

4th Healthy Cities: Making Cities Liveable Conference

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4th Healthy Cities: *Making Cities Liveable*

Conference

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4th Healthy Cities: *Making Cities Liveable* Conference

Peer Reviewed Papers

Healthy Cities Are Accessible Cities

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Paper presented at the
4th Healthy Cities: Making Cities Liveable Conference, Noosa (QLD), 27-29 July 2011

ABSTRACT: *Every community desires a healthy living environment. A city in which all citizens can be a part of the community will be a healthy city. The underlying requirement for an inclusive community is an accessible environment. The paper investigates how these particular characteristics make for a healthy city.*

The newly introduced Disability (Access to Premises – Buildings) Standards (Premises Standards) aim to align building legislation with the accessibility intent of Australian anti-discrimination law.

The way in which this new legislation is implemented and administered is discussed, as well as its potential application on a broader canvas, namely the public domain, including where to find assistance to achieve an accessible city.

The paper also investigates the shortcomings of the legislation that underpins the extent to which people who are elderly, parents with very young children and people with disability are able to gain independent access to the community in which they reside.

Keywords: *Access; Accessible; Adaptable; Discrimination law; Inclusive; Premises Standards; Universal access*

Introduction

Events of the summer of 2010-2011 delivered hurt and hardship to many people and much property throughout most of Australia. The devastating cyclones, floods and fires damaged or destroyed many buildings and businesses. This will result in a huge cost for rebuilding and reconstruction, yet it will provide an opportunity for government and industry to show leadership in that rebuilding, with one object being the advance towards improving the health of the cities.

One measure of this advance is the importance we place on community inclusiveness. As Cox (2001) states, we need to value our communalities, the quality of relationships, and the care and nurture of others, to put a good society in front of a growth economy.

Other commentators (Gittens, 2011) have noted that governments should be seeking to maximize our subjective wellbeing, our happiness, not just our material standard of living. We are all able to adjust to our circumstances and find happiness, but not if our community is inaccessible. Communities must have the goal of increasing every person's ability to take part in normal life.

Accessible cities provide opportunities for people to work and participate in the community to the maximum extent they are able.

Herein lies the concept of sustainability of the built environment. Well-designed environments cater for people of diverse ages and abilities. They recognize that the built environment will outlive any generation of users, with the near-certain result that at least some members of any generation will develop temporary or permanent mobility disability. Sustainable design anticipates these changing needs. Accessible cities are livable because they are sustainable. Livable cities are sustainable because they are accessible.

If an accessible environment is so important to the creation of healthy cities one must ask why is it that society neglects this important facet of its wellbeing. Perhaps it stems from a deeply ingrained mindset that it is not important to care for others. But it is. As Graeme Innes, the Australian Disability Discrimination Commissioner is reported to have said (Pitt, 2011), “the overriding thing for me in the disability field is working to achieve attitude change. The way society needs to see people with disabilities is just as agents of our own destiny. Getting on, living normal lives, raising children, holding down jobs”.

Design of our built environment - buildings and their contents, transport, the public domain - has suffered because "accessibility" has been regarded by the persons responsible as an "add-on" rather than an integral part of the basic performance brief. In Vitruvius' trio of attributes interpreted by Wotton (1624) as firmness, commodity and delight (construction, function and form), "commodity" is the attribute which has most often been disregarded, with a resultant diminution in delight. The designers will say that they are simply reflecting community attitudes.

So how might the mindset of society be changed? To paraphrase one US President – when people are caught by legislation, their hearts and minds will follow. The same philosophy can be applied to the future of healthy cities. The newly introduced Disability (Access to Premises – Buildings) Standards (“the Premises Standards”) aim to align building legislation with the accessibility intent of Australian anti-discrimination law. The way in which this new legislation is implemented and administered is now discussed, as well as its potential application on a broader canvas, that is, in the public domain. The paper will also provide information about the evolution and advancement of the occupational discipline of access consulting, which embraces much of the current body of knowledge in the matter.

It's worth remembering that the Disability Discrimination Act is about to celebrate its 20th anniversary. The Disability Standards which it anticipates – the codes of practice which contain the detail necessary for implementation - have been a long time coming.

Premises Standards

Building Regulations have developed progressively throughout history. Regulations have been developed to provide safe environments on the basis of equity of use and to sustain the quality of human life. The Premises Standards are no exception. They serve to interpret the operation of the Federal Disability Discrimination Act 1992 (DDA'92) which prohibits discriminatory action. They add the principle of dignity for individuals in their use of buildings and require building owners and managers to provide a safe environment as well as one which does not discriminate against people with disabilities. While the right of persons who consider they have suffered discrimination on the grounds of their disability to complain to the Federal Court is retained, compliance with the Premises Standards now provides an effective defence.

Following an extended period of evolution, the Premises Standards are now in force and the building and construction industry can look forward with certainty that, by meeting the requirements of these Standards, its buildings will comply with the anti-discrimination law. The important corollary to this is that society can now look forward to friendlier, more accessible buildings. This will be another step towards healthier cities, in that their residents can access all public buildings - not just those which have been designed by well-informed practitioners and sponsored by responsible owners and developers over the last two decades.

The Missing Link

The Premises Standards follow the Disability Standards for Accessible Public Transport (2002) and the Disability Standards for Education (2005). What's missing is the bit in between, the bit that literally joins the dots - namely infrastructure. There is no equivalent national Standard which applies to the parts of our cities which comprise the public domain - footpaths, parks, bridges, squares, beaches and the like.

The regulation of these spaces is left to local government, with varying and erratic degrees of success, but with an increasing awareness that this part of the built environment should not impede residents' access to their city and its facilities.

There is an obvious benefit in consistency in these matters. State and Territory Governments now incorporate the Australian Road Rules in their traffic acts, so that they are consistent throughout the network. The Disability Standards for Accessible Public Transport are made under federal legislation. The Building Code of Australia is referenced in building legislation in all states and territories. Similar consistency in the design of pedestrian ways would enhance accessibility and improve confidence in use.

Another new paradigm

The building industry is long acquainted with relying on the Building Code of Australia (BCA) for direction regarding compliance with building law. This reliance is continued through the alliance of the Premises Standards and the BCA 2011 which contains text that reflects the Access Code section of the Premises Standards. The Access Code contains both Deemed-to-Satisfy Provisions, which in turn reference Australian Standards, and Performance Requirements. Building Solutions which comply with BCA 2011 will satisfy its Performance Requirements by complying with the Deemed-to-Satisfy Provisions, or by formulating an Alternative Solution, or by a combination of both. These methods remain unchanged from previous editions of the BCA. BCA compliance will meet the Access Code, and hence the Premises Standards, and thereby the intent of the DDA as it applies to access to buildings.

However, the greater precision of the Access Code may lead to a demand for more precise Alternative Solutions. The Premises Standards also provide additional concessions for parts and components of existing buildings. The most intense issue, however, is how existing buildings undergoing alteration may be treated when compliance with the current regulations proves difficult or impossible.

The DDA has always embraced the concept of unjustifiable hardship as a way to deal with such cases. This concept is absent from the BCA.

Administration of building access legislation

The DDA is federal law, but building regulation is the responsibility of the states and territories. They have no authority to enforce the federal law, but some, at least, feel obliged to

arrange their own legislation to align as nearly as possible with it. The stumbling-block is how to deal with unjustifiable hardship.

In 2008 the Federal Attorney General released for consideration a paper prepared by the Australian Building Codes Board (ABCB, 2008) entitled A Model Process to Administer Building Access for People with a Disability (The Protocol).

The Protocol is careful to restrict its scope to access-related matters covered by building legislation, although it does give some guidance for existing buildings which may at a later date become subject to that legislation. Buildings which are not subject to building legislation, for example, existing buildings not undergoing renovation or extension, remain subject to the broad provisions of the DDA.

As stated, administration of building law is a State or Territory responsibility. At the time of writing not all jurisdictions had determined how they might empower their own legislations to exercise the responsibilities imposed by the Premises Standards, or, in fact, whether or not they wished to empower them at all. The Protocol introduces the concept of Persons Competent in Access, and in so doing establishes legitimacy for a motley group of practitioners - architects, building surveyors, occupational therapists and others - in their part in the construction industry. Long utilized as individual advisors as interpreters of the federal law, Access Consultants now come into the fold as practitioners in this facet of building regulation. The Protocol also introduces the concept of Access Panels –bodies authorised by a jurisdiction to advise a building control authority on access related matters. Such matters range from advice about an Alternative Solution, to considering an application for relaxation of the BCA due to a claim of unjustifiable hardship.

The question now arises, how can one determine if a person is competent in access? Currently there is no agreed class for this expertise within any building licensing authority. There is no bachelor degree for academic qualification and no equivalent vocational qualification. It is of interest that a Cert IV course being offered this year for the first time is understood to be over-subscribed, indicating the level of demand.

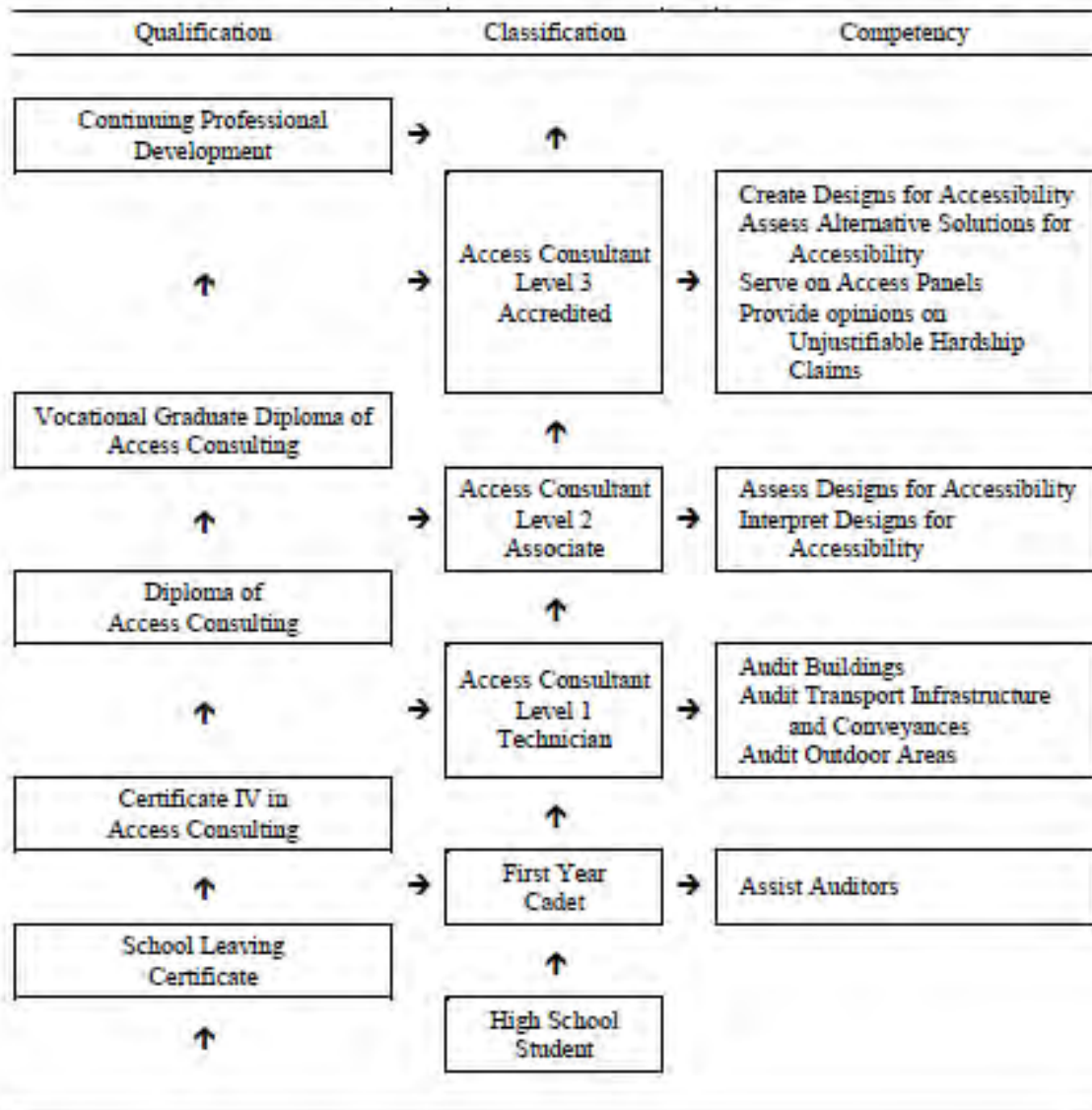
To date, accreditation has been based on peer assessment of competence to practice by the Association of Consultants in Access Australia (ACAA). For both professional credibility and a reliable career path this must change, and the present practice will be phased out when possible.

Persons competent in access

The need for a robust and accountable measure of competence of persons claiming to be competent in access is recognized. While the Certificate IV and Diploma of Access Consulting have been endorsed for several years, the State and Territory jurisdictions have requested a post graduate qualification be developed as the appropriate level for accreditation of access consultants. Consequently a Vocational Graduate Diploma of Access Consulting is currently being developed by the Construction and Property Services Industry Skills Council (CPSISC). This qualification will be offered by distance education, and, along with appropriate experience, will underpin any process for accreditation/licensing of persons as competent in access. In time this process will provide a pool of reliable expertise from which the necessary Access Panel member(s) may be drawn.

Table 1 presents a possible relationship between the three levels of qualification and a suggested career path for persons interested in being accredited as competent in access. The suggested scope of work to be permitted by each level of classification is also given in Table 1.

Table 1 Suggested Career Path for Persons Intending a Career in Access Consulting



As Table 1 illustrates, the scope of services provided by access consultants is quite extensive. These services include accessibility assessments of building and landscape designs, interpreting designs for accessibility and creating designs for accessible developments, as well as providing expert judgment on alternative solutions for accessibility, serving on access panels and preparing reports on unjustifiable hardship claims. Services also include accessibility audits of buildings, transport infrastructure and conveyances, and outdoor areas

Healthy Cities

Our communities include a huge range of people, with a wide range of abilities. Mobility impairments hinder access to places of work and play. Some people will have impairments which are permanent, because of acute incidents at birth, (e.g. cerebral palsy), or accidents, stroke, war injuries or terrorism attacks; some have impairments which are progressive, as with multiple sclerosis, muscular dystrophy or frailty due to ageing. For others, their impairment will be temporary, and may be due to accident or to illness. Still others will be restricted by the limitations of family members, such as those experienced by parents with young children in pushers. All people, however, anticipate the basic human right to participate in the broadest range of social activities. To maintain a healthy lifestyle, everyone needs a balance of work, social activities, recreation, and exercise. Informed planning of our cities can provide the facilities to enable this to happen.

In his address at the announcement of the commencement of the Premises Standards in Sydney on 2 May 2011, Disability Discrimination Commissioner, Graeme Innes said:

1 May 2011, the day the Disability (Access to Premises – buildings) Standards 2010 commenced, would be remembered as the day many people who had been traditionally locked out of public buildings in our community were finally let in.

The commencement of these Premises Standards is a momentous event in our community, and heralds the most important and widespread improvements in building access Australia has ever introduced. They usher in significant changes to the way public buildings are designed, constructed and renovated, which means greater safety and accessibility for all Australians, whether they live with disability, are ageing or simply experience difficulty entering and using buildings for any other reason. For too long, a large sector of our community had been locked out of public buildings that everybody else could access freely.

The Commissioner's comments overlooked the responsible activities of developers, building owners and designers who have promoted and practiced accessible design for the better part of two decades. Some have seen it as simple common sense – think of a shopping centre that didn't accommodate shopping trolleys. However, the requirements have now been codified, and those previously unwilling to address the issue are now obliged to do so. They will turn to accredited access consultants for advice and assistance in advancing the health of our cities.

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SUSTAINABLE GROWTH:

The pathway to prosperity ...

or an oxymoron???

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**SUSTAINABLE GROWTH:
The pathway to prosperity ... or an oxymoron???**

ABSTRACT: *Is there such a process as “sustainable growth”? The term appears frequently in government reports and in company strategic plans. “Sustainable growth” holds out the tantalising prospect that a society can achieve the holy grail of sustainability – a modern term embracing alignment with environmental imperatives – without forgoing the benefits of economic expansion. These benefits include rising standards of living, full employment, increasing opportunities for investment or professional development – generally rising wealth for all.*

“Growth” is commonly used as a shorthand term for “economic growth” which relies upon geometrically expanding extraction and throughput of material resources, which is unsustainable in a finite planet, but there are forms of community advancement other than “growth” in a material sense. “Sustainability” implies a steady-state condition, not one built upon expansion or increasing throughput of material resources, but if it is based upon utilisation of renewable resources, then the steady-state condition may be satisfied.

The paper explores the concept of “sustainable growth” by reviewing several scholarly attempts to explain the causes or consequences of economic growth. The paper touches on related questions such as: Is there any way of decoupling a rise in living standards from throughput of biophysical resources? Is it possible to have rising real wealth other than by accumulating more physical goods which means more demands upon the earth’s resources? Can the contrasting views of science and economics on these questions be reconciled?

Keywords: *sustainability, economic growth, limits to growth*

*Dedicated to the late Professor John Kenneth Galbraith, who in The Affluent Society in 1958 brought the consequences of consumer-led growth to the attention of the world.
The contribution of ecological economist Richard Sanders is acknowledged.*

Introduction

‘Sustainable growth’ is a mellifluous term. It tantalisingly promises continually rising living standards – but in an environmentally benign manner that can continue indefinitely.

The tension between the two limbs of the term is easy to spot: ‘sustainability’ is a steady state function; ‘growth’ is expansionary. ‘Growth’ is shorthand for economic growth and since World War II has been associated with consumption of ever-increasing quantities of raw materials. Expanding throughput of materials results in exhaustion of sources and challenges the capacity of the rivers and atmosphere to absorb the wastes.

But the unanimity of environmental scientists that the earth’s capacity to support the human population sustainably is being exceeded is matched by the unanimity of economists that growth can continue indefinitely.

Can we have both? This paper critiques the claim that global society can decouple rising affluence from consumption of energy and materials. To do this, after defining terms it presents some foundational propositions, evaluates competing theories, argues the logical implications and considers the origin of divergent perspectives.

Three definitions

Economic growth

The Western belief in material progress is of relatively recent origin. Fatalism is a feature of traditional societies and it was not until the Enlightenment in the eighteenth century and the decline of religious rigidity that Europeans recognised that humans need not be resigned to some pre-ordained status in life. Public confidence in scientific achievements subtly altered Europeans’ cultural viewpoint to become deeply optimistic about the prospect of human material and other progress.

Economic growth as an explicit goal of Western governments is even more recent, dating from 1950 when it was first articulated as a policy weapon during the Cold War (Arndt 1978). An improved ‘standard of living’ for their citizens is the proclaimed aim of most governments and economic growth is almost universally considered necessary to achieve it.

Gross Domestic Product

The accepted measure is gross domestic product (GDP), which tallies the value of traded goods and services passing through an economy. This is calculated by averaging statistics for *production* (prices of goods and services less intermediate costs); *income* (incomes generated by domestic production); and *expenditure* (net final expenditure on goods and services). The figures include cost of tangible materials as well as intangible value added by commercial human endeavour.

The raw scores for GDP include consumption generated by increased population as well as inflation in the value of money. To allow undistorted comparisons between years and countries, population growth and inflation are commonly sifted out, yielding the mainstream definition of growth as *change in real GDP per capita per time period*. This is not the same as 'quality of life', a holistic measure of well-being; or 'prosperity', a potentially sustainable condition of material comfort; or 'development', a process that unleashes human potential.

Capital

Capital takes several forms: *natural*, *manufactured*, *financial*, *human* and *social*. The renewable form of *natural capital* is living and if healthy, spontaneously produces a sustainable flow of goods and services. The non-renewable form (including fossil and mineral deposits) is passive and flow rates are a matter of policy. If the financial proceeds from using non-renewable natural capital are invested in renewable alternatives, the effect can be deemed essentially sustainable (Sanders 2004).

Divergent opinions about the seriousness of the ecological crisis pivot on divergent understandings about the convertibility of capital: if man-made capital can be substituted indefinitely for natural capital, then growth is limited only by human imagination.

An oblique way of expressing the central question is to examine whether the 'services' component can boost GDP without a corresponding rise in the 'goods' component, which more overtly necessitates rising consumption of material resources.

Four foundations

To ground an analysis, it is helpful to articulate some propositions the validity of which does not depend on personal opinion. The following observations about the sufficiency of the planet's resources should be unarguable.

The laws of thermodynamics reign supreme

By the First Law of Thermodynamics, matter and energy cannot be created or destroyed but can be converted. This principle explains exactly what economic activity does: it transforms matter and energy from one form to another, or more candidly, turns resources into waste. By the Second Law, in a closed system energy and matter dissipate. The universe is continually becoming more disordered; wastes are more dispersed and useless than resources.

No equations of economic growth can be valid if they contradict the laws of thermodynamics, “the most thoroughly tested and validated laws of nature” (Hall et al 2001). This axiom alone nullifies models of growth that do not factor in consumption of energy and materials.

Concentrated sources of energy and raw materials are limited

On 28 April 2011, the International Energy Agency (IEA) admitted to a reporter from the Australian Broadcasting Corporation in Paris that world oil production had already peaked (Newby 2011). Only five years previously, this mainstream agency had confidently predicted expansion until at least 2030, from the current 83 to >103 m barrels/day (Miller 2011).

What caused the change? IEA audited oil fields and found that producer country after country was in post-peak decline and no amount of pushing with enhanced recovery techniques or pulling with higher prices could summon from the ancient sediments oil that wasn't there. In other words, the evidence of petroleum geologists and engineers has prevailed over the assumptions of economists that supply would somehow rise to meet whatever the market demands.

Oil is not the only raw material facing global peak production. On current trends, coal production will peak around 2020 (Mohr 2010; Zittel and Schindler 2007). Phosphorus is modelled to peak by about 2033 (Cordell et al 2009), a matter of grave concern for the intensive agriculture that feeds the current human population. Just one country (China) controls more than 90% of the world's production of rare earths (USGS 2011), essential for a computerised society. Some 25 per cent of the world's lithium is raised from a single mine (Greenbushes, Western Australia) (USGS 2011). As Africa digs deeper to keep its platinum mines open, it seems that an economy powered by platinum-catalysed fuel cells is out of the question.

Worldwide, ore grades are falling and energy inputs required for extraction are increasing. The productivity of Australian mining declined by 25% from 2000-2006 (Topp et al 2008). Economists tend to be unconcerned about falling grades, claiming that as scarcity bites, prices will rise sufficiently to ration demand and render dispersed deposits economic. Scientists counter that there is an energy penalty for extracting and refining low-grade sources. If concentrated energy itself is a declining resource, the energy and economic costs of extraction quickly overwhelm optimism.

Peak production is not exhaustion. Yes, there are vast quantities of oil and gas diffused within rock formations in all continents and vast quantities of minerals disseminated through the earth's crust and dissolved in the oceans. The significance of peak production is first biophysical, signalling that future generations will have to construct their societies from a declining supply; and second economic, as prices of materials indispensable to industrial society rise more than incrementally, potentially destabilising societies as they struggle to find resources to feed their growth economies ((Mason et al 2011a; Mason et al 2011b).

The biophysical environment is in crisis. The widely debated climate change is only one of numerous indicators of impeccably documented environmental distress.

The 2005 Millennium Ecosystem Assessment involved more than 1360 leading experts and multilateral institutions. "At the heart of this assessment is a stark warning. Human activity is putting such strain on the natural functions of earth that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted. ...Nearly two thirds of the services provided by nature to humankind are found to be in decline worldwide." (MEA 2005). This authoritative account is more-or-less uncontested.

Globally, humans are currently drawing resources directly from 2.2 ha of the earth's surface per capita, but only 1.8 ha is available, the gap being papered over by exploiting ecosystems harder and by drawing down finite deposits of oil and coal. Australians' 'ecological footprint' is 7.2 ha (c.2000, Lenzen & Murray 2001).

Growth is exponential

Growth is an accelerating not an arithmetic progression. The speed with which an exponential function compounds is not obvious in the early years.

Five explanations

The scholarly literature on the causes and consequences of economic growth is vast. For this paper, I have selected two ground-breaking works warning of limits; one that legitimised economics' belief that human capital can substitute for natural resources; and two attempts to reconcile the conflicting viewpoints. They are presented in chronological order.

Thomas Malthus

Malthus warned in 1798 that increases in population would eventually outstrip food supply. Malthus has been ridiculed, to this day. Malthus did not foresee that a large population could nourish itself with food vacuumed from the whole world in ships and planes powered by internal combustion engines burning coal and oil. However, Malthus' predicted consequences were only postponed, not avoided. Malthusian collapse is now arriving in many African countries, where too little arable land is available to support a growing population (Diamond 2005), with climate change accentuating this shortfall south of the Sahara. But the crisis is not always recognised as Malthusian. It is commonly interpreted through the lens of sociology as due to ethnic hostility, or through the lens of economics as due to incompetence of governments or trade barriers in Western markets. (Of course, famine, violence and migration in subsistence economies are never mono-causal – Reuveny (2007) and Nordås & Gleditsch (2007) present useful reviews).

Solow's unexplained residual

In classical economics, the three inputs to production were considered to be land, labour and capital. In modern language, 'land' represents natural resources. When U.S. economist Robert Solow in the late 1950s formulated neoclassical¹ equations to explain economic growth, he ignored land and modelled just capital and labour. These equations were unable to explain observed growth, so in an influential paper (1957) he inserted a factor to make the equations fit, although he cautioned that this "residual" – some 70% or more of observed growth (!) – was an empirical observation without theoretical justification.

A large literature arose ascribing to 'technological innovation' the unexplained gap between observed growth and growth generated by capital and labour. Innovation came to be regarded as the primary driver of growth. Even on first principles, this sounds unconvincing, as innovation is intangible, not easily expressed quantitatively, unlike capital and labour. "The production function is a technical recipe with real terms in physical units..." (Daly 1997), even if dollars are used as proxies. In any case, the residual has been critiqued as tautological (McCombie 2000/2001) and does not even capture innovation reliably (Hartley 2000).

¹ 'Mainstream' or 'orthodox' economics in this paper is taken to be the neoclassical sub-discipline. This forms the economics limb of neoliberal political philosophy.

It is a short step from explaining away any amount of growth as deriving from 'innovation' to asserting that any amount of innovation will allow growth to rise indefinitely. That arguably is what economics has done, ignoring Solow's warning.

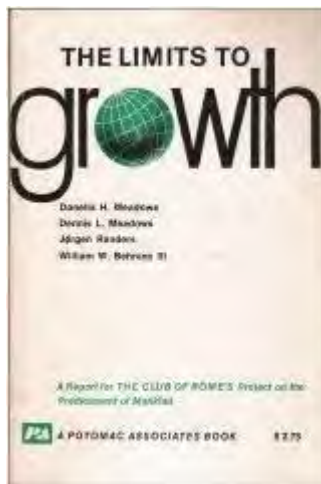
But repeated studies have shown that the size of the Solow residual correlates nicely with observed rates of consumption of energy (Beaudreau 2005). This is hardly surprising, as energy is the means of wresting more productivity out of raw materials and labour. This would restore the missing 'land' to the neoclassical equations. Beaudreau deplored the absence from this academic discourse of process engineers, who would instead model growth as a function of inputs of materials, energy and "information" (including tools and equipment).

Solow's legacy endures. In the urban blueprint *Melbourne 2030 planning for sustainable growth*, Policy 4.4 asserts that "Achieving growth in jobs, and creating wealth and higher living standards, depend on knowledge creation and the innovation that results from it.", as if higher living standards can arise out of cerebral power with no impact on the physical world.

Solow later opined that given substitutability between forms of capital, "The world can, in effect, get along without natural resources..." (Daly 1997). This assertion is plain wrong. Real people, even the most cerebrally inclined, require food, water, housing and transport if they are to innovate. With the neutralisation of Solow's a-theoretical residual, orthodox economics has no satisfactory theory of growth; and if that statement holds, then Jackson's observation (2009) that there is no macro-economics for sustainability also holds. We must look elsewhere.

The Limits to Growth

This ground-breaking study (Meadows et al 1972) modelled constraints for a number of natural resources such as oil, metals and food. The key finding was that, assuming exponential increases (growth) of both global population and of industrial production "the great majority of the currently important non-renewable resources will be extremely costly 100 years from now".



The work was vehemently attacked by economists and politicians, primarily on the grounds that the models ignored human ingenuity. Technology would discover new materials and more efficient methods of using existing materials; and the price mechanism would ensure that scarce resources would be automatically husbanded and more abundant resources would be substituted. Precisely these arguments are still advanced, to this day.

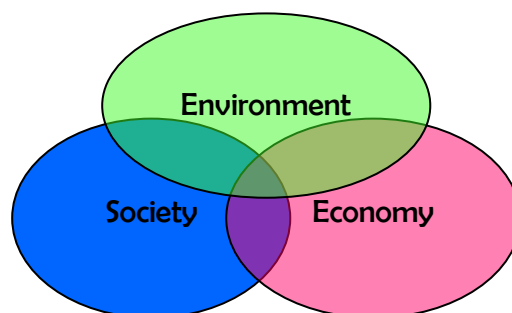
But *Limits* has not been disproved. Graham Turner at the Commonwealth Scientific and Industrial Research Organisation (2008) plotted the past three decades of reality and found that changes in industrial production, food production and pollution are all in line with the book's warnings of economic and societal collapse in the 21st century – in the absence of prompt remedial action.

Ecologically balanced development

The foundational 1992 Australian *National Strategy for Ecologically Sustainable Development* (NSED) included a curiously inconsistent paragraph:

“No objective or principle should predominate over the others. A balanced approach is required that takes into account all these objectives and principles...”.

This qualifier is represented in a widely reproduced diagram by three overlapping circles:



This depiction is illogical. There is no part of human society that lies outside the biosphere and is not 100% dependent upon the natural environment. There is no part of any economy that is not a construct of the society that hosts it and sets its bounds. The notion that the economy has an autonomous existence is non-rational, even though it underpins much modern economic commentary.

The economic imperative never allows any 'balance' to remain in equilibrium. 'Balance' involves repeated trade-offs that incrementally erode the ecological dimension (Sanders 2004). This is problematic if the essential pre-condition for sustainability is keeping stocks intact. Under 'balance' there is no end to iterative conversion of natural resources into manufactured capital unless the undeveloped residue is placed in a protected wilderness arena. 'Balance' subtly disparages alternative outlooks such as conservation as being 'unbalanced' or 'extreme'.

The language of balance is popular as it allows the inherent tensions between environmental quality and economic expansion to be brushed aside – without constraining development. To read strategy documents from business and governments such as Sensis's *Sustainable Growth* (Dee 2010), there is little reason to doubt that 'we can have it all'. But NSESD articulated an incoherent theory that cannot be made operational. Unsurprisingly, 'sustainability' is widely regarded as ambiguous!

Natural capitalism

In their flagship work of that title, Hawken, Lovins & Lovins (1999) acknowledged the unsustainability of traditional capitalism's practice of liquidating natural capital and calling it income. These analysts, noting the decline in energy intensity of GDP in mature economies (one-third between 1973 and 1998 – IEA 2004), claimed that sophisticated modern technology allows growth to be unshackled from the wasteful intermediate stages of industrialisation.

Natural capitalism advocates conserving resources through more efficient manufacturing processes, reusing raw materials, incentivising quality over quantity, and restoring natural capital. This model underpins *The Natural Advantage of Nations*, edited by keynote speaker Charlie Hargroves and Michael Smith. As a transitional measure, it is most worthy and probably necessary. But as a substitute for sustainability, it has five fundamental defects.

First, a rate of increase of 1% per annum or even 0.1% compared with 3% notional current average still constitutes a geometrically expanding function: slower growth, but still growth. Second, to keep the throughput of natural capital constant, dematerialisation must proceed *geometrically* at a

rate as least as great as GDP grows. This implies a shift towards a spiritual economy with an *exponentially* disappearing material basis. Mathematically, this seems impossible (Sanders 2004). Pasche (2002) found that “under reasonable assumptions about technical progress a positive sustainable growth rate fails to exist.”

Third, gains in efficiency caused by process redesign are commonly swamped by continuing economic growth. This *rebound effect* is standard economics: increased efficiency is equivalent to a reduction in cost (Brookes 2000). Only natural or imposed scarcity reduces throughput of resources.

When William Jevons in 1864 warned that Britain’s prosperity was at risk because “there is no probability that when our coal is used up any more powerful substitute will be forthcoming...”, he could hardly have anticipated that his book would be quoted more than 140 years later as evidence *against* doomsaying. Jevons, of course, failed to foresee the discovery of petroleum and the enormous expansion in productivity that it would bring. However, Jevons gave his name to the paradox that more efficient utilisation can increase consumption as the resource becomes more attractive to use.

Fourth, the efficiency dividend that renders intelligent design profitable for a household or single firm, when aggregated to an entire economy, can be disruptive. A slow-down in growth risks unemployment, recession or depression. Certainly, a re-localised society in which bicycles replace motor cars and food is produced on rooftops might well be much closer to sustainable, but it is not a growing one. ‘Growth’ is a region-wide or nation-wide index; the index applicable to a firm is ‘profitability’ and to a household is ‘savings’. Brookes (2000) has warned against the “‘fallacy of composition’ namely believing that all the multitudinous individual savings identified can be added together to produce an estimate of what can be saved over the economy as a whole.” Societies are systems, not aggregations of simple transactions, and they exhibit system dynamics.

Finally, there is the empirical response that, overall, natural capitalism is not happening. Throughput of resources is proceeding apace, in Australia and globally, even though many of natural capitalism’s prescriptions such as energy conservation have been advocated by environmentalists for four decades. This is not surprising, as the Australian economy is permeated by systemic incentives *not* to conserve resources (Riedy 2003). This doesn’t of itself invalidate the concept of natural capitalism, but it does indicate that something else is required: a commitment by the nation’s leadership, for example.

Worse, the teeming populations of the Asia-Pacific are in the early to middle stages of transitioning from agrarian, biomass-based economies to industrial, mineral-based economies. Such transitions typically result in a two-four fold increase in demand for raw materials. Indeed, material efficiency for the Asia-Pacific is deteriorating rapidly (Schandl & West 2010).

Hargroves' & Smith's sunnily optimistic book is an impressive catalogue of worthy local initiatives. But it presents no theory of sustainability and contains no feasible path to transition from individual and local savings to a restructure of the systems that drive expansion in the wider economy. Without this, the hypothesis it advocates collapses.

Three logical consequences

Considering the axioms and the scholarly explanations presented above, the following propositions ineluctably follow.

GDP is useless for measuring sustainability

GDP does not pretend to be an asset account and ignores the extent to which the current generation is consuming the resource inheritance of future generations. Conversion of a natural asset into a manufactured one registers as an increase in GDP, though it should be only a net change in asset composition. Commercial firms know that to consume assets to pay for running costs is the pathway to commercial oblivion, but this logic does not seem to underpin the more important task of charting the strength of national economies. Without a balance sheet, GDP does not flag depletion and reinforces the cornucopian view that more consumption is better.

Government, household and non-profit activity, unlike traded goods, is computed at input cost not output value. GDP perpetuates the fiction that the public sector is parasitic and nourishes anti-government, anti-community rhetoric. So GDP does not even signpost the preconditions of economic prosperity, let alone sustainability. By misleading those responsible for public policy, GDP drives perverse economic policies worldwide (Edwards 2004).

The physical component of GDP cannot increase without expanding throughput of energy and raw materials. The non-physical component can increase without limit, for the value added by human services in principle is notionally unlimited. But services presuppose expenditure on buildings, equipment, fuel and materials; and the resulting financial wealth once accumulated is spent on

buildings, equipment, fuel and materials. Humans and their households are anchored in the biophysical world.

The matter-energy system (which since World War II has been expanding exponentially but cannot long continue to do so) is disconnected from the monetary system (which grows by compound interest and can grow without limits).

An economy is either expanding or not expanding

If it is expanding, an economy will necessarily draw down on energy and raw materials. This is what expansion means: development, construction, conversion of nature into goods and the tools for supplying services. If it is not expanding, it is not growing.

This finding does not dispute that technological innovation can underpin efficiency, nor is it simply an unoriginal acknowledgement that Solow's residual has no theoretical explanation. It is simply an observation that "there are no material factors other than natural resources." (Georgescu-Roegen, quoted in Daly 1997).

The interpretations offered by science and economics are irreconcilable

Contention between economists and most other disciplines has been an enduring feature of this debate (Simmons 2000) which today "seems more polarized than ever" (Tilton 1996). The opposition to the concept of limits is more ideological than scientific: the belief that economic growth is an essential feature of a successful society and to challenge it is to attack the fundamentals of society or to demean human capacity to overcome obstacles.

Evidence-led science is adamant that exponential growth in throughput of material resources cannot long continue on a finite planet. Assumption-led neoclassical economics is adamant that the limits are nowhere near being breached, but to a scientist economics sounds like "a perpetual motion machine, with no required inputs or limits", in direct contradiction of the First and Second Laws of Thermodynamics (Hall et al 2001).

Most definitions of economics describe it more or less as the study of how scarce resources are allocated. This implies that economists above most other professionals should be sensitive to scarcity. But there is a caveat: economics' recognition of scarcity applies only to resources within the arena being modelled; outside, resources are assumed to be unlimited and subject only to the economic laws of supply and demand not the biophysical laws of nature.

Tilton (1996) wrote: “The anticipated exploitation of exhaustible resources either does or does not pose a significant threat to sustainable development. Which it is, is important. The policy recommendations of one group cannot be right unless those of the other are wrong.”

One causative proposition

The only plausible explanation for the unresolved gulf between the scientific and economic explanations of growth is that it originates from deep within the disciplines. Tilton (1996) referred to “the very different paradigms adopted by the two different groups coupled with quite contrasting views on the beneficence of technology, public policy and the marketplace.”

A public discourse that cleaves over the disciplinary mindsets of the protagonists should send warning signals to the analyst. While worldviews in society will never be uniform (the individualist-collectivist divide, for example, is deeply entrenched in human culture), tertiary education should enable graduates to sieve evidence, apply logic and reach at least an understanding of their protagonists’ position. Persistent acrimonious disciplinary cleavages hint at a systemic weakness in the education of one or both sides.

As with the public controversy over climate change, debate over the limits to growth seems to be not about the quality of the scientific evidence but to be a consequence of applying very different mindsets or lenses to the evidence. Drawing on the academic and popular literature, six worldviews relevant to growth policy can be identified (Table 1), though the distinctions are neither exhaustive nor rigorous. It is postulated here that the worldviews reflect disciplinary training of their advocates.

A disciplinary ‘worldview’ is embedded in a matrix of concepts and principles that practitioners of that field adopt in dealing with each other and wider society. Every novice is inducted into this mindset from the earliest exposure, through textbooks, lectures and mentoring by old timers. There is some evidence that professionals’ outlooks are shaped in their first year of post-secondary study (Anderson 1982). Lawyers become naturally suspicious and engineers become impatient with ‘airy fairy’ philosophical speculation. Teachers become more compassionate and economists become convinced that humans are self-interested materialists.

Table 1 : Six Worldviews and Their Disciplinary Associations

Worldview	Features	Level of Optimism	Disciplinary Association
<i>Cornucopian materialism</i>			
Market	Price mechanism will ensure there are no	We can enjoy rising prosperity indefinitely.	Mainstream neoclassical

	biophysical limits to growth	Capital is interchangeable	economics and commerce (Bjørn Lomborg (2001), most economists and business leaders)
Balanced	There should be no obstacle to development	We can enjoy rising prosperity indefinitely, but compromises will be necessary	Politics (Most politicians and policy experts)
Natural capital	Intelligent design: materials intensity of growth can be greatly reduced	We can enjoy rising prosperity indefinitely. However, natural capital is limited and must be preserved	Engineering, physics (Paul Hawken, Amory and Hunter Lovins (1999), locally Charlie Hargroves (2005))
<i>Sustainable stewardship</i>			
Limits to growth	Forecasts overshoot and collapse by mid-century	Becoming more pessimistic as time without concerted policy action passes. We must live within the carrying capacity of the planet. Denigrated as 'doomsaying'	Environmental science, ecological economics (Donella and Dennis Meadows (1972, 2005), Herman Daly (2004), Robert Costanza (1997), locally Richard Sanders (2006))
Spiritual	Humans are subjects of Mother Nature; the land does not belong to humans; Earth is even an organism (Gaia);	Fearful of the consequences of the waste and destruction now being wreaked	Arts, philosophy, mainstream religion, indigenous studies (James Lovelock (1979), David Suzuki (2008))
<i>Apocalyptic</i>			
Fundamentalist	God will 'save' the planet, humans don't need to bother	Highly optimistic (God will save His creation) or highly pessimistic (at the last days this world will be utterly destroyed)	Christian literalism (most fundamentalist preachers)

The well-attested pre-eminence of economics in the language of public affairs (Edwards 2007) both reflects and reinforces obeisance to economic growth as the pathway to a better society. If a society thinks that economic growth is the primary objective of policy, then naturally economics and commerce will be pre-eminent amongst professions represented in the leadership elite. If society thought that living within the planet's natural systems is the greatest challenge, natural scientists would be richly represented. How are the disciplines represented at present?

