and coincident action). This explains why collective action – public policy – is so contentious in so many countries. Moreover, ‘consensus’ – the best thing to do under the circumstances - must be met with political acceptance by those charged with formulating a course forward.

The process of institutional change highlights that whilst some financial and technical assistance is required in each developing country, the real challenge lies with administrative reform, public engagement (towards consensus) and political will.

## REFERENCES

- Boydell, S. (2007) Myth, Embeddedness and Tradition: Property Rights Perceptions from the Pacific. IN SMAJGL, A. & LARSON, S. (Eds.) *Sustainable Resource Use: Institutional Dynamics and Economics*. (London: Earthscan).
- Boydell, S. & Holzknicht, H. (2003) Land - caught in the conflict between custom and commercialism. *Land Use Policy*, 20, 3, 203-07.
- Boydell, S., Small, G., Holzknicht, H. & Naidu, V. (2002) Declaration and Resolutions of the FAO/USP/RICS Foundation South Pacific Land Tenure Conflict Symposium, Suva, Fiji, 10 - 12 April 2002. Land Management and Development, University of the South Pacific, Accessed: 15/06/02, Web based PDF, Available at: <http://www.usp.ac.fj/landmgmt/PDF/SPLTCDECLARATIONRESOLUTIONS.PDF>.
- Bromley, D. W. (2004) Reconsidering Environmental Policy: Prescriptive Consequentialism and Volitional Pragmatism. *Environmental and Resource Economics*, 28, pp.73-99.
- Bromley, D. W. & Yao, Y. (2006) Understanding China's Economic Transformation: Are there lessons here for the developing world? *World Economics*, 7, 2, pp.73-95.
- Crocombe, R. G. (1968) Improving Land Tenure. South Pacific Commission, Noumea, New Caledonia, 72.

---

<sup>1</sup> This was the first strategy in the Declaration and Resolutions of the 2002 South Pacific Land Tenure Conflict Symposium.



- Curtin, T. & Lea, D. (2006) Land titling and socioeconomic development in the South Pacific. *Pacific Economic Bulletin*, 21, (1), pp.153-80.
- de Soto, H. (2000) *The mystery of capital: why capitalism triumphs in the West and fails everywhere else*, (New York: Basic Books).
- Dekker, S. (2006) Past the edge of chaos. *Technical Report 2006-03*, Lund University School of Aviation, Accessed: 12/01/08, Web sourced PDF, Available at: [http://www.lusa.lu.se/upload/Trafikflyghogskolan/TR2006-03\\_PastEdgeofChaos.pdf](http://www.lusa.lu.se/upload/Trafikflyghogskolan/TR2006-03_PastEdgeofChaos.pdf).
- Dubois, O. (1998) *Getting Participation and Power Right in Collaborative Forest Management: Can Certification and the '4Rs' Help? Lessons from Africa and Europe*, EAEME European Postgraduate Programme in Environmental Management, Parma, Italy, Parma.
- Fingleton, J. (2004) Is Papua New Guinea viable without customary groups? *Pacific Economic Bulletin*, v.19, 2, pp.96-103.
- Fingleton, J. (2005a) Pacific 2020 Background Paper: Land. *Pacific 2020 Background Papers*, Commonwealth of Australia.
- Fingleton, J. (Ed.) (2005b) *Privatising Land in the Pacific - A defence of customary tenures*, (Canberra: The Australia Institute).
- Fingleton, J. (2007) Rethinking the need for land reform in Papua New Guinea. *Pacific Economic Bulletin*, 22, (1), pp.115-21.
- Gosarevski, S., Hughes, H. & Windybank, S. (2004a) Is Papua New Guinea viable with customary land ownership? *Pacific Economic Bulletin*, v.19, 3, pp.133-36.
- Gosarevski, S., Hughes, H. & Windybank, S. (2004b) Is Papua New Guinea viable? *Pacific Economic Bulletin*, v.19, 1, pp.134-48.
- Greenway, I. & Enemark, S. (2007) FIG's Contribution to Institutional and Organisational Development. *Strategic Integration of Surveying Services*, VILIKKA, M., Hong Kong SAR, China, FIG (International Federation of Surveyors), 14 pages, [http://www.fig.net/pub/fig2007/papers/ts\\_2e/ts02e\\_01\\_greenway\\_1311.pdf](http://www.fig.net/pub/fig2007/papers/ts_2e/ts02e_01_greenway_1311.pdf).
- Greif, A. (2006) *Institutions and the Path to the Modern Economy: Lessons from Medieval Trade*, (Cambridge: Cambridge University Press).
- Home, R. & Lim, H. (Eds.) (2004) *Demystifying the Mystery of Capital: Land Tenure and Poverty in Africa and the Caribbean*, (London: GlassHouse Press).
- Hughes, H. (2004) Can Papua New Guinea Come Back From the Brink? *Centre for Independent Studies - Issue Analysis*, 49, (13 July 2004), 12 pages.
- IIED (2005) Stakeholder Power Analysis. IIED, Accessed: 04/05/2005, Website, Available at: <http://www.iied.org/forestry/tools/stakeholder.html>.
- Lemmen, C., Augustinus, C., van Oosterom, P. & van der Molen, P. (2007) The Social Tenure Domain Model - Design of a First Draft Model. *Strategic Integration of Surveying Services*, VILIKKA, M., Hong Kong SAR, China, FIG (International Federation of Surveyors), 23 pages, [http://www.fig.net/pub/fig2007/papers/ts\\_1a/TS01A\\_01\\_lemmen\\_augustinus\\_oosterom\\_mole\\_n\\_1373.pdf](http://www.fig.net/pub/fig2007/papers/ts_1a/TS01A_01_lemmen_augustinus_oosterom_mole_n_1373.pdf).
- Marchak, M. P. (1998) Who Own's Natural Resources in the United States and Canada? Land Tenure Center - University of Wisconsin, Madison, 11.