Official data of the numbers of undergraduates enrolled in Australian universities (DEEWR 2010) show a pronounced skew towards courses in management and commerce.

Table 2: Field of Study of Undergraduates 2009

Broad Field	Number*	%
Natural and physical sciences (includes ecology)	65,388	7.7
Information technology	33,569	3.9
Engineering and related technologies	61,385	7.2
Architecture and building	19,791	2.3
Agriculture, environmental and related studies	11,581	1.4
Health	117,058	13.8
Education	66,108	7.8
Management and commerce	230,894	27.1
Society and culture (includes law and economics)	177,245	20.8
Creative arts	67,125	7.9
Food, hospitality and personal services	1,143	0.1
	851,287	100

* Combined courses are counted twice.

Management & commerce outstrip all other fields by a generous margin; and the social disciplines (loosely defined) outstrip the natural and built disciplines by 659,573 to 191,714, a factor of 3.4. Agriculture and environmental studies preoccupy only 1.4% of the student body.

Within the national parliament, the representation of the natural sciences, agriculture and environment is even lower. The statistics in the *Parliamentary Handbook* are in Table 3 re-arranged to correspond as closely as possible with the classification above.

The number of law degrees outnumbers all sciences combined by a factor of 6.5. If one regards the parliament as simply a forum for passing laws, this may seem appropriate. If a parliamentarian's primary role is to listen to the electorate and balance competing representations, then education in law or liberal humanities would seem to fit for purpose. But the parliament is also a deliberative forum for setting policy across all fields and in any case supplies the executive for which subject-anchored insights are required. While it would be misguided and even dangerous to fill the parliament with specialised technical experts (C.P. Snow in 1961 warned eloquently against relying on expert opinion), it is not unreasonable to conclude that a chamber and executive unfamiliar with the language of science is poorly equipped to debate the emerging critical environmental issues with depth of understanding.

Table 3: Field of Study of Parliamentarians' Qualifications

Broad Field (At 1 July 2008)	Number of Qualifications	%
Natural and physical sciences	11	3.2
Information technology	2	0.6
Engineering and related technologies	5	1.4
Architecture and building		
Agriculture, environmental and related studies	3	0.9
Health*	11	3.1
Education	24	6.9
Management and commerce (including economics)	69**	19.9
Society and culture	206***	59.5
Creative arts	3	0.9
Food, hospitality and personal services	1	0.3
Trade and certificates	11	3.1
Total	346	99.8
(Members and Senators with qualifications)	(180)	(180/226 = 79.6)

* MBBS counts as one qualification.

** Some 32 or 9% of qualifications were commerce and economics.

*** This includes 94 (27%) classified as unspecified "General degrees", such as B.A. and Ph.D. and 91 (26%) classified as law.

Of course, any analysis of educational balance in the parliament must be supplemented by analysis of the disciplinary background of senior executives within the Australian Public Service, especially in the central agencies. There, the dominance in the 1980s of economists was well attested by Pusey (1991), but no comparable recent study is known.

Further research could interrogate the parliamentarians' and senior executives' biographies to identify precise field, first degree, subject of any research degree and prior employment. Additionally, the content of undergraduate courses, especially in that critical first year, could be perused for evidence of exclusivity or diversity.

Conclusions

The analysis above allows three main findings.

First, economic growth is measured via GDP in monetary units, which commingle physical and non-physical inputs, hiding the distinction. One cannot read from GDP any necessary conclusion about the throughput of energy and raw materials underpinning economic expansion. While logically an expanding economy entails expanding consumption of energy and materials; and logically if

expanding wealth does not entail expanding consumption it is merely inflation, one can conceive of an economy that is growing in terms of GDP but is not expanding physically. If this is possible, it is an artefact of economic accounting.

Second, this study has been unable to find a theoretically robust pathway between the *relative* drop in throughput documented by the advocates of natural capitalism in specific cases of industrial design, and the *absolute* decline in throughput required for a steady-state economy. The enthusiasm for natural capitalism is another species of the cornucopian fallacy, that society can have it all: endlessly rising living standards with increasing wealth, a harmonious community and a flourishing natural environment. No such benign condition is possible on a planet governed by the laws of thermodynamics.

Third, there is a deficiency in scientific literacy in our national parliament and in the courses undertaken by recent cohorts of tertiary undergraduates. Given that public policy in forthcoming decades will become preoccupied with environmental and climate change problematics, the graduates who will form the leadership elites in the next generation must be given the analytical tools to manage these issues. No person should graduate from any academic course without having had scholarly exposure to each of ecological science; history or sociology or public policy; and systems dynamics. Expressed simplistically, economists and lawyers should be taught some basic environmental science and scientists should be groomed to participate in public affairs.

It is customary to end articles of this kind with some expression of optimism, such as 'If we can all work together, we can overcome'; or 'We have only 5/10/20 years to reduce our footprint sufficiently to save the planet', which sounds pessimistic but in fact subtly pushes the need for action into the future.

I don't share this optimism. An opportunity was presented in the 1970s to change the trajectory of world consumption of biophysical resources. Western society resisted the opportunity then and continues to ignore the message of the people who understand ecological systems.

"Sustainable growth" is an oxymoron. The concept has been legitimised by a false theory of neoclassical economics, in which a substantial proportion of national parliamentarians has been trained. The concept reflects an unjustified faith in the ability of policy, technology and markets to avert the environmental consequences of Australians' lifestyle. This situation is unsustainable.

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Lines of Motion: The Flow of a City

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Abstract

The paper introduces *Lines of Motion*, an urban design concept to improve urban and transport planning for the health and well-being of city populations. The concept regards transportation as lines of motion, not modes of transport. It does not matter if it is a car, train, bus, ferry or bicycle; it is the line of motion that defines transport routes around a city. Furthermore *Lines of Motion* manage population growth and economics in healthy cities by separating transport lines into streams. Each stream has a purpose in the transportation system and is part of many lines of motion around the metropolis. The concept works at every scale of local, district, municipal and metropolitan size.

This paper explains three examples of *Lines of Motion* in Sydney, New South Wales, Australia:

In the central business district (CBD) the first stream addresses city gridlock by separating grid lines into private transport in one direction and public transport in the other. Private transport is channelled via access streets into arteries, such as the Western and Eastern Motorways. This rationale fits with many of the 2030 Plan proposals.

The second stream addresses the current separation of the CBD into East and West. A new *Greater City Circle* railway line would travel around the western edge to incorporate newer areas like Barangaroo and link back into the existing City Circle Railway at Circular Quay. The rationale fits with the Western Relief Line, Pitt Alignment and Second Harbour Crossing, because the Central-Wynyard rail track could be reused as a through-line and create a new railway interchange at the northern end of the CBD.

The third stream addresses the poor rail connection around the 'City or Cities' by creating a *City Ring* railway to link most CBDs and major business parks of metropolitan Sydney. Using 76 percent of existing rail track, it would connect: CBD-Chatswood-Epping-Blacktown-Parramatta-Liverpool-Airport-CBD. The rationale fits with the Norwest Rail Line and Parramatta-Epping Rail Line by connecting Epping to Blacktown.

Keywords (5)

Sydney Transport Network, Metro, Urban Design, Transport Planning, Barangaroo,

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Introduction

This paper introduces *Lines of Motion*, an urban design concept to improve urban and transport planning for the health and well-being of city populations. The concept regards transportation as *Lines of Motion*, not modes of transport. It does not matter whether it is a car, train, bus, ferry, bicycle or walking; it is the line of motion that defines transport routes around a city and the location of stations and interchanges can be the pivotal factor which creates the sense of 'place' in an area.

The structure of this paper is about different scales; Small (S), Medium (M), Large (L) and Extra Large (XL). This is taken from Rem Koolhaas's concept of S,M,L,XL where his book is grouped into those sections / scales (Koolhaas 1995). The paper adapts the concept of scales as another representation of *Lines of Motion* working in different fractals of the geometry of transport planning.

Small (S) represents the person, an individual, or us. The smallest component in the flow of a city is the fundamental unit on which everything is based. Wherever people choose to live together, it is the manner in which they move around their city that dictates how a city with grow and develop. **Medium (M)** represents a scale which is walkable. It is the scale of the immediate surroundings around the person, so it is the vicinity of the home, work-place or place of interest. **Large (L)** is the suburb, neighbourhood, community or local area. Large is a scale of place which we identify as 'where we come from' - a place which is large enough that a mode of transport is needed to get around it or to the hub of the locality. The hub is a node that might be the local shopping centre, a beach frontage or a business district. **Extra Large (XL)** is the city. Extra large is a scale of place that contains several local communities and nodes which come together to create a much greater place - a greater identity for the city dweller. Within the Extra Large scale there might be some nodes that are large and critical to the functioning of the city as a whole, while other nodes are not. This scale is the metropolis.

Regardless of whether a node within metropolitan geometry is a person, a local shop or a central business district (CBD), it creates flows and ripples between nodes, either because of the importance of a node to the city; what the node is; or where the node is located. The connections and spaces between nodes – and where travellers flow, intersect and pause to reach them - affects how and where other nodes develop. *Lines of Motion* takes advantage of these flows, intersections and pauses, and links them into streams which can cross a city and reveal connections that are clearer and easier pathways, but hidden from obvious view in the disorder of a big city.

XL: The Metropolitan City

The scale of **Extra Large** looks at the big picture. XL looks at how a city functions at its heart and how functionality generates the way people move around during their daily travels. Extra Large is the metropolis; a city full of local communities and nodes which come together to create a greater place or a greater identity. A metropolitan city functions on the basis that these communities are close together and movement between them is easy and quick for a day-to-day routine. If a metropolitan city can no longer cope with routine movement, it is at risk of being slowly choked and eventually fragmented into smaller cities.

Sydney is well known as the 'City of Cities' so in a sense it is already fragmented. It could be argued that Metropolitan Sydney never completely amalgamated in the first place. Sydney is a sprawling city that has evolved in the shape of spokes-in-a-wheel, where the focus is the City CBD. This might work for a small city or regional town because it is at a scale where going between outer areas is not much shorter or quicker than via the city centre, but not at the big city scale. However Sydney would be better suited to an orbital transport route because it is a coastal city where the CBD is not located in the physical centre of the metropolis. The spokes-in-a-wheel type transport shape has always been difficult for Sydney. At the scale of Extra Large, an improved flow of transport routes requires a re-think that considers functionality at such large-scale geometry. With this mindset, urban designers need not be constrained by the smaller-scale space and conventional thinking typical of a small city or regional town.

Connecting the Hidden Paths of Sydney

Sydney is an example of a place where local communities and nodes come together to create a much greater identity than each of the individual cities from which Sydney is composed. Some nodes are not critical to greater Sydney, while other nodes are self-sufficient. Nevertheless, some nodes are key to the whole metropolis. The concept of *Lines of Motion* accepts these levels of critically and gives priority to the preferred ways that commuters want to move around. So it connects nodes in a transport design that provides city-wide transport routes for the needs of Sydney-wide travellers. *Lines of Motion* does not try to change the paths already created by travellers, unless there is a clearer path made apparent during the process of re-design.

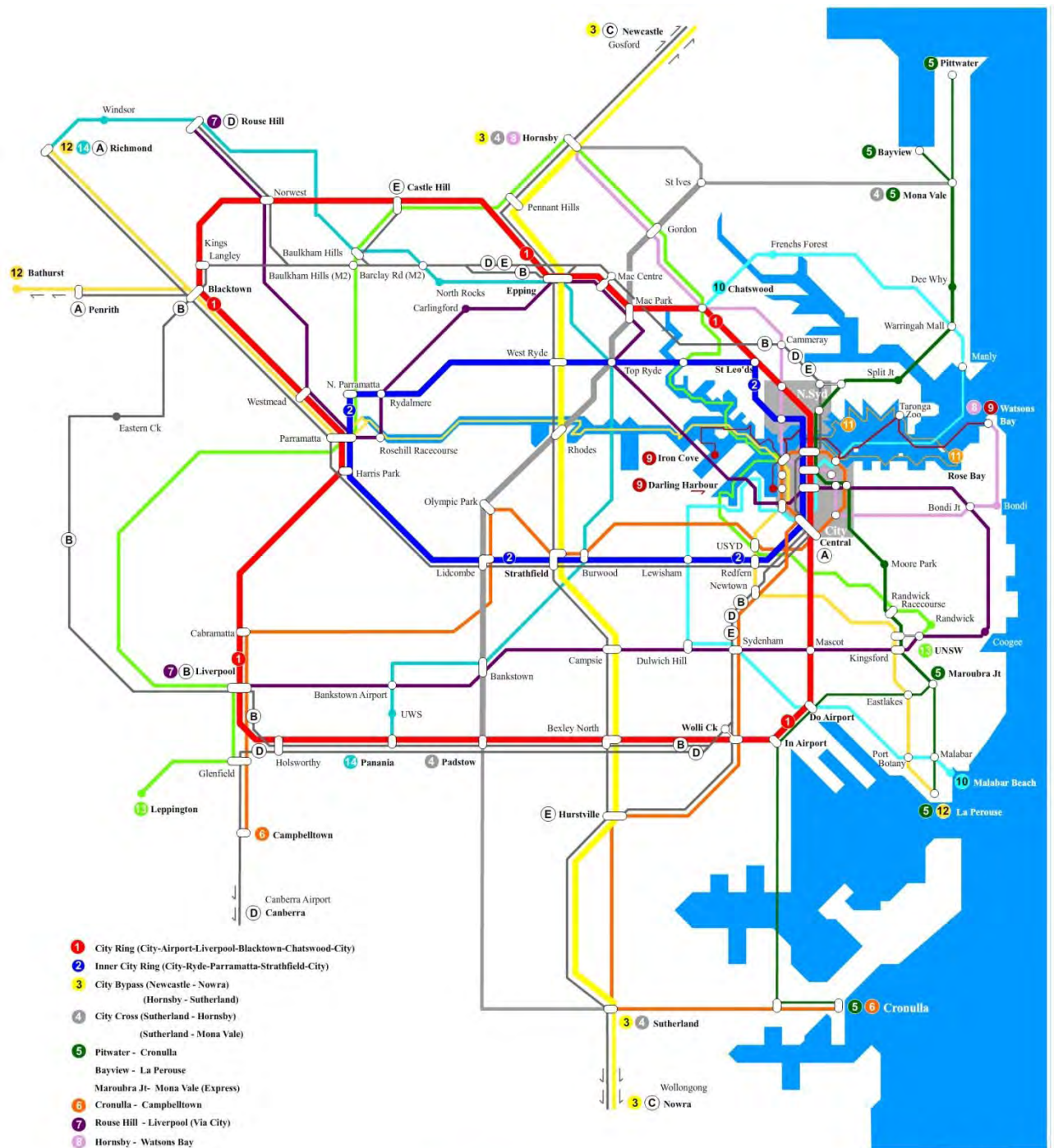
Lines of Motion takes advantage of the existing transport routes, whether the mode is a Train, Light Rail, T-Way, Bus or Ferry and cuts and re-ties the existing pathways in a more streamlined combination of routes. The concept takes into account:

- simplifying the transport system to an intuitively simple level so that a tourist could easily understand it with one map;
- simplifying patronage along the same pathway;
- satisfying commuters' needs in getting from A to B either by enhancing an existing route or creating a quicker alternative;
- increasing the usage of a specific transport mode such that when one group of commuters depart, another group takes its place as the train / ferry / bus line continues;

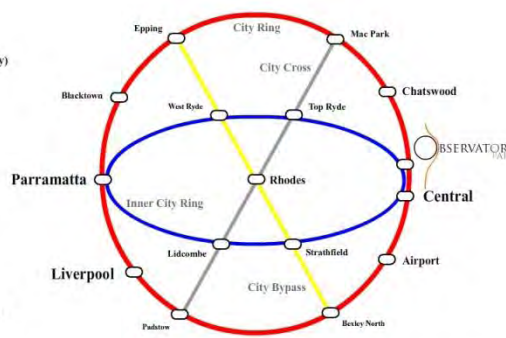
- providing the capacity (number) of train tracks or bus lanes which can support the pathways as a two-way journey. (eg: one line per pair of tracks or bus lanes);
- reducing the amount of duplicated lines running side by side and (where needed) operating one of the lines as an express service;
- dividing commuters so that they are not funnelled into the same path.

By adopting these criteria as the basis for transport design and applying them to Sydney, the author has designed a metropolitan transport system along his *Lines of Motion* concept and developed a new transport map for Sydney. The map uses the criteria and other rules to create a network that allows it to grow with the city's needs. The map is set out with an over-all grid of four main lines, detailed in the *City Ring* sections, and all the other lines assist these main lines. The network is derived from the Paris Metro concept (RATP 2011) where passengers need to change to get to a specific destination point, which greatly increases the efficiency in Paris. Given the scale of Sydney, the *Lines of Motion* network is designed for a passenger to change once to get from home to (most) major nodes or the CBD. Alternatively they might need to change twice to get from their own house to another house, anywhere in the metropolitan area. This design is helped by the secondary lines interchanging with the primary lines (Lines 1-4) as much as possible. The speed of the transport flow in the design is further assisted by an express service system, which is detailed later in the Simple Transport Systems section.

This layout is shown by graphics on the next page. The Appendix has further detail on the rationale and routes of lines.



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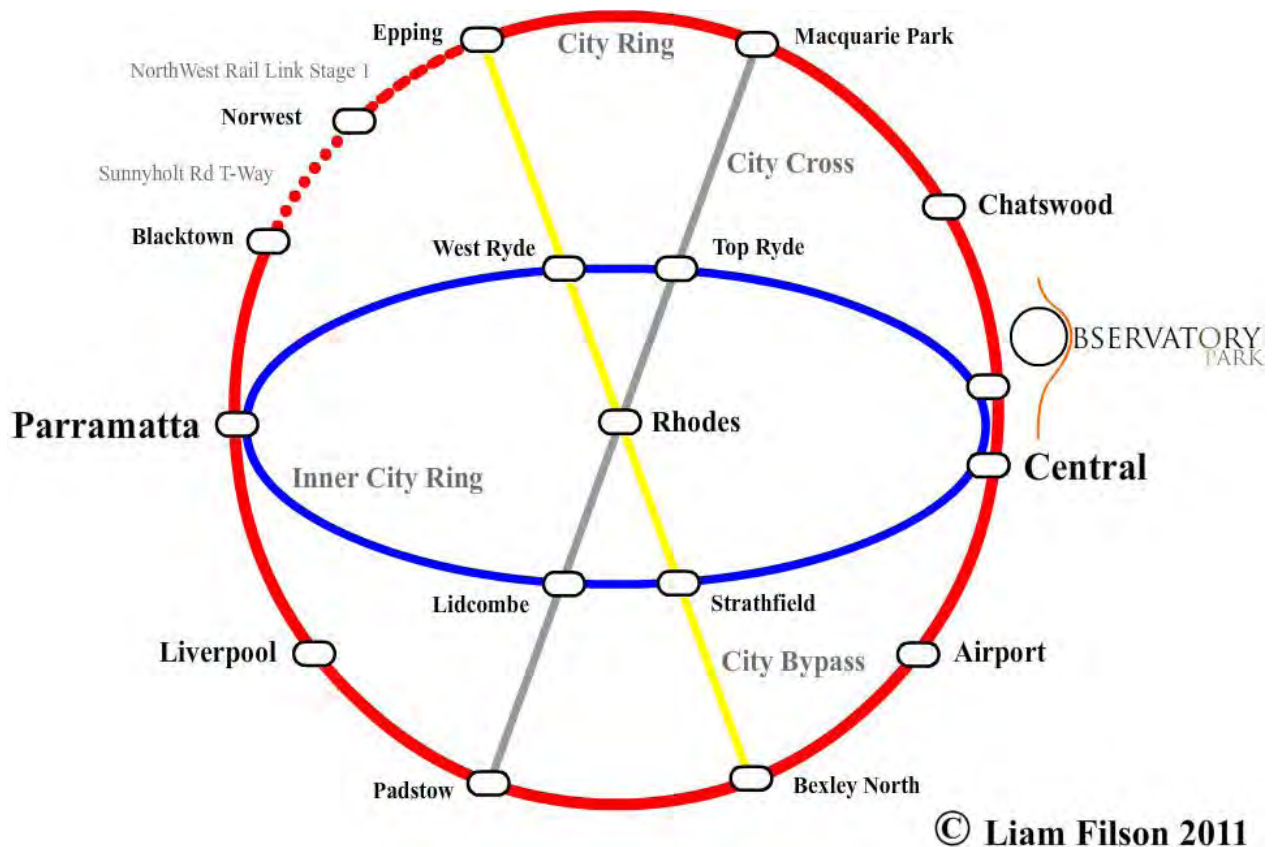
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Lines of Motion – Sydney Network Map

City Ring - Epping to Blacktown Link

A Ring Line is a continuous circuit line which connects a large area at the scale of XL. The Ring Line is a line type used commonly around the world, however it can only be used in particular parts of a network for an overall unifying purpose. These lines are very important as they link other lines together and give distinction to a city as a metropolitan area. Examples are the London and the Moscow Circle lines (Moscow Metro 2011) (Transport for London 2011).

For Sydney, the *City Ring* would address the poor rail connection currently built around the 'City or Cities' by creating a heavy rail train line which links most CBDs and major business parks of Sydney. Using 76 percent of existing train-track, it would connect: CityCBD-Chatswood-Epping-Blacktown-Parramatta-Liverpool-Airport-City CBD. This creates a train line to connects Epping to Blacktown. The rationale fits with the Norwest Rail Line and Parramatta-Epping Rail Line (PRL 2003) (Department of Transport, 2011). It would allow Sydney's transport system to change from its spokes-in-a-wheel shape to an orbital network, such that everyone does not have to go via the city CBD. This forms the pivotal piece in the four main lines of the concept, as shown below.



Lines of Motion – City Ring Graphic

A description of the *City Ring* starts at Central Station through to Wynyard via the current city circle line (which is reused in the design of Line 6) and crosses the Sydney Harbour Bridge using the Independent Public Inquiry ideas of hanging trains under the deck of the bridge (Independent

Public Inquiry 2010). It then follows a similar tunnel route to the Metropolitan Rail Expansion Programme, CBD Rail Link (2005) to St Leonards, via Victoria Cross (Miller Street and Pacific Highway) in North Sydney and Crows Nest (Department of Transport 2011). From there it uses the current track to Epping and then via the current proposed Northwest Stage One section to the Norwest business park (Department of Transport 2011). From there the *Line of Motion* concept proposes that the rail line continues via Parklea Markets and follows the State-owned land within the current T-Way on Sunnyholt Road to Blacktown (Transitway 2011). The route then runs along existing track to Parramatta and on to Liverpool. A bend would be need to be constructed to continue the line on to the East Hills track and connect with the Airport. From here it returns to Central Station. (Please refer to the Appendix for further detail about other lines).

The advantage of a transport ring is that it defines a city. It combines the city into a whole, from a physiological understanding and allows locals and tourists to easily see the city from a greater perspective. This enables passengers to understand the public transport system better and be more willing to use it.

Multi-Stage Lines - Integrating Major and Minor Lines

The idea of a multi-stage line is where multiple services use a common line, increasing the frequency of the line within built-up areas and dividing when the line reaches the outlying suburbs. It creates a continuous transport system without overly complicated services. These lines can end in one, or many of, three forms:

- A Y-line has multiple services that share a line before separating. This type of line is used in many places around the world, such as Paris (RATP 201);
- A Two-stage service is where one of the services terminates and the other continues along the line.
- A Terminus located at the other end of the line.

An example of a multi-stage line in the *Lines of Motion* transport network is the proposed Line 5 (Please refer to the Appendix for detail).

Simple Transport Systems - Fast Train / Slow Train

A Fast Train and Slow Train is a simple transport system used in Mumbai, India, one of the world's most heavily used transport systems (Mumbai Railway Vikas Corporation Ltd 2011). The system consists of two completely separate tracks: One train is 'All Stops' and another stops every five railway stations. This creates a strange distortion of time and distance for a traveller living near a minor station. It is faster to go past a minor station to the next express stop and get an 'All Stops' service back to the minor station. These bi-directional options on the 'All Stops' train helps to thin-out peak-hour crowds.

Almost all city transport systems use a type of fast / slow system but rarely is it similar to Mumbai's train system. Few Fast Train / Slow Train systems get around the issues that it causes - conflict on a single track; slowing down the timetable; or a similar style bus system being too complicated and not understood easily. The Fast Train and Slow Train system is a very simple idea for the public: fast and slow. It helps increase the use of public transport and can be implemented in several ways:

- Duplicating the existing track network, which is an expensive but effective option;
- Using an existing track network with well-timed overtaking lanes for express service trains. (However this does have a risk of flow-on delays if there is a problem);
- Using a simple fast / slow bus network, which can be easily integrated with normal road infrastructure.

The *Lines of Motion* concept would utilise nomenclature that involves the use of letters to label the express lines. This is inspired by the Paris regional lines, where the long distance rail lines are signified by letters (not numbers) to clearly define them and they would mostly follow other numbered lines and only stop at major stations (RATP 2011). Some multi-stage lines also have express lines within them where the express follows the same route. This is only for the shared section of the track. (Please refer to Line 5 in the multi-stage lines section).

Cost Benefit Analysis - Who Gets the Monetary Return?

In analyses between whether user-pay tolls or general taxation is the better arrangement to finance transport infrastructure, it has been shown that taxpayer funding has benefits in the long-term for society. This is mainly due to the typically lower interest rate charged on government borrowings of capital. One example of a failed road toll funding method in Sydney was construction of *The Cross City Tunnel* which was funded by a Public Private Partnership (PPP). This project was somewhat unusual in that it was subjected to commuter boycott because the public did not want to pay another road toll in Sydney. Therefore the tunnel was not used in sufficient numbers to make it viable. The PPP was not the only agency to lose money on this particular toll road venture. Society also made a loss because citizens did not benefit from reduced congestion in the city's CBD and subsequently, business was slowed rather than enhanced by the new road. In turn, corporate tax to the government slowed too. Furthermore, *The Cross City Tunnel* was devised as a single project in response to politics around marginal electorates combined with the merchant-venturer's focus on profit from the its investment in the Public Private Partnership (PPP).

Research from UTS in 2009 suggests that it is cheaper to operate public transport in Sydney than road transport. Per passenger the cost compares at 47c for train, 57c for bus and 86c per car in transport infrastructure (Dr Glazebrook 2009). Furthermore, articles published by the Public Transport User Association suggest that "it costs much less per passenger to operate public transport well than it does to run it badly". (Public Transport User Association, 2009) These studies indicate that building more road infrastructure will be a costly way to satisfy Sydney's transport needs. Ron Christie's Independent Public Inquiry suggested that in relative proportions,

Sydney needs 100% more public transport and only 2% more roads (Independent Public Inquiry, 2010).

Simple Timetables - Peak / Off-Peak / 24-hours

The litmus test of a good transport system is whether it is easy to understand and therefore well patronised. Sydney's public transport timetable is not easy to read and it is not structured in relation to the individual traveller. By contrast, Europe has been using better human-engineered timetabling for many years, such as the 24-hour clock and time-of-the-hour timetabling. A good example of this is the local St Arlberg am Anton to Zürs am Arlberg shuttle bus service in Austria. These buses run on a very simple timetable and signage is blue and green poles in the snow for blue and green buses. These poles have the start time of the bus, the time-of-the-hour departure for the bus and the last bus in 24-hour clock time (Zürs am Arlberg 2009). For example:

06:20

:00

:20

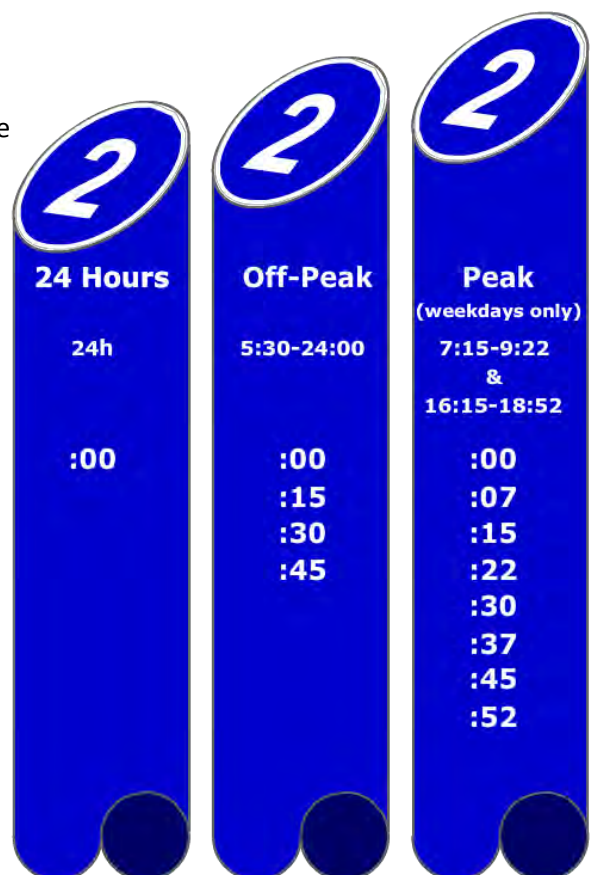
:40

20:40

This is an example of a very simply described bus timetable that is complete in five sets of numbers and independent of language.

The *Lines of Motion* concept would utilise this type of traveller-centred signage in a large scale application to the metropolitan transport system in order for a commuter to be able to use the lines with ease. For a city-scale application the timetable would be different, but use the same principle. In the line's signage colours there would be a combination of poles that are:

- a peak pole showing the time-of-the-hour and the start and end times of peak services for that stop, for the two peak periods each day, for week-days and weekends;
- an off-peak pole, showing the same type of information for the off-peak timetable;
- a 24-hour pole showing the time-of-the-hour that the service runs (only for 24-hours per day, main lines).



The three pole's signage and timetables, together form the simple timetable, as shown below.

Lines of Motion – Three Poles Timetable Graphic

Taxi Subsidy for Off-Peak

In public commuter transport, there is a point and a time in the day where public transport is no longer cost effective to run as a mass transit service. This opens opportunity for a taxi subsidy to transport public passengers in the low-use times, such as late night and early morning. This takes advantage of existing commercial infrastructure which commuters tend to not use due to the unaffordable cost for typical public passengers. However compared to operating normal public transport, the taxi subsidy could be cheaper than continuing a 24-hour bus over night.

Also the taxi subsidy would have flow-on effects, such as:

- Completing the journey to the door at night which means a commuter would use the main line public system, knowing they can get home safely (Sydney Morning Herald 2011).
- Improving late-night economy with more people able to be in the CBD later. (Sydney Morning Herald 2011)
- Providing much better safety at night:
- Reducing drink-driving risk because there is an alternative to the car on Friday and Saturday nights.

L: The Local Area

The XL scale is complex and needs be approached from different aspects, such as the local area or different methods of motion, in context with the flow of the city as a whole. **Large (L)** is the suburb, neighbourhood, community or local area. Large is a scale of place that we identify as 'where we come from' - a place which is large enough that a mode of transport is needed to get around it or to the hub of the locality. The hub is a node that might be the local shopping centre, a beach frontage or a business district.

While some nodes are not critical, nevertheless they need to function so the commuter can travel from door to door. If a public transport system does not provide the first step for people to get from their door to the main line, then public transport is not a viable alternative to the private car. At Sydney's scale and density in its cityscape, a car is unable to function with the speed needed for commuting, therefore making public transport a necessary *Line of Motion* for metropolitan Sydney.

Greater City Circle – Barangaroo to Circular Quay Link

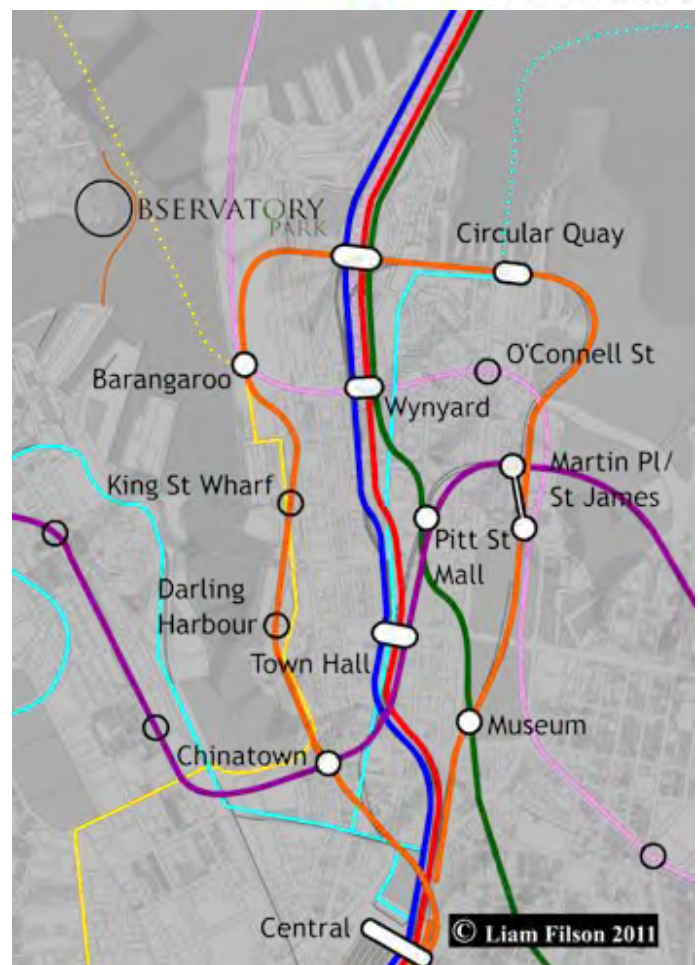
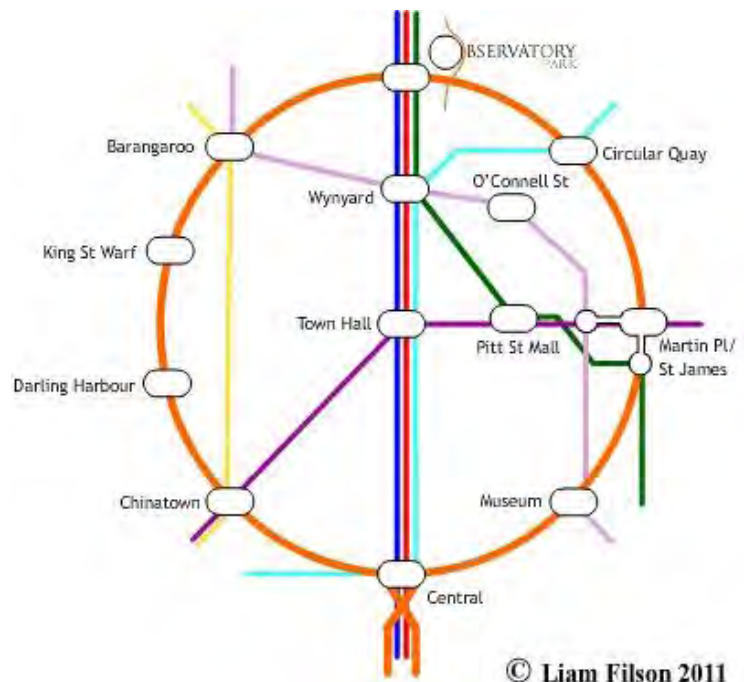
The current separation of the City's CBD into East and West is an artifact from the placement of the *City Circle* rail line and the growth in the western side of the CBD. *Lines of Motion* proposes a new *Greater City Circle* railway line that would travel around the western edge of the CBD to incorporate areas like Barangaroo. It would link back into the existing *City Circle* railway at Circular Quay Station. This is only part of a much larger Line 6 which connects to the greater city (detailed in the Appendix). The rationale fits with the Western Relief Line, Pitt Alignment and Second Harbour Crossing because the Central-Wynyard track could be re-used as a through-line and create a new railway

Lines of Motion – Greater City Circle Graphic

interchange at the northern end of the CBD (Department of Transport 2011) (Public Transport User Association 2009). Please refer to Observatory Park section.

This would:

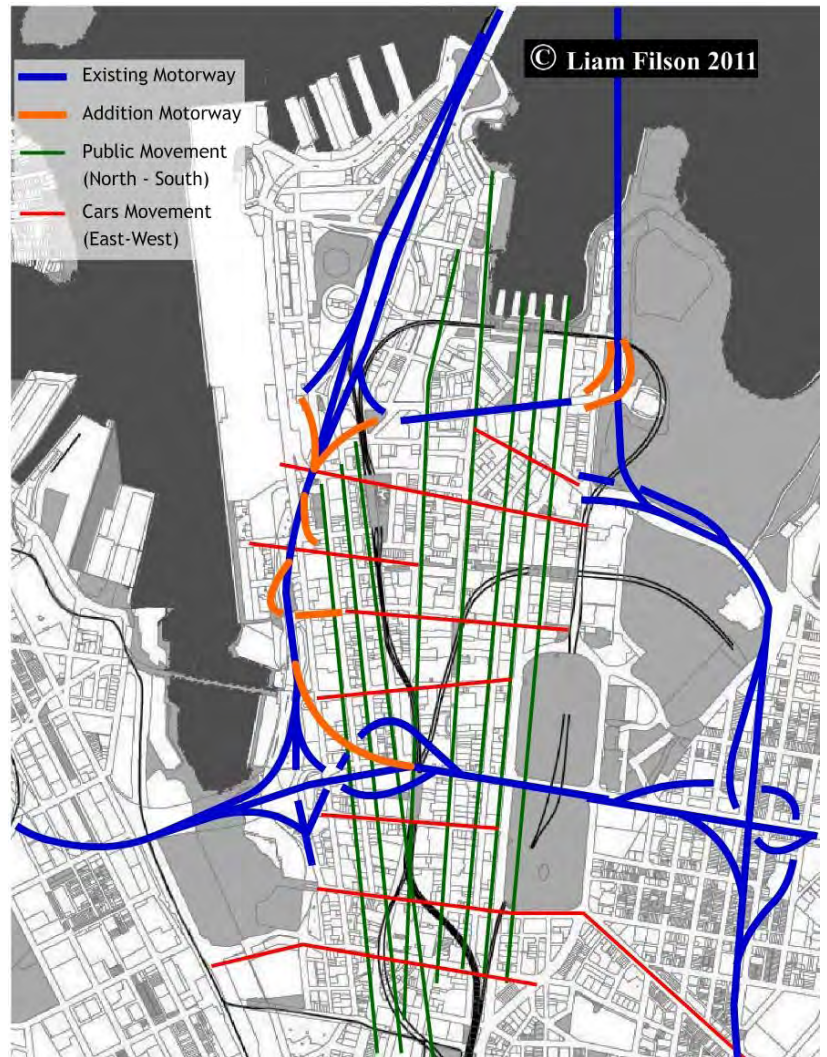
- substantially address Barangaroo's transport needs;
- connect Circular Quay and Barangaroo directly as the future East-West city wharfs;
- make the existing *City Circle* into a quicker alternative to cross-town walking, due to its greater passenger catchment width.



Lines of Motion – Greater City Circle Map

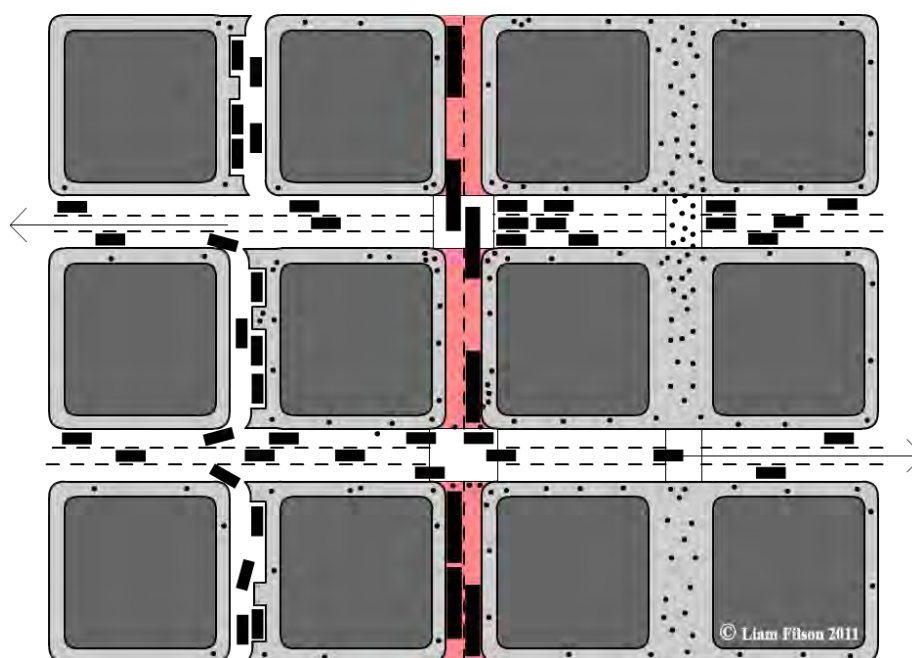
Grid Separation - Reducing Sydney's CBD Grid Lock

Line of Motion proposes grid separation in the city streets of Sydney's CBD. This addresses city gridlock by separating grid lines into private transport in one direction (East-West) and public transport in the other (North-South). Private transport would be channelled via access streets into arteries such as the Western and Eastern Motorways, while maintaining some North-South traffic for access, but limited to one way lanes and one city block of travel. Although this rationale goes against a few of the City of Sydney's 2030 Plan and Gehl Architects report, however by doing so it is in accordance with the majority of the proposals (Sydney 2030 Plan 2008) (Gehl Architects 2007). The benefits of separation would be better access to public transport and public areas, improved safety in the city, better utilisation of the city's motorways and increased throughput of traffic with less street intersections.



Lines of Motion – Grid Separation City Graphic

Lines of Motion – Grid Separation Street Graphic

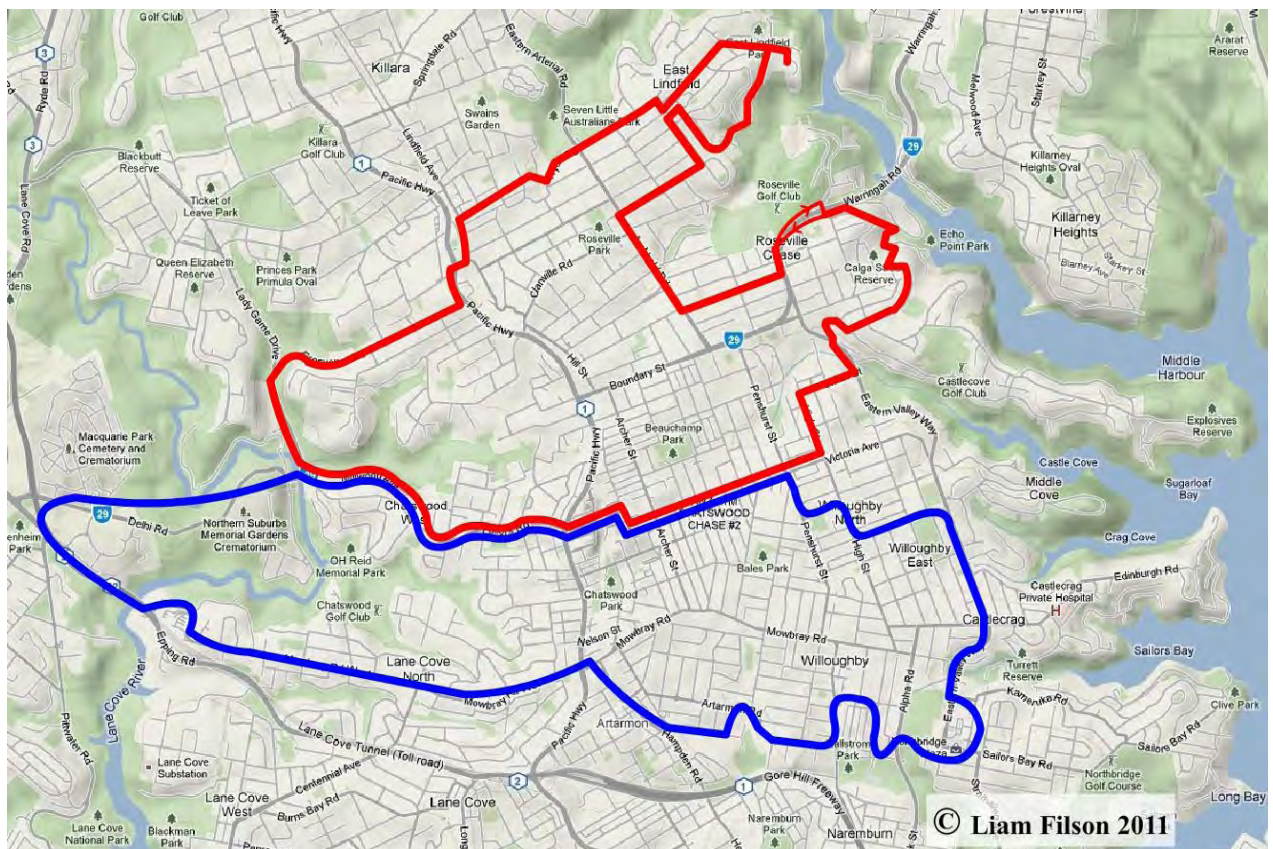


Butterfly Buses – Archetype for District Transport

Local and district transport generally fit into one of two archetypes of local bus routes. Usually the routes spread out from the main node in a spoke-in-the-wheel (star pattern) or a loop around an area. *Butterfly Buses* is a different and new archetype which works with the density and catchment at the local area scale.

The route of *Butterfly Buses* takes the form of a butterfly pattern. The local area's main road would become the 'body' of a butterfly shape with 'wings' that loop out from the 'head' into the surrounding suburbs and return to the 'tail of the body'. These 'wings' form A wing and B wing for the bus route. This configuration captures the maximum number of passengers as well as providing a higher frequency of bus journeys in denser areas. The *Butterfly Buses* pattern is readily understood, user-friendly and more likely to be used because it is a simple shape that a passenger could learn quickly. The *Butterfly Buses* archetype can be applied to most localities, although not all local areas because it depends on the geography of the terrain and the arrangement of the existing road layout.

Another advantage of *Butterfly Buses* is that the pattern links the local area together well, giving it an identity. When combined with other transport routes, almost all local areas could be accessed easily with a straightforward and understandable public transport network. An example where the *Butterfly Buses* pattern would be suitable is Chatswood, Sydney.



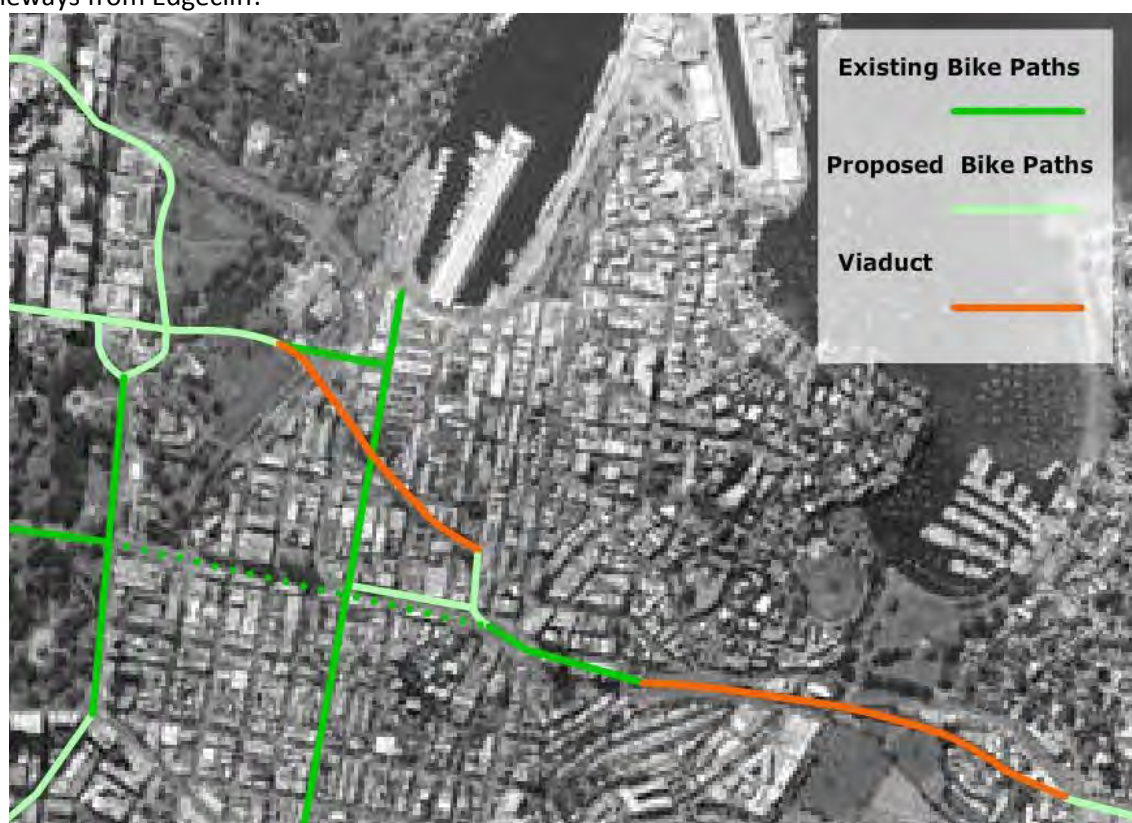
Lines of Motion – Chatswood Butterfly Graphic

Kings Cross High Line - Adaptation of the Eastern Suburbs Cycleway

Cycleways are becoming more popular in the cityscape and are a fast, green connection for commuters which - around the world - is being proven increasingly as quite workable. For example cycleways Copenhagen uses Jahn Gehl's proposals and shows substantial increase in cyclists (Gehl J 2010) The *Lines of Motion* concept is adaptable to the design of cycleways.

The King Cross High Line would be a city walkway and cycleway built on top of the train gantries on the Eastern Suburbs railway viaduct. This would connect two very walkable areas of Sydney. They are the separate locations of the Domain and Kings Cross. This concept is based on the idea in the City of Sydney report 'Woolloomooloo Plan' which suggests a cycleway on top (or hanging along) the viaduct between The Domain and Kings Cross. (City of Sydney 2010)

The *Lines of Motion* concept develops these ideas further to create a walkway with expansive views of the city and harbour and would continue to Edgecliff along the next viaduct. It would reflect the New York High Line Park design (High line, 2010). This connection would be primarily for cyclists as it connects into the King Street cycleways through the Domain and continues onto Bondi Junction cycleways from Edgecliff.



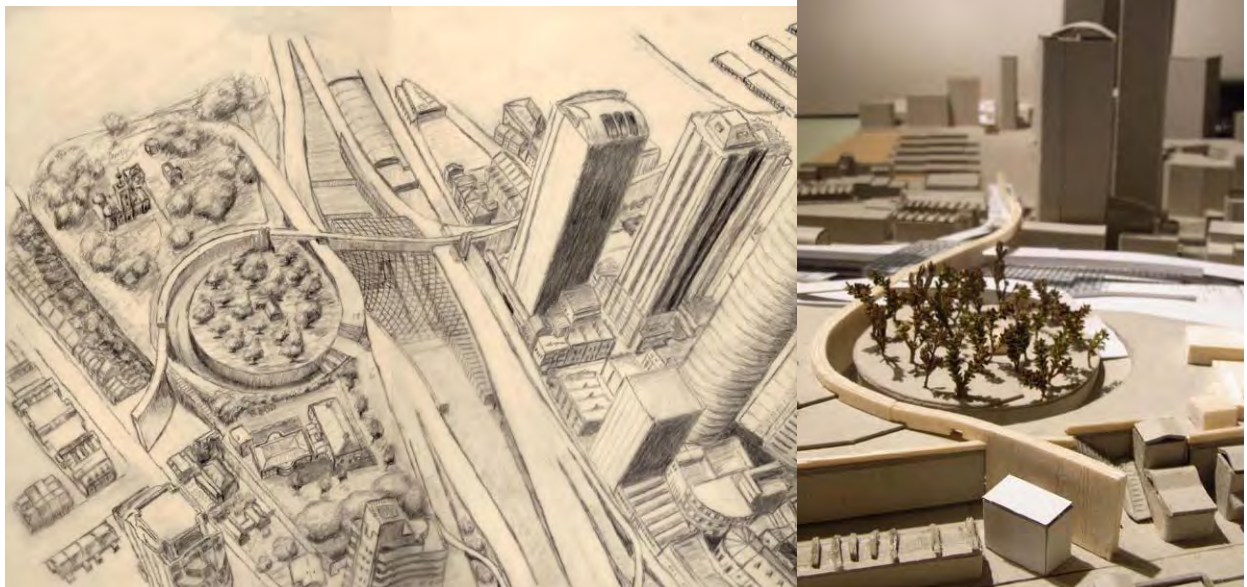
Lines of Motion – City Cycleways Graphic © Liam Filson

M: The Site

The XL and L scales can be approach from smaller aspects such as the site. **Medium (M)** represents a scale which is walkable. It is the scale of the immediate surrounds around the person, so it is the vicinity of the home, work-place or place of interest. This is the scale where commuters get into or onto their selected mode of transport. This scale is critical to allow commuters to be able to approach, or easily interchange between, modes of transport. At this scale, patronage is critical to the next biggest scale to provide the numbers of passengers for the next scale of transport to function well.

Observatory Park - Gateway to the North

The Observatory Park (OP) project is a proposed rail station located at the (now) disused toll gates still located on the Sydney Harbour Bridge. From the greater understanding that has been generated from the concept of *Lines of Motion*, OP would be an ideal location for a transport interchange and a catalyst for a more streamlined public transport system in Sydney's CBD.

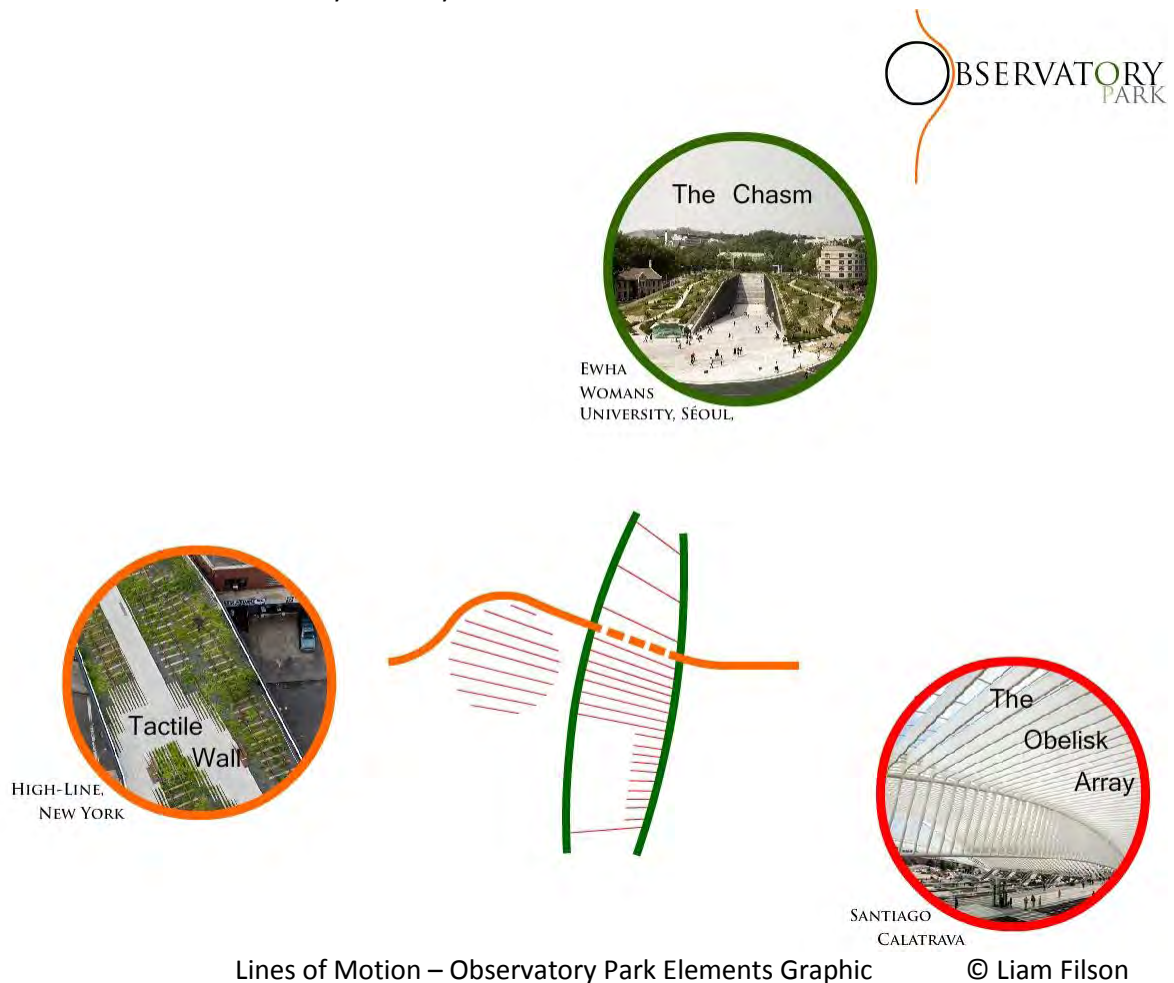


Lines of Motion – Observatory Park Drawing and Photo of 1:1000 Model

© Liam Filson

OP station recreates Bradfield's original 'Gateway to the North' (J.J.C.Bradfield, 1915). The interchange concept is an adaptive reuse of the Cahill Expressway and the bridge toll gates. There are three key elements that define the design:

- **The Tactile Wall** is a single High-line like element to connect East with West, from Circular Quay to Barangaroo (High line, 2010);
- **The Chasm** is a sunken space located in the toll gate area which reveals an underground city in this location. It creates an inclined park that allows continuous uninterrupted flow between platforms;
- **The Obelisk Array** is a unifying grid that symbolically projects from the Obelisk in Macquarie's Park to connect with the city's history.



The design creates a layered and dynamic form via interaction of these three key elements, in the context of Sydney's history and geography. By removing the barrier formed by the current Cahill Expressway across the Quay and resolving the visual resistance it causes now, the architecture would flow more easily, giving an approachability to the harbour and Opera House which is so critical to the greater architectural concept of Sydney.

For full details view the website:
<https://sites.google.com/site/observatorypark/>

North Sydney Park - Taking Back the Land

The North Sydney Park concept would make a land bridge over the motorway between Mount Street and High Street in North Sydney. This would create a green landscape in the heart of North Sydney. This concept reclaims the land taken by the motorway without affecting it, by:

- bringing another park back into North Sydney;
- incorporating access and flow to the Mount Street Mall and North Sydney Station within the *Lines of Motion* transport system;
- streamlining the motorway's on-ramps and off-ramps by becoming a large round-about to allow car traffic to flow;
- creating direct North Sydney access to the Sydney Harbour Tunnel, greatly reducing usage of the Cahill Expressway as the alternative access (Please refer to Observatory Park section);
- integrating the Harbour Link Project into the new parkland to increase walking connections and public use (Harbour Link 2007);
- off-setting the cost of economic options for this design by releasing nearby park lands for development because they are less useful as public green space, being mostly remnants remaining from turning circles for roads.



Lines of Motion – North Sydney Park Graphic

Barangaroo Island Concept - The Adaptive Suburb

The Barangaroo Island concept tackles the issues which might eventuate with Barangaroo South, in regard to transport demand. It would be one method for Barangaroo Central to address this (expected) high usage. Using the *Lines of Motion* concept, it aims to reduce the need for transport by creating a suburb that can semi-support itself, by keeping commuters within the Medium scale. The City of Sydney's study which predicts the current floor space (and therefore commuter traffic) proposed for Barangaroo South is in excess of the transport capacity of the station proposed in *Lines of Motion*: Line 6 (City of Sydney 2010).

This concept is to create a new harbour island. It takes the Lendlease designs for the site with the two bays and strengthens the canal in order to be able to allow for the passage of boats (RSH-P 2009). This physically and physiologically turns Barangaroo Central into an island. The concept adapts this canal and aligns it with continuous buildings on both sides and allows northern sunlight to flow within the canal to create a 'Venice-like' ambience.

The continuous buildings are set behind Globe Street in the winning Hill Thalys design and are a grid which is broken down into structurally separated modules, reminiscent of the row houses in the area (Hill Thalys 2006). This allows for the building to be changed for varying needs and re-designed by many architects over time to break away from the monotonous. However keeping a strict code in order for the use of buildings to be easily converted between offices and apartments, would allow the suburb to be adaptive within the height limits set by the Hill Thalys design (Hill Thalys 2006).

The Barangaroo Island concept raises 'ground level' by two stories on the 'island' to create a park in front of the continuous buildings. This avoids the issue of digging out too much contaminated soil on the site because space underneath this park could provide parking (City of Sydney 2010). Other considerations here are soil depth for tree roots as well as direct truck access to the waters edge so that the international shipping terminal can remain on the site.



Lines of Motion – Barangarpp Island Graphic

S: The Person

The XL, L and M scales can be approach from the **Small (S)** scale. **Small (S)** represents the person, an individual, or us. The smallest component in the flow of a city is the fundamental unit on which everything is based. Wherever people choose to live together, it is the manner in which they move around their city, that dictates how a city with grow and develop.

This small scale is not something which can be designed definitively because people are who they are. Nevertheless, this scale is useful to study for the patterns and habits which it reveals and might be used at larger scales. *Lines of Motion* discerns patterns of movement and many of the hidden paths are discovered from studies of the small scale.

Conclusion

In conclusion, *Lines of Motion* is an urban design intervention which adapts the flows of a city and connects them to bring the metropolis closer together and to find connections that were already there, hidden away, and make them into clear and connected pathways. *Lines of Motion* is ready to learn from past examples and create a transport system which is intended to be beneficial for the well-being of the city population which uses the system. The funding mechanism to achieve this might be through the government or via a Public Private Partnership. By not focusing on the mode of transport, a city can create a holistic system with the users of all the city's existing infrastructure - irrespective of whether it is a car, train, bus, ferry, bicycle or walking. The transport system utilises the lines of motion that define transport routes around a cityscape and can be the catalyst which creates the sense of 'place' in a city. As the concept steps through the scales, this 'place' can be a sense of self (S), a sense of home (M) a sense of community (L) and a sense of city (XL).

XL: The Hidden Paths of Sydney (Lines 1 to 14 and Express Lines A to E)

Numbered Lines

Line 1 - The City Ring - (City-Airport-Liverpool-Blacktown-Chatswood-City)

Heavy Rail (76% existing)

Please refer to the featured explanation in the City Ring - Epping to Blacktown Link section.

Line 2 - Inner City Ring - (City-St Leonard's-Ryde-Parramatta-Strathfield-City)

Metro Train or Heavy Rail (~55% existing)

Line 2 works in conjunction with Line 1 to pickup the inner city areas as a secondary ring line. The line goes from Parramatta, Strathfield, Central via current tracks. It then returns the Ring via the North Shore line to St Lennard's then going underground in new track to Lane Cove, Lane Cove Business Park to Top Ryde. From there it follows the Metrobus M52 route along Victoria Rd to West Ryde, North Parramatta and Parramatta (Metrobus 2011). This creates a link between all the other lines which cross it so the other lines are more networked.

Line 3 - City Bypass - (Newcastle - Nowra)

Heavy Rail (~90% existing)

Line 3 works in conjunction with Line 4 and the Line 1 and 2 ring lines as an overall network. It is a city bypass as it brings commuters inform other cities without going through the city to reduce clogging up the track. This line is a two-staged line - that is a line that has two trains 3: Newcastle - Nowra and 3: Hornsby - Sutherland. The line goes from Newcastle to Hornsby, via existing tracks, is continues to Strathfield via existing tracks, then continues underground on new track to Campie, Bexley North and Hurstville, connecting all the crossing lines, then continuing to Sutherland and on to Nowra via existing track (CityRail 2011).

Line 4 - City Cross - (Sutherland - St-lives on to Mona Vale & Hornsby)

Monorail, Light Rail, Bus or a combination (100% existing road route)

Line 4 works in conjunction with Line 3 and the Line 1 and 2 ring lines as an overall network. It works together with Line 3 to create the cross in the heart of the city. This line is a two-staged line - that is a line that has two trains 4: Padstow - Hornsby and 4: Sutherland - Mona Vale, sharing between Padstow and St-lives. The line starts from Sutherland to Padstow via Bangor Bypass and Alfords Point, Road. At Padstow the line is joined with the other service and continues on to

Bankstown via Ring Road 6. The line then continues through Olympic Park via Lidcombe on existing track (CityRail 2011). Then on to Rhodes, Top Ryde, Macquarie Park, Gordon and St-lives via Ring Road 3. The line splits, where one service continues along Ring Road 3 to Mona Vale, and the other turns long Killeaton Street / Burn Road / Junction Road to Hornsby.

Line 5 - (Bayveiw & Pitwater to Mona Vale - Maroubra Junction on to Cronulla & La Pouse)
Light Rail (~95% existing road route and some tunnels)

Line 5 is a coastal line, its a little separate to the rest of the network due to the topology of the coast line. Line 5 brings the Northern beaches and Eastern suburbs into the greater network with a multi-stage line made up of three services, 5: Pittwater - Cronulla; 5: Bayview - La Pouse; and an express services 5: Mona Vale and Maroubra Junction. The latter is the shared section. The line starts as a Y-line from both Bayview to Mona Vale via Pittwater Road and from Pitwater to Mona Vale via Barrenjoey Road. The express two-stage service starts at Mona Vale and all three services continue together along the L90 bus route to North Sydney via Pittwater Road, Condamine Street, Military Road, Warringah Freeway (Department of Transport 2011). From there it would also cross the Sydney Harbour Bridge using the Independent Public Inquiry ideas from Line 1 and use the old tram platforms in Wynyard Station and continue underground to Pitt Street Mall (Independent Public Inquiry 2010) (J.J.C.Bradfield 1915). Then it would utilise the never-used train platforms in St James Station and those down in the old Bradfield tunnel along Oxford Street (J.J.C.Bradfield 1915). The line would go through Surry Hills and partly follow the route of the North West Metro/Anzac Railway Line/CBD Metro, as well as a variation of the Ecotransit's Bay Light Express (Department of Transport 2011) (Ecotransit, 2010). Next it would connect into the ANZAC Rd / Alison Rd bus-way to Randwick Racecourse and back to ANZAC Road via Ascot Street. The line then follows ANZAC Rd to Maroubra Junction. This is the express service terminus, however the other two split there. One line would continue along ANZAC Road to La Pouse and the other would go to the Airport via Wentworth Avenue. Finally this line continues along The Grand Parade, President Avenue, Taren Point Road and Kingsway to its terminus at Cronulla.

Line 6 - (Cronulla - Campbelltown via City)
Metro (~70% reuse of heavy rail tracks)

Line 6 is a metro line in the true sense, with a metro style train. This line uses mostly existing heavy rail tracks to operate a fast and light metro train (CityRail 2011). The line goes from Campbelltown to Cabramatta, Regents Park and Lidcombe on existing track (CityRail 2011). It then follows the Olympic Park track and takes the proposed CBD West Metro Line to Central (Department of Transport 2011).

It then becomes the *Greater City Circle* (as described in the paper) following the city's western side underground Chinatown, Darling Harbour, Barangaroo and on to Circular Quay where it follows the existing line back to Central (CityRail 2011). The line then continues via the current Illawarra Line to Hurstville and continues on new track to Sutherland via Sylvania Waters (CityRail 2011). It terminates at Cronulla via existing track (CityRail 2011).

Line 7 - (Rouse Hill - Liverpool via City)

Light Rail (~40% heavy rail tracks and ~20% T-ways)

Line 7 allows for an integration of the North West T-Way with the Carlingford Line to link Paramatta directly to Epping as well as linking Bondi Junction with the University of NSW and the main train lines. The line goes from Rouse Hill to Paramatta, via the North West T-Way, and then continues along Hassall Street to connect to the Carlingford Line and continues to Carlingford, then along Carlingford Road to Epping (Transitway, 2011) (CityRail 2011). It continues to the city via Top Ryde. From Epping it follows Epping Road, through Macquarie University and down Waterloo Road, connecting to the shopping areas and business parks. Continuing along Wicks Road to Top Ryde it follows Victoria Road to the City, going through the future developments of the White Bay area and over the old Bank Street bridge, as a tunnel into the current Eastern Suburbs/Illawarra Line at Town Hall, see Lines 6 for reconnection details (CityRail 2011). The light rail uses the train line to Bondi Junction and continues to Coogee via the coast. From here it continues to University of NSW and via Gardens Rd to Sydenham Station in a different alignment to the Ecotransit's Coogee Light Rail (Ecotransit 2010). From there the line uses the Bankstown Line to Bankstown continuing mostly via the Metrobus M90 route along Chapel Road, Milperra Road and Newbirdge Road passing Bankstown Airport and terminating at Liverpool (CityRail 2011) (Metrobus 2011).

Line 8 - (Hornsby - Watsons Bay)

Light Rail or a combination with Heavy Rail (~50% heavy rail tracks)

Line 8 connects the East with the North with light rail. The line goes from Watsons Bay to Bondi via Old South Head Road and Military Road. It then follows Bondi Road to Bondi Junction where it follows the Metro M40 route along Oxford Street to the CBD (Metrobus 2011). It takes Elizabeth Street through the city and Hunter St/Margaret St to Barangaroo. From there it follows Hickson Road to the Wharf Theatre and uses a ferry to transport the tram across the harbour following the Billy Blue's ferry route (Warne C 1984). From there the tram continues on the other side up Blues Point Road, Miller Street, Sailors Bay Road, Alpha Rd, Mowbray Road, Archer St and Albert Ave to Chatswood Station. From there it continues as an All stops service to Hornsby via the North Shore line as a heavy rail or a continuation of the light rail. Line 13 runs as the express in this section (CityRail 2011).

Line 9 - (Watsons Bay - Barangaroo and on to Darling Harbour & Iron Cove)

Ferry (100% existing wharf, expect Barangaroo)

Line 9 is a tourist and express ferry, connecting all the main parts of Sydney Harbour. The line is a Y-line - that is two lines that share a large amount of the main lines and then separate. The two lines are 9: Watsons Bay - Darling Harbour and 9: Watsons Bay - Iron Cove. The line goes from Watsons Bay to Taronga Zoo to interchange with Line 11, then on to Fort Denison, Circular

Quay, Luna Park and Barangaroo. The line then splits, one line to Darling Harbour and the other continuing on to interchange with Lines 12 and 13 on Cockatoo Island finishing at Iron Cove.

Line 10 - (Chatswood - Malabar Beach)

Light Rail and Ferry (100% existing roads, light rail, train corridor and wharves)

Line 10 links the Manly ferry into the greater city with existing and proposed concepts. The line goes from Chatswood Station to Manly Wharf as light rail via Archer St, Boundary Street, Warringah Road, Beacon Hill Road and Pittwater Road. Continuing as the Manly ferry to Circular Quay and along George Street as the City of Sydney proposed light rail to Central (Sydney 2030 Plan 2008). It connects into the exist light rail to Lilyfield and the proposed light rail to Dulwich Hill (Department of Transport 2011). From there it takes part of the Ecotransit's Coogee Light Rail via the cargo train easement, all the way to Port Botany and on to Malabar Beach via Perry Street /Franklin Street (Ecotransit, 2010).

Line 11 - Harbour Circle- (Circular Quay - Rose Bay)

Ferry (100% existing wharf)

Line 11 is a ring line which circles Sydney Harbour as a ferry, breaking the star-type ferry system to allow people to travel around the harbour instead of to and from the city (Sydney Ferries 2011). The line goes from Circular Quay to Kirribilli stopping at all wharves to Taronga Park Zoo, an interchange with Line 9 for direct service to the city. It travels across the harbour to Rose Bay via Shark Island and stops at all wharves back to Circular Quay.

Line 12 - (La Perouse - Blacktown and on to Richmond or Bathurst)

Heavy Rail, Ferry and Bus (100% existing roads, wharves and heavy rail)

Line 12 connects the Blue Mountains and the Parramatta River into the city fabric. The line is a Y-line - that is two lines that share a large amount of the main lines and then separate in the outer suburbs. The two lines are 12: La Perouse - Richmond and 12: La Perouse - Bathurst. Starting from both Bathurst and Richmond the line follows existing train track to Blacktown to continue together to Parramatta as a non-stop express on existing separated track (CityRail 2011). From here it becomes a lower capacity line with the same frequency to line up services. The line becomes the local transport of the Parramatta CBD with a bus from the station to the wharf. From there the line becomes a ferry, similar to the Parramatta Ferry, stopping at all wharves, interchanging with Lines 9 and 13 Cockatoo Island before becoming an express to Barangaroo (Sydney Ferries 2011). The line becomes a bus to Sydney University via the Western Distributor, Chinatown, Pier Street, William Henry Street, Bay Street. From there it connects to University of NSW via King Street, Sydney Park Road, Bourke Road, O'Dea Avenue, Todman Avenue and ANZAC Parade. The line then continues to La Perouse via Bunnerong Road.

Line 13 - (Leppington - UNSW Via Hornsby)

Light Rail, Ferry and Bus (100% existing T-ways, roads, wharves and heavy rail track)

Line 13 is a line which orbits the city and connects the other lines together. The line starts as a light rail from Leppington to Glenfield following the South West railway line, continuing to Liverpool via Hume Highway and along the T-way to Parramatta (Department of Transport 2011) (Transitway, 2011). From there it follows the Metrobus M60 route, as a light rail to Pennant Hills via North Parramatta, Baulkham Hills and Castle Hill (Metrobus 2011). From there it follows roads along the railway line to Hornsby. From Hornsby it runs as the express service to Chatswood with Line 8 running as an All stops, either as heavy or light rail (CityRail 2011). It then continues as light rail or a 'bendy' bus to Lane Cove Business Park via the Pacific Highway, Epping Road and through the Business Park to the Wharf at the end of Mars Road. From there it becomes a ferry, stopping at all wharves down the Lane Cove River, interchanging with Lines 9 and 12 on Cockatoo Island before it continues to Rozelle Bay via Balmain Wharves, Barangaroo and the Sydney Fish Markets. From there the line becomes a bus to Sydney University via Glebe Point Road and on to University of NSW via Cleveland Street, Anzac Parade, Alison Road, Avoca Street and High Street.

Line 14 - (Richmond - Panania)

Bus (100% existing roads)

Line 14 is a bus to connect areas missed by the larger or main lines. The line goes from Richmond to Rouse Hill via Windsor. It continues along Windsor Road to Baulkham Hills, Barclay Road to North Rocks and via North Rocks Road and Ray Road to Epping. The line then takes Blaxland Road to Top Ryde and then on to Putney Punt - Mortlake Ferry via Morrison Road and Pellisier Road. On the other side of the Parramatta River the bus continues to Burwood along Hilly Street, Majors Bay Road and Burwood Road. It then follows the Hume Highway to Bankstown and on to Bankstown Airport via Marion Street. It travels through the airport to interchange with Line 7 on Milperra Road and continues to University of Western Sydney and Panania via the main roads.

Lettered Lines - Express Lines

Line A - Western Express - (Central - Blacktown and on to Penrith & Richmond)

Heavy Rail (80% existing separate track)

Line A is an express Y-line, A: Central - Penrith and A: Central - Richmond. The line is an express service to Parramatta and onto Blacktown, splitting and continuing to Penrith or Richmond. This follows the existing express tracks to Blacktown with duplication needed to Richmond and past St Marys to Penrith (CityRail 2011).

Line B - City Ring Express - (City-Epping-Blacktown-Eastern Creek-Liverpool-Wolli Creek-City)
Heavy Rail and Freeway Bus (~30% existing heavy rail separate track, ~30 existing separate bus lane)

Line B has the same ring concept as Line 1. The express line is from Central Station to Wolli Creek and along the East Hills line using existing, or soon to be completed, duplication. It then continues the short distance to Liverpool with new track. It continues as a freeway bus along the the T-way to the M7 at Hoxton Park (Transitway, 2011). The line continues along the M7, M4 (passing Eastern Creek) and then turns off at Reservoir Road to Blacktown Station. From here the line go along the T-Way Sunnyholt Road T-Way to the M2, looping out to connect with Epping Station, but staying on the motorways to the city (Transitway, 2011). The bus stops at Observatory Park (See Observatory Park section) and becomes a city bypass express on the Western Distributor to Central, completing the ring.

Line C - City Bypass Express - (Newcastle - Nowra)
Heavy Rail and Freeway Bus (~90% existing heavy rail track, ~10% separate track)

Line C follows the same route as Line 3, but runs as an express service to bring commuters from Newcastle and Wollongong into the city via Strathfield Interchange. This frees up train track in the CBD to provide better flow.

Line D - Inter City Express - (Canberra - Rouse Hill via Campbelltown & City)
Heavy Rail and Freeway Bus (~90% existing heavy rail track, ~10% existing T-way)

Line D connects Canberra to Sydney with a high speed rail connection. This has been proposed in theory for many years along a similar route. This also allows Canberra Airport to become Sydney's second airport with 50 minute travel time between Canberra Airport and Wolli Creek, which would become part of the airport complex (Sydney Morning Herald 2009). The line is from Canberra to Campbelltown along the existing corridor. It continues to Central via the East Hills line, Wolli Creek and Sydenham. The line then continues to Rouse Hill as a freeway bus along the Western Distributor, M2 and North West T-Way (Transitway, 2011).

Line E - (Hurstville - Castle Hill)
Heavy Rail and Freeway Bus (~50% existing heavy rail separate track, ~20% existing T-way)

Line E is from Hurstville to Central along the existing express route, Wolli Creek, Sydenham, Central (CityRail 2011). The line continues to Castle Hill as a freeway bus along the Western Distributor, M2 and Old Northern Road.

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Urban Informatics, Ubiquitous Computing and Social Media for Healthy Cities

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ABSTRACT: *The increasing ubiquity of digital technology, internet services and location-aware applications in our everyday lives allows for a seamless transitioning between the visible and the invisible infrastructure of cities: road systems, building complexes, information and communication technology, and people networks create a buzzing environment that is alive and exciting. Driven by curiosity, initiative and interdisciplinary exchange, the Urban Informatics Research Lab at Queensland University of Technology (QUT), Brisbane, Australia, is an emerging cluster of people interested in research and development at the intersection of people, place and technology with a focus on cities, locative media and mobile technology. This paper introduces urban informatics as a transdisciplinary practice across people, place and technology that can aid local governments, urban designers and planners in creating responsive and inclusive urban spaces and nurturing healthy cities. Three challenges are being discussed. First, people, and the challenge of creativity explores the opportunities and challenges of urban informatics that can lead to the design and development of new tools, methods and applications fostering participation, the democratisation of knowledge, and new creative practices. Second, technology, and the challenge of innovation examines how urban informatics can be applied to support user-led innovation with a view to promote entrepreneurial ideas and creative industries. Third, place, and the challenge of engagement discusses the potential to establish places within cities that are dedicated to place-based applications of urban informatics with a view to deliver community and civic engagement strategies.*

Keywords: *urban informatics; urban computing; mobile applications; real-time city; community engagement*

Introduction

Local governments have been seeking new strategies to move from a model of passive community consultation to modes of active community engagement. Technology innovations such as urban informatics, social media, ubiquitous computing, mobile applications, and location based services, open up new opportunities for engaging people in critical thinking, green initiatives, and creative practices, in order to create healthy cities.

This paper introduces urban informatics as a transdisciplinary practice across people, place and technology that can aid local governments and their partners to create responsive and inclusive public spaces in the context of modern knowledge economies. Focussing on new urban spaces as examples this, the goal of this paper is twofold: theoretical and empirical. The first part discusses three challenges:

- a. *People, and the challenge of creativity*: The paper explores the opportunities and challenges of urban informatics that can lead to the design and development of new tools, methods and applications fostering participation, the democratisation of knowledge, and new creative practices.
- b. *Technology, and the challenge of innovation*: The paper examines how urban informatics can be applied to support user-led innovation with a view to promote entrepreneurial ideas and creative industries.
- c. *Place, and the challenge of engagement*: The paper discusses the potential to establish sites within urban spaces that are dedicated to place-based applications of urban informatics with a view to deliver community and civic engagement strategies.

The discussion of these challenges is illustrated by a review of projects as examples drawn from diverse fields such as urban computing, locative media, community activism, and sustainability initiatives.

Urban Informatics

As both technology and technological practice evolve in turn, human-computer interaction (HCI) has expanded its focus from the design and assessment of particular interaction styles to encompass the role that interactive systems play in connecting people with their world. The focus of HCI is no longer grounded by the notion of people stationarily moored to a fixed desktop computer in an organisational context. Rather, people are constructed as fluid and mobile interacting with technologies in different environments and across a broad range of contexts.