- North, D. C. (1993) Economic Performance through Time. The Nobel Foundation, Accessed: 30/09/07, Lecture for the memory of Alfred Nobel, December 9, 1993, Nobel website, Available at: [http://nobelprize.org/nobel\\_prizes/economics/laureates/1993/north-lecture.html](http://nobelprize.org/nobel_prizes/economics/laureates/1993/north-lecture.html).
- Ramírez, R. (2002) A conceptual map of land conflict management: Organising the parts of two puzzles. Sustainable Development Department (SD), Food and Agriculture Organization of the United Nations (FAO), Accessed: 23/03/2002, FAO website, Available at: [http://www.fao.org/sd/2002/IN0301\\_en.htm](http://www.fao.org/sd/2002/IN0301_en.htm).
- Siwatibau, S. (2002) Welcome Address for the FAO/USP/RICS Foundation South Pacific Land Tenure Conflict Symposium, Suva, Fiji, 10 - 12 April, 2002. Transcribed by Boydell, S., Accessed: Web based PDF, Available at: <http://www.usp.ac.fj/landmgmt/WEBPAPERS/WELCOMEADDRESS.PDF>.
- Smajgl, A. & Larson, S. (2007) Institutional Dynamics and Natural Resource Management. IN SMAJGL, A. & LARSON, S. (Eds.) *Sustainable Resource Use: Institutional Dynamics and Economics*. (London: Earthscan).
- Vodoz, L. (1994) La prise de décision par consensus: pourquoi, comment, à quelles conditions. *Environnement & Société*, 13, 57-66.
- Waldrop, M. M. (1992) *Complexity: the emerging science at the edge of order and chaos*, (New York: Simon & Schuster).
- Walker, G. B. & Daniels, S. E. (1996) Foundations of Natural Resource Conflict: Conflict Theory and Public Policy. *Conflict Management and Public Participation in Land Management*, SOLBERG, B. & MIINA, S., Joensuu, Finland, European Forest Institute, 14, 1997.

## BIOGRAPHICAL NOTES

As Professor of the Built Environment, **Spike Boydell** takes a leading role in developing the research directions and achievements of the construction, property, urban planning, and project management disciplines in the UTS Faculty of Design, Architecture, and Building. He also leads the UTS Property Rights Research Group (PRRG), which specialises in land tenure and property rights research, advocacy, public policy development and consultancy. He is currently engaged in research projects on: the City as Common Property; Sustainable Urbanism; the Financial Management of Customary and other Land in the South Pacific; and the Politics and Economy of Emerging Property Rights (e.g. water, carbon, biota).

Following an early high profile career in the property industry, Professor Boydell has held academic positions in Australia, the UK, and the South Pacific. His doctoral research investigated the investment appraisal of enclosed regional shopping centres in Australia. A property theorist and property rights specialist, the emphasis of his research over the last decade has been at the interface of people, place, and property. He has served as a United Nations Visiting Expert on land tenure and property rights issues. He is a Fellow of the Royal Institution of Chartered Surveyors, a Fellow of the Australian Property Institute, and a Fellow of the Institute of Valuation and Estate Management of Fiji.

## CONTACTS

Professor Spike Boydell phd frics fapi fivem

University of Technology, Sydney

PO Box 123, Broadway, NSW 2007

AUSTRALIA

Tel. + 61 2 9514 8675

Fax + 61 2 9514 8777

Email: spike.boydell@uts.edu.au

Web site: <http://datasearch.uts.edu.au/dab/staff/built-environment/details.cfm?StaffId=2198>