Urban informatics² deals with the processing of information particularly via network technologies, which comprises a wide range of urban constituents from the overall configuration of the city (such as the control and monitoring of resources through sensor networks) to the individual's day-to-day interaction with technologies (such as mobile social media and location-based services). While urban informatics shares similarities with pervasive or ubiquitous computing, it focuses specifically on urban (and peri-urban) contexts as the site of enquiry. Urban informatics takes a transdisciplinary approach to understanding the city as an ecology that consists of technological, social, and architectural layers.

²Founded in 2006, the Urban Informatics Research Lab is a dynamic and fast growing team working across research and development at the intersection of people, place and technology with a focus on social media, ubiquitous computing and mobile applications. The lab is transdisciplinary in that it comprises and collaborates with architects with degrees in media studies, software engineers with expertise in urban sociology, human-computer interaction designers with a grounding in cultural studies, and urban planners with an interest in digital media and social networking. Being hosted by the Creative Industries Faculty, and specifically the cross-faculty research *Institute for Creative Industries and Innovation* at QUT enables the lab's projects to embrace the creative energy of a range of disciplines across design, performance, production and writing.

Following on from the remarks about urban informatics in the preface to the *Handbook of Urban Informatics*(Foth, 2009), we have now defined urban informatics as,

“the study, design, and practice of urban experiences across different urban contexts that are created by new opportunities of real-time, ubiquitous technology and the augmentation that mediates the physical and digital layers of people networks and urban infrastructures.” (Foth, Choi, & Satchell, 2011, p. 4).

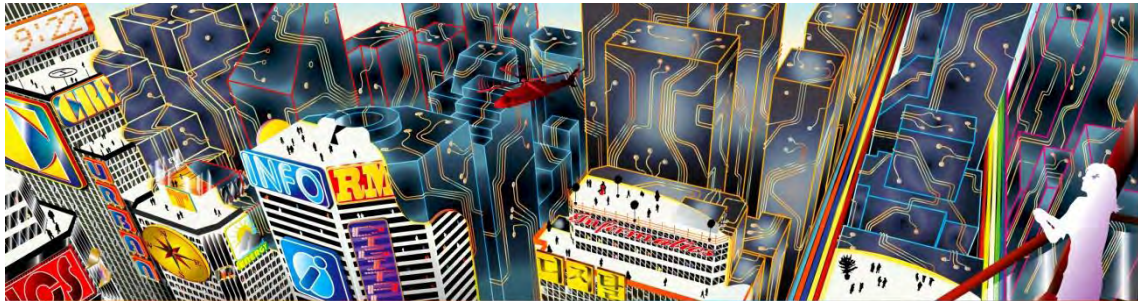


Figure 1: An artwork commissioned by the Urban Informatics Research Lab to illustrate the physical and digital layers of the city

In addition to the term ‘urban informatics,’ one of the most prominent descriptors is ‘urban computing.’ However, with its narrow focus on technology, it falls short of adequately representing the triad of people, place, and technology that makes up urban informatics research, specifically the human element: people, citizens, urban residents, city dwellers, urbanites. ‘Informatics’ with its implied reference to information systems and information science shifts the attention – away from the hardware and more towards the qualitative aspects of information exchange, communication and interaction, social networks, and human knowledge and creativity. Hence, urban informatics is concerned with the impact of technology, systems and infrastructure on *people* in urban environments. This conceptualisation resonates with Mumford’s (1934) use of the term ‘technics’ (as opposed to technologies), highlighting the active interplay between technological and social domains – or techno-social development – rather than a purely socially or technologically deterministic approach to understanding urbanisation processes and their impact on society.

Concrete examples of the outputs of the Urban Informatics Research Lab demonstrate the contributions that academic research can make to social agendas:

- **EnergyWiz:** A smart phone application to monitor and help reduce domestic energy consumption through different behavioural strategies such as serious games, comparative feedback and benchmarking.
- **Discussions in Space:** A multi-platform civic engagement application allowing city residents to participate in urban planning consultation processes via public screens, SMS, twitter and the web.

- **FixVegas:** A smart phone application that enables users to take photos of broken city assets and submit maintenance requests to local government authorities.
- **Sapporo World Window:** An interactive public screen based application that allows people to share their creativity and knowledge about places around Sapporo, Japan.
- **Dispo Maps:** A smart phone application that enables users to share their location ad hoc and temporarily with others, and then “dispose” of their location sharing data to protect privacy.
- **Capital Music:** A system that allows people in public places to publish their music and song choices.
- **PlaceTagz:** A location-based service based on QR codes that allows people to leave comments and feedback in space by anchoring the content to longitude and latitude coordinates.
- **StoryTrails:** An engaging e-book reader for smart phones that only releases chapters of a book when the reader is at specific locations that the author specified.
- **HistoryLines:** A Google Map mash-up application that visualises a residential community’s migrational history and memory and allows for the sharing of experiences and encounters.

Within the last decade, interest in urban informatics research and development has increased in parallel with the heightened urgency and immediacy of key trends in the three core areas of influence, that is, across *people*, *place*, and *technology* domains in urban environments. The following section addresses three key intellectual challenges in each of the areas of scholarship of people, place, and technology that will now be discussed in turn.

People, and the Challenge of Creativity

The urban environment is increasingly conceptualised as a complex techno-social network. The city, however, only meaningfully exists when it is occupied by a sustained stream of people. In this sense, people are the core of the city.

Google Maps and Google Earth are examples of a trend towards Geographical Information Systems (GIS) and related tools that can be used by lay persons and non-experts without intensive training. Di-Ann Eisnor of Platial Inc. coined the term ‘neogeography’ to describe the notion of a “geography without geographers” (Sui, 2008). This new trend describes tools and services that allow non-geographers to use advanced GIS. Similarly, our previous research work identified potential for the emergence of a ‘neo-planning’ paradigm in which urban planning is aided by the active engagement of everyday citizens enabled by social media and new technology (Foth, Bajracharya, Brown, & Hearn, 2009; Mallan, Foth, Greenaway, & Young, 2010; Schroeter & Houghton, 2011).

Both neogeography and neo-planning are examples of what Beer and Burrows (2007) describe as the emergence of a new rhetoric of democratisation, specifically the democratisation of knowledge. From individuals to collective entities, people are increasingly presented with new opportunities to participate, engage, and make their voice heard on a variety of issues. The proliferation of blogs and social networking sites such as *Facebook* and *Twitter* proves that media 'produsage' – referring to the convergence of production and usage as evidenced in the rise of user-led content creation (Bruns, 2008) – is becoming part of everyday social interactions. Individuals concurrently exist as constitutive nodes and users of the city as a network. Hence concepts such as *communicative ecology* – which refers to the technological and social context in which communication processes occur (Hearn, Tacchi, Foth, & Lennie, 2009) – and *network sociality* (Foth, Choi, Bilandzic, & Satchell, 2008) are pivotal to understanding urban processes today.

Many examples of how participatory culture is enabled by recent technological innovation rely on so-called 'Web 2.0' applications and services such as blogs, *Wikipedia*, *YouTube*, *Flickr*, and social networking sites such as *Facebook*, which are arguably more open, collaborative, personalisable, and therefore participatory than the previous Internet experience. According to Kolbitsch and Maurer (2006), the participatory qualities of Web 2.0 encourage ordinary users to make their knowledge explicit and help a collective intelligence to develop. As Shirky (2008) observes, "here comes everybody" – by creating and leveraging collective intelligence via ICTs, the means to engage in participatory culture are no longer limited to the technically versed or the civically inclined. Scholars such as Jenkins (2006) and Burgess, Foth et al. (2006) have identified socio-technical trends towards a wider, 'vernacular' ability of people to participate in digital culture through new expressions of creativity. The implications for citizenship, and cultural citizenship, only start to be realised now. In an urban context, we have argued that vernacular expressions of creativity present diverse possibilities for network socialities to form and for a profound urban epistemology to emerge (Foth, et al., 2008; Foth, Odendaal, & Hearn, 2007).

Two examples will be discussed to illustrate the argument.

Creative Environments for Collaboration and Innovation

The first example looks at the impact of new technology and new technological practices and possibilities on work environments. Laura Forlano's research started off by examining local area wireless networks in New York and other cities around the world (Forlano, 2009). This work led to her more recent interest in the role of information technology in supporting open innovation networks in urban environments with a specific emphasis on the use of mobile, wireless and ubiquitous computing technologies to support collaboration.

Forlano and colleagues contributed “Breakout!” to the 2009 exhibition “Toward the Sentient City” (<http://www.sentientcity.net>) curated by Mark Shepard and organised by the Architectural League of New York (Townsend, Forlano, & Simeti, 2011). They describe Breakout! as:

a festival of work in the city, that explores the dynamic possibilities of a single question: what if the entire city was your office? Drawing inspiration from the shared office spaces of the co-working movement, Breakout! creates alternative venues for collaborative work outside of traditional office buildings by injecting lightweight versions of essential office infrastructure into urban public spaces.

Originating in Lower Manhattan, Breakout! explores the potential of public plazas and parks throughout the Financial District to serve as gathering points for workers from throughout the city. From this hub, organizers fan out across the city, bringing satellite “breakout sessions” to diverse public locations. During the second half of Breakout! our growing social network will “breakout of Manhattan,” by turning transit into workspaces as we travel to co-working hubs throughout the region – in Westchester, Brooklyn, New Jersey and Philadelphia.

Every Breakout! session provides three sets of tools to help office workers escape dull cubicles and conference rooms and re-locate their work in public settings:

- Lightweight infrastructure – chairs, tables, electrical power and wireless Internet
- Social software – a web portal accessible locally and remotely for scheduling sessions, seeing who’s there, and recording their social media produced during sessions.
- Facilitator’s guides – An automated help system that will provide cues and information for session facilitators to help jumpstart collaborations and sharing, to create value and a novel work experience that takes advantage of public spaces.

Breakout! is a useful example that demonstrates how social networks and the communication and interaction applications and devices used to support these networks bring about new forms of collaboration that have the potential to spur creativity. Adkins et al. (2007) termed these cross-disciplinary, cross-organisational linkages, “ecologies of innovation.” Forlano (2012) summarises the contribution that new situated mixed-media initiatives such as Breakout!, but also for example, “Jelly” (<http://workatjelly.com>, see Figure 2) deliver, as follows:

Building on the experience of co-working communities, Breakout! sought to stage mobile work and co-working activities in public spaces in order to reintegrate these practices into everyday life with a belief in the potential to spur creative thinking, build new networks and take advantage of New York’s natural demographic diversity. Citizens and passersby were believed to be both participants and observers in an ongoing experiment in mobile work and peer production. By considering factors such as the interplay between people, places, and technologies, the team believed that it was possible to improve individual experiences and group interactions as well as create new modes of collaboration and innovation.



Figure 2: Jelly ActionHack #26 meet-up 27 March 2011, Brisbane. Photo by Nigel: twitter @nr99

Creative Engagement of Youth in Local Planning

The Urban Informatics Research Lab conducted a study in collaboration with a local government body that included an exploratory workshop with a group of high school students using the virtual reality environment *Second Life* as a planning tool for designing a community space as part of an urban redevelopment project. The project was part of a larger study that investigated the way narrative and creative practice can be utilised in community engagement activities and realized in design ideas. The primary aim of the workshop was to trial *Second Life* as an immersive virtual world for stimulating the creativity of students in learning design and communication skills through play (Foth, et al., 2009; Mallan, et al., 2010).

The local government was redeveloping a site that was formerly used as a timber mill. The vision for the new site was 'to develop and sustain facilities [...] for present and future generations of the community with balanced consideration to history, culture, education, arts and economics.' The master plan of the site proposed the development of a new library building, as well as the renovation of heritage-listed buildings that formed part of the timber mill precinct. The building of a former butter factory, which has been redesigned as a performing arts centre, is also in close proximity to the site and forms part of the overall precinct.

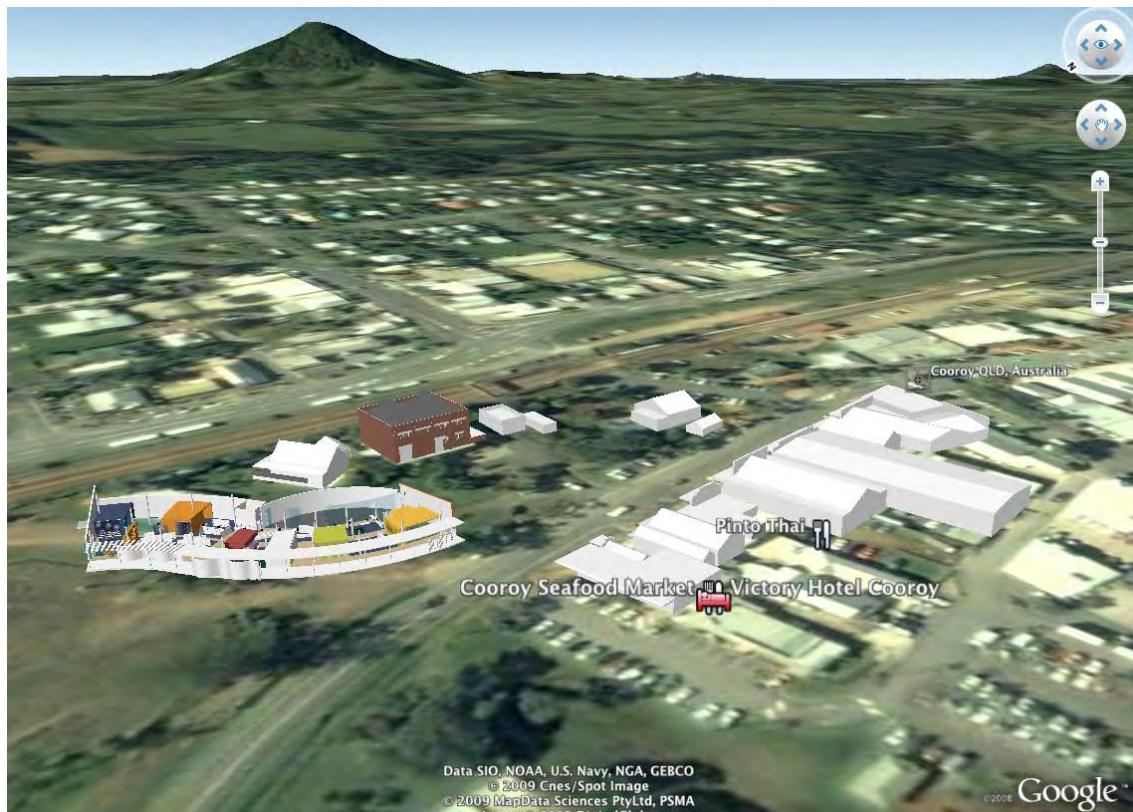


Figure 3: The model of the new library building was locally embedded in Google Earth

The study was interested in exploring new ways to engage diverse and traditionally under-represented sections of the local community, such as young people. The objective of our workshops with 20 middle school students, aged 13-15 years, was to experiment with Second Life as an interactive tool to allow them to participate in the project and contribute creative ideas and feedback for the planned development.

In preparation for the workshop, we re-constructed the precinct in its pre-development stage on a stand-alone Second Life 'island.' The class was equipped with twenty laptop computers that connected to this island. In order to give the students a sense of the spatial and other physical features of the precinct, we accompanied them on a half-day excursion to the site where they were encouraged to explore – the creek, the recently cut down camphor laurels, the woodworkers' house, the butter factory and the restored mill – to take photographs of things that interested them.

Following the half-day excursion, we began the workshop with using Google Earth to allow the students to explore the area in a more photo-realistic environment. We uploaded a 3D SketchUp rendering of the proposed library building to illustrate certain qualities of a virtual environment

(Figure 3). After an initial training phase to familiarise themselves with the avatar controls that the Second Life client offers, students were asked to brainstorm creative ideas about both the current and intended usages of the three main precincts (timber mill; butter factory arts centre; library). We then focused on the outdoor areas and the greenbelt in the centre of the site, and students were asked to identify ideas and opportunities for how this space could be utilised to enhance the user experience of each of the three elements of the precinct. The class was then divided into three groups representing each one of the three sites, and each group was asked to vote on their favourite idea that was then constructed on-the-fly in Second Life.



Figure 4: A group of student avatars meet and chat 'in-world'

The study provides some positive evidence that Second Life and a constructivist learning approach can provide a useful means for stimulating students' creativity to be engaged in a real-world learning experience. The workshop took on a flexible learning approach providing the students with multiple opportunities to engage freely with the technology, to consider the needs of the community and to experience the precinct first-hand. Collaborative learning was prominent in the workshop and exhibited through the students imagining creative scenarios about the site and its possible development, in role-playing as various workers at the site, making decisions about design features and site locations, and by having their avatars move around the site. This allowed them to observe aspects from a different perspective, enabling them to play the role of designers, decision makers and

explorers. Foth et al. (2009) and Mallan et al. (2010) have published a more detailed analysis of this study.

Technology, and the Challenge of Innovation

The advancement of network technologies – most notably the Internet – has offered ways to augment experiences of ‘place’ in two contradicting ways. While wireless ubiquitous computing allows for interactivity in a *place-independent* way across physical and geographical boundaries, technologies such as mobile and locative media provide access to *place-specific* information. Movements such as ‘Earth Hour’ are a clear example of social networking assisted by information and communication technologies (ICTs) that can connect individuals and communities around the world to make an impact based on their shared beliefs (B&T, 2010). In the current hybrid environment, many of its constituents are becoming – if not already – the ‘Internet of Things,’ hinting at the potential of more inclusive interactions (also thus exclusion) amongst people and other entities that jointly constitute society. Two key trends are worthy of further exploration in this context: the ubiquity of new technology, and access to real-time information.

First, everyday technology becomes more and more ubiquitous: small, embedded and accessible anywhere, anytime (Greenfield, 2006). Bell and Dourish (2007) argue that the design and development of ubiquitous computing (ubiquomp) as well as the ability to access information in places other than the conventional ‘desktop,’ call for a better appreciation of the ‘messiness of everyday life,’ which ultimately requires social and cultural research skills in addition to technical expertise. Dave (2007) compiled examples of such cross-disciplinary studies in the field of urban ubiquomp, which our research tries to enrich further. The findings of both our own (Bilandzic, Foth, & De Luca, 2008; Foth, Forlano, Satchell, & Gibbs, 2012; Satchell, 2004, 2006; Satchell & Singh, 2005) as well as other research (Consolvo, Paulos, & Smith, 2007; Goggin, 2006; Kopomaa, 2004; Nyiri, 2005) corroborate our hypothesis that the mobile phone will play a crucial role in expanding the means of participatory culture in an effort to embrace and foster values of sustainability.

Second, as a consequence of widespread ubiquomp deployment in urban environments such as sensor networks, locative media and mobile devices (Scharl & Tochtermann, 2007), the accessibility of real-time information enables a major transformation of the way we perceive, understand and subsequently conceive and plan city spaces (Calabrese, Kloeckl, & Ratti, 2007). Heralding the ‘real-time city’, Townsend (2009) writes:

“Where we will see lots of change is in the software that shapes cities. Embedded sensing will replace a lot of human watchers, and ‘watch’ things on a frequency and scale we can barely

imagine. But what will be important is how these abundant data streams provide a new ability to model and simulate very complex urban systems in real-time. Whereas today, urban managers and planners react on the time cycle of a census, by mid-century real-time dashboards and predictive models will rule the trade. ... If aerial photography showed us the muscular and skeletal structure of the city, the revolution in urban informatics is likely to reveal its circulatory and nervous systems.”

Informing the design of real-time mobile information systems that make the invisible visible holds great potential to have wide-ranging impacts on sustainable urban development. By being mindful of these developments at the very outset of the research, as well as keeping risks in mind and avoiding to pre-empt any conclusions, the research seeks to be guided by a balanced affinity considering social, economic and environmental downsides. Ubicomp applications and devices require electricity, one of the main causes of greenhouse gas emissions; in Australia the combined domestic and workplace usage accounts for one fifth of total national emissions (Climate Risk, 2007, p. ix). However, as noted in the Stern (2007) report, removing ‘barriers to behavioural change’ (McKenzie-Mohr, 2000) is one of the essential elements in advancing opportunities for energy efficiency. Our work in this area, bringing real-time environmental data into the homes and hands of the city dwellers via ubiquitous computing, finds vast potential for positive feedback and learning to better understand the impact of personal and collective habits.

In the face of these trends, as well as the continued and accelerated crisis in environmental, economic and social sustainability, a number of trends informs our work in urban informatics and specifically the possible role of community engagement in contributing to enhancing urban sustainability:

- i. Changes in the public sphere in terms of participation, online deliberation systems, polity of urban futures;
- ii. The possible use of user-generated content for urban planning (paralleling the rise of user-generated content in other domains);
- iii. The related role of social networking, collective and civic intelligence, and crowd-sourcing in urban futures;
- iv. The rise of technologies such as wireless Internet and mobile applications, and the impact of neogeography, simulations and 3D virtual environments that reproduce and analyse complex social phenomena and city systems in urban futures, design and planning.

We recently compiled an edited book, *From Social Butterfly to Engaged Citizen: Urban Informatics, Social Media, Ubiquitous Computing, and Mobile Technology to Support Citizen Engagement*, (Foth, et al., 2012). It provides strong empirical evidence from an international group of authors to show that applications of social media and mobile technology have left the purely 'social' realm causing real impact in terms of community activism, civic engagement, cultural citizenship, and user-led innovation.

In our book, Hirsch (2012, in press) discusses ushahidi.com, an incident-reporting system developed during Kenya's post-election violence in 2007 that combines citizen journalism with map visualisations (Figure 5). He argues that,

“most of the current literature on activist use of social and mobile media focuses on what activists can do with commercial services, it tends to overlook what they cannot do. That is to say, analysts who study activist appropriation of services like Facebook and Twitter often miss the ways activist needs outstrip the capabilities that these services offer. I suggest that examining activist alternatives to commercial social and mobile media services provides valuable insights both into the technology design and into the nature of contemporary advocacy movements.

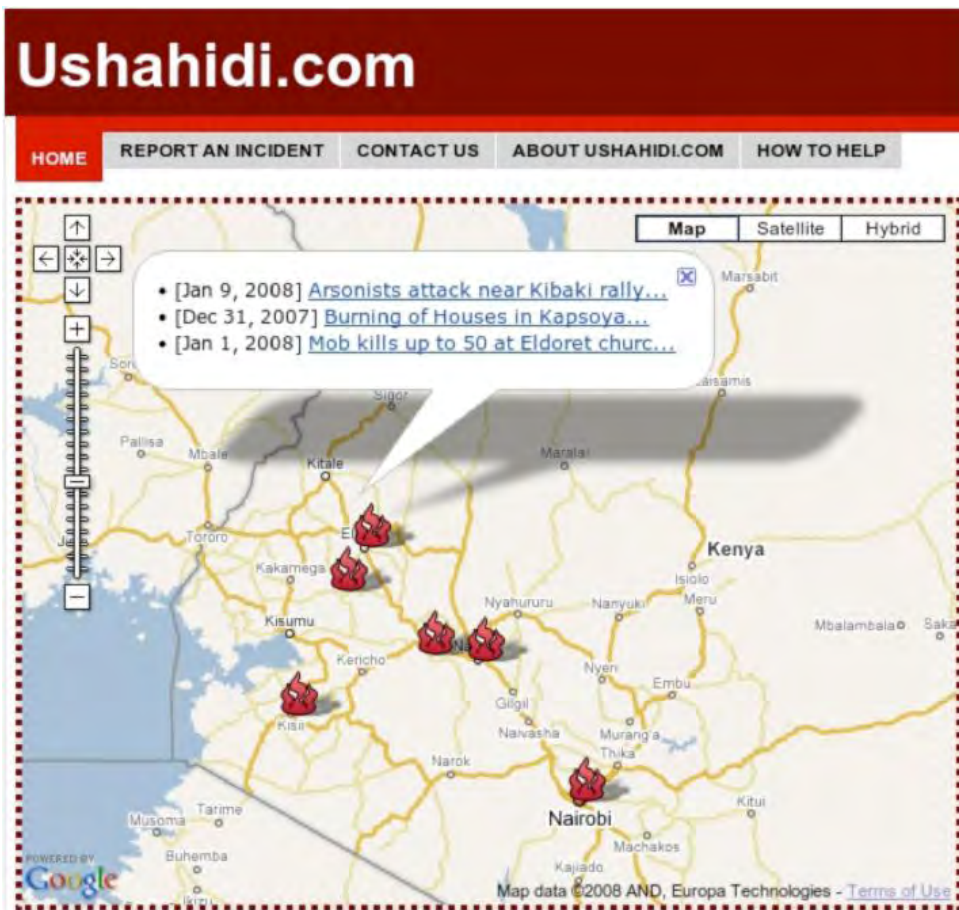


Figure 5: ushahidi.com – screenshot by Hirsch (2012, in press)

”

Hirsch’s argument corroborates the significance of our goal to examine the limitations to merely appropriating existing off-the-shelf ICT solutions with a view to identify opportunities to create purpose-made design innovations that are informed by and further support user-led innovation.

Citizen Science

A further example of user-led innovation was highlighted by Paulos and his colleagues as part of their ongoing research program into participatory urbanism, DIY (Do-It-Yourself) culture and citizen science (Paulos, Honicky, & Hooker, 2009; Paulos, Kim, & Kuznetsov, 2012). Paulos and his team recruited taxi drivers in Accra, Ghana to participate in a study to collect air quality data.

We chose Accra because of its poor air quality and common practice of domestic cooking outside using wood, charcoal, and other biofuels. ... Each taxi driver was provided with a dash

mounted GPS logger and a tube to hang from their passenger window that contained a carbon monoxide sensor, and a sulfur dioxide or a nitrogen dioxide sensor. At the end of each day, the sensor tube was dropped off at a convenient location where the data was extracted and the sensors charged. ... Over the two-week period we collected an impressive and diverse collection of air quality data, revealing dynamic ranges of air quality across neighborhoods and over time. Looking only at CO, for which safe levels are defined as 9 ppm for 8 hours and 35 ppm for 1 hour, our participants logged frequent readings around 30 ppm with many samples ranging up to 75 ppm and some as high as 200 ppm. A heat-map visualizing only the CO values over one 24-hour period captures the dynamic range of air quality across the city as never before seen (Figure 6).

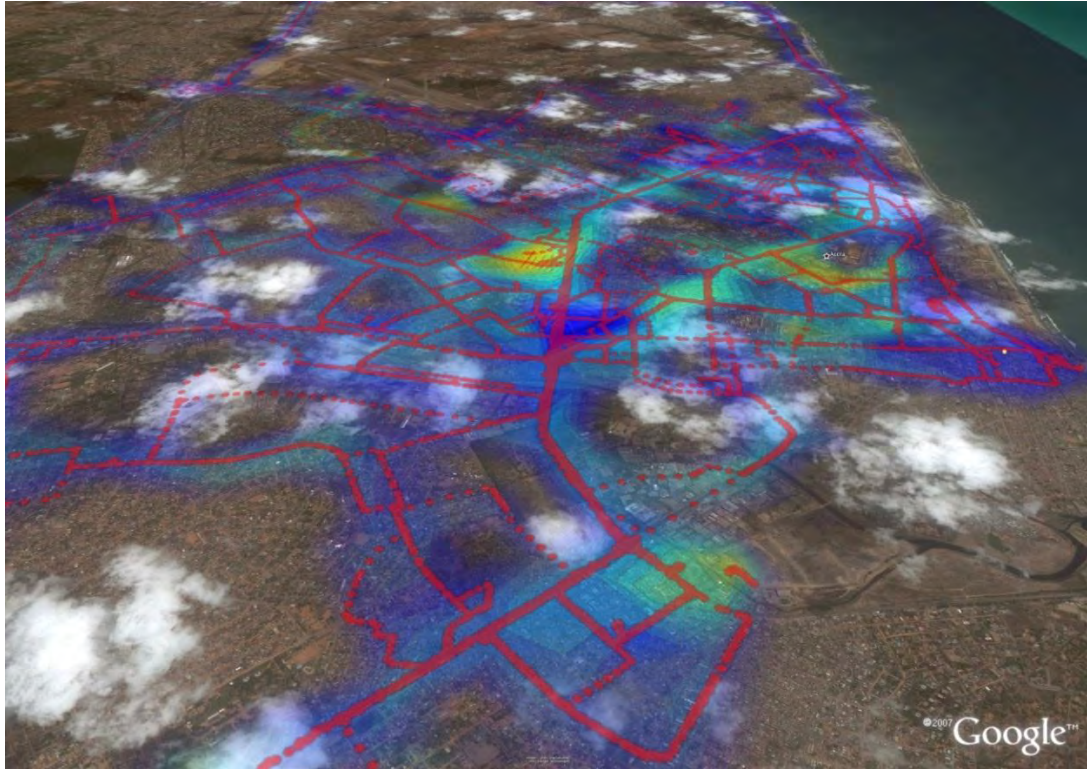


Figure 6: A heat-map visualization of carbon monoxide readings across Accra, Ghana rendered atop Google Earth. Colors represent individual intensity reading of carbon monoxide during a single 24-hour period across the city. Red circles are locations where actual readings were taken. Photo by Paulos, et al. (2009)

While the rich data sampled from our two-week study in Accra provided hard evidence for the need for citizen science air quality sampling, there were even more revealing and unexpected social effects that resulted. Recall that we provided the participants only with the technology and instructions to carry it during their everyday activities. At the end of each day they dropped off the gear where it was charged and the data extracted. When we conducted exit interviews, it was clear that, although it was not our intention to provide any humanly readable output on the devices, the participants had begun to look at the numbers and piece together a personal view of the areas of toxic air across Accra. Many discussed how they watched to see how parts of their city changed as they travelled through neighborhoods at different times of day and how they discussed air quality and passed on their new knowledge of hazardous locations to their friends and family. Subjects who thought about air quality once

every few months before the study were now thinking about it hourly. Even more interesting, our subjects reported changing their routes through the city, choosing different times to travel downtown, walking further from roadways, being outside later in the day rather than during high pollution times, and even taking their own automobile in for inspection to insure they were not contributing to the problem they were measuring. Several of the participants encountered each other when dropping off their equipment for charging and, although they did not know each other, many of them reported discussing the data they were measuring each day, where they had captured dangerously high readings, alternate routes they had found to be less polluted, and compared graphs from each day's journey.

Most participants reported that the most important thing they learned from the study was that there were extremely unsafe levels of air quality in their city beyond what any government or news agency had reported to them before. Many expressed anger and distrust in their civic leadership for not informing them of such a hazardous condition nor enacting legislation to improve it in the name of public health. Remember, there was no formal networked, real-time sharing mechanism or informed interface for this study and yet spectacular elements of citizen science emerged. (Paulos, et al., 2009)

The air quality sensors provided by the study were adopted by the participants who started to learn how to interpret the displayed values and change their behaviour and actions accordingly. Paulos' case is an example of user-led innovation, that is, a practice of products and services being re-appropriated, re-developed or refined by users during use (von Hippel, 2005).

Place, and the Challenge of Engagement

Simmel's observation of the rising metropolitan life in Europe at the beginning of the 20th century was that:

"[t]he relationships and affairs of the typical metropolitan are usually so varied and complex that without the strictest punctuality in promises and services the whole structure would break down into an inextricable chaos" (Simmel, 2004).

The thin veneer holding together urban infrastructures has become more fragile in recent years with an epochal shift in urban densification across the globe. More than half of the entire global population now lives in cities. The UN Population Fund (UNFPA, 2007, p. 2) predicts that urban populations will grow even further to reach 60% of the entire global population by 2030. Thus planning, developing, and experiencing various infrastructures of the city, including social and technological, are becoming increasingly complex. I previously argued (Foth, 2009) that such complexity necessitates a *real-time* examination with flexibility in macro-/microscopic perspectives in order to account for both tangible and intangible urban constituents that occupy the 'hybrid space' (De Souza e Silva, 2006) between the physical and digital. Urban informatics as a scholarly domain offers useful research apparatuses for this type of real-time examinations.

Townsend (2009) argues that:

“the timing is certainly right. Urban planning is well into an undeclared crisis of thought leadership – despite it being one of the best avenues for dealing with global challenges like climate change and migration. Information science is poking its head out of the burrow and seeing the enormous intellectual challenge of expanding what worked on the desktop of the elites, to a diverse and mobile urban population.”

Townsend refers to two trends: First, decision making support for the variety of situations and the diversity of people in cities requires the information sciences to deliver complex modelling and simulation tools for urban planners which they can use to represent the many aspects of the behaviour of cities and their inhabitants, including transport, utilities, facilities, and the environment. It is hoped that such tools can assist with rational decision making about future developments and improve resource management whilst considering the diversity of urban contexts and environmental factors. However, secondly, such tools should not stay just in the hands and power of professionally trained urban planners. Similar to the way Web 2.0 tools and services have brought about a more participatory Internet experience, neogeography and related innovation in the *place* domain need to ensure the products of the information sciences deliver access, usability and usefulness tailored to “*a diverse and mobile urban population*” rather than elite experts only.

It is important to consider that “The City” as a conceptual category and abstract intellectual notion is an intriguing but also dangerously complex entity to such an extent that its merits on this broad and encompassing level may not even be useful. Williams, Robles, and Dourish (2009) unpacked the assumptions underpinning “The City” in a lot of urban informatics research and found a dense ecology of impersonal social interactions occurring within recognisably public places. They argue for a heightened awareness that accounts for local particularities between cities as well as the broader global networks of connection between these sites.

Mobile phones have become a well-established communication device in the everyday lives of many people. Their promise is to connect us to anybody, from anywhere at anytime. Mobile communication has contributed to a shift of people’s role towards ‘networked individuals’ in urban environments (Wellman, 2001, 2002); our person-to-person relationships have become more complex affording a seamless transitioning between being physically present at a particular place and being digitally connected at all times. Mobile media support people not only to connect to distant others, but also to coordinate and initiate social interactions in their physical proximity, e.g. spontaneously organising collective actions (Rheingold, 2002). This is supported by Gordon and de Souza e Silva (2011) who have recently published a book-length account that provides strong evidence from various sources and perspectives to confirm that place continues to matter in a networked world:

“The local still matters, and in fact, it may matter more than ever before because it can have an immediate and powerful global impact.” (p. 168).

The potential of this impact led some local governments to embark on exploring what difference *place* can make to new technological practices and new engagement strategies (Freeman, 2005). Such explorations include social networking, user-generated content creation and curation, crowd sourcing, etc. However, the strategic direction is still mostly experimental, scattered and patchy.

Discussions in Space

The Urban Informatics Research Lab is leading the development and trial of a public consultation tool specifically designed for urban planning that we call Discussions in Space. It serves to illustrate the challenge of place-based engagement.

Discussions in Space (DiS) is a project offering an additional, experimental channel to engage with Brisbane residents as part of a Brisbane City Council (BCC) urban planning project, which requires a consultation phase with Brisbane residents. The DiS project facilitates a public civic discussion and opinion forum through the installation of a large public screen, which passers-by can interact with using their mobile phone's SMS, Bluetooth, camera and Internet capabilities. The installation promotes civic topics, issues and questions and invites the general public to submit their opinion to the publicly visible screen, hence providing a platform for collective expression and public discourse amongst Brisbane residents. Collaborative and distributed editing and censoring capabilities ensure that the content reflects the norms and values of the installation providers, namely the university partner and the Brisbane City Council.



Figure 7: Discussions in Space running on the big screen at Federation Square in Melbourne

The project provides and investigates forms of in-place digital augmentation, which refer to the ability to enhance the experiences of citizens in physical spaces through digital technologies that are directly accessible within that space. This can take place in many forms and ways, predominantly through location-aware applications running on the individuals' portable devices, such as mobile phones, or through large static devices, such as public displays, which are located within the augmented space and accessible by everyone.

The hypothesis of this research project is that in-place digital augmentation, in the context of civic participation, where citizens collaboratively aim at making their community or city a better place, offers significant new benefits compared to conventional online forums or wikis— as used today. For instance, it allows a wide range of urban dwellers to access services and information and to engage with each other, where and when it is mostly needed, in place. Currently, such in-place access or engagement is either not available at all or too cumbersome to reach.

Our study is specifically interested in system designs that effectively engage with residents who councils generally have difficulties to engage with, as indicated by interviews with urban and neighbourhood planners. BCC refers to these demographics as “backyard buddies” (the not interested

and involved, transient, younger residents) and “loyal locals” (the time poor professionals and young families who might have some emotional connection to their neighbourhood as new home owners). In contrast to the third group, the “neighbourhood guardians” (older residents who have been living in the same area for many years), these two groups either do not care enough to engage on their own accord and co-create their urban environment or, although interested, they simply do not find the time in their busy lifestyles to visit time-consuming community consultation events.

Our initial user study with residents in Melbourne and Brisbane (Satchell, Foth, Hearn, & Schroeter, 2008) aligns with these findings of interviewing members of the council. Discussions in Space was developed as part of an ARC Linkage research grant in collaboration with Brisbane City Council’s neighbourhood planning team (Schroeter & Foth, 2009; Schroeter & Houghton, 2011). It was installed at the Royal Brisbane Hospital, QUT Gardens Point, QUT Kelvin Grove, Brisbane Square, and the State Library of Queensland. It was also used for community engagement purposes at the OZCHI 2009 conference, the Workforce Innovation conferences 2010 and 2011, at the opening of The Edge (State Library of Queensland), and at Federation Square, Melbourne (Figure 7).

The triad of the Urban Informatics paradigm – people, place, and technology, has proven to be a simple but powerful way to conceptualise the thinking that guides the research and development work in the lab. Significant trends such as the rise of a participatory culture, social networking applications, Web 2.0 services, the increasing ubiquity of mobile technology and real-time sensor networks, and neogeography, amongst others, have contributed to the timeliness of this research work that is grounded in a variety of real-world contexts and applications. We now turn to a case study that illustrates some of this discussion and incorporates elements of urban informatics, knowledge economy, digital culture in a prototype engagement space led by a library.

Conclusions

Healthy cities do not come about just by the virtue of physically and physiologically healthy urban residents. The health of a city also relates to associated factors such as air and water quality, food access and security, building standards, social relationships, cultural activities, entrepreneurial support, infrastructure provisions, green environments, government leadership, etc. Rather than the superficial tectonic view of a city, the term ‘healthy’ gives rise to a very organic notion – a picture that I introduced in the Preface to Foth (2009) to pose a number of open-ended questions:

Cities are indeed living organisms. They are alive with movement. A rapid flow of exchange is facilitated by a meshwork of infrastructure connections. Transport grids, building complexes, information and communication technology, social networks and people form the bones, organs, muscles, nerves and cell tissue of a city. Studying the organisation and structure of these systems may seem straightforward at first, since there are visible appearances and tangible objects that we can observe and examine. We can count the number of cars on the road, the

number of apartments in a building, the number of emails on our computer screens and the number of profiles on social networking sites. We could also qualify these observations by recording the make and model of cars, the size and price of apartments, the sender and recipient of emails and the content and popularity of online profiles. This approach would potentially produce a large amount of data and render a detailed map of various levels of a city's infrastructure, but a large quantity of detail does not necessarily result in a great quality (and clarity) of meaning. How do we analyse this data to better understand the 'city' organism? How do the cells of the city cluster to form tissue and organs, and how do various systems communicate and interact with each other? And, recognising that we ourselves are cells living in cities as active agents, how do we evaluate the effectiveness and efficiency of the processes we observe in order to plan, design and develop more livable cities?

Urban informatics fosters the artful integration of *culture* and *technology* in a place-based context. This presents a key endeavour in the ongoing process of creating and nurturing healthy cities, and there are and will be plenty of open, unanswered research questions such as those mentioned in the citation above that require new knowledge, new theories, and new methods. Concepts such as crowd sourcing, neogeography (Foth, et al., 2009), neoplanning (Schroeter & Houghton, 2011), collective intelligence (Shirky, 2008), civic intelligence (Schuler, 2009), citizen science and participatory urbanism (Paulos, et al., 2009), feature prominently in urban informatics research and practice. The examples and insights presented in this paper are hoped to benefit urban designers, urban planners and local governments in a way that will help them renew their objectives for the present and their vision for the future to better interact with for instance, youth and young people for the purpose of civic engagement, social change and community action. The digital generation – both young and old – is already apt to create, remix, manipulate, control, play, identify themselves, express their taste, their beliefs, political affiliations, their aesthetics, their sexuality and humor via their digital representations, social networks, and real-world interactions. The experience of our lab indicates that this new generation of Australians – often falsely accused of being apathetic and disengaged – is entering, advancing and leading political and social debate using new technological applications that allow them to incorporate their viewpoints as an integral part of society. Being at the forefront of this research and development will ensure that local governments, urban planning and policy, and the economy more broadly continue to support and contribute to a diverse and vibrant socio-cultural life in Australia.

This paper sought to provide an introductory overview of urban informatics and the underlying principles and theories that inform research and development in this dynamic and transdisciplinary field of inquiry. It also sought to highlight opportunities for some of the insights that are emerging from urban informatics research to be taken up by leaders of other disciplines and sectors, specifically urban design, planning and policy. We are only witnessing the early beginnings of this

new economic paradigm that produces innovation and in turn, wealth and prosperity, through digital media, creativity, and online networks.

It will be essential to be proactive about how these key trends will unfold and what impact they will have on cities, urban and peri-urban environments, regions, and the wider economy. Being proactive means not to sit back and wait, but to take risks, explore, and experiment in order to gauge how some of these trends can benefit our collective ability to move society forward, and what role each sector, each entity, each person can play in this new environment. Some of these key trends, chief insights, meaningful learnings that warrant further exploration on a case by case basis.

Urban informatics is situated at the hub of new technological innovations as well as new technological (user-led) practices that have already triggered some significant changes in the way we work and play. The conventional 9 to 5 roster is less and less useful to meet today's business needs. Global connectivity across time zones requires us to deal with collaborators on the other side of the planet who wake up when we go home, and who will send their work packages of the day overnight when we come back to work the next morning. Furthermore, social media and mobile devices allow us to switch between different roles seamlessly. We can receive a text message from our children at work in our role as parent, respond to an email from a work colleague the next minute, and then accept a friend request from a long lost high school mate. The prejudice that this mixing of work and leisure may be counterproductive is mostly unfounded for several reasons. First, the same mix of work and play usually creeps up on us and continues at home, when for instance, work emails are being answered after hours. Second, maintaining and expanding our social network can have profound professional benefits as the nodes at the edges of our social ties help us to increase the level of diversity of knowledge and experiences that we can tap into. This in turn leads to heterogeneous structures of social capital that may be dormant for a long time, but that can be activated when needs be. The advantages of these communicative patterns can be replicated for the purpose of informing new governance structures, too. Engagement, participation, shared responsibility and ownership, and motivational tools have already been explored for political campaigns (Obama 2.0), for environmental sustainability, and health purposes. It will be a natural next step to also investigate their utility for new governance and communication practices in organisational contexts of local governments and city administrations.

Urban informatics is all but one of the key ingredients that form the cutting edge of new knowledge production and exchange. Rather than sticking to the actual objects of inquiry, in this case, digital media technology used in urban environments, this paper sought to shed light on the meta level of analysis that looks at the underlying principles and practices and how they may be applied or transferred to other disciplines or areas of practice. Such transfers of experiences, insights and

findings do not happen without some tacit knowledge being lost, and some noise being added in the process. However, if open-minded partners can be found that help to maintain an ongoing dialogue, it will be possible to stimulate a cross-disciplinary exchange of knowledge with a real chance to activate new inputs, stimulate innovative thinking, and create thought leaders for the future.

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Sense of Place and Urbanity: Challenges and Interventions at the Gold Coast

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Sense of Place and Urbanity: Challenges and Interventions at the Gold Coast

ABSTRACT: *For many decades the Gold Coast was largely perceived as a seasonally occupied beach-holiday resort strip of linked settlements that started life as dispersed service centres for the hinterland. While this was its origins in the late 19th Century the Gold Coast is now the sixth largest city in Australia and the most rapidly growing. The city has many layers of complexity related principally to rapidly increased urbanisation. Arguably the overarching 'spirit of place' at the Gold Coast derives from its ocean coastline and secondly from river and canal waterway edges. Other characteristics that make Gold Coast special derive from those qualities that foster a sense of authentic human attachment and belonging. As urbanisation intensified with it came growing numbers of small and large businesses to service the new city residents as well as transient visitors. Increased activity and services was the catalyst for visits from hinterland suburbanites and out-of-town trippers seeking to participate in the emerging urbanity as they partake of the natural attractions. At risk is degradation of 'sense of place'. Theoretical constructs relating to 'sense of place' will be explored. Three milestone initiatives are discussed in terms of fixed, semi-fixed and un-fixed elements as well as their functioning and contribution to the city's urban vitality and 'sense of place'. Speculative design interventions are also discussed that could initiate debate about encouraging Gold Coast City to adopt a sustainable healthy balance between urbanisation and sense of place. These respond to the uniqueness of every place.*

Keywords: *Sense of Place; Spirit of Place; Milestone Architecture; Conceptual Designs; Gold Coast*

Introduction

Media descriptions of developments on the Gold Coast typically use phrases such as, "...each property embraces the local culture to create a true sense of place for guests" or another, more elaborately expressed, "to create a more convenient and enjoyable place to live....the epitome of diversity with a fine selection of quality residential property options that satisfy aesthetics, enrich comfort, create a sense of place and nourish the human spirit". Description of the location's attributes typically follows with emphasis such as, "....premium views towards Pacific Ocean, Hinterland and Surfers CBD, short walks to beach".

Without necessarily knowing the Gold Coast intimately, from this snapshot we can reasonably deduce that the writers of such material regard the ideal 'sense of place' of the City as being incorporated in enjoyable access to an attractive built and natural environment.

Less positive perceptions regard Gold Coast City as a cultural desert and a superficial destination of extravagant beaches, glitzy, shallow and egotistical (Ditton, 2009) (pp 165-166). Weaver and Lawton (2004) are equally damning through their adoption of Relph's (1976) idea of 'placelessness' to summarise the character of the City. Such negative observations may be summarised as positing the Gold Coast City as mostly an inauthentic place.

This paper explains perceptions, ideas and concepts relating to 'place' with a view to understanding some recent initiatives and to exploring potential interventions that may improve the 'sense of place' for long-term residents, which it is anticipated will also heighten place experience for tourists (visitors). The paper discusses what are considered to be relevant theoretical constructs.

Optimistic conclusions are drawn, encouraged by Bosman and Dredge who support the proposition of 'minor placemaking' at the Gold Coast as a measure to "reconcile the home/local and tourist/global dichotomy" (Bosman and Dredge, 2011) (p 4).

Healthy Cities and Sense of Place

'Sense of place' elements are one aspect of several that underpin criteria considered essential for sustainable and healthy cities (O'Neill and Simard, 2006). While having a strong 'sense of place' may be seen as a lower priority than safe drinking water or sewerage systems for the health of a city it is widely accepted that a holistic approach to city planning includes encouraging a recognisable 'sense of place'. 'Sense of place' strengthening is key objective for contemporary planning strategies in Australia, see for instance: the Queensland Board for Urban Places document "A Charter for Queensland Places (2010)" and the documents "Melbourne 2030: Planning for Sustainable Growth, Direction 5 (2002)"; and "Sustainable Sydney 2030: City of Sydney Strategic Plan (2008)".

The World Health Organisation firmly establishes a relationship between sense of place and healthy cities. In the WHO publication "Healthy Cities and the Planning Process" eleven key parameters for healthy cities, communities and towns are proposed. Of these four relate to 'sense of place' elements, being: high-quality environments; sustainable ecosystem; access to wide variety of experiences and resources; connections with the past; and city form (Duhl and Sanchez, 1999) (pp 23/24).

Further, connections between healthy cities and 'sense of place' physicality and experiences are expressed in the first and third of three criteria reported by Johnson et al, in quoting Baum (1993)

"places can be judged for their health – and equity – according to three sets of criteria:

1. Physical form, including the use of land, housing type and standard, communications infrastructure, transport provision and the quality of the built and natural environment
2. Interaction, recognizing that people come to regions, cities and towns for contact with others. This contact includes politics, work, economic activity, caring, education, recreation and home life
3. Individual experiences of a place, which includes the sense of history and tradition, life-style, culture, expressions of creativity and art" (Johnson et al, 2007) (p1)

The link between 'sense of place' and sustainable healthy cities is summarised by Susan Moore (1997), who is quoted by Newman and Jennings (2008)

"a sense of place may not be sufficient for sustainable practice but a lack of sense of place may be related closely to unsustainable practices" (p6)

Authentic Place

One of the strongest forces in contemporary global tourism is a search for authentic experience (Cohen, 2002, Yeoman and Brass, 2007). In addition to the attraction of the natural environment of the Gold Coast, the local culture and urbanscape, together the 'sense of place', is the main vehicle for providing authenticity. Local culture has a symbiotic relationship with tourism, as explained by Chang and Yeoh (1999)

"The relationship between global tourism and local culture is a two-way process. Tourism affects the way cultural practices and landscapes are shaped, and cultural change reflects the influence of tourism as one agent in place transformation" (pp 101-115).

The natural environment of the Gold Coast could be considered as underpinning its inherent 'spirit of place', or *Genius Loci* (Norberg-Schulz, 1979). Relph (2009) says that "sometimes 'sense of place' is used to refer to what might more accurately be called 'spirit of place' – the unique environmental ambience and character of a landscape or place" (p26). He proceeds to say that he prefers, as this author does, "to keep a distinction between 'sense of place' and 'spirit of place', though clearly they are closely related" (p26). He further explains that 'spirit of place' exists outside of us while 'sense of place' lies inside of us, but is aroused by the landscape we encounter.

Separation of 'spirit' from 'sense' allows us to more clearly consider human-made interventions (Cantrill, 1998). For 'spirit of place' Cantrill adopts the word 'natural' and for 'sense of place' he adopts the word 'social'. An image depicting the Gold Coast's historical 'spirit of place' is shown in Figure 1, while Figure 2 shows the current physical overlap of human-made 'spirit of place' with nature's 'sense of place'.

Figure 1. View looking south from Nobbys over to Little Burleigh. Miami Beach is seen in its original 'authentic' state with dunes reaching inland, circa 1885.

Image credit -: Gold Coast City Council Heritage Tours



Figure 2 shows a section of the current physical overlap of the Gold Coast's 'spirit' and 'sense' of place - looking South from Q1.

Image credit – Gordon Holden



Bosman and Dredge remind us that “place meanings and values emerge out of everyday activities...and, for touristed areas such as the Gold Coast, place is not simply a location”. If everyday meaning and values of an actively engaged community (home/local) are not also incorporated into urban development the result may be a “risky place that holds little meaning for local people and fails to capture and hold the interest of tourists” who know global culture (Bosman and Dredge, 2011) (p3).

Gold Coast City Council frequently refers to ‘sense of place’ in planning documents, but not ‘spirit of place’. Not surprisingly ‘spirit of place’ is always presented as a positive attribute or goal. In its use the term appears to embrace both ‘sense’ and ‘spirit’ of place, as defined by Relph (see: Gold Coast City Council, 2004, 2009a, 2009b). It is suggested that greater clarity of purpose and capacity to

manage and/or enhance both natural place and human-made place, as directed through planning documents, may be better achieved through treating the two terms 'spirit' and 'sense' separately.

Placelessness

In reflecting on the meaning of 'sense of place' in 2009 Relph states that

"Place is an expression of what is specific and local, while placelessness corresponds to what is general and mass-produced.....it is helpful therefore, to think of place and placelessness arranged along a continuum and existing in a state of tension. At one extreme, distinctiveness is ascendant and sameness diminished; at the other extreme, uniformity dominates and distinctiveness is suppressed" (p25).

Jorgensen & Stedman (2006) add the further dimension that 'sense of place' is multidimensional, incorporating beliefs, emotions and behavioural commitments. Seamon and Sowers (2008) explain that

"Ralph suggests that, in general, placelessness arises from kitsch – an uncritical acceptance of mass values, or technique – the overriding concern with efficiency as an end in itself. The overall impact of these two forces, which manifest through such processes as mass communication, mass culture, and central authority, is the 'undermining of place for both individuals and cultures, and the casual replacement of the diverse and significant places of the world with anonymous spaces and exchangeable environments" (p46).

Spirit of Place and Sense of Place

There being such a strong 'spirit of place' at the water's edge of the Gold Coast it could be speculated that the 'sense of place' qualities of urban development on the adjoining land is less significant. Such speculation may be a case of Ditton's 'extravagant beaches' being sufficient to overwhelm place perception sensibilities. With low attention given to the urban design of many Gold Coast urban areas, back from the coastline, some areas deteriorate into places of low significance with few 'sense of place' attributes. Respectful of the community, some of these areas could be described as placeless.

Research indicates that there is a further dimension to consider. Stedman (2003) introduces the concept of 'baseline effect' citing the example of wilderness lakes in Canada where if the pristine qualities of a lake are compromised through increasing settlements on the shore, with consequential more boating and other human activity, then 'sense of place' deterioration is perceived by long-standing residents. By comparison, new users (or visitors) who only know the place in its current state, consider this to be normal and perceive it as having a positive 'sense of place'. The difference is the starting baseline. Fitchen (1991) and Relph (1976) reinforce this relativity idea through their conclusions that place attachment and meaning can erode due to changed physical conditions.

It is suggested that while 'spirit of place' remains substantially intact and highly relevant for both visitors and residents at the Gold Coast the 'sense of place' baseline is variable, with the major divide being that long term residents see urban places differently from short-term visitors. Long term residents are especially interested in the places that they frequent such as the local shops, parks walking/cycling routes and favourite swimming/surfing sites. Visitors are mainly attracted to the exceptional beauty of the ever-present seascape coupled with access to the changeable and exciting urban activities symbolised by tall buildings and street life (Bosman and Dredge, 2011) (p 2). We may conclude from this that visitors tend to not engage with the ordinary or minor places of the city.

Bosman and Dredge explain that "Minor placemaking is an approach that recognises difference and diversity and has the potential to heighten images of localness in a global tourist landscape and thus, broaden the tourist profile" (p4). The types of arousal needed by the residents and visitors are different at a baseline level but it is postulated that potential is available that may derive from there being greater authenticity in minor places. This will be explored further with the conjectural designs.

Our experience of travel tells us that a place can be attractive to people and have a distinctive 'sense of place' because it has a unique human made identity, activity and vitality that is authentic to the location. This distinctiveness can be present notwithstanding the attributes of the natural environment (Relph, 1976).

"An authentic attitude to place is understood to be a direct and genuine experience of the entire complex of the identity of places – not mediated and distorted through a series of quite arbitrary social and intellectual fashions about how that experience should be, nor following stereotyped conventions. It comes from a full awareness of of places for what they are as products of man's intentions and the meaningful settings for human activities, or from profound and unselfconscious identity with place" (p64).

The concept 'topophilia' or 'love of place' was injected into 'sense of place' research in the mid 1970's by Yi-Fu Taun although the concept had been coined earlier. Taun (1974) advocated that topophilia embraced all emotional connections between physical environments and humans. This idea has substantially remained in place theory development.

Although not central to 'sense of place' theory, Jay Appleton's 'prospect-refuge' theory is considered to have relevance in understanding our preference for favourite places, through the proposition that there is a survival motivation that underpins aesthetic engagement when viewing landscapes. Prospect-refuge theory has been used in landscape architecture to underpin designs that encourage

engagement with place. Appleton (1975) believes that the ability to see and the ability to hide are both important in calculating survival prospects...

“Where a person has an unimpeded opportunity to see we can call it a *prospect*, where the person has an opportunity to hide, a *refuge*” (p79).

In discussing what built environment elements relate to experience and behaviour, Heath (1991) adopted Rapoport's (1982) three types of elements: fixed, semi-fixed and unfixed. The fixed elements are those which constitute the form makers of the city, including the streets, parks and buildings. Semi-fixed are elements such as street furniture and street landscaping. Heath argues that the elements in both of these categories contribute little to people's need for stimulation, but rather are important in establishing a sense of order and place. He concludes that the unfixed or temporary elements such as window displays, market stalls, banners and the presence of people are the ones which provide most stimulation and 'life' to the city.

Heath's somewhat 'strict' classification derives from environmental psychology research into stimulation but may not be as certain when considering the multi dimensions imbedded in 'sense of place'. Evidence from research in Bilbao, Spain suggests that innovatively designed new fixed elements, such as buildings, and semi-fixed element upgrades, such as those incorporated in pedestrian streets and malls, have resulted in positive responses amongst residents and visitors alike and higher vitality for an area (Gospondi, 2004). We may conclude that innovative high quality new design elements can strengthen 'sense of place'. It is asserted that through supporting and rewarding a culture of seeking high quality design throughout the Gold Coast for small scale local, private and public elements, as well as for large scale private and public elements that Gold Coast City will establish a stronger 'sense of place' that is integral to resident's experiences and can also be recognised by both visitors and critics.

Three Milestone Initiatives

The following projects are discussed mainly in terms of their contributions and limitations in improving authentic 'sense of place'.

1. Broadwater Parklands

The Broadwater Parklands (refer to Figure 3) are one of the city's major, regional foreshore parkland areas, popular with both residents and visitors. The long history of the Parklands as a favourite place for local residents as well as a family holiday destination has shaped its future as a world class community and cultural parkland. The recent upgrade of the Park offers a wider variety of recreational options than in the past, including picnics and barbecues, strolling on the rooftop terrace to take in the spectacular views of Surfers Paradise, fishing off the pier, swimming, and lunchtime sports on the

Great Lawn (Gold Coast, 2009 b). While the Parklands have a long and successful history the upgrade has generated increased visitations by both residents and tourists. The area is highly authentic and helps to bridge the local/global divide discussed by Bosman and Dredge.

Figure 3 Broadwater Parklands– Fixed and semi-fixed elements including buildings, shelters, paths and jetty. Image credit – Gordon Holden



Broadwater Parklands re-connects Gold Coast central business district at Southport with the Nerang River/Broadwater waterways and harbour. The design integrates public art to provide an effective and important means of generating a strong, wide-reaching sense of community and regional identity. The place provides events spaces for large organised activities including Yugambeh Corroboree Food, Art and Language Festival and the Gold Coast Marathon. Parklands functions are supported by fixed and semi-fixed elements but also encompass un-fixed elements, such as banners, posters and temporary facilities thereby completing the full range of Rappoport's elements discussed by Heath. A wide scope of experiences is available to serve individuals and groups across a wide age and gender profile during day and night hours and this coupled with historical usage and high quality design provides the ingredients for a strong and authentic 'sense of place' (refer to Figure 4).

Figure 4. Broadwater Parklands – Semi-Fixed elements including sun shades Un-fixed elements including banners. Image credit – Gordon Holden



2. Tedder Avenue, Main Beach

A place on the Gold Coast of great vibrancy is Tedder Avenue's restaurant and retail district. This area was originally a minor local-shop service provider. Through the initiatives of local retailers supported by residents it has blossomed into a world class centre that receives considerable local patronage as well as attracting global visitors. This is a good example of local authenticity strengthening 'sense of place' experience (refer to Figure 5).

The driving force behind the success of Tedder Avenue is the Main Beach-Tedder Avenue Association, a community group which was formed to improve and maintain the physical character and community life. The Association seeks to work proactively with the Gold Coast City Council and other authorities for the betterment of the area and it does so through close community consultation with local stakeholders. As referred to earlier, Bosman and Dredge suggest that an engaged community can assist 'sense of place' strengthening.

Despite the perception that the Association harbours 'up-market' ambitions of an exclusionary nature, of significance to 'sense of place' strengthening for Tedder Avenue, in common with Broadwater Parklands, is that they are public places, not private ones. Public places can be freely accessed by everybody at all times and such accommodation encourages the development of everyday meaning and values, important for 'minor placemaking' in Bosman and Dredge's terms.

Figure 5. Tedder Avenue – Encompassing Fixed, Semi-fixed and Un-fixed elements to establish a strong sense of place attracting visitors and locals.

Image credit – Gordon Holden



3. Circle on Cavill

Another milestone example, but one of a different nature to those already discussed, is ‘Circle on Cavill’ in Surfers Paradise. This is an award winning high-rise twin tower development with ground level retail and public plaza spaces. The difference is that this is a private ‘fixed’ development (refer to Figure 6). Circle on Cavill creates several spaces for public access from streets, including avenue/malls and a central gathering place which accommodates a large suspended screen capable of showing television as well as video clips, a popular gathering place to view major events such as the ‘World Cup’. The linking space on the West side visually connects towards the Nerang River and beyond and could physically connect to future urban development.

However, being privately owned, management has the capacity to exclude access and thoroughfare and this inherently can work against developing an authentic ‘sense of place’ because the community can never regard the place as freely accessible.

The development is considered to be well intentioned in urban design placemaking terms but after a few years of use there appears to be less public activity, a ‘sense of place’ indicator, in the spaces than might have been anticipated through applying placemaking principles to a detached study of the design. Some of the lower than expected use may be attributable to retail downturn as a result of the Global Financial situation, but anecdotally there also appears to be a perception that the ‘public’ spaces are somewhat utilitarian, suggesting that further attention to design detailing with expanded functions could address the matter.

Figure 6. Circle on Cavill at Surfers Paradise. Fixed elements. This is a valuable contribution to the city skyline and it provides well connected, public places and activities at ground level that with better detailing and management could strengthen 'sense of place'.
Image credit – Gordon Holden



Whether private developments can ever attain the level of authentic 'sense of place' available to public places is a subject worthy of further study. Nevertheless Circle on Cavill is considered to incorporate basic characteristics essential for establishing a 'sense of place', including accessibility and visual linkages. What appears to be needed are a wider profile of functions and facilities that attract more people across all ages for longer periods of time. Starting with a focus on modifications that attract local residents may build the authenticity that could underpin a stronger interest for visitors.

Student Special Place Field Work

Griffith University, Gold Coast, 2010 first year architecture student project 'Special Place' called for students to select a place that has significance for them and to analyse the place in order to understand its special qualities and reasons why it appeals. Theoretical constructs about 'place' had not yet been discussed in class that might condition student thinking and selection. However it was clear from the results of the sixty students that their place selection could be considered in three main ways: Appleton's 'prospect-refuge' theory (1975); Place as a social-cultural construct imbued with meaning derived from experience of the place (Taun, 1974) and, the 'essence' of the place as

explained through 'genius loci, which proposes that the qualities of a place are not constructed by experience, but are already there (Relph, 2009).

Almost two thirds of the places selected fall into in the 'prospect-refuge' category. Typically these places were on a headland, sand dune or river bank overlooking an expansive view of the ocean or waterway, each of great 'prospect'. Typically they had trees or shrubs, or a large rock or embankment to the back of the position all of which provide a sense of security or 'refuge'. Most of the rest of the places selected were of an enclosed nature, without long distance views.

That the majority of significant places selected interacted with water, though predictable given that seventy percent of students live at the Gold Coast, may be interpreted as communicating the importance of the water's edge 'spirit of place' and its essential contribution to a collective 'sense of place'.

Student narratives for almost half of the places selected included discussion about sharing experience of the place with others, including friends and family, often dating back to childhood. This is allied to Taun's social-cultural experience theory of place.

Almost all of the narratives discussed the place in terms of natural beauty of the place, reinforcing that the essence 'spirit of place' was very important, connected to Relph's theory. Also almost all of the places selected were discussed in terms of at least two of the categories above, thereby aligning with what Stedman describes as the 'meaning-mediated' model. In this "Physical features do not produce sense of place directly, but influence the symbolic meanings of the landscape, which are in turn associated with evaluations such as attachment" (Stedman 2003) (p674). This may simply be described as an interactive model where people find the landscape attractive and thereby interact with it frequently resulting in strong attachment and strengthen 'sense of place'.

It is suggested that this pilot study is a model that could be extended to engage local residents in identifying 'special' places throughout the Gold Coast, which in turn could inform planning instruments for protection and enhancement, which further could lead to directed development of authentic places with positive outcomes for both residents and visitors. It is recognised that the Gold Coast City Council's 'Bold Future' initiative went some way in seeking the community's views about people and places, but it stopped short of identifying sufficiently detailed 'sense of place' indicators for interventions to be explored.

Student Conceptual Designs

In 2011 the same group of students (now in second year) analysed the coastal edge strip of the Gold Coast from Runaway Bay to Burleigh Heads searching for 'sense of place' indicators. In doing this the students used knowledge about the nature of favourite places from the previous year's work but added further dimensions. These drew from Taun's thesis that 'place' is marked by human engagement in the urban landscape and this must be experienced firsthand. In a sense they were Baudelaire's 'flaneurs', or urban strollers 'a person who walks the street in order to experience it', but more in the Benjamin (2006) use of the term, as 'highly perceptive observers'. The students also studied the history of the place and they interviewed people at the place, thereby deepening conclusions.

This work underpinned conceptual urban design intervention proposals intended to strengthen community 'sense of place' within an environment of increased urbanity. Each student adopted a section of the urban area that is adjacent to the land and sea edge. These sites were chosen because of the meaning conveyed over time and through popular media that the water's edge symbolises the city.

Design interventions by students mainly addressed public place design which ranged from minor works that improve amenity to an existing place, such as new paths, seats or shelters in a park, to a new park (refer to figure 7), to the re-design of roads that are currently bland or placeless locations to people, but with the potential to strengthen a sense of community and provide linkages to significant place markers (refer to figure 8) and to major structures that bridge waterways (refer to figure 9).

A few design intervention proposals focused on private development, mainly on intensifying residential building, with associated service facilities. Motivations for private residential development derived from a strategic view that there are many parts of the Gold Coast, near the water's edge, that currently have low resident density but lend themselves to medium density, which in turn would provide populations that would support better services and facilities. Further logic to increasing residential density in existing areas derived from the simple expectation that less new urban growth at the periphery of the City would consequently be required.

Three conjectural design interventions are shown below that relate to public projects. These conjectures seek to provide authentic places for increasing numbers of residents, but with the expectation that visitors would then recognise qualities of place resulting in more memorable experiences. The student projects are being prepared for public exhibition as a stimulus to community

debate about Gold Coast City's capacity to work with its natural physical attributes and its built fabric to strengthen authenticity and the link between 'spirit of place' and 'sense of place'.

1. Urban Sculpture Park

Figure 7. Student John Kurko Project

Fixed and semi-fixed elements – proposal for an urban sculpture park at Broadbeach on vacant land, adopting themes that reinforce the place. The Park explores prospect-refuge concepts and marks a nearby artisan precinct. Through its distinctiveness it could also act as a 'way finder' for this part of the Coast.

Image credit – John Kurko



2. Street re-design

Figure 8. Student Pam Deasy Project

Fixed and un-fixed elements – proposal to re-design a street in Labrador at right angles to the Broadwater incorporating children activity areas. Intention is to encourage safety and security through community interaction and involvement, while also strengthening the visual link to the water. This design idea has authentic place-making potential, a model for adaptation elsewhere. Image credit – Pam Deasy.



3. Pedestrian/Cyclist Bridge

Figure 9. Student Chris Byron Project

Fixed element – proposal for a pedestrian/cyclist bridge across Nerang River connecting Southport with Tedder Av and Main Beach via a boulevard and park. (perspective view from East side). As a major new element this design has the potential for 'iconic' distinctiveness that could reinforce 'sense of place' for both residents and visitors. Image credit – Chris Byron



Conclusion

This paper shows the multi-dimensional nature of 'sense of place' theoretically and in terms of Gold Coast City built examples, investigations and design conjectures. 'Sense of place', interpreted as a human phenomenon, is discussed as being linked but different from 'spirit of place' which relates to the inherent natural environment.

Milestone place making initiatives at the Gold Coast were discussed in terms of fixed, semi-fixed and un-fixed elements and they scoped across public works (Broadwater Parklands), private development (Circle on Cavill) and community initiative (Tedder Avenue). These examples illustrate the Gold Coast's broad engagement with and commitment to strengthening 'sense of place' through high quality contemporary design. In the public and community cases an authentic 'sense of place' that is perceived as being meaningful for residents is evident. For the private development, modifications that may improve 'sense of place' are explored.

Conceptual design intervention proposals engage with 'sense of place' enhancement, especially in terms of improving authentic experience for residents, which in a similar way to built examples may also strengthen 'place' experience for visitors.

The design conjectures may stimulate debate and encourage further initiatives to help Gold Coast City authorities and the wider community to achieve a sustainable healthy balance between the challenges of urbanisation and the development of a 'sense of place' that is in a symbiotic relationship with 'spirit of place'.

International parameters for the creation of healthy and liveable cities include the need for authentic human generated 'sense of place', which in the case of the Gold Coast when overlapping the natural 'spirit of place' may lift the Gold Coast's attraction as a place to live and to visit.

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Sustainable Flood Management Strategy

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Sustainable Flood Management Strategy

ABSTRACT: *Climate change and uncertainty of its likely impacts at different time horizons present challenges that require more adaptive risk management approaches. Greater flexibility is required to continually adapt to emerging information around climate change, flood management and community protection. Population growth is regarded as another emerging challenge to sustainable management of flooding. Responding to these challenges Gold Coast City Council has developed a corporate strategy for sustainable flood management (2010). The strategy outlines the elements of best practice in flood management under uncertainty and achieves sustainability through incorporating an adaptive approach in strategic planning. The strategy delivers a strategic decision support system and a scenario planning process to guide decision making in this uncertain environment. The strategy proposes a number of actions aimed at creating capacity in a local government and empowering it to make a journey from a static to a more dynamic and adaptive decision-making process. This paper contributes to the body of knowledge by outlining the principle of best practice in flood risk management in an era of uncertainty and showing how these principles are used to achieve sustainability in flood risk management.*

Keywords: *Sustainable, Flood, Management, Strategy, Adaptive*

Introduction

Gold Coast like many coastal cities has been partly developed within the floodplain of its natural waterways and as a result has experienced more than 45 floods since 1925 (Bureau of Meteorology web site), the most severe of which in recent history was triggered by a passing cyclone (Wanda - 1974). Bureau of Meteorology records show that more than 40 cyclones have occurred in the SEQ region over the past 120 years. A main extreme weather driver in SEQ is low pressure systems, known as East Coast Lows, that occur off the east coast of Australia. East Coast Lows on average occur several times a year and contribute to the occurrences of heavy rainfall event and storm surge on the Gold Coast. A moderate flood in the Gold Coast in 2005, is an example of this weather pattern. Past flood events caused moderate to extensive damage to private property, community buildings, bridges and roads. The last major flood (1974) led to the evacuation of 1500 people and homes inundated with 1.2m to 1.5m of water (Gold Coast Bulletin, Tuesday 29, 1974 p3). More recent localised flooding in June 2005, resulted in the inundation of a number of houses and the loss of two lives.

It is important to note that the recurrence of extreme rainfall that results in flooding is a normal part of natural climate variability. A floodplain is the land that, in its natural state, would be hydraulically and biologically connected to a main river and from time to time be inundated due to river flooding. Flooding is a natural process that creates both hazard and opportunity. Smaller floods have an important role in reinvigorating floodplain ecological processes and maintaining biodiversity. Medium and larger floods in the upper catchment also replenish water supplies for domestic and commercial uses. On this basis, a comprehensive and sustainable flood risk management regime would ideally integrate with a river's natural processes. It would involve the development of strategies and specific

actions to both reduce losses and at the same time increase catchment efficiency through leveraging opportunities that a flood provides.

Strategy development

The strategy development has been based on Gold Coast City Council (GCCC) corporate strategy development guideline (GCCC, 2009). This process requires extensive consultation with key stakeholders. The strategy has been developed in four main stages as follows:

- ❖ concept plan
- ❖ Scoping study
- ❖ project management plan
- ❖ strategy development (including implementation plan and costing)

Each stage has been signed off by the stakeholders and the Council Executive Leadership Team (ELT) of the GCCC. At the final stage, the strategy document (Including implementation plan and costing) has been presented to the Council and endorsed by the full Council (Sustainable Flood Management Strategy, 2010).

Components of flood risk

Following recommendations of SCARM report (1998) on best practice on floodplain management, flood risk on the Gold Coast is considered to have three main components, i.e. existing, future and residual flood risks. Actions 12 and 15 of the strategy (refer to Appendix A) are specifically designed to address elements of flood risk through the development of appropriate modelling tools and flood information system for the prediction of flood and assessing its impacts.

Existing flood risk

Existing flood risk refers to the amount of flood damage, if a flood happens today.

Although the city is geographically susceptible to flooding, recent development of sophisticated engineering and modelling techniques and regulations and planning policies places the Gold Coast in a much better position to mitigate and respond more appropriately and effectively to flooding. Flood studies on the Gold Coast show that over-floor flooding will occur during a major regional flood on the Gold Coast. Although this flooding in some areas is only for a very limited depth of inundation and duration, the damage bill could be substantial. Potentially several thousand people would be directly affected in an unlikely event of all catchments in the city simultaneously experiencing a major flood.

event. Actions 10, 16 and 17 of the strategy are specifically designed to address existing flood risk on the Gold Coast through the design of the suitable flood mitigation measures.

Future flood risk

Future flood risk refers to the amount of flood damage, if a major flood happens some time in the future. Anticipated future flood risk is in part attributable to the projected impacts of climate change and development in already flood prone areas, if not controlled properly. Flooding and climate change are inextricably linked issues, for example CSIRO predicts that as a result of a changing climate the Gold Coast will possibly become more susceptible to increased intense rainfall events, extreme weather, sea level rise and storm tide. This means that a 1 in 100 year flood event by today's standards may occur with greater frequency or a flood with 100 year return period would have greater consequence in the coming decades. Actions 11 and 13 of the strategy are specifically designed to address future flood risk through planning processes.

Residual flood risk

Mitigation and protection measures are generally aimed at protecting people against flood events that occur within the design level for residential buildings. Based on the Building Code of Australia and various state and national policies and strategies, the design level for residential buildings is set at 1 in 100 year annual return interval (ARI) flood. Risk over this standard measure is described as 'residual risk'.

Residual flood risk highlights the fact that a flood risk management plan cannot totally eliminate the adverse impacts of flooding everywhere, anytime and for all land use types. Each land use type can be managed to a level of hazard that is determined through legislation or community expectations.

Beyond this level, the flood risk management plan generally aims at reducing risk to a point, through emergency management services, that enables the community to recover from an extreme event.

Actions 18 and 19 of the strategy are designed to enhance community resilience against residual flood risk. These actions include the development of a flood emergency decision support system and real time flood fighting strategy.

Current Trends and Issues

Future-proofing of the strategy requires a good understanding of the various trends in the elements of flood risk management. The strategy identifies and addresses three type of trends as follows:

Trends in the Level of Flood Hazard

Traditionally, future floods are predicted based on the recorded historical flood information in a region. The historical flood data for the Gold Coast is available for the past few decades (during a period of relatively stable climate). Faced with predicted change in global temperature, such extrapolation of historical data can no longer produce an accurate estimate of future flood frequency, intensity, extent and duration. Depending on climate change scenarios which might occur, future floods are likely to be different from the ones in the past.

The knowledge of the extent of climate change and its likely impacts on the city is developing. Existing climate change studies for the Gold Coast (Abbs and McInnes, 2004, Abbs et al, 2007, Mirfenderesk and Abbs, 2007) suggest that extreme rainfall and flood consequences on the Gold Coast may become more severe in the future. However, there is a substantial degree of uncertainty associated with these predictions. It is important to note that floods can be highly variable, depending on how each catchment responds to different rainfall events. Likely changes in catchment response to rainfall due to climate change is unknown at present. It is, therefore, important to realise that there is a fundamental degree of uncertainty in any prediction of changes in flood frequency in the future. Action 6 of the strategy is aimed at enabling Council to acquire-required knowledge on climate change and other future trends through the development of a flood research program.

Trend in Vulnerability to Flooding

Vulnerability to flood increases with the intensification of land use in areas potentially subject to flooding, increasing value of property or assets located on that land, and increased population levels.

Due to population and economic growth, it is anticipated that more people will reside in the Gold Coast's urban areas, more assets will be created and the value of these assets will increase over time. Such growth, if not adequately planned and regulated, will potentially result in an upward trend in vulnerability to flooding.

Trends in Landowner Expectations and the Role of Council

While flooding is a natural phenomenon, Council has taken a leadership approach to the city's flood management challenges, particularly in regards to climate change and community capacity to adapt to and to mitigate against adverse impacts. However, community expectations are likely to exceed Council's capacity to predict, mitigate and respond to some extreme flood events. The adverse impact of climate change is expected to elevate community expectations of the Council to take a leadership role in developing and implementing appropriate adaptation and mitigation measures. Consequently, the role of Council in flood risk management is expected to increase in future, unless further actions

on community empowerment are undertaken. Addressing this issue, action nine of the strategy is designed to enhance collaborative partnerships within the community in regard to flood risk management. Actions 1, 2 and 6 of the strategy are designed to enhance Council's internal processes and its regional role, preparing the Council for taking more of a leadership role in flood risk management.

Best Practice in Flood Risk Management

Best practice in flood risk management is established based on Council's first hand experience on flood risk management for more than a decade. This best practice has been used as the guideline for the development of the strategy and is as follows:

- ❖ Management measures are technically sound and ecologically, socially and economically sustainable
- ❖ Management measures are based on an understanding of natural processes and are integrated with these processes as far as practicable
- ❖ Natural processes will not be disturbed as far as practicably possible. Engineering intervention is warranted only where human life, significant infrastructure or natural assets are at risk
- ❖ Risk changes over time due to changes in the hazard, the value of exposed assets, and their vulnerability
- ❖ The broader community has a role in flood risk management;
- ❖ All types of flood risks, such as existing, future and residual, will be managed
- ❖ The objective of flood management will go beyond minimising flood losses but also to maximising the efficient use of the catchment
- ❖ Flood risk management will be sustainable, despite future uncertainties, through the ability of efficient and effective adaptation to change.
- ❖ Flood management is an integral part of water resource and catchment management systems that aims to increase the efficiency of the usage of water resources and catchments without compromising sustainability of these vital systems.
- ❖ Flood risk will be mitigated through a multi-faceted approach aimed at reducing all three constituents of risk:
 - Hazard that is a measure of frequency and severity of flood
 - Exposure that is a measure of human life and assets that are located in a flood risk area, and
 - Vulnerability that is a measure of a community resilience and their ability to anticipate, cope with and recover from the impact of a flood event.

where,

Flood Risk = Hazard * Exposure * Vulnerability (refer to figure 1)

Figure 1 – Construct of flood risk in terms of its basic elements

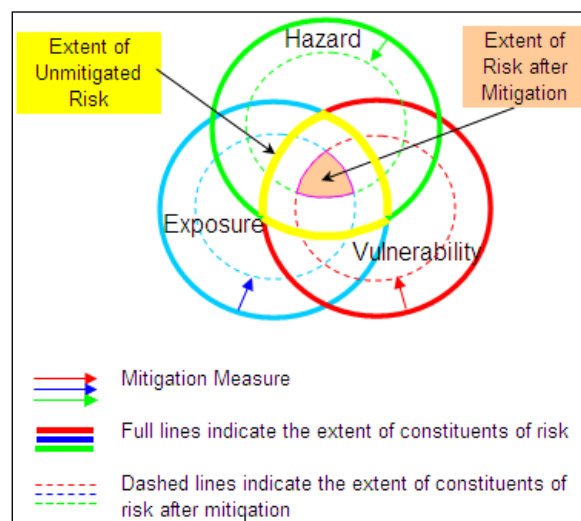


Figure 2 shows how Council seeks to manage flood risk by reducing the physical hazard, the exposure to the hazard, or the vulnerability to hazard.

Flood defence has traditionally been concerned with reducing the physical hazard for existing risk, whereas this strategy seeks to consider and include all three above-mentioned groups of measures for existing, future and residual risks. The two axes in this figure, i.e. “Risk Type” and “Risk Reduction Method”, provide a space within which the 19 Actions of the Strategy are prescribed for the management of flood risk on the Gold Coast. Each one of these actions is aimed at reducing one or more elements of flood risk.

Actions that are placed close to the bottom right corner generally comprise of non-structural measures for flood risk management. Actions that are placed close to the top left corner have a more structural nature. Structural methods of flood risk management require construction of physical assets, such as dams, weirs and levies. These measures require considerable upfront investments, are less flexible and are often irreversible. Non-structural methods require less upfront investment and are of a non-permanent nature. Development of flood warning systems or community education programs are examples of these types of measures. These measures are suitable for climate change

adaptation strategies by providing a high level of flexibility, which fit well with the uncertain nature of climate change impacts on flooding.

Figure 2 – Flood Risk Management Matrix

	Risk Type		
	Existing Flood Risk	Future Flood Risk	Residual Flood Risk
Risk Reduction Method	Reduce Hazard Actions: 16, 17, 18	Actions: 3, 10, 11, 12, 16, 17	Actions: 1, 7, 12
	Reduce Exposure to Hazard Actions: 10, 12, 13, 15	Actions: 1, 2, 4, 5, 6, 7, 10, 11, 12, 13, 15, 19	Actions: 1, 7, 10, 11, 12
	Reduce Vulnerability Actions: 8, 10, 12, 14, 19	Actions: 1, 2, 4, 6, 9, 17, 19	Actions: 1, 7, 8, 11, 12, 19
Strategic Decision Support System (SDSS) based on Environmental, social and economic data collection & modeling & Research			

Strategy Sustainability and Review process

The Sustainable Flood Management Strategy does not limit itself to just a periodic review process. Reviews can be triggered at any time even by natural phenomenon events. The need for strategy review is identified through the operation of the Strategic Decision Support System (SDSS) that will be developed as part of implementation of this strategy (Action 4 of the strategy). The SDSS can identify the need for a review through its environmental and adaptive management modules.

- ❖ Environmental scanning is a continuous operation of the SDSS. The aim of environmental scanning is to identify the latest trends on climate change, legislation or policies, socio-economic status or any other changes that have the potential to impact on flood risk management. Any detected change, where necessary, is converted to information, fact, knowledge or impact statement through a scientific process embedded within the SDSS. A threshold analysis then determines the importance of the change (based on the corporate risk assessment methodology) and depending on the seriousness of the assessed risk, a review and/or modification of the strategy can be triggered.
- ❖ Adaptive management process of the SDSS includes four steps, - Implementation, Monitoring, Evaluation and New Learning. These steps create a feedback loop that iteratively feeds new learning from the implementation of the strategy back into the

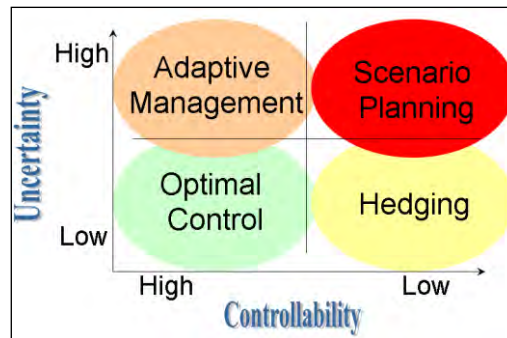
- ❖ \decision-making process. As part of this process a number of indicators are set to measure the performance of different aspects of the strategy. Once an indicator exceeds a threshold, an evaluation process is triggered. The evaluation process leads to new learning and identification of the need for change. A threshold analysis determines the importance of the required change and depending on the seriousness of the assessed risk a review of the strategy can be triggered.

The adaptive management element of the strategy ensures the sustainability of the strategy in the face of a highly dynamic and uncertain external environment.

Addressing uncertainty

Lack of full knowledge of scientific processes pertinent to climate change and an inability to accurately predict future socio-economic conditions render our projections of the climate change induced flood impacts as being uncertain. The strategy considers uncertainty under two distinct situations, i.e. uncertainty under high and uncertainty under low controllability, as suggested by Petersen et al (2003), Figure 3.

Figure 3 – Alternative Adaptive Planning Approaches (after Petersen 2003).



The strategy acknowledges that some of the issues pertinent to flood risk management are highly uncertain but we can exercise some level of control over them. For instance, changes in urban form depend on many socio-economic drivers. However, local authorities can influence these changes by exercising appropriate development control measures. Changes in urban form can substantially change the level of vulnerability of a city to flooding and therefore the accuracy of their control measures is vital for appropriate management of future flood risk. The challenge in exercising such control measures is that they can only be set based on current projections of future changes that are highly uncertain and therefore imprecise.

A key concept with the proposed strategy is that it is necessary to, as accurately as possible, forecast changes in the built environment, social demography, economic situations and climatic conditions to

ensure that control measures, physical mitigation and planning responses are able to reduce risk, both today and also into the future. This is especially important given the lifespan of infrastructure assets that will be built today. In other words, our responses to this risk must seek to be flexible to future changes and must ensure associated investigations of probable floods are both justifiable and effective.

The strategy addresses the uncertainty associated with the future projections of socio-economic and climatic conditions through the development of a strategic decision support system (Mirfenderesk and Corkill, 2009). This system empowers the organisation to exercise adaptive management, gradually improve the accuracy of these projections and their consequences on the Gold Coast; and iteratively examine the effectiveness of policy positions with respect to flood risk management and improve policy responses accordingly.

The strategy also recognises that there are uncertain issues with respect to flood risk that are beyond the control of the Council, e.g. intensity of future storm events and their impacts of flooding. Such changes in environmental forces can have profound impact on the future of a city such as the Gold Coast that is highly exposed to the adverse impact of natural hazards. The proposed strategy response to this type of uncertainty is scenario planning (Action 7 of the strategy).

Conclusion

The study presents a sustainable strategy for managing flood risk under the uncertainties associated with climate change impacts. The strategy contributes to sustainable land use planning as well as sustainable development and growth of the city. It assists with asset management activities in flood affected areas and supports Council's flood emergency efforts by creating and maintaining appropriate flood emergency decision support tools. The strategy introduces an holistic approach towards flood risk management by implementing measures that are aimed at:

- ❖ Reducing the probability of flood hazard occurrence.
- ❖ Reducing the exposure and vulnerability of the city's built and natural environment to flood hazards.

Lack of full knowledge of scientific processes pertinent to climate change and an inability to accurately predict future socio-economic conditions render our projections of the climate change induced flood impacts as being uncertain. This study presents a sustainable strategy that aims at addressing these uncertainties. Sustainability is defined as the ability to adapt to change within the limited available time-frame. The proposed strategy achieves sustainability through the development and implementation of a knowledge-based adaptive planning/decision making model. This model enables

the organisation to respond to change in a timely and systematic way. The strategy proposes a number of actions aimed at creating capacity in a local government and empowering it to make a journey from a static to a more dynamic and adaptive decision-making process.

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Appendix 1 – Strategic Actions

1. Review Corporate Governance Framework to integrate and embed flood risk management.
2. Engage in regional cooperation on flood risk management.
3. Continue to ensure the currency of Council's legal responsibilities in regard to flood risk management under federal and state legislation, under current and future climate conditions.
4. Develop a Strategic Decision Support System (SDSS) that enables Council to respond to changed knowledge in a consistent and efficient manner.
5. Assist with the integration of the operational arrangements & business processes between stormwater, mainstream flood management, Ocean, Beaches and Foreshores; and water cycle strategy.
6. Undertake flood risk management research for the Gold Coast in partnership with research facilities.
7. Develop a flood risk model that is capable of quantified assessment of various future scenarios and analyse change in the main drivers of flood risk.
8. Enhance collaborative partnerships within the community.
9. Advocate on behalf of Council and the community for improved flood management outcomes.
10. Investigate the status of critical infrastructure with respect to flood impacts and identify necessary priority-based remedial measures.
11. Review and progressively amend flood design standards in the Land Development Guidelines.
12. Undertake modelling and investigative studies for effective management of existing, future and residual flood risks.
13. Review development, building and land use controls in the Planning Scheme to support both existing, future and residual flood risk management.
14. Develop a dedicated flood information system.
15. Review other governmental arrangements for the acquisition of residential buildings where the flood immunity is unacceptably low.
16. Investigate physical flood mitigation work.
17. Identify areas cannot be adequately defended by catchment-wide strategic measures and develop specific local flood defences.

18. Undertake a feasibility study on real time physical flood fighting responses.
19. Develop, implement and maintain the Council's flood emergency management Decision Support System (DSS), and ensure the provision of an adequate and cost-effective flood warning system.

Utilizing Public Space and Local Community to Transform the City towards a more Healthy Environment

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Utilizing Public Space and Local Community to Transform the City towards a more Healthy Environment

ABSTRACT

Public space network plays a fundamental role in the viability and liveability of any city. As numerous cities around the globe endorse planning policies, aimed at increasing population densities in existing urban environments instead of continuing greenfield development, greater attention needs to be given to the role of such networks and to connectivity. This paper explores the potential for transformation of cities towards a healthier environment by analysing the public space and local community interaction of three case studies (Copenhagen, Hanoi and Sana'a). In this content the following questions arise: how can better guidance be given to the designers of urban public spaces in order to maintain and enhance existing healthy community attributes? Considering the increase of urban infill projects and the continuing densification of existing communities, how can we ensure more quality public spaces are developed, to ensure a healthy future for cities?

This paper discusses green urban design principles and suggests a series of guidelines to support decision-making in the design of public spaces. The three case studies present medium-density and car-reduced urban precincts from Europe and Asia, as precedents for the positive interaction of pedestrian-oriented urban design and citizens behavioural values. The qualities of streetscape are examined and compared, using these historical and contemporary precedents to frame a conceptual model of car-reduced/car-free communities for the design of healthy cities.

From this precedent analysis and conceptual model, the paper proposes a design framework which enables the transformation of existing urban environments towards a car-reduced future, while increasing the potential for higher population densities and promoting green urban design principles. This adaptive design framework retains the unique qualities and features of existing urban environments to deliver more sustainable and healthier cities for the future.

Keywords: Green Urban Design; Public Space; Urban Space Network; Local Community; Liveability.

Introduction

Public space networks play a fundamental role in the viability and liveability of the urban environment. It offers a platform for public activities and consequently facilitates public life. Streetscapes, as a significant part of public space, provide opportunities for communication, transportation and trade in the public realm (Gehl and Gemzoe, 2001), enhancing individual and collective experiences.

Numerous scholars demonstrate that a significant proportion of contemporary environmental issues is related to urban areas (Leinberger, 2011, Lehmann, 2010, Shirley and Moughtin, 2005, Beatley, 2000, Newman and Kenworthy, 1999) and that an urban environment will be more sustainable if it provides increased liveability, a key element of which is public health (Girardet, 2004, Lehmann, 2010, Newman and Kenworthy, 1999).

Intensification of existing urban environments, which is promoted by the principles of green urbanism to form more sustainable and liveable cities, is based on the assumption that more compact cities will be more effective in both resource consumption and social interaction (Beatley, 2000, Girardet, 2004, Lehmann, 2010, Newman and Kenworthy, 1999, Ng, 2010). As planning policies shift towards increasing population densities in existing urban environments instead of continuing greenfield development, we need to place a greater emphasis on the design of streetscapes to ensure a healthy future for cities.

Over time the balance of activities occurring in urban streetscapes has shifted, with priority given to transportation over communication and trade. This paper employs existing urban literature and precedent examples to argue that as cities intensify over time an adaptive design framework is necessary to facilitate the evolution of healthy streetscapes in which an appropriate balance of activity is reinstated.

Identifying the Problem

Contemporary urban society is affected by increased sedentary habits and the isolation of residents' lifestyles, which cause problems for both citizens' physical and social health. Sedentary lifestyles have a significant impact on human health. High dependency on modern technological devices keeps citizens apart from essential physical activities which can increase citizens' physiological and psychological problems (Alpert, 2009).

Social isolation of life is another issue of contemporary cities. Telecommunication, fast mobility and virtual trade diminish face-to-face social life in the physical space of the city. Citizens' engagement in public space during daily life encourages social activities, assisting to counteract the identified problem of isolation in urban life. As such, a lively and active public space has the ability to improve health and well-being.

Background

Current urban planning policies provide guidelines to the numeric properties or physical dimensions of both private and public open space in cities. However, they generally fall short of providing advice to the desirable social or physical qualities of the streetscape. As planning policies encourage intensification of urban areas, it seems essential to consider social and physical activities of future residents. How can designers ensure the streetscape of medium-density urban environments do not reinforce these existing problems but encourage socially and physically 'healthy' outcomes?

Intensification of existing urban environments raises the potential of having car-reduced streets through a reduction of transport need. However, current intensification models typically involve the

construction of medium to high density housing on existing, underutilised, allotments within existing urban infrastructure. Investment is typically limited to the boundaries of ownership and little change occurs at the street level to promote healthy community activity. To develop guidelines which extend into this currently neglected public realm we need to consider the activities of future residents more.

The character of a car-reduced street

A part of each citizen's everyday life is conducted on streets. Activities inside and around the streetscape define its character in the hierarchy of urban linkages, diversity of functions and distinctive identity (Elizabeth and Lynne, 2006, Moughtin, 1999). These pedestrian-base activities have had mutual interactions with the qualities of the built environment.

'Automobility' offers new types of freedom in space and time (Newman and Kenworthy, 1999) as well as a kind of personal identity in the modern urban environment (Sheller and Urry, 2006, Urry 2004). Car dependency and reliance on personalised mobility discourage effective participation in urban outdoor activities in the contemporary zoned cities. The streets of contemporary cities work primarily as spaces for transportation with mobility needs, surpassing the critical roles of communication, social exchange and trade (Gehl and Gemzoe, 2001). This leads to new patterns of public life in contemporary cities which are faster, more isolating and socially fragmented. Subsequently, the way citizens interact with other humans and the built environment has changed. Human scale is overlooked because the main users of the streets are no longer people but cars.³ Consequently, few contemporary streets represent quality spaces for humans.

Walkable inner-city public spaces provide quality spaces for humans rather than cars. Gehl (2002) describes them as 'prominent assets in present society'. Studies show that decreasing the speed of travel in an urban environment enhances the rate of social interaction in the urban space (Sauter 2008). Lowering the rate of car traffic also encourages people to spend more time in public space and consequently providing more opportunities for people to utilize the streetscape as an active urban space (Gehl 2010).

A car-reduced urban precinct is a place where people move safer and more conveniently, improving urban health by increasing the rate of walking and cycling as well as social activities in the city. This kind of urban space is a spatial catalyst for behavioural change towards more liveable and sustainable lifestyles.

³ - Contemporary cities are divided into four categories by Gehl and Gemzoe (2001): 'Traditional Cities' which continues to use their public space as meeting place, market place and traffic space; 'Invaded Cities' in which car traffic surpasses the other functions of public space; 'Abandoned Cities' which do not represent considerable public space for public life; and 'Reconquered Cities' where notable efforts are being made to rebalance to three functions of their public space. For more information see: Gehl, J. & Gemzoe, L. (2001), *New City Life*, English Translation by: Steenhard, K., Copenhagen, Royal Danish Academy of Fine.

Different street activity types

Qualities of streetscape can be divided into structural and activity qualities. Structural qualities such as harmony, legibility, continuity, permeability and human scale consideration draw the spatial character of the street and make it appropriate to accept different types of activities. The spatial qualities of streetscape are preliminary conditions to serve different types of activity in and around streets and are well documented by existing literature.

With respect to activity qualities, Gehl enumerates three primary types of activity in public space: 'Necessary, Optional and Social' (1987, 2010).

- a) Necessary activities are related to unavoidable occasions of everyday life which happen in almost all climate and time conditions (Gehl, 1987, 2010, Lillebye, 2001). As an example, going from home to work is a necessary (primary) activity, so too is travel to and between essential services, education and shopping. Existence and patterns of necessary activities define a part of the street character. Although the quality of public space does not affect the realization of these activities, it has influences on means of implementation and the frequency of activities. Necessary activities may be conducted by walking, bicycling, driving, public transport or a combination of these. These activities are undertaken across time and involve all residents of a city, so they have considerable influences on the preliminary qualities of the public space.
- b) Optional activities take place only if the climate and time conditions are appropriate for humans to spend time outdoors (Gehl, 1987, 2010, Lillebye, 2001). Sightseeing, sitting or doing exercises in public space are examples of optional activities. They are also affected by cultural, social and economic conditions. Optional activities have a critical role in the qualities of streetscape, because they provide platforms for social activities.⁴ Creating appropriate conditions for people to stand, sit, watch, listen and talk in public space can instigate social activities and public life in the city. The patterns and frequency of optional activities are directly affected by the structural qualities of public space such as continuity, permeability, legibility and distinctiveness. Gehl (1987) claims that optional activities are also influenced by attributes such as safety, comfort, vibrancy and tranquillity.
- c) Social activities in public space are directly affected by four factors: behavioural values, sufficient population, appropriate space and climate conditions (Lillebye, 2001, Gehl, 1987, 2010). Patterns of social activities vary from culture to culture and location to location. Playing

⁴ - Optional activities are also called 'voluntary activities' by Lillebye (2001).

football inside the street is a social activity for a typical South American society⁵, while this is not that common in North Europe. Even within a city, different social activity patterns exist in different community demographics and at different time patterns. The patterns of social activities during the day and night and special events are dramatically varied from place to place. Social activities need to be addressed in each specific design context in order to achieve sustainable outcomes.

The boundaries of these three types of activity are not fixed. Urban activities overlap due to community behavioural values, local climate and social constructions. If the 'necessary' activity of travelling between home and school has the option to be undertaken by foot, bicycle or public transport, optional and social activities are more likely to occur in parallel.

Activity patterns, behavioural values and streetscape qualities

Activity patterns in public space are affected by citizens' cultural and behavioural values (Beatley, 2000). Diversity of activities in a public space makes it alive, vibrant and safe. Three successful car-reduced urban precincts are presented below as evidence of positive interactions between citizens' behavioural values and the qualities of car-reduced streetscapes. Mutual interaction between behavioural values and spatial qualities make these precedents active, safe and appropriate for walking, cycling and healthier lifestyles.

1- Accessible Alternatives: Copenhagen

The city of Copenhagen has been implementing a comprehensive sustainability plan containing planning strategies (i.e. increasing costs of parking in the city centre and free city bike system), public transport improvement, cycling infrastructure development and pedestrianisation of the city centre (Pedestrian-only and pedestrian-priority precincts) since the 1960s. Numerous small steps towards decreasing car dependency, gradually transform Copenhagen to a more liveable city over the past five decades.⁶

Copenhagen's car-reduced city centre was established with the pedestrianisation⁷ of Støget St in 1962. The precinct was incrementally expanded to an area of 1km² by 2000 (Gehl and Gemzoe, 2001, Beatley, 2000). This step by step reduction of car dependency in the city centre has provided the

⁵ - Bogota, Colombia has 110 km of temporary and permanent bike paths called 'Ciclovía' which refers to the closing of a street to motor vehicles to prepare it for cyclists and pedestrians. The Ciclovía network of Bogota is closed to automobiles every Sunday and other holidays for 7 hours to allow walking, cycling and social events.

⁶ - Many European cities, including Copenhagen, rely heavily on bicycle mobility. It is a quiet, simple and cheap mode of mobility with a reliable speed in short and medium-distance inner city travels (20-30 kph comparing with 5 kph for walking, 10 kph for running and 50-60 kph for driving). Indeed, it is an important kind of physical exercise. See: Beatley, 2000, pp. 93-100; Gehl and Gemzoe, 2001, pp. 52-56.

⁷ - Pedestrianisation means partially, temporary or permanent removal of cars from urban environments which once serviced automobile traffic.

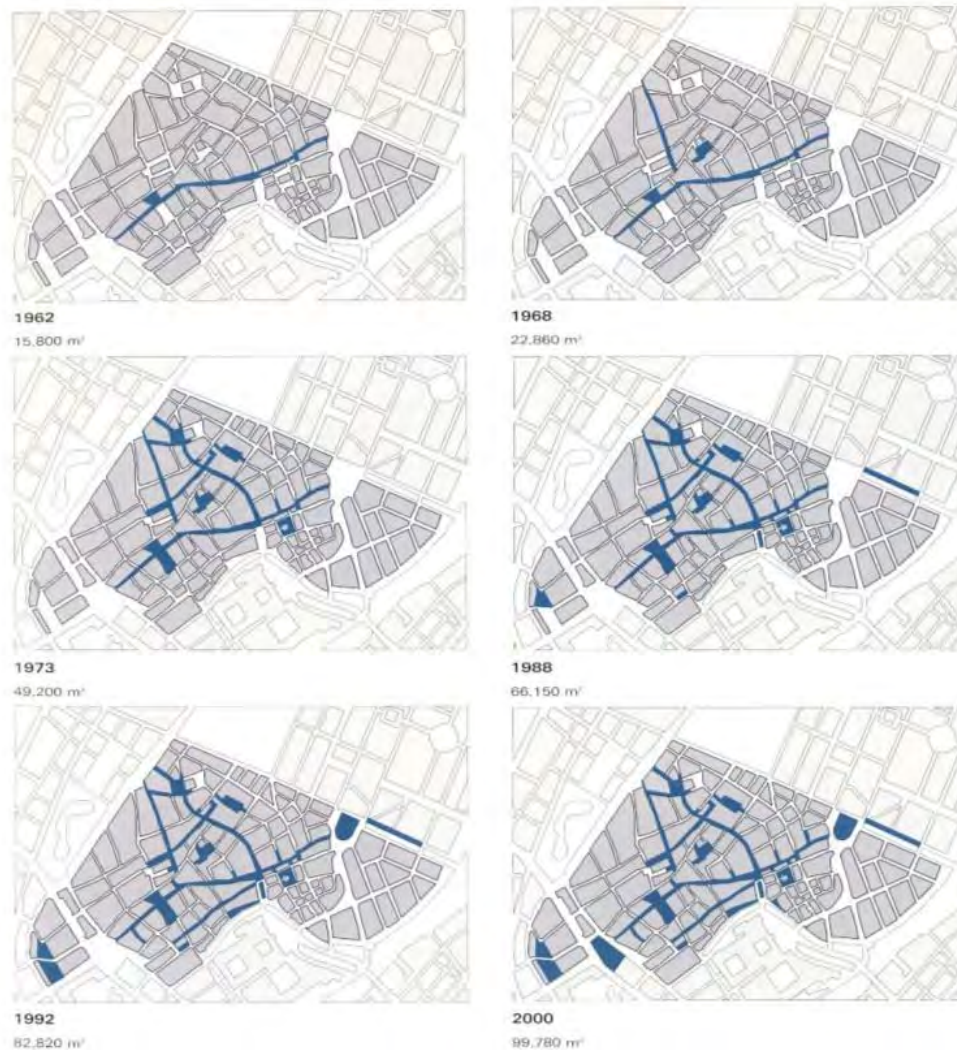
opportunity to form a new culture of walking and cycling in Copenhagen over time⁸ which was hardly predictable in the 1960s at the beginning of the project (Gehl and Gemzoe, 2001).

Environmentally concerned citizens support sustainable development plans in Scandinavian countries (Newman and Kenworthy, 1999). Sustainability as a community-base value is identified and enhanced through complimentary planning, policy and education programs along with providing accessible alternatives for necessary activities such as cycling, walking and public transport. These alternatives have become equally feasible choices and equally valued.

Accessible alternative choices in Copenhagen have made walking and cycling more comfortable, safer and easier than utilizing an automobile for inner city transportation. Currently, almost 80% of inner city traffic is on foot or bicycle, whilst around 40% of the population of Copenhagen ride bicycles to work (Gehl and Gemzoe, 2001). Gradual transformation of parking areas to public space and adapting the existing streets to meet the needs of pedestrians and cyclists has increased public life and street activity. Recent surveys show that street activity is now six times that of 1962 (Gehl, 2010)

Figure 1: Pedestrian-only and pedestrian-priority streets have been expanded gradually in Copenhagen since 1962. It is supported by appropriate strategies, integrated transport system and citizens' values.

⁸ - Strategies, plans and achievements of Copenhagen pedestrianisation process are discussed by Jan Gehl (1987, 2001, 2002 and 2010) in detail.



This continuous and slow process of behavioural change provides adequate time for citizens to adapt their patterns of accessibility with healthier modes of transportation in the urban environment. The tendency for residents to continue cycling and walking through the winter snowfall clearly shows the power of such behavioural values in Copenhagen.

Figure 2: Cycling and public transport as accessible alternative means of transportation change citizens' behavioural values in Copenhagen. Almost 40% of the population of Copenhagen use bike as the primary means of transportation.



Merging a necessary activity of transportation with an optional activity of cycling affects the boundaries of the optional activity. Walking and Cycling in Copenhagen are not only an exercise or one option of moving in the city, but also a part of citizens' behavioural and cultural values (Gehl, 2010). Thus, gradual elimination of cars from the streetscape has a mutual interaction with citizens' behavioural values, developing healthier, safer and more active public spaces. Transportation, communication, play and trade happen more frequently and conveniently in such car-reduced streetscapes.

Figure 3: Pedestrian optional activities make the streetscape diverse and active in different times in Copenhagen.



2- *The Optional and the Necessary: Hanoi*

The 36 streets of Hanoi⁹ were founded by skilled craftsmen migrating from workshop villages to the city between the 13th and 15th centuries (Logan, 2000). Inhabitants of each street arrived from a single village, bringing with them similar behavioural values, customs and beliefs. Living and working together, craftsmen have created a co-operative system for making, transferring and selling their merchandise while at the same time forming their urban community (Logan, 1994). Having similar cultural values, inhabitants of each street built community-based public spaces.¹⁰ Thus a number of streets with social and cultural infrastructures were made for citizens to work, live and trade simultaneously.

Due to the short distances between necessary activities and the vitality of citizens' participation in the streetscape, the unique architecture of the 36 streets of Hanoi have established a quality public space which is not dependent on car traffic. Due to a local taxation system based on the width of storefronts, living spaces located above and behind shops and building plots have become very narrow and long.¹¹ Residential buildings located on top of fine grain shops (three to five stories) provide sufficient population to maintain an alive and active streetscape. Calm and pedestrian-friendly modes of transportation in the precinct allow social and economical activities to take place effectively. People and goods transportation primarily occur on foot, bicycles, tricycles and trolleys.

The activity boundaries exist in complex layers and shift over time. The strong business and trade character of the streetscape in the day time makes street edges active and engaging at a human scale. Contextual buildings consist of residences, work places and small scale restaurants which expand their services into the street. Indeed, temporary activities of street hawkers make the public space more active, diverse and even safer during 24 hours.

Figure 4: Daily life in Old Quarter of Hanoi. Working and living are intertwined with each other.

⁹ - The actual number of streets is nearly 70. The name may come from 36 guilds which primary founded the area.

¹⁰ - The 36 streets of Hanoi still have their historical names, originating from their particular goods and services (i.e. Silver Street and Silk Street). Originally, each street had at least one temple, some of which have been used as shops today.

¹¹ - 'Tube Houses' of Hanoi have a typical width of 3 meters and length of 60 meters which form a very distinct type of mixed-use buildings in the Old Quarter.



At night, as the sun and the heat of the day recede, the character of the streets alters. Inhabitants come into the cool of the streetscape for dining, shopping and communication. Numerous stalls open in front of the now-closed daytime shops, keeping the streetscape active until midnight. Private activities above the street edges provide eyes upon the street to increase night time safety.

Overlaying activity patterns of working and living in the precinct provides a healthy urban environment in the *36 streets* of Hanoi, which is closely intertwined with the vitality of pedestrian movement in the area for social and economic purposes.

Figure 5: Alternative activities at night make the *36 streets* of Hanoi diverse, alive and attractive.



The small scale building plots, medium-density and short distances between activities enable the *36 streets* of Hanoi to blur the boundaries between a vibrant workspace and a healthy living space. Necessary, optional and social activities utilise the same street space, shifting with time to make the

36 streets of Hanoi truly lively public spaces which support the residents' needs and respect community values.

3- Social Scales: Sana'a

The old city of Sana'a has been working as a central trade and transport node for surrounding tribes and a trade centre for southern Arabia for more than 2500 years (Davidson, 1995). Tribal structure of the local community has resulted in distinctive urban divisions in the old city. A strong sense of community inside tribes translates into the physical urban form and makes the seven historical quarters self-sufficient in terms of public space and public life. Although the city has a central square, a main mosque, a major shopping area and an iconic entry statement, each community has its own, smaller public structures including neighbourhood mosques, public buildings and shops.

Narrow and curved residential streets connected community squares and urban agricultural lands and are surrounded by traditional tower buildings of up to 9 levels. This structure allows wind to enter the area and moderate the regional hot and dry climate (Pini, 2008). A typical tower building in Sana'a does not contain considerable open space. The tiny court yard on the ground floor is traditionally used as storage or stable. Upper level terraces are the extension of private living areas and the walled roof is utilized as a night time open space for occupants¹² (Al-Asad, 1995). Due to the compact interior spaces of dwellings, housing extended families, a significant amount of public space is required for necessary, optional and social activities. This space is provided inside the streetscape and surrounded by contextual residential buildings. The streetscape effectively becomes a community space encouraging inhabitants to spend time outdoors and utilize the shared space for social and cultural activities (i.e. wedding parties, religious festivals, communication and children playing). The strong sense of unity inside the communities and short distances between buildings discourages strangers from moving through residential streets. Numerous small windows of contextual buildings open into the streetscape and provide community supervision upon the space.

Figure 6: Dense buildings provide adequate space to use as agricultural land in the historical city of Sana'a. Working in these urban farms enhances activity overlaps in the local community.

¹² - Usually a tower building occupy by one family only with the main door which opens into the stair case. This is not typical of Middle Eastern housing typologies, which more typically feature a private court yard in the middle of the house.

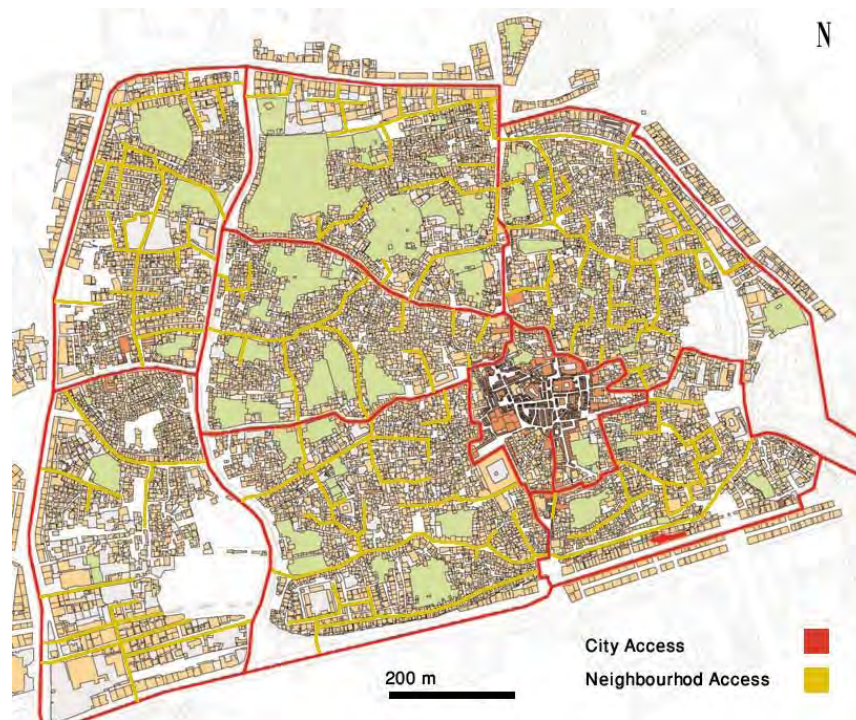


Figure 7: Almost all the streets in Sana'a can accommodate automobiles to some extent. However the community does not prefer cars within these streets due to its social structure and behavioural values.



Despite the fact that there is no legal prohibition for cars to come into the area, the only streets which accept car traffic are community separators. In the example of Sana'a, strong social integration, appropriate density and behavioural values, exclude cars from the streetscape, enabling the occupants of the medium-density housing to utilise the streetscape as an extension of their living space. This reinforces neighbourhood identity and a sense of community.

Figure 8: Social structure of the city affects urban morphology and divides it into seven distinguishable communities. Urban agriculture in the old town of Sana'a is a necessary activity empowered by social values.



Further discussion

Type, duration and patterns of activities affect the quality of public space. A streetscape responsive to the needs of residents including children, youth, adults and elders is more active, vibrant and attractive. Although the patterns of activities in streetscape vary from one group to another, the space and time overlap of activities can facilitate the streetscape as a lively and active public space. The question is how flexible the spaces are to be adapted to a variety of uses at different times.

The boundaries of activity types in urban areas are not fixed and overlap in time and space. Behavioural values, social construction and norms of local communities influence these boundaries. The hypothesis of this paper is to enable the streetscape to accept such overlapping activities. It will allow the urban environment to gradually evolve in parallel with urban intensification, reducing transport dominance and increasing the support of community activities. This is vital to ensure our increasingly intensified urban futures provide occupants opportunities for healthier lifestyles.

In the case of Copenhagen, streetscapes are facilitated by cycling and walking infrastructures, providing the opportunity to merge exercise with transport and sightseeing. The integrated public transport system and supportive incentives encourage people to leave their cars and live healthier in the city while gradually changing their behavioural values.

The historical *36 Streets* of Hanoi merge necessary and optional activities through the proximity of housing and workplace. Shopping in the old city of Hanoi is a necessary daily activity both for shopkeepers and residents. Compact and time-responsive activities facilitate social activities in the overlap between the necessary and the optional. Social activities in this dense mixed-use precinct are necessary components, both to live and work.

The social structure of Sana'a, which relies on extended families and community living, needs strong connections between community members both at family and community scales. Overlooking of the local community at the residential scale converts the streetscape into a small intimate public space for residents, ensuring social interactions happen necessarily under the eyes of the local community. Along with the example of Hanoi, Sana'a gives clues as to how our existing streetscapes may be appropriated by pedestrians over time as car use diminishes.

All three cases have one thing in common: the boundaries of necessary and optional activities become blurred and a subsequent increase in social activities can be observed. Increasing optional and social activities in the public realm is a critical point of health improvement in our rapidly intensifying cities.

Suggesting a conceptual model

This paper has examined a contemporary urban precedent (Copenhagen) as well as two historical Asian examples (Hanoi and Sana'a). A structural and activity-based analysis of these three examples can provide us with a conceptual model for a healthy, car-reduced urban precinct which:

1. is mixed-use and medium-density
2. has human scale in its structural qualities
3. is active during the day and at night time
4. has a network of alternative, viable transport options (i.e. cycling, trams)
5. has culturally appropriate, affordable housing near workplaces
6. is constructed of interconnected, identifiable local communities

Conclusion: an adaptive design framework

Intensification of existing urban communities is a way of providing a more sustainable future for cities. Denser urban environments have also the potential to support more necessary, optional and

social activities in public space if designed properly. In order to ensure such healthy activities are encouraged in intensified urban environments six recommendations for streetscape design are suggested:

- 1- Medium and high density developments are to be of mixed-use, supporting sufficient population to enable all three types of street activities (necessary, optional and social) to occur, while retaining existing positive structural and activity qualities.
- 2- Acknowledging local residents as the primary users of the spaces formed by the streets.
- 3- Increasing the overlap between necessary and optional activities in order to promote the social activities.
- 4- Providing integrated means of transportation with accessible alternatives, which are essential to encourage more walking and cycling for short and medium-distance travels.
- 5- Integrating workplaces with living spaces to increase activity types while decreasing necessary travels and encouraging unplanned optional and social activities to occur.
- 6- Enhancing the sense of community by designing public space as an extension of the residents' living space, which will further encourage outdoor activities.

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- Figure 4 (http://www.flickr.com/photos/anwoody/4671691671, certified by Andrew Wood)
- Figure 5 (http://my.opera.com/springhotelhanoi/blog, certified by Tran Hoang Linh)
- Figure 6 (http://www.flickr.com/photos/waltercallens/5174239523, certified by Retlaw Snellac)
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The Child in the City's Play Space: Creating and Sustaining Child-Friendly Public Domains

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The Child in the City's Play Space: Creating and Sustaining Child-Friendly Public Domains

ABSTRACT:

From its spectacular origins as the host site for World Expo 88, South Bank in Brisbane, Australia has been redeveloped as an inner-city precinct that is highly attractive to families and children. Unlike its theme park rivals with their highly contrived and commercialized play environments, South Bank's success - with more than 11 million visitors annually - stems from its deliberative effort in creating and managing a public domain that is not only free but highly adaptive in the play, leisure and learning experiences it offers.

Referencing the South Bank exemplar, this paper examines the current disconnect between the planning and design of Australian cities and their public spaces in providing environments that not only welcome children but also establish social and psychological connections that stimulate learning and ultimately civic participation. Too easily, the public environment of many Australian cities uncritically fails to consider the child's experience of place and the critical opportunity that experience offers to shape an understanding of how children exercise their democratic rights and in turn accept their responsibilities as future citizens.

The rich diversity of children's experiences across the South Bank precinct, ranging from physical recreational participation to active involvement in the arts, are critically examined to assess how children's right to play and to participate in large public spaces are not only creatively generated but also sustained. South Bank conclusively demonstrates that children can experience and establish genuine connection with natural environments in the inner-city, a connection that does not necessarily need to be confined to highly regulated botanical gardens or sterile green spaces.

The paper will however, also assert that a key reason for the success of children's connection with South Bank is the facility's provision of security mechanisms and technology that ensure safety for children and families. Popularly seen as a critical inhibitor of children's rights to play and participate, security and risk management procedures will be highlighted with particular reference to child safety incidents in the South Bank Parklands and how these have been effectively managed.

The paper will also draw on relevant preliminary research commissioned by the Place Leaders' Association on benchmarking different public domains and other research conducted by the Urban Research Program Griffith University, on place-based indicators of child-friendly communities.

Reference Points:

- Children's participation
- Public domain design
- Right to public play
- Assessment of public domain's child-friendliness

Introduction

From its spectacular origins as the host site for the highly successful 1988 World Exposition, South Bank in Brisbane, Australia has been conceived, planned and redeveloped as a precinct that is highly attractive to families and children. As a major international event credited with giving global exposure to the capital city of Queensland on a scale previously not experienced, it is the social legacy of Expo '88 that 23 years on, continues to resonate with the next generation of citizens. South Bank today is Brisbane's pre-eminent public domain, supporting a rich array of civic and community events, cultural activities and visitor experiences.

Unlike its private theme park rivals with their highly contrived and commercialized play environments, South Bank's popularity - with more than 13 million visitors annually - stems from its deliberative efforts in creating and managing a network of high quality public spaces and facilities that are not only free but highly adaptive in the play, leisure and spontaneous learning experiences they provide. The plan at Appendix 1 illustrates the location and distribution of these across the precinct.

South Bank Parklands, covering nearly 20 hectares of a riverfront site within the central city, features a sub-tropical landscape which supports a rich bio-diversity of flora and fauna some of which are protected native species. While children's interaction with the Parkland's plants and animals is discreetly managed, South Bank powerfully demonstrates that children can experience and establish genuine connection with the natural environment and the ecology of the city, a connection that does not necessarily need to be confined to botanical or zoological gardens and other regulated public spaces.

Contrary to popular depictions of a vast, unpopulated continent, Australia is one of the world's most urbanized countries with nine in ten Australians living in the cities. Our cities however, have been developed in a very inefficient way and we are now paying the price. With rampant problems such as traffic congestion, housing affordability and a lack of community services in new suburban and peri-urban communities, virtually all Australian capital cities are facing up to the challenge of consolidating their sprawling footprints due to sustained growth pressures fuelled by a strong national economy and an ambitious immigration programme.

Australian city planners still look to Old World cities with their denser, heterogeneous urban communities to understand and appropriate those aspects of public space planning, design and use they see as being relevant in finding solutions to the problems they now face. In many cities, existing public spaces and parks are being redesigned to accommodate not only much higher levels of usage but also to perform new roles as multi-purpose spaces.

In Western European cities there is growing support for a movement that could best be described as 'green urbanism' (Louv 2008). This approach refocuses attention on urban ecology and the opportunity even within densely populated cities to not only preserve nature habitats but to also reclaim blighted areas and reinstate woodlands, meadows and streams. These areas, once established, have spawned educational and recreational initiatives resulting in significant social benefits to the adjoining communities and re-establishing the connection to nature.

As a contemporary, master planned precinct South Bank has anticipated this shift in both demand and use and created a public environment which not only welcomes children but invites their exploration of the structured and unstructured play experiences on offer. The enduring place making principles that have guided the precinct's development and public domain management have, since 1997, been consistently applied and the benefits of this tenacity are today clearly evident. Recent market research confirms this with more than 8 out of 10 of Brisbane's 2.5 million residents alone having visited South Bank in the previous 6 months.

Child-Friendly Public Spaces

Good public spaces exhibit common place attributes of social inclusiveness, egalitarianism, freedom of exchange, sensory stimulation and flexibility of use. A key test of the presence of these qualities is how children, who too commonly are regarded as a minority interest group, are attracted to and engage with the facilities offered. South Bank's enduring appeal to children and parents is achieved primarily through the variety of innovative play and learning environments it has created and sustains through its active place management practices.

South Bank provides clear evidence that a successful public space is inherently child-friendly, when it exhibits the following traits:

Character - A place with its own identity with the objective to promote place character by responding to and reinforcing locally distinctive patterns of development, landscape and culture.

Continuity and enclosure - A place where public and private spaces are clearly distinguished with the objective to promote the primacy of streets and the enclosure of space by development which clearly defines private and public areas.

Quality of the public realm - A place with a high level of aesthetic and functional appeal with the objective to promote public space usage and work effectively for all in society, including disabled and elderly people.

Ease of movement - A place that is easy to get to and move through with the objective to promote accessibility and local permeability by making places that connect with each other and are easy to move through, putting people before cars and integrating land uses and public transport.

Legibility - A place that has a clear image and is easy to understand with the objective to promote legibility through development that provides recognisable routes, intersections and landmarks to help people find their way around.

Adaptability - A place that can change easily with the objective to promote adaptability through development that can respond to changing social, technological and economic conditions.

Diversity - A place offering both variety and choice with the objective of realizing these qualities through a mix of compatible developments and uses that work together to create viable places that respond to local needs.¹³

A meandering bush stream, a rainforest, an interactive water playground incorporating sound and light, and a working maritime museum are just some of the diverse settings children find highly attractive across the precinct. These are complemented by a busy calendar of free events many of which have a strong active leisure focus in recognition of the need to support the state government's policy on reducing childhood obesity levels.

South Bank's many positive place attributes when considered in the broader national urban context are however, somewhat of an anomaly. There is regrettably, still evidence of a clear disconnect between the planning and design of Australian cities and their public spaces in providing places that not only welcome children but also establish social and psychological connections that stimulate learning and ultimately, active civic participation. Too easily, the public domain of many Australian cities but particularly their central areas falls short in considering the child's experience of public space and the potential that experience offers to shape an understanding of how children exercise their democratic rights and in turn, accept their responsibilities as future citizens.

The reasons for this condition are interrelated but stem primarily from a lack of concern for the interests of children at the formative stage of determining what role a city's public domain should necessarily support and what audiences it should engage. Designers, place managers and their clients still commonly approach the task without any meaningful attempt been made to consider the full breadth of user needs and as a result, they create or modify public spaces that unthinkingly have the effect of excluding children, or worse, placing them at increased risk. This failing is being recognized, albeit slowly, and its significance understood at a practitioner level but the clear onus remains on public and local authorities whose responsibility it is to address the needs of all citizens, to rethink current policies and practices.

Security and Risk

¹³ *By Design: Urban Design in the Planning System*, Department of Transport, Local Government and Regions, London, UK., p. 4.

Juvenile crime rates and the incidence of anti-social behaviour in public spaces across all Australian cities are at unacceptably high levels. Australian Institute of Criminology statistics reveal that since 1997 Australian juvenile offender rates have generally been twice as high as adult ones (AIC 2011). The nexus between this negative trend and the design and management of the public domain demands greater attention from different levels of government and from different professions. Urban planners and designers can however, be much stronger champions of children's rights and needs in how they shape and then manage the urban landscape. Focusing exclusively on crime reduction in the public domain however, runs the risk of masking other important dimensions of children's experience and use of public space.

A key reason for the success of children's connection with South Bank is the facility's provision of security mechanisms and technology that ensure safety for children and families. Popularly seen as a critical inhibitor of children's rights to play and participate, security and risk management procedures at South Bank have in fact become crucial enablers for participation across the age spectrum and through to after-dark hours.

Children's Health & Wellbeing and the Urban Built and Natural Environment

Traditionally, community interventions to address perceived problems for children and young people have been targeted through schools, recreational settings, or families and individuals considered most at risk. However, it is only recently that the built environment has been recognised as an alternative intervention point for improving health and wellbeing. For children and young people, outdoor environments such as South Bank are not just the typical places to play, but also provides a place for children and teenagers to socialise, be physically active, explore, have fun, 'hang out', be in contact with nature, escape from indoors, or just be free from the encumbrances of an increasingly adult world. Outdoor environments are also increasingly important spaces in the face of a diminishing public domain and disappearing Australian backyards (Hall 2010).

Scholarly research and popular interest in children's health has continued into the twenty-first century, focusing particularly on the incidence of childhood obesity and the associated decrease in children's physical activity (see Gill 2007 and Louv 2008 for two of the most popular examples of these concerns). Responding to concern about childhood obesity, a growing range of studies has examined the links between children's physical activity patterns and built environment form (eg Richardson & Prior 2005; Davison & Lawson 2006; Cutumisu & Spence 2008; American Academy of Paediatrics 2009). Few of these studies, however, focus on physical activity in urban public spaces and parks such as South Bank.

And while there have been important tributary streams of interest in children in urban scholarship - including, for example, the work of Tranter and Sharpe (2007) on children's rights, Malone (2007) on

residential living and Walsh (2006) on play environments - this renewed focus on children's well-being and the relationship to the built environment is not well served by a developed urban understanding (see Gleeson & Sipe 2006). Most contemporary developed Western cities are hybridised landscapes containing surviving (frequently gentrified) historical accretions from industrialism, significant suburban swathes bequeathed by 20th century planned growth and new and emergent compact urban forms (including both brownfield redevelopment and a denser suburbia).

These contemporary landscapes are also marked by socio-spatial polarisation, revealed in the contrast between localised concentrations of poverty/exclusion and new spaces of affluence and selective inclusion, such as gated communities. Whatever the context, it is also unfortunately true that the vast majority of both the creation and adaptation of built environments occurs with a complete absence of children and young people's voice (Nordstrom 2010).

How then to link the importance of children's relationships with built and natural environments and significant urban public spaces like South Bank? Talen and Coffindaffer's (1999) important children and environments research in the US tells us:

- children experience their environments differently to adults; their experience is high-personal. It is about 'texture and variety', rather than function;
- children prefer places that are diverse and accessible, with opportunity for social interaction, as opposed to homogeneous and isolated; it is about shared spaces;
- gender differences are important to consider; and that
- children tend to have socialised, commercialised view of neighbourhood rather than the naturalised world.

Other Canadian contributions have been highlighted by McAllister (2008) who argues that a community's design and land-use decisions have a significant impact on their physical, social and mental health. The four main issues discussed in her paper - safety, green space, access and integration – she believes *"should be at the top of every planner's list in order to create healthy, child friendly cities"*.

Child-Friendly Urban Play Spaces

South Bank's popularity underscores the growing importance of safe and supportive environments able to nurture children of all ages with opportunities for recreation, learning, social interaction, and cultural expression, thereby promoting the highest quality of life for its young citizens. Building such environments demands embracing child friendly design principles. Play England (2008) has outlined in

its *Design for Play* resource what they consider makes a successful play space, including each of the following traits that South Bank's public spaces can, in part, lay claim to possessing:

- A space that offers movement and physical activity – with the room and features that allow a range of energetic and strength building play experiences (for example Aquativity)
- A space that stimulates the five senses – maybe providing music and sound, and different smells made by plants and leaves (for example the Rainforest)
- A space that provides good places for social interactions – allowing children to choose whether and when to play alone or with others, to negotiate, cooperate, complete and resolve conflicts (for example Picnic Island playground)
- A space that allows children to manipulate natural and fabricated materials, use tools, and have access to bits and pieces of all kinds (for example the Beach) and
- Spaces that offer children challenge – and activities that test the limits of their capabilities, including rough and tumble, sports and games, and opportunities to climb (for example Riverside Green).

Most importantly, Play England (2008, p.15) states that making a successful place involves adhering to the golden rule:

‘a successful play space is a place in its own right, specially designed for its location, in such a way as to provide as much play value as possible.’

The *type* of space that we use in our communities is also important. Public space, which is different to our own backyards or school playgrounds, is in principle, accessible to everyone, regardless of where we live. Research tells us that the interactions that take place in public space provide a rich education for children in terms of the world around them, and the people who live in it. Places where children play are important social places, not just for children and young people, but also for parents, carers and the wider community. South Bank is an obvious demonstration of what Play England (2008, p.8) argues there should be places *‘where children and young people can enjoy spending time, be physically active, interact with their natural surroundings, experience change and continuity, take risks in an environment where they feel safe and, of course, play – alone or with others – in a wide variety of ways’*.

Gradually, the importance of play is being increasingly recognised as a fundamental element of children's wellbeing. Little & Wyver's (2008) comprehensive paper examines the current status of outdoor play in urbanised, Western societies such as Australia and provides a critical analysis of the literature to present a persuasive argument for the inclusion of positive risk-taking experiences in

children's outdoor play. Again, South Bank is challenged in this regard by sustaining the delicate balance between its provision of a range of play experiences whilst maintaining a sense of safety and wellbeing. There is certainly a diversity of play spaces within the South Bank complex but the precinct's planning - with an arts cluster at its northern end and recreational play areas towards the southern end - presents an ongoing challenge to ensure that children and young people's experience of urban public space is integrated and accessible to all.

Finally, perhaps South Bank's most significant test is its capacity to continue demonstrating how all its features and amenities contribute to sustaining its child-friendliness. The ongoing need for more nuanced and sophisticated means of place assessment that goes well beyond the basic measures of numbers of visitors (Woolcock & Steele 2008) is evidenced by South Bank Corporation's willingness to participate in commissioned and internal research on the performance of public space and how this influences its design.

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Attachment 1: **South Bank Precinct Plan showing location and distribution of child-friendly experiences**

The design of the Carbon Pollution Reduction Scheme viewed through a framework of Communication, Compensation and Community Engagement.

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Abstract:

The Carbon Pollution Reduction Scheme (CPRS), an Australian Labor Party initiative, was a response to climate change. A cap and trade scheme to mitigate greenhouse gas emissions. The CPRS White Paper was released in December 2008 and the CPRS Bill was defeated by a margin of forty one to thirty three votes in December 2009. Critics of the CPRS suggest that there was a lack of informed debate about alternate methods that could be used to reduce emissions of greenhouse gases. Concepts many in the wider community e.g. businesses, the labour force, schools and families struggled to come to terms with. This paper suggests that these issues led to a diminished level of engagement with the CPRS (Parkinson 2010, Akter Bennett 2009).

The paper discusses the policy approach taken toward the design for greenhouse gas emission trading in the CPRS Bill. It uses a comparative methodology to contrast the important decisions about the design of the CPRS with a selection of other emission trading schemes. Examples are also introduced of other so called market based mechanisms, or transferable quota programs. These programs have been used to reduce the harmful impacts of air borne sulphur dioxide (SO₂) and to stabilise the level of fish stocks depleted by commercial activity.

In communicating emission trading as public policy there are four factors that become apparent in the design considerations, i.e. targets, allocation of allowances, coverage and compensation. These factors are discussed in detail, in particular compensation and its' relationship to engaging the wider community.

Keywords: Carbon Pollution Reduction Scheme, CPRS, Greenhouse Gas Emission Trading.

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Introduction

In Australia there has been measured support from academics and business for a cap and trade scheme such as the CPRS. While the aim of emissions trading is to mitigate greenhouse gases some environmental groups and labour organisations strongly oppose the idea. A lack of familiarity with

this so called market based mechanism compounds the lack of engagement with the wider community.

Amid leadership battles and policy changes from the major parties (Johnson 2010) the CPRS Bill did not get a clear passage through parliament. The ongoing debate appears to be about in the first place, the imperative to act on climate change and secondly, the optimal forms of emission mitigation. Even though the scientific assessments are confirming need for action on climate change (Holland 2011), the imposition of a carbon price, via emission trading program, remains unpopular as public policy. The wider community remains unconvinced about the reported efficiencies and flexibility of cap and trade. Another relatively new approach, a carbon tax (Stavins 2011), is proposed by the incumbent Australian government as a lead in to an eventual emission trading program.

The literature on the regulation of the environment identifies direct government intervention, also known as command and control, to be a familiar method by which to address pollution. In an economic sense pollution is described as an undesirable externality. An emission trading scheme (such as the CPRS) is described as a quantity based approach to account for an undesirable externality (greenhouse gas emissions). A carbon tax, it is said, is a price based approach.

The designers of the CPRS anticipated that a cap and trade scheme would promote cost effective ways to reduce emissions and introduce a carbon price. Ellerman and Decaux (1998) derive a shadow price on carbon from the marginal abatement curve (MAC). The MAC graphically represents cost of abatement plotted against the corresponding reduction of greenhouse gas emissions over time. As a quantity based approach the CPRS, it is said, could deliver the environmental benefit of known targets for emission reductions, whereas, a carbon tax does not. Leaving these theoretical aspects aside the objective of the paper is to identify the social factors that were, in my opinion, not well distinguished in the design of the CPRS.

It could be said of the CPRS that there was lengthy industry level consultation carried out. Although time constraints meant there was less community level information for affected parties. A discussion now follows on four factors entrenched in the design of the CPRS. The treatment of these factors can determine the degree of engagement the wider community has with emission trading. These four factors are the targets for emission reductions and the manner in which the allowances for one tonne of carbon dioxide (CO₂) or carbon dioxide equivalent (CO₂e) are distributed.

Other factors are the coverage of the proposed CPRS and the level of compensation provided to affected parties.

Setting modest targets initially, the CPRS was to reduce emissions by 5% of 2000 emissions by 2020 (Australian Government 2008). Some critics of the CPRS held the view that the targets for emission reductions were inadequate for the desired environmental outcomes (Walters Baird 2009).

There was some controversy generated because the CPRS was to provide free allowances for the activities of selected industries and eligible Trade Exposed Emissions Intensive Industries (TEEII). In regard to emission trading programs generally there has been concern about the polluters being given a property right (and a carbon price) where no such right (or price) previously existed (Pearse 2010, Beber 2009).

The CPRS aimed for wide economic coverage to distribute the burden of compliance, although the inclusion of agriculture was to be delayed due to uncertainties with the greenhouse gas accounting measures. Given the dependence of the Australian economy on the exploitation of natural resources there were also concerns about a phenomenon known as carbon leakage. Carbon leakage occurs when a business decides to move offshore following a significant increase in the costs of production. In the planning for the CPRS it was recognised that there were scenarios that could lead to a weakened trading position for some TEEII. The CPRS was fine tuned to define a band of products that would be eligible for compensation. Given the wide spread of the sources of greenhouse gases a response that seeks to price carbon emissions will inevitably pass on costs to many aspects of our lifestyles.

There was to be compensation for eligible households in the CPRS as well as a 'cent for cent' reduction on fuel tax (Australian Department of Climate Change 2008). The costs of production in relation to transport and energy were expected to rise (ABARE 2009) and it was thought that there was also a risk of job losses in the stationary energy and coal mining sectors (Adams 2007). There was provision in the CPRS for financial assistance to these participants.

On a wider front fiscal pressure was creating hurdles for the CPRS Bill. It came in the wake of the global financial crisis and coincided with a steady rise in the price of gas, water and electricity, relative to the Australian consumer price index (CPI) (ABS 2011). Organised labour groups were concerned about the GFC and the implications for employment following the introduction of the CPRS (AWU 2009).

It has been stated in regard to major policy reforms such as the CPRS that,

'no single policy instrument – whether market based or conventional – will be appropriate for all environmental problems. Which instrument is best in any given situation depends on the characteristics of the specific environmental problem and, the social, political and economic context in which the instrument is to be implemented' (Stavins 2005).

The next part of the paper considers the extent to which transferable quota programs have been used to address the social cost of environmental damage. It considers a number of market based programs that have been introduced to address the depletion of fish stocks and to mitigate acid rain. Looking at how these programs were implemented can give an insight into the introduction of greenhouse gas emission trading.

Transferable Quota Programs

Transferable quota programs are akin to emission trading and they herald a move away from more direct regulation over polluters (command and control). Using a market based mechanism to regulate the environment in an economically efficient manner. A controversial aspect of this idea is

the allocation of property rights that previously did not exist. This allocation is the first stumbling block for greenhouse gas trading in terms of community engagement. To counter suspicion in the wider community it is possible to provide examples of environmental problems that have been addressed by transferable quota programs.

Common and Stagl (2005) provide a comprehensive list of transferable quota schemes that operate in OECD countries. Described are schemes that have been used for regulating the salinity of rivers, distributing hunting rights and the issuance of rights to develop forest areas. Considerable use has been made of tradeable quotas has been in the efforts to manage air borne pollutants. Globally the use of Individual Transferrable Quotas (ITQ) to manage commercial fishing stocks is considered a standard approach (Stavins 2011).

The ITQ systems used in fishing exhibit the flexibility inherent in a transferable quota scheme. As the number of quotas issued for an individual species can be adjusted annually to align with the variation in fish stocks. The extensive use of transferable quotas for commercial fishing rights has been studied in Australia, Canada, Iceland, New Zealand and the United States. It has been recorded that a potentially negative aspect (for some fisherman) of these programs is that the smaller participants have been forced out of the market by larger operators. On the other hand it is also considered that the use of ITQs' may have improved the safety of crews that do not have to endure extended periods at sea due to reduced seasons as quotas are filled.

In terms of airborne pollutants The US Acid Rain program is one of a number of quota systems for atmospheric regulation. The US Acid Rain Program was implemented to remove sulphur dioxide (SO₂) from the emissions of large stationary energy sources (power stations). Given the scale and success of the US Acid Rain program it has been widely thought of as when,

'Emissions trading programs went from theory to practice' (Wang et al 2008).

While there is some suspicion as to the ability of emission trading to achieve large scale emission reductions it is acknowledged that the US Acid Rain Program reduced the emissions of SO₂ from coal fired power stations by about 50%. The US EPA has been collaborating with the Chinese State Environmental Protection Administration (SEPA) to bring a large scale trial of emission trading into being. The US Acid Rain program has been used as a model for China to improve air quality by removing the sulphur from the emissions of a variety of heat sources (Wang et al 2011). Under environmental pressure to reduce emissions of SO₂ this collaboration has produced a workable policy for the implementation of emission trading.

The lessons developed in the pilot phase are being applied more widely as the implementation of SO₂ emission trading moves across several provinces (Liao 2011). The literature now provides an insight into how, in a practical sense, the trades in the Chinese emission trading program have taken

place. An arrangement between two ageing power facilities in the Jiangsu province has drawn some interest. To share the cost burden of installing equipment that would reduce emissions of SO₂ the Taicang Power Plant and Nantong Power Plant reached a partnership agreement where one plant would install the equipment that would provide surplus allowances for the second plant to use. This arrangement and the transfer of allowances allowed overall emissions reduction targets to be met. Wang et al 2008 have provided several case studies of trades that demonstrate how a range of different stakeholders can take advantage of the flexibility offered by an emission trading strategy. Table 1 below summarises the general circumstances of the sellers and the buyers of SO₂ emission permits in the Chinese program.

Seller	Buyer	Volume (tons/year)	Province
*Nanjing Xiagaun Power Plant	Taicang Harbour Environmental Protection Electrical Power Company	1700	Jiangsu
*Zhenjiang Jianbi Power Plant	Changzou State Power Company Limited	2800	Jiangsu
**Sanmenxia Zhonggyuan Gold Smelter	Yima Gas Company	900	Henan
**Liuzhou timber mill	Liuzhou Chemical Industry Group	200	Guangxi
*Tianshenggang Nantong Power Company Limited	Unnamed large-scale chemical joint venture	1800	Jiangsu
**Tianjin Petrochemical Company	Dagang Power Plant	1000	Tianjin
**Xinxing Environmental Protection Company	Second Datong Power Plant	2500	Shanxi
Seller	Buyer	Volume (tons/year)	Province
**Qingdao Haijing Chemical Co., Ltd	Qingdao Dongyi Industrial Companies	1200	Shandong

Figure 1 SO₂ Emission Trading (China)

Sources: *Wang et al 2008, **Dudek et al as cited in Wang et al 2008.

Factors affecting Community Engagement with Greenhouse Gas Emission Trading

The third part of the paper addresses some of the factors that are of concern within the community when considering carbon pricing through a greenhouse gas emission trading scheme. These factors emerge in the literature that has developed from the experience gained in a number of what are considered pilot programs. It has been said (Tietenberg 2006) that the basic framework of an emission trading scheme involves a dialogue between two parties. Where the first party, a regulator; determines the governance, sectors, and other parameters of a scheme, and the second party; the sources of the greenhouse gases makes decisions about an optimal response to a new set of rules. A small set of these rules, or factors, are considered in this paper. In the context of a particular region examining these factors can give an insight into the attitudes of the regulators and the response from the sources of emissions. From a historical perspective the data for the discussion of the CPRS in light of the so called factors comes from a number of reports. Including papers from the National Emission Trading Taskforce (2006) and the Prime Ministerial Task Group on Emission Trading (2007). More specific to the design of the CPRS is the Green Paper on Emission Trading (Australian Department of Climate Change 2008). The work by Garnaut Climate Change Review (2008) was to provide a blueprint for the Australian governments' CPRS White Paper (2009). Additional comparative data was obtained from the pilot schemes referred to earlier. These are in the European Union and the United States, where programs for greenhouse gas emission trading are currently operating. The European Union Emission Trading Scheme (EU ETS) and the US Regional Greenhouse Gas Initiative (RGGI) have been in operation since 2005 and 2008 respectively. Parallels between the CPRS and these two schemes are considered in terms of the four factor framework. This framework is used to compare the CPRS, EU ETS and RGGI. It considers targets, allocation of allowances, coverage and compensation.

Factor 1. Targets.

Targets refer to the cap in a cap and trade scheme, i.e. the legal limit on all emissions. The United Nations Framework Convention on Climate Change (UNFCCC) recently recorded the 2020 economy wide emission reduction targets of parties included in Annexe 1 of the Kyoto protocol. While the UNFCCC commitments are not the subject of this paper they are for Australia 25%, the EU and its' member states 20% and for the US 17%. In the proposed CPRS Bill the overarching target was a reduction in greenhouse gas emissions of 60% of 2000 levels by 2050. In the shorter term the emission reduction aims of the CPRS were to be variable. It seems that there were concerns that Australia may act in relative isolation in reducing emissions. This being the case a range of targets to 2020 was to be used. In the event that there was coordinated international action then the national target would be a reduction of 25% on 2000 levels. If on the other hand Australia were to go it alone

then the emission reduction targets would be between 5% and 15%. The EU ETS has set targets for 2020 of 21%. The RGGI scheme in the US aims for stabilisation of emission levels in the period 2009 - 2014. Annual emission cuts of 2.5% are to start in 2015 to result in a total of 10% by 2018 (RGGI Inc' 2011).

Factor 2. Allocation of allowances

Allocation refers to the method used to distribute allowances, i.e. either free allocation based on historical emissions or auctioning of allowances. In terms of emission trading the allocation of allowances (also described as permits or units), is for the right to emit one tonne of carbon dioxide (CO₂) or an equivalent amount of another greenhouse gas (CO₂e). The allocation of allowances has a primary importance for emission trading. This is because the essence of a trading scheme is the creation of property rights where before none existed. In this context there are at least two important considerations in the wider community. Many environmental groups consider it is perverse to issue large emitters with a property right to pollute. While there are also concerns raised by the reliance on a market based mechanism to protect the environment. These concerns reflect a difficulty in establishing if reductions are actually occurring and how the efficiency of a carbon price and trading can be measured.

In the proposed CPRS allowances were to be auctioned although this process would be circumvented for some participants who were to be issued with free permits. In relation to the method of allocating allowances the EU ETS and RGGI case studies illustrate the contrasting views on the allocation of allowances. In the first phase of the EU ETS allowances were allocated free of charge based on historical emissions. On the other hand in the RGGI allowances are auctioned and then surrendered in the appropriate control period. The auction process is supplemented with a futures market for a limited number of allowances in future control periods.

Factor 3. Coverage

In terms of greenhouse gas emission trading coverage is taken to mean two things, the gases covered and the sectors covered. The greenhouse gases are, in the case of the CPRS,

‘all gases listed in the Kyoto Protocol’ (Australian Government 2008).

The six Kyoto gases are carbon dioxide (CO₂) methane (CH₄) nitrous oxide (N₂O) sulphur hexafluoride (SF₆) Hydrofluorocarbons (HFCs) Perfluorocarbons (PFCs).

The coverage of industrial sectors included in the scheme is considered important for community engagement as the cost of production and jobs can be adversely impacted. It has been said that wide sectoral coverage can lower the financial burden of compliance (Garnaut 2011a). In the pilot programs studied here a moderate level of sectoral coverage has been more typical. The CPRS was

aiming for wide coverage in terms of gases and sectors and could be regarded as an ambitious program.

Emissions of synthetic greenhouse gases from air conditioning, refrigeration and high voltage electrical equipment would be covered. The emissions from waste treatment facilities and fugitive emissions (from oil, gas and coal production) were to be covered. The primary industrial processes to be covered were iron and steel processing, cement and lime making and aluminium smelting. Facilities burning gas, coal and synthetic fuels and emitting more than 25,000 tonnes of carbon dioxide per year were covered. Petroleum and LPG gas use were covered. Stationary energy sources and transport were to be covered also. Agriculture while accounting for 16% of total emissions was not to be included in the CPRS until at least 2015 (ABARE 2009).

Other greenhouse gas emission trading programs have been less ambitious at the implementation stage. The EU ETS began with the coverage of a cross section of large industrial emitters and stationary energy sources. In the RGGI stationary energy sources only were included. Difficulties with greenhouse gas accounting measures were often cited as the reason why wider coverage was not seen as practical. The European parliament directive of 2009/29/EC lists the types of installations covered by the EU ETS as those installations with thermal inputs greater than 20MW producing CO₂ through the combustion of fossil fuels. Also processes that produce mineral oil, coke, steel, aluminium, cement, lime, glass, bricks, chemicals, building materials and gases. The coverage of the EU ETS is growing to include aviation from the 1st January 2012. In the RGGI the coverage extends to fossil fuel powered electrical power plants and their greenhouse gas emissions for a three year period from the start of 2009 to the end of 2011.

Factor 4. Compensation.

As a carbon price is passed on, as a result of emission trading, special funds are likely to be needed to protect jobs and offset rising energy prices. An observation of the commentary on the CPRS reveals that the level of community engagement with emission trading is directly related to the level of compensation that is offered. When wide sectoral coverage is proposed, as with the CPRS, there will be a need to provide equally wide compensation for many parties.

In developing the CPRS the Australian government acknowledged that some Trade Exposed Emissions Intensive Industries (TEEI) could be adversely affected. The criteria for determining a trade exposed industry was determined on a case by case basis and compensation was to be assessed at a common activity (product) level. The assistance to a TEEI would be in the form of an administrative allocation of carbon pollution permits at the beginning of each compliance period. Two levels of assistance would be applied, 90% to more emissions intensive activities (greater than 2000t CO₂ per \$million revenue) and 60% to less emissions intensive activities (less than 2000t CO₂ per \$million revenue). TEEI that were high consumers of electrical power were also to be compensated through an energy allocation factor. Special financial arrangements were to be provided for sections of the coal mining industry from a Climate Change Action Fund. As well the

electricity sector was to be provided a limited amount of direct assistance with so called structural adjustment assistance from the Climate Change Action Fund.

In the RGGI program auctioning is used to distribute allowances. According to the RGGI Model Rule the proceeds of an auction can then be used, subject to state approval, for climate change related projects. In the EU ETS allowances had been distributed free of charge and this avoided some of the complications involved in awarding compensation. As the EU ETS is moving toward auctioning of allowances the issue of compensation for affected industries is being discussed at an individual member state level.

A Framework for the Implementation of Emission Trading

What follows is a framework that has been developed for the purposes of this paper to describe the four preceding factors and their perceived strength of association with implementation and community engagement. In the case studies i.e. the EU ETS and RGGI, each of the factors (targets, allocation of allowances, coverage, and compensation) are looked at in regard to having what is described as either a direct association or indirect association with the implementation of greenhouse gas emission trading. The data for the classification of a factor as either direct or indirect is produced from an academic journal database search.

Using the SciVerse (Sciadirect) journal database the level of academic interest in each factor has been determined using the search criteria of, for example, 'EU ETS COVERAGE' or 'RGGI COVERAGE'. The total number of results for this search term has then been used to weight how important each factor has been to the implementation of the greenhouse gas emission trading programs. The definition of the two strengths of association that are used is a form of the Pareto Principle (80/20 rule). A *direct association* with program implementation (and community engagement) indicates the search for a factor in the SciVerse (Sciadirect) database returned a high number of results, i.e. equal to or greater than 20% of total results for each case as studied separately. It follows that an *indirect association* with implementation indicates that the search results were less than 20%.

The SciVerse (Sciadirect) keyword search results are shown below.

Search term	Results	Percentage per scheme
1. EU ETS TARGETS	773	43 %
2. EU ETS ALLOWANCE ALLOCATION	380	21%
3. EU ETS COVERAGE	339	19%
4. EU ETS COMPENSATION	292	17%
1. RGGI COVERAGE	268	60%
2. RGGI TARGETS	100	22%
3. RGGI ALLOWANCE ALLOCATION	61	14%
4. RGGI COMPENSATION	19	4%

Based on these results for the EU ETS two factors, targets and allowance allocation are assessed as being directly associated with the implementation of the EU ETS. In the RGGI the factors of coverage and targets were assessed to have had a direct association with the implementation of the RGGI. Overall in both of the case studies three different factors are considered to have been directly associated with implementation, i.e. targets, allowance allocation and coverage.

The factor of compensation was ranked the lowest in both the EU ETS and RGGI case studies. In the CPRS the issue of compensation was at the forefront in the debate over scheme design. The range of compensation on offer included help in the form of fuel subsidies, household assistance, a number of free permits for TEEI's, direct payments to the coal industry and power stations. The information about decisions on the impact of the CPRS and the appropriate level of compensation for polluters has been questioned (Rosewarne Goodman 2009). Although the scheme's wide sectoral coverage meant wide compensation for industry and it was acknowledged that the introduction of the CPRS would see overcompensation for some participants (Garnaut 2011b).

Concluding remarks

The reduction of emissions and the pricing of carbon with the CPRS have been considered here in relation to communication, compensation and community engagement. The CPRS Bill, a market based response to climate change, was defeated amidst the uncertainty around greenhouse gas emission trading. The research has found compensation to be a significant factor in terms of community engagement. This concern in regard to compensation can be evidenced in the recent Australian proposal for a carbon tax. Early reactions to the proposed carbon tax suggest there is a perceived level of predictability (about cost and compensation) in using a tax based scheme. Although this alone is unlikely to lead to the wider community engagement with a market based response.

The carbon tax will if enacted lead to greenhouse gas emission trading in about three years. A looming challenge for policy makers, given that a carbon tax is foreshadowed, would be the transition between a carbon tax and emission trading. Greenhouse gas emission trading is a complicated process and the bodies that were to govern the process were not in place when the CPRS was developed. Evidence has been found for the required regulatory structures from greenhouse gas emission trading in other countries. This paper has also identified the shape of policies that allow trades between facilities and across borders (Grubb Cooper 2011, Wang et al 2008).

The conference stream the paper addresses is community engagement with climate change. To improve engagement with the community a four factor framework is reported on which consists of

targets, allocation, compensation and coverage. It is becoming more widely acknowledged that individuals and organisations will need to become increasingly engaged with a range of options to decarbonise our communities. In terms of emission trading observations on other programs indicate that at the early stages the marginal cost of abatement is relatively low. Although it is not yet clear what role, if any, a market based mechanism has to play in the reduction of greenhouse gas emissions in Australia. Examining the design factors of the CPRS may lead to a better community understanding about emissions trading and its' role in the pricing of carbon in the future.

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Identifying the Beliefs which Predict Environmentally Friendly Behaviour in the Brisbane Area: A Foundation for Informed Interventions

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Identifying the Beliefs which Predict Environmentally Friendly Behaviour in the Brisbane Area: A Foundation for Informed Interventions

ABSTRACT: *A move to more sustainable living can provide immediate and long term health and environmental benefits. The Green Living Study consisted of a mail survey of 1186 South East Queensland residents and an online survey of a further 451 individuals, primarily from South East Queensland, and explored the predictors of environmentally friendly behaviour. This paper explores the underlying beliefs that were found to predict specific environmentally friendly behaviours, such as walking for transport, switching off lights when not in use, switching off unused appliances at the wall and shopping with reusable bags. Beliefs explored included social norms, advantages and disadvantages of performing the behaviours, and issues of control over ones behaviour. The findings showed that people's environmentally friendly behaviours may be influenced by convenience, saving money and saving face; i.e. is it easy to do, will I be better off, and will I be seen as 'different'? Understanding the beliefs which directly predict behaviour can help inform public policy and educational initiatives. A number of models for transferring this knowledge into policy and practice will be discussed.*

Keywords: *Sustainable Living, Environmentally Friendly Behaviour, Underlying Beliefs, Walking for transport, Switching off Lights*

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Introduction

Over recent decades there has been an increasing concern with issues of environmental sustainability. Rampant consumerism has led to pollution of land, oceans and atmosphere (IPCC, 2007). Climate change is increasingly being linked with extremes in weather: including hurricanes, floods and droughts. With these events comes loss of life, injury, and damage to crops and infrastructure. Researchers have focused on two distinct pathways in relation to climate change, mitigation and adaptation. It is now quite firmly accepted that no amount of mitigation will prevent significant climate change over the coming century (IPCC, 2007); however, we still have an obligation to change our relationship with the environment, and act sustainably, so that the damage is minimised as much as possible. We must adapt to a new sustainable culture; where we are less reliant on cars, eat foods with a lower carbon footprint, and where we are conscious of the energy we consume.

While most people know what they should be doing in order to protect the environment (Gagnon Thompson and Barton, 1994), relatively few are doing it. Embracing sustainability will have both direct and indirect influences on public health. For example, increasing active transport and public transport use, and decreasing reliance on private motor vehicles will have the direct effect of improving cardiovascular health amongst the population (Dora, 1999). It will also have the indirect

effect of reducing CO₂ and other toxic emissions from cars, thereby reducing ozone, and reducing the incidence of asthma in the community (Jackson, 2003). Lower energy consumption in the home (through simple measures such as switching off lights or appliances when not in use), at a societal level, has the potential to reduce CO₂ emissions and aid in the mitigation of climate change. At an individual level, these behaviours would reduce electricity costs, allocating more money to where it is needed. Similarly, switching to reusable shopping bags rather than plastic is an important step in protecting marine life and reducing pollution from manufacturing (Moore, 2008).

Evidence based research has the potential to reveal mechanisms driving public conscientiousness about sustainable living and to highlight pathways through which people can optimize their environmentally friendly behaviours. The Theory of Planned Behaviour (TPB) (Ajzen, 1991) is a well validated decision-making model that allows for an examination of people's underlying beliefs and has much support in the social and health domains (Armitage and Christen, 2003). According to the TPB, intention to perform a given behaviour and the individual's actual control over performing the behaviour predict behavioural performance. Intention, in turn, is influenced by the degree to which a person is in favour of performing a particular behaviour (attitude), the degree to which a person feels social pressure to perform a behaviour (subjective norm), and the degree to which a person feels they have control over performing the behaviour (perceived behavioural control) (Ajzen, 1991).

Underlying the TPB is the assumption that the antecedents of attitude, subjective norms, and perceived behavioural control are corresponding behavioural (costs and benefits), normative (pressure to comply with important others' approval or disapproval), and control beliefs (motivating or inhibiting factors), respectively, that reflect an individual's intention and subsequent behaviour (Ajzen, 1991). Assessing the belief-based determinants of attitude, subjective norms, and perceived behavioural control allows researchers to establish the beliefs that differentiate those who perform a given behaviour from those who do not. A number of studies have explored these underlying beliefs in order to increase understanding of health behaviours (Rhodes et al., 2007, White et al., 2007, Wilson and White, 2008), including environmentally friendly practices (Fielding et al., 2008).

In the specific case of environmentally friendly behaviour, recent research suggests that descriptive norms, rather than the purely subjective norms assessed by the TPB, and tailored messages to reinforce these norms can be effective in shaping people's environmentally friendly behaviour (Goldstein et al., 2008, Cialdini, 2003, Nolan et al., 2008, Schultz, 1999). Schultz (1999) provided normative information describing the amount of waste recycled by an average neighbourhood. Families who received this message increased both the amount and frequency of

their roadside recycling. Similar results were found in a hotel setting where normative messages which highlighted the number of people who hung and reused their bathroom towels increased towel reuse by more than 28% (Goldstein et al., 2008). Nolan et al. (2008) surveyed 810 Californians and found that the provision of factual normative information regarding energy conservation behaviour (descriptive norms) was more predictive than other normative beliefs. This was despite the fact that participants themselves reported that such beliefs about others behaviour would have little influence on their behaviour.

Using an extended TPB theoretical framework, i.e. including descriptive normative beliefs, this study aims to investigate the beliefs that differentiate those who do or do not walk for transport, switch off lights when leaving a room, switch off appliances at the wall when not in use and shop with reusable bags. Specifically, the study assessed beliefs relating to the costs and benefits associated with the above specific behaviours (behavioural beliefs), beliefs about which important referents would approve or disapprove of the specific behaviours (subjective normative beliefs), beliefs about supportive or inhibiting factors and (control beliefs) and beliefs about the degree to which important referents have adopted the behaviours (descriptive norms).

Method

Participants and Procedure

Prior to any data collection, the university human research ethics committee approved the study. The design of the Green Living Project was collaborative and multi-disciplinary from its inception (Bikhchandani et al., 1998). Using methods from both Public Health and Psychology disciplines, key stakeholders from local and state government, electricity providers, and relevant research fields were consulted. The results of two separate surveys are included in this paper. First, a mail based survey explored the predictors of walking for transport and switching off lights when leaving a room. Second, an internet based survey explored the predictors of switching off appliances at the wall when not in use and shopping with reusable bags. For the mail based survey individuals aged 18 – 67 were randomly selected from 11 Electorates from the Australian Electoral Commission roll (See Table 1). Of those, 2,000 were randomly selected from Electorates within the Brisbane Local Government Area and 1,000 were randomly selected from those three electorates within the Moreton Bay Region (Figure 1), which did not overlap with the Brisbane Local Government Area. Those sampled were asked to complete a paper and pen survey. Of the 3,000 questionnaires that were mailed, 113 were subsequently considered 'ineligible' (e.g. not at last known address, overseas) and 1,186 were returned with usable data to give a response-rate of 42% (1,186/2835).

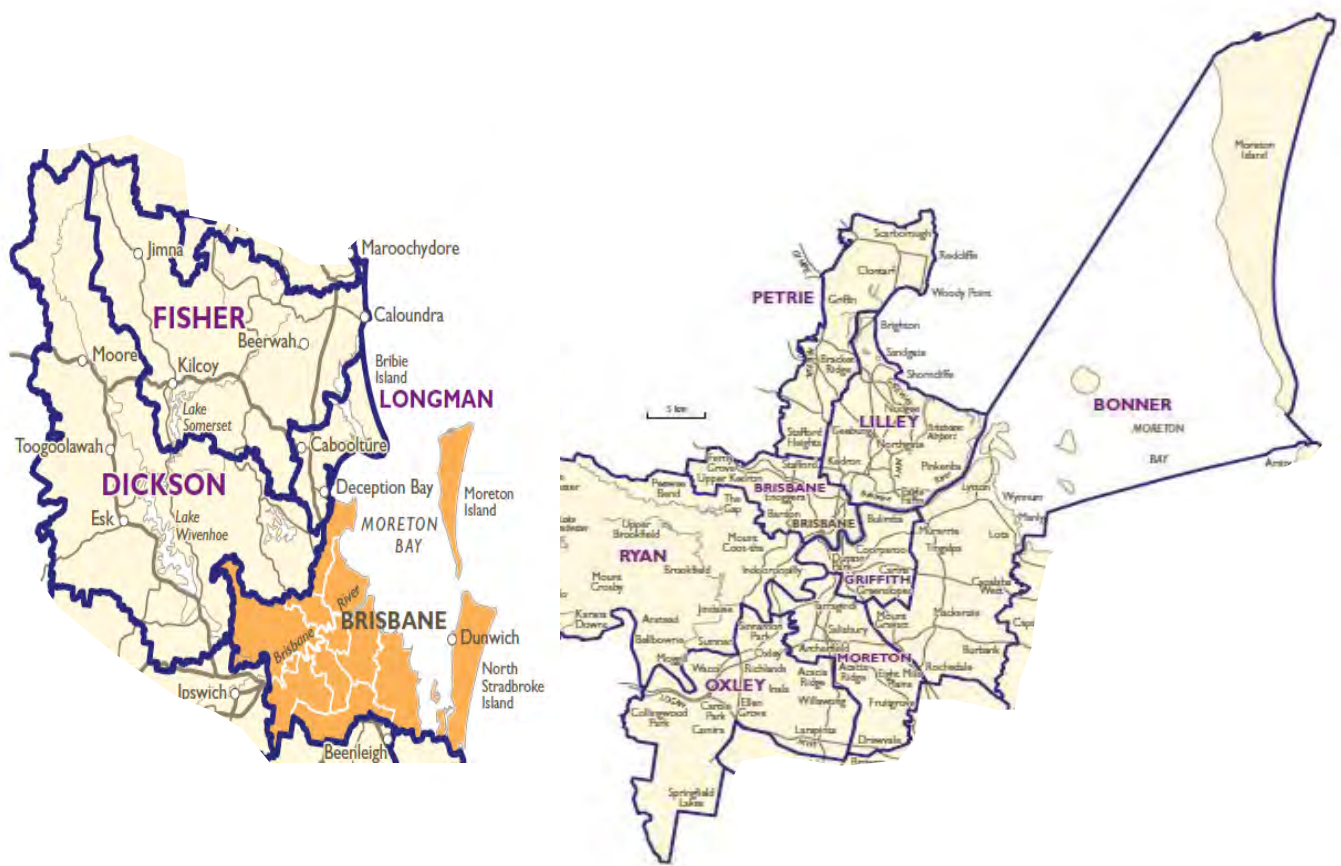


Figure 1. Green Living Mail Study areas, consisting of eleven Federal Electorates

For the online survey a number of channels were employed (bulk email lists, sign-up sheets, word of mouth and a facebook page), through which individuals were invited to participate in the study. Those interested were able to click on a web link and were taken to a survey site; hosted through Queensland University of Technology. In total, 451 individuals aged 18 - 80 completed the online survey. Only four of these participants were over the age of 67 and so the age range can be considered similar to that used in the mail based survey. In addition to the standard survey questions, those participating in the online survey were asked to provide their post code so their City and State of residence could be determined. Nine participants (6.9%) lived outside of Queensland. Table 1 shows the Demographic characteristics of the samples, including Age, Gender, Education, and Household Income, presented separately for the mail survey and the online survey.

Table 1. Demographic Characteristics of the Two Samples

	Online %	Mail %
Age	<i>n</i> =451	<i>n</i> = 1184
18 - 22	6.0	7.3
23 - 27	17.7	6.5
28 - 32	18.0	7.6
33 - 37	6.2	9.3
38 - 42	8.4	9.5
43 - 47	7.1	12.1
48 - 52	10.4	11.7
53 - 57	6.7	12.5
58 - 62	4.8	13.2
63 and over	4.7	10.2
Gender	<i>n</i> =450	<i>n</i> = 1186
Male	32.4	39.0
Female	67.4	61.0
Education	<i>n</i> =480	<i>n</i> = 1129
Bachelor's degree or higher	64.1	32.9
Diploma/Associate Diploma	8.2	14.3
Certificate (trade/business)	8.4	21.3
Year 12 (Senior/6 th form)	7.3	13.2
Year 11 or less	2.7	17.3
Other	1.2	1.0
Household Income	<i>n</i> =472	<i>n</i> = 1112
\$0 - \$25,999	5.3	8.3
\$26,000 - \$41,599	6.0	7.9
\$41,600 - \$51,999	7.1	8.5
\$52,000 - \$72,799	13.5	15.3
\$72,800 - \$129,999	32.4	26.6
\$130,000 pa or more	23.3	16.2
Don't know	3.3	4.3
Don't want to answer this	9.1	12.9

Measures

The target behaviours assessed in the mail survey were the number of times participants had walked for transport for 10 minutes or more over the preceding four weeks and how regularly participants switched

off lights when leaving a room. The target behaviours assessed in the online survey were switching off appliances at the wall when not in use and use of reusable shopping bags. The last three behaviours were measured on a five point scale (never, rarely, sometimes, often, and always).

Two separate pilot studies were conducted via email to a convenience sample (Mail Survey: $N = 12$, Internet Survey: $N = 8$) to elicit the salient behavioural, normative, and control beliefs (Bikhchandani et al., 1998) as recommended by Fishbein and Ajzen (Fishbein and Ajzen, 1975). Using content analysis, the most commonly reported advantages (e.g., saving money) and disadvantages (e.g., inconvenience), referents approving or disapproving (e.g., family, friends), and factors preventing each environmentally friendly behaviour (e.g., lack of time) were used to assess the behavioural, normative, and control belief-based measures, respectively. Further details regarding this pilot study and the methods of the Green Living Study as a whole can be found in (Bikhchandani et al., 1998)

All belief-based items were scored on 7-point Likert scales, scored *extremely unlikely* (1) to *extremely likely* (7). To assess behavioural beliefs, participants were asked to rate how likely particular costs and benefits would result if walked for transport or switched off lights when leaving a room. For normative beliefs, participants were asked to rate how likely particular referents would think they should walk for transport or switch off lights when leaving a room. Participants indicated how likely internal and external factors would prevent them from walking for transport or switching off lights when leaving a room. It should be noted that internal consistency is not a necessary feature of belief composites as no assumption is made that the salient beliefs are internally consistent (Jackson, 2003); thus, alpha coefficients were not computed for the behavioural, normative, and control belief-based measures.

Results

For belief-based analyses, responses were re-coded so that they were dichotomous. In the case of walking for transport, recoding discriminated those who did not walk for transport from those who did. For switching off lights, switching off appliances at the wall when not in use and shopping with reusable bags, recoding discriminated those who performed the behaviour never, rarely or sometimes from those who performed the behaviour often or always. Using SPSS 17.0, multivariate analyses of variance (MANOVA) were conducted to examine the influence of beliefs on whether or not people engaged in each of the behaviours. The results of the multivariate tests are presented in Table 2.

Table 2. Results of Wilks' Lambda multivariate tests of significance for four environmentally friendly behaviours.

	<i>df1</i>	<i>df2</i>	<i>F</i>	η^2
Walking for transport				
Behavioural beliefs	15	716	4.12*	.079
Normative beliefs	5	740	5.01*	.033
Control beliefs	9	726	1.21	<i>ns</i>
Descriptive norms	2	757	7.91*	.020
Switching off lights				
Behavioural beliefs	8	797	5.64*	.054
Normative beliefs	4	802	5.98*	.029
Control beliefs	6	792	5.28*	.038
Descriptive norms	2	812	10.93*	.026
Switching off appliances at the wall				
Behavioural beliefs	7	443	28.42*	.310
Normative beliefs	4	446	17.63*	.137
Control beliefs	10	440	4.54*	.093
Descriptive norms	2	445	18.59*	.077
Shopping with reusable bags				
Behavioural beliefs	10	440	33.44*	.432
Normative beliefs	6	440	9.83*	.117
Control beliefs	8	442	1.21*	.180
Descriptive norms	2	445	34.56*	.134

* $p < .001$

To explore where the differences exist between the groups, dependent variables (i.e., beliefs) were examined at the univariate level. Bonferonni adjustments were used to control for familywise type 1 error. A description of the findings for each of the environmentally friendly behaviour is included below. Please refer to Table 3 through 6 for the mean differences in groups between those who did and did not engage in each of the examined behaviours. Significance levels are presented at .05 and with a Bonferroni correction.

Belief-based Analyses for walking for transport

Univariate analyses (Table 3) revealed that those participants who walked for transport were significantly less likely than those who did not to believe that walking for transport would take too

much time, would be inconvenient and that they would get tired. They were more likely to believe that they would be happier and it would relieve stress if they walked for transport.

In terms of normative beliefs, analyses indicated that those participants who walked for transport were more likely to believe that their family and their doctor would think that they should walk for transport. For control based beliefs, participants who walked for transport were more likely to indicate that a safe route and whether they had a car would influence their decision to walk for transport. Finally, for descriptive norms, participants who walked for transport were significantly more likely to believe that their closest friend and their neighbours also walked for transport.

Table 3. Mean differences in behavioural, normative, and control beliefs for participants walking for transport

Walking for transport	<i>Not walking</i>	<i>Walking</i>
Behavioural Beliefs	<i>n</i> = 224	<i>n</i> = 508
I would reduce my carbon emissions	5.97	5.81
It would be good for the environment	6.11	6.0
I would be attacked by dogs or birds	3.22	3.02
I would have more energy	5.42	5.41
It would take too much time	5.22	4.38***
I would save money	5.07	5.00
I would be happier	4.47	4.81*
I would not be safe in the traffic	3.18	2.98
I would risk getting skin cancer	3.78	3.52
It would be inconvenient	5.35	4.39***
It would be good for my health	6.01	6.13
It would be a good way to relieve stress	5.13	5.61***
I would get too tired	3.79	3.15***
The weather would make it difficult	4.29	4.02
I would get to know my local community	4.44	4.52
* <i>p</i> < .05, *** <i>p</i> < .003		
Normative Beliefs	<i>n</i> = 223	<i>n</i> = 523
My family	3.66	4.34***
Environmentalists	6.38	6.43
The Government	5.55	5.63
My Doctor	5.52	5.80*

The National Heart Foundation	6.21	6.21
<i>*p<.05, *** p <.010</i>		
Control Beliefs	<i>n</i> = 219	<i>n</i> = 517
If there was a shower at my destination	3.59	3.70
If there was a safe route	4.49	4.87*
If I did not have a car	5.60	5.87*
If I were more fit	3.89	3.96
If my destination was close by	5.46	5.59
If there was better public transport	5.16	5.14
If I had the time	5.01	5.15
If I was more motivated	4.26	4.52
If the weather was bad	4.26	4.50
<i>*p<.05, *** p <.006</i>		
Descriptive Norms		
Closest friend	0.97	1.83***
Neighbours	1.20	1.64*
<i>*p<.05, *** p <.025</i>		

Belief-based Analyses for switching off lights

Univariate analyses (Table 4) revealed that those participants who indicated that they switched off lights often or very often were less likely than those who switched out lights never, rarely or sometimes to believe that they would need to switch the lights on again a few minutes later and that they would feel less safe with the lights out. They were more likely to believe that their electricity bill would be lower, that switching off lights would reduce their carbon emissions, that switching off lights would be good for the environment and that they won't have to replace their light bulbs as often.

In terms of normative beliefs, analyses indicated that those participants who switched off lights often or very often were more likely to believe that their family would think that they should switch off lights when they leave a room. For control beliefs, analyses showed that participants who switched out lights often or very often were more likely to indicate that their friends telling them they should switch out lights and if they were trying to save money would influence their decision to switch out lights. Finally, in terms of descriptive norms, analyses revealed that participants who switched off lights often or very often were significantly more likely to believe that their closest friend and their neighbours also switch off lights when leaving a room.

Table 4. Mean differences in behavioural, normative, and control beliefs for participants switching off lights when leaving a room

Switching off Lights	Sometimes	Often
Behavioural Beliefs	<i>n</i> = 66	<i>n</i> = 740
My electricity bill would be lower	5.24	5.86***
I would reduce my carbon emissions	5.44	6.03***
It would be good for the environment	5.44	6.18***
I won't have to replace light bulbs as often	4.41	5.27***
I would have to switch the light on again a few minutes later	4.91	4.36*
I would feel less safe with the lights out	3.32	2.59***
My home would feel colder	2.48	2.60
I might stumble and fall in the darkness	3.33	2.91
* <i>p</i> < .05, *** <i>p</i> < .006		
Normative Beliefs	<i>n</i> = 70	<i>n</i> = 737
Environmentalists	6.59	6.78
My family	4.97	5.71***
The Government	5.59	5.92
Electricity companies	2.53	3.03
* <i>p</i> < .05, *** <i>p</i> < .013		
Control Beliefs	<i>n</i> = 68	<i>n</i> = 731
My friends telling me I should	3.38	4.06***
If I were trying to save money	4.91	5.84***
Being reminded	4.78	5.15
If it was inconvenient	4.18	4.11
Household members who are afraid of the dark	3.85	3.74
A desire to be in a well-lit environment	4.19	3.75
* <i>p</i> < .05, *** <i>p</i> < .008		
Descriptive Norms	<i>n</i> = 70	<i>n</i> = 745
Closest friend	3.04	3.45***
Neighbour	2.83	3.25***
* <i>p</i> < .05, *** <i>p</i> < .025		

Belief-based Analyses for switching off appliances

Univariate analyses (Table 5) revealed that those participants who indicated that they switched off appliances often or very often were less likely than those who switched out lights never, rarely or often to believe that it would be inconvenient and that they would have to reset their clocks, timers, channels etc. They were more likely to believe that their electricity bill would be lower, that switching off appliances would reduce their carbon emissions, and be good for the environment, that their appliances would have a longer life and that their home would be safer.

In terms of normative beliefs, analyses indicated that those participants who switched off appliances often or very often were more likely to believe that their family and electricity companies would think that they should switch off lights when they leave a room. For control beliefs, analyses showed that participants who switched off appliances often or very often were more likely to indicate that the degree of inconvenience and if they were trying to save money would influence their decision to switch out lights. Finally, in terms of descriptive norms, participants who switched off appliances often or very often were significantly more likely to believe that their closest friend and their neighbours also switch off appliances when not in use.

Table 5. Mean differences in behavioural, normative, and control beliefs for participants switching off appliances when not in use

Switching off Appliances	Not	Switching Off
Behavioural Beliefs	<i>n</i> = 194	<i>n</i> = 257
My electricity bill would be lower	5.24	5.89***
I would reduce my carbon emissions	5.49	6.10***
It would be good for the environment	5.66	6.26***
It would be inconvenient	5.25	3.21***
My appliances would have a longer life	4.15	4.78***
I would have to reset clocks/timers/channels etc	5.56	4.28***
My home would be safer	4.62	5.10***
* <i>p</i> < .05, *** <i>p</i> < .003		
Normative Beliefs	<i>n</i> = 194	<i>n</i> = 257
Environmentalists	6.65	6.73
My family	4.25	5.35***
The Government	5.29	5.50
Electricity companies	2.52	3.11***

* $p < .05$, *** $p < .010$

Control Beliefs	$n = 194$	$n = 257$
Being reminded	5.16	5.40
If I were trying to save money	5.39	5.82***
If it was inconvenient	4.77	4.07***
If my appliances did not need to be reset	5.77	5.47*
Being able to reach the switches easily	5.94	5.70
My friends telling me I should	4.28	4.62*
If I were going away for a few days or more	6.01	6.31*
If I use an item frequently	4.53	4.97*
If I have complex cabling arrangements	4.30	4.40
* $p < .05$, *** $p < .006$		
Descriptive Norms	$n = 193$	$n = 255$
Closest friend	2.27	2.83***
Neighbours	2.13	2.38***
* $p < .05$, *** $p < .025$		

Belief-based Analyses for shopping with reusable bags

Univariate analyses (Table 6) revealed that those participants who shopped with reusable bags were significantly less likely than those who did not to believe that shopping with reusable bags would be expensive, would be inconvenient, that they would find it difficult to remember to bring the bags and that they would have to buy rubbish bags. They were more likely to believe that it would be good for the environment, would reduce the amount of plastic bags lying around their house, would protect waterways and wildlife, and that less plastic would need to be produced.

In terms of normative beliefs, analyses indicated that those participants who shopped with reusable bags were more likely to believe that their family would think that they should shop with reusable bags. For control beliefs, analyses showed that participants who shopped with reusable bags were less likely to believe that it would be inconvenient. They believed they would be more likely to shop with reusable bags if their friends told them they should, if the bags were always in their car or if they had to pay for the plastic shopping bags. Finally, in terms of descriptive norms, participants who shopped with reusable bags were significantly more likely to believe that their closest friend and their neighbours also shopped with reusable bags.

Table 6. Mean differences in behavioural, normative, and control beliefs for participants shopping with reusable bags.

Shopping with Reusable Bags	Not Reusable	Reusable
Behavioural Beliefs	<i>n</i> = 151	<i>n</i> = 300
It would be good for the environment	5.87	6.59***
I would be inconvenient to carry them around with me	4.47	2.53***
I would reduce the amount of plastic bags lying around my home	5.25	6.27***
It would protect our waterways	5.52	6.51***
It would protect wildlife	5.52	6.47***
It would save the supermarkets money	5.21	5.60*
Less plastic would need to be produced	5.46	6.16***
I would find it difficult to remember to bring them with me	5.59	3.13***
It would be expensive to buy the bags	3.88	2.42***
I would have to buy rubbish bags	5.43	4.24***
* <i>p</i> < .05, *** <i>p</i> < .003		
Normative Beliefs	<i>n</i> = 151	<i>n</i> = 300
Environmentalists	6.83	6.82
My family	4.99	5.88***
The Government	5.45	5.60
Retailers	5.25	5.20
Reusable bag manufacturers	6.14	6.43*
Plastic bag manufacturers/suppliers	2.28	2.08
* <i>p</i> < .05, *** <i>p</i> < .010		
Control Beliefs	<i>n</i> = 151	<i>n</i> = 300
My friends telling me I should	4.05	4.65***
If it was inconvenient	4.78	3.90***
Being reminded	5.32	5.49
If the bags were always in my car so I wouldn't forget them	5.34	6.06***
If there were some kind of reward program	5.14	4.92
If the reusable bags were free	5.42	5.06*
If I could still get free rubbish bags	5.08	4.58*

If I had to pay for plastic shopping bags	5.19	5.73***
* $p < .05$, *** $p < .006$		
Descriptive Norms	$n = 150$	$n = 298$
Closest friend	2.92	3.70***
Neighbours	2.81	3.10***
* $p < .05$, *** $p < .025$		

Discussion

A number of beliefs which predict walking for transport, switching off lights when leaving a room, switching off appliances at the wall and shopping with reusable bags have been identified. Importantly, discriminating beliefs included behavioural, normative and control beliefs from the TPB as well as the descriptive normative beliefs. By way of example, those who walked for transport were more likely to believe that it would be a good way to relieve stress (behavioural belief). The belief that family would approve of switching off lights when leaving a room was a significant determinant of whether people switched off lights (normative belief). Convenience was a significant determinant of switching off appliances when not in use (control belief) and the belief that one's closest friend shops with reusable bags was associated with shopping with reusable bags (descriptive normative belief).

Implications and Strengths

Understanding the beliefs predicting specific environmentally friendly behaviours is very useful in terms of future policy and environmental education. According to Brisbane City Council's corporate sustainability policy, they are working towards a Brisbane that is 'a city to look forward to living in – a clean and green city that is smart, prosperous, accessible, inclusive, creative and healthy, and that leads the region by example' (Brisbane City Council, 2010). Similarly, Moreton Bay Regional Council's climate change policy aims to 'raise awareness of climate change and better manage local greenhouse gas emissions' (Moreton Bay Regional Council, 2009). In order to meet these policy guidelines, councils must understand their people; understand what motivates people and understand the types of interventions that are most likely to result in a 'cleaner', 'greener' and 'healthier' region.

By identifying specific beliefs which predict behaviour, these beliefs can be targeted in social marketing campaigns. For example, in a study conducted by Goldstein, Cialdini and Griskevicius (2008) descriptive norm messages such as 'The majority of guests who stayed at our hotel, do recycle their towels at least once' were effective in increasing the percentage of hotel guests who reused their towels. This same method could be utilised by local councils and other key

stakeholders. For example, the message 'Eighty percent of people in your neighbourhood switch off lights when they are leaving a room' would likely be effective in encouraging people to switch off lights. An important caveat is, however, that such messages should be true (Goldstein et al., 2008).

Behaviour change interventions which include modelling of a desired behaviour are generally effective (Bikhchandani et al., 1998). We have found that people are more likely to shop with reusable bags if they believe their friends and neighbours also shop with reusable bags. Therefore, based on the findings of this study and existing evidence around the efficacy of observational learning, a media campaign might show a typical suburban street with people storing their reusable shopping bags in their car or show someone who sees their friends or neighbours at the supermarket and notices that they are shopping with reusable bags. Wherever possible, people should be encouraged to talk to their friends and neighbours about their efforts to live sustainably.

It is important to fully understand the various factors that influence a particular behaviour. For example, to encourage more people to switch off appliances at the wall it may be necessary to cover two fronts. Firstly, emphasising the benefits in terms of saving money by reducing energy consumption and secondly, by better understanding and addressing issues of convenience. Many participants indicated that switching off appliances at the wall when not in use was inconvenient because they would lose their settings or because plugs were hidden behind furniture and were difficult to get to. These are challenging behavioural control based challenges that will require innovative solutions.

It is useful to look at the behaviours individually, i.e. if a particular group or organisation are seeking to change a specific behaviour, such as increasing walking for transport, then any relevant or suitable beliefs significantly associated with that behaviour could be targeted, e.g. 'Did you know that, apart from improving your overall health and fitness, walking to work can help you relieve stress?' However, it is also helpful to look at the behaviours together. Looking across the four behaviours examined, commonalities can be identified that may be useful in encouraging environmentally friendly behaviour generally.

Of note, family were important referents for all four behaviours, as was the perceived behaviour of one's closest friend. Moreton Bay Regional Council have an Education for Sustainability program and, based on the findings of this research, it would be appropriate to include more family and friend inclusive activities in their lesson plans. Beliefs in regards to the convenience of performing each of the examined behaviours were also consistent predictors. It is easy to see how making particular behaviours more convenient (e.g. providing showering facilities at work places) or highlighting the perceived benefits of behaviours (e.g. walking for transport may greatly improve your health) could encourage these behaviours.

The design of the Green Living Project was collaborative and multi-disciplinary from its inception (Bikhchandani et al., 1998). The beliefs explored were elicited in a grounded and theory based approach and the findings have good face validity. Further, using mixed methods, employing both a mail survey and an internet based survey, has provided insight into the possible implications of each method. With a mail based survey method it is easier to achieve a representative sample and to target your sample to particular geographic areas. Internet surveys, on the other hand, are much cheaper to conduct; however, the sample may be biased by self-selection, particularly in terms of socio-economic factors (average age of respondents, income and education). In the case of the current study, highest level of education achieved, in particular, was markedly different between the two samples. This is likely because the internet study was marketed through university mailing lists. Participants in the internet survey were also much more likely to be self-selecting based on an interest in environmental sustainability.

Conclusions and Recommendations

Tackling environmental issues is an immediate and serious concern for policy makers, local governments, and environmental groups, to name a few, and a great deal of time and money has already been invested in educating the public and introducing new schemes. Unfortunately, while most people know what they should be doing in order to protect the environment (Gagnon Thompson and Barton, 1994), very few are doing it. The aim of this research has been to explore the predictors of environmentally friendly behaviour with an interdisciplinary, collaborative approach utilising established psycho-social theory. A number of important discriminating beliefs have been identified and these can readily be applied to educational initiatives and social marketing efforts.

Specifically, to address behavioural beliefs, it would be beneficial to highlight any advantages associated with environmentally friendly behaviours (e.g. saving time or money). To address normative beliefs, educational programs can involve families and friendship networks, as these groups are known to influence behaviour. For addressing control beliefs, desired actions should be facilitated (e.g. having a reminder system for shopping with reusable bags) and impeding factors should be minimised (e.g. making switching off appliances more convenient) wherever possible. Finally, to target descriptive normative beliefs, social marketing campaigns and educational initiatives should highlight the ways in which people 'just like me' (i.e. friends and neighbours) are already engaging in sustainable behaviours.

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Non Peer Reviewed Papers

Green Roofs in Seoul to Make the Metropolis Healthier: A Critical Discussion

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Green Roofs in Seoul to Make the Metropolis Healthier: A Critical Discussion

ABSTRACT: *Green roofs and green walls are “reclaimed urban open spaces” helping mitigation of heat islands, global warming, and other environmental problems. In many Korean cities an increasing number of green roofs and green walls are created in response to local governments’ incentives and/or legal requirements. Seoul city started a subsidy program supporting half the cost of green roofs in 2002. During the last nine years (2002-2010) a total 202,449m² of green roofs have been built on 446 buildings by the program. This year alone the city plans to support 51,527m² of green roofs in 109 places, with an annual budget of approximately A\$8.8million.*

Buildings with 99m² or greater space for green roof construction with good public access, are eligible. Priorities are given to potentially good environmental education sites, potential stepping stones for ecosystem network, and public or welfare facilities attracting many visitors like kindergartens, hospitals, and so on. Subsidies are up to Korean Won 90,000/m² (approx. A\$79) for extensive types, and up to Korean Won 108,000/m² (approx. A\$95) for semi-intensive or intensive type green roofs.

Green roofs should be welcomed in Seoul, a metropolitan home for more than ten million inhabitants, where land prices are too high and on-ground open spaces are insufficiently provided. Though the achievements to date are noticeable, the created roof greens are simply tiny compared to the size of the city, and the green roof program should not be an excuse to slow or neglect the supply of on-ground open spaces in Seoul. The amount of subsidy (currently 50% of construction cost) may be reconsidered, and the matching funds from the building owner should be put under stricter auditing. For any similar programs, regular and continued monitoring and researches on the maintenance, management, and effectiveness of the projects are recommended.

Keywords: *Green roofs, Subsidy program, Seoul,*

Introduction

Green roofs have been promoted for their many benefits including helping to mitigate global climate change and to make a city more liveable by; 1) improving building energy balance and reducing CO₂ emissions; 2) reducing urban heat island effect; 3) improving storm water attenuation; 4) conserving and improving biodiversity; 5) enhancing amenity value (more open spaces, scenic beauty, reduced noise/air-pollutants/glare). (Osmundson 1999, Korea Green Roof Association, Greater London Authority 2008, IGRA, GRHC, European Federation of Greenroof Associations)

An increasing amount of research has been done on green roofs (eg. Castletona 2010, White 2011). The industry is growing fast. In North America, *Green Roofs for Healthy Cities* announced the results of its 2011 *Annual Industry Survey* of Corporate Members which found that “the green roof industry grew by 28.5% over the course of 2010, up significantly from 16% growth recorded in 2009.” (GRHC 2011)

Green Roofs in Seoul

Seoul city was born as a newly planned capital city of *Joseon* kingdom (1392-1910) during the 14th century. The city planner and *Fengshui* practitioner, following the order of the new king, surveyed many sites and chose this ideal location with a mountain ridge coming down from the back or north, and lower ridges branching out east and west to surround the city, with a hill and river in the front or south for protection. As the city grew to house over ten million inhabitants, roughly a quarter of the total population of the Republic of Korea, by the late 20th century, protection of the little remaining green space and provision of more open spaces had become challenging tasks for the city.

In Seoul, during the last decade, very few urban park areas have been increased, and per capita park areas are much smaller compared to other major metropolitan cities of the world. (Table 1) More than half of the ‘urban park’ area is ‘natural urban parks’ which are usually more distant steep hills that survived from urban developments. ‘Home range parks’ are those closer to living areas including neighborhood parks, children’s play grounds, and pocket parks. But some of the home range parks are historic gardens with limited accessibility as admission fees are charged and they are open during office hours only. This picture was shown clearly in a study which used GIS buffering

techniques and concluded that only half or less of urban areas in Seoul are serviced by parks within a walking distance (or 1,000 meters in this study, whereas half a mile or 800 meters are regarded average walking distance in many other studies). (Oh et al 2007)

Table 1. Park areas in Seoul

Year	Urban park		Home range park	
	Area(1,000m ²)	Area(m ²)/person	Area(1,000m ²)	Area(m ²)/person
2010	113,754	11	50,902	5
2002	107,650	10	47,045	5

Source: Seoul city (<http://greencity.seoul.go.kr>) Note; Numbers are rounded

Some building owners, landscape architects, architects, and urban planners began to see the potentialities of rooftops as green spaces in this metropolis with open space being far from sufficient. And the city began its subsidy program for green roofs in 2002.

Eligibility for green roof subsidy

Existing public or private buildings with 99m² or more of roof areas that can be greened are eligible for this program, but up to a maximum of total 992 m². Applications are competitive, and projects are selected within the budget limit, which was approximately ten million A\$ for the year 2010.

Selection criteria

Priorities are given to buildings 1) readily accessible to many and diverse visitors; 2) of which roofs are potential sites for public environmental education; 3) used for major public and/or welfare purposes; 4) with positive impacts for improving awareness and environmental/amenity effects; 5) that will be key stepping stones of urban ecological networks; 6) children's daycare center, kindergarten, hospital, and others where rooftop gardens will be most intensively used.

Subsidies

Up to 50% (or up to 70% for those buildings visible in the foreground from the Mt. *Nam-San* which sits in the center of the city) of costs including structural safety check, design, and construction are supported by the city for private buildings. This year, the city supports up to 90,000 Korean Won (approx. A\$78)/m² for extensive type green roofs, and up to 108,000 Korean Won (approx. A\$94)/m² for semi/intensive type green roof. Extensive type green roofs are defined as those with 20cm or less depth of soil and usually have ground covers or flowers. Buildings near Mt. *Nam-San* are given special favors. In addition to lifting the upper limit of area, they get a greater amount of support per unit area; up to 126,000 Korean Won (approx. A\$109)/m² for extensive type green roof, and up to 150,000 Korean Won (approx. A\$130)/m² for semi/intensive type green roof. Buildings owned by the

city government are fully supported for the costs of green roofs. Other public buildings are eligible when the owners are willing to bear 30% or more of costs.

Achievements

Since the beginning of the green roof subsidy program in 2002, over 200,000 square meters have been constructed by the program up to 2010. An impressive increase in annual budget was made in 2007. (Table 2) In 2011, the planned number of projects is 109 and the area will be 51,527 square meters. Green Seoul Council voted five best sustainability policies of Seoul in 2009, and this program ranked the 2nd. The Council members comprise academics, journalists, NPO members, and others representing Seoul citizens. (Choi 2011) Seoul city government was awarded the 'Best Administration Award' of the 1st Korea Green Roof Award in 2009 for the achievements of this subsidy program.

Table 2. Green roof subsidy program of Seoul (2002 – 2010)

	total	2002	2003	2004	2005	2006	2007	2008	2009	2010
Projects (public/ private)	446 (130/ 208)	11 (0/11)	10 (0/10)	9 (0/9)	6 (0/6)	14 (4/10)	62 (37/25)	106 (42/64)	120 (47/73)	108 (49/59)
area(m ²)	202,448	5,455	3,322	2,670	3,970	5,611	24,154	59,221	46,971	51,074
subsidies (A\$1,000)	36,173	556	556	278	374	698	4,855	10,706	8,394	9,756

Source: Choi 2011; Seoul city (<http://greencity.seoul.go.kr>)

Fig.1. Green roofs at *Dongguk University*, Seoul, Korea



Grand prix award winning project of the 1st Korea Green Roof Award in 2009. Close to Mt. *Nam-San* (in the back ground of the photo, under cloud), this project covers 14,296 square meters at eleven places on top of several university buildings. And this project got higher subsidy per unit area. This project won the World Best Roof Garden Award (Gold medal) during the Shanghai Green Roof Congress, China, May 2010. (Photos by T. M. Ahn May 16, 2009)

Fig.2. Green roof of the National Library of Korea



2nd place award winning project of the 2nd Korea Green Roof Award in 2010. The whole green area shown in the photo covers library buildings and digital library below. (Photo by T. M. Ahn Sep. 11, 2010)

Issues and Discussions

Seoul city was one of the pioneering metropolitan cities in the world to start a rigorous green roof program, and the achievements made during the last decade are impressive. Considering the environmental conditions of the city, the following are some critical discussions and suggestions for improvement of the green roof subsidy program.

Location of projects

Subsidized green roofs first should be located in those parts of Seoul where more parks and open spaces are in need. The variation of per capita park area is great among twenty five districts (*gu*) of Seoul city. In *Geumcheon-gu*, per capita home range park area was only one square meter in 2009, compared to 21 square meters per person in *Jongno-gu*. (Appendix-1, Seoul city, <http://greencity.seoul.go.kr>). *Geumcheon-gu* is characterized by high density residential developments with less open spaces, whereas *Jongno-gu* has five major historic royal palace gardens (though these have limited accessibility), and more offices, which means many daily commuters coming in but less residents. This explains part of the reasons for the great variation. However, in order to fix the extreme disparity in parks distribution among districts in Seoul city, we should give priority to applications from those disadvantaged districts in selecting and locating subsidized green roof projects. Currently priorities are focused in areas close to Mt. *Nam-San* with additional favors of un-limited area of support per project, and more subsidy money per unit area.

Keeping roof gardens accessible

Accessibility and use by as many citizens as possible are major criteria to choose subsidy projects. In a metropolis like Seoul city, security is always a critical concern to the owner and/or manager in

charge of larger buildings housing multiple offices or other uses. Accesses to the roof gardens or the building itself are usually locked up after office hours. Our expectations that the roof gardens will be visited and used by many citizens may not be met from the beginning or increasingly become so over time. This is one of the reasons that it is suggested to subsidize more of the extensive type of green roofs than semi/intensive ones.

Parks and greens on the ground

While green roofs have shown significant increase ratios both in number and area during the last decade, there has not been such noticeable increase ratio of areas of parks on the ground during the same period in Seoul. On the contrary, if we look into each district (*gu*), twelve out of twenty five districts of Seoul have had decreased or little increase (less than one hundred square meters) in area of home range parks. (Seoul city, <http://greencity.seoul.go.kr>) We need to fully take advantage of the benefits of green roofs in a densely developed metropolis on the one hand, we should try our best to increase on the ground parks and greens on the other, and do not make green roofs an excuse for not providing enough parks on the ground. We also should watch in order to keep existing parks from being converted to many other uses for many reasons, including widening of narrow urban roads.

Extensive vs. intensive green roofs

Building owners in Seoul tend to favor having intensive type green roofs. This may be because they do not have enough parks and open spaces nearby. It is understandable that they would make a garden if they have a flat rooftop and if they have a chance to make it green. From the efficiency point of view, subsidizing more extensive green roofs than semi/intensive green roofs will benefit the city's environment most, within the limitation of annual budget. Intensive or semi-intensive green roofs are not much more effective in thermal insulation than extensive ones. It is arguable that subsidizing extensive green roofs is acceptable as they serve more to improve the city environment, but we do not necessarily need to subsidize roof gardens when they are expensive and used mainly by the building occupants.

Fig. 3. Extensive, and intensive green roofs in Seoul



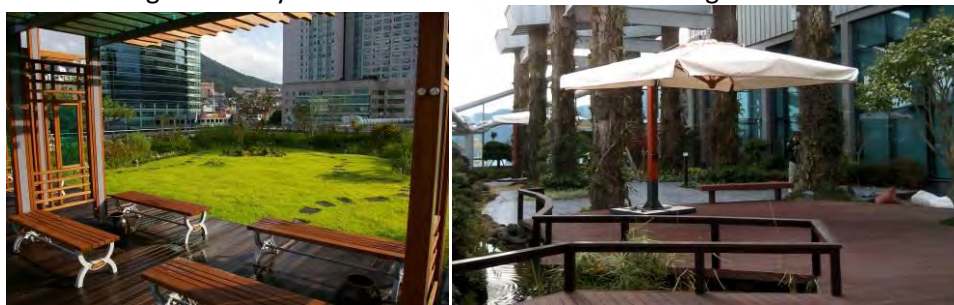
Building more contemporary hanging gardens among concrete forests is plausible, but the same money may better be used for building bigger extensive green roofs. (Photos by T. M. Ahn)

Sustainability

Choice of materials for construction of green roofs will influence sustainability. Embodied energy of materials, which is “the total energy used to produce something – either a single material, a complex product, or a whole project”, (Thompson 2008) should be considered in order to make the green roofs truly contribute to the sustainability objectives of a city. A few examples of average estimated embodied energy are; fertilizer (phosphate) 32,373Btu/lb; concrete (aerated) 1,548Btu/lb; stone (granite, cut) 2,537Btu/lb; lumber (hardwood, kilndry) 1,054Btu/lb; plastics (HDPE) 42,226Btu/lb. (Thompson 2008, p.284)

Maintenance may be the most critical factor in sustainability analysis, and again, extensive type green roof should be favored in this respect also as it usually needs much less inputs for maintenance.

Fig. 4. Variety of construction materials used for green roofs



(Photos by T. M. Ahn, and Greenconcept Co.)

Subsidy, and building owner's share

First, we may question if we should subsidize green roofs at all, and then how much percentage of what costs we need to support. In Japan, since April 2001, Tokyo prefecture made a local regulation requiring buildings (new, rehabilitation, or extension) on a site 1,000m² or larger, should make their

roofs green. Similarly, Hyogo prefecture of Japan also requires buildings with floor area of 1,000m² or larger to make their roofs green since October 2002. (Jang et al 2008) The green roof subsidy program of Seoul city has helped realize some excellent showcase projects and raised awareness of the benefits of green roofs. Now, the support per unit area of green roofs on existing buildings may be reduced progressively on the one hand, and larger new buildings and old buildings with low energy efficiency may be required, without subsidy, to make their roofs green on the other.

Second, we are not completely certain if every building owner's payment of her/his share, without exception, is fully used for construction of the project. This will also support the policy change to decreasing, or eventually, eliminating subsidy for green roofs.

Concluding Remarks

Seoul city chose to subsidize green roofs early in 2002 hoping to make the metropolis more liveable by taking advantage of the varied benefits of them. By subsidizing half or even more of the cost for over 446 projects, the program has been successful during the last decade in promoting green roofs and increasing awareness of their benefits. In the future the program may focus on environmentally disadvantaged areas and extensive type green roof, but progressively reduce the subsidy. Instead, compulsory requirements of green roofs on existing less energy efficient buildings and all new larger buildings are suggested.

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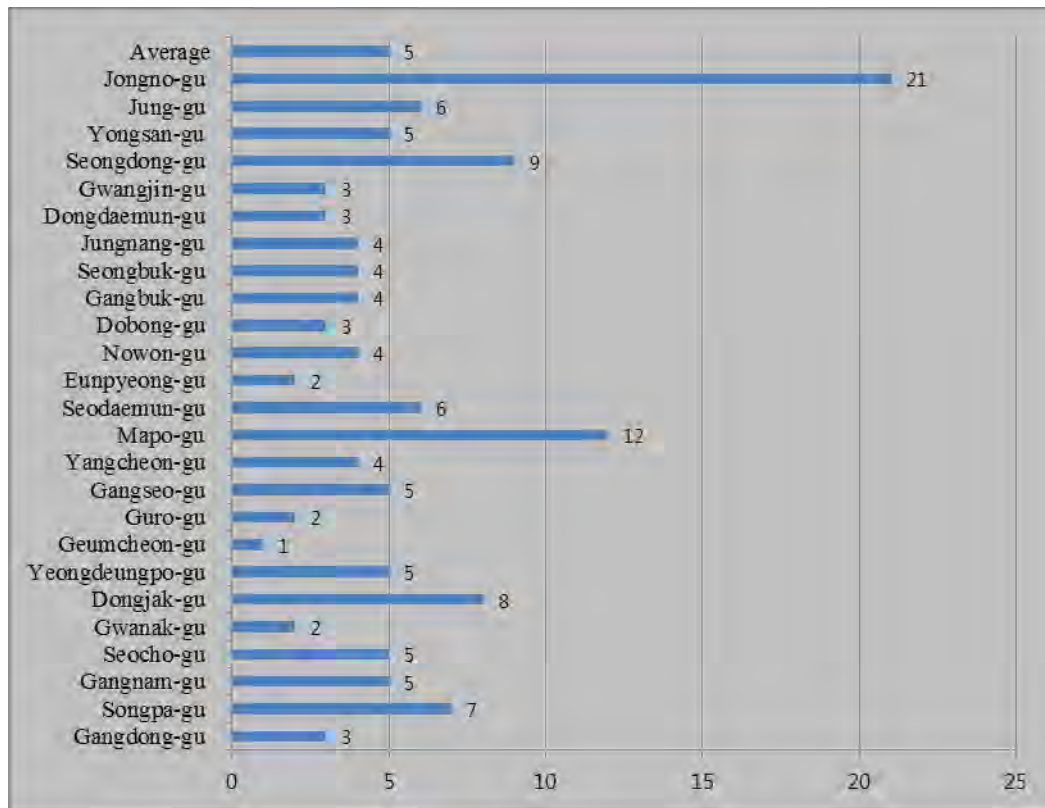
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Appendix: Home range parks per capita in 25 districts (*gu*) of Seoul in 2009 (unit: m²/person)



Delivering Healthy Living Environments in Remote towns of the NT

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Paper presented at the
4th Healthy Cities: Making Cities Liveable Conference, Noosa (QLD), 27-29 July 2011

ABSTRACT

Being *Healthy* is more than about the absence of disease, although that is obviously part of it.

There are 4 central aspects of health from an holistic understanding of the term [which some might say equates to wellbeing]:

- ☐ The physical,
- ☐ The mental, psychological or emotional
- ☐ The social and
- ☐ The cultural – [which includes – the Spiritual dimension]

The cultural aspect recognises that different cultures have different beliefs, customs and views that have a major impact on the perception and understanding of health as well as the perception, understanding and arrangement of space/place and the relationship between the two.

All of these are important when working on a project that incorporates an array of objectives which include socio-economic and community outcomes in a cross-cultural context.

According to WHO:

“Healthy cities are all about local involvement. They continually and actively explore ways to contribute to implementing WHO strategies at the urban and local levels. AND

“Where people live affects their health and chances of leading flourishing lives. Communities and neighbourhoods that ensure access to basic goods, that are socially cohesive, that are designed to promote good physical and psychological wellbeing, and that are protective of the natural environment are essential for health equity.”

Embarking on a new planning, housing and infrastructure project in a cross cultural context where there are health related objectives therefore required a development process that was people focused, robust, integrated a broad range of opportunities and constraints and mindful of locational issues.

This paper is a summary of an aspect of the journey so far involving a detailed engagement or “embracing” process [with examples and illustrations] as it relates to these aspects and how they have been considered and practically integrated into the development of new areas and housing in a number of remote NT towns/communities, with predominant Aboriginal population.

The paper argues that there are broad sustainability and health benefits from an holistic engagement and implementation strategy involving local people and concludes with the question, “what is the opportunity cost of not having a comprehensive engagement process for planning a physical environment that promotes health?”

Unlike many projects on which we as Architects and Planners are involved the current project required us to put aside common held views, tools and processes and focus on what might be required to achieve a broad arrange of outcomes in a remote community and working cross culturally. Having worked cross culturally in the NT for many years and in many of the locations in which the current program was to be implemented I and many of the team found this new program and its objectives a welcome innovation. There was so much potential to deliver on the broad objectives built into the program

INTRODUCTION

We recognise that different cultures have different beliefs, customs and views that have a major impact on the perception and understanding of health as well as the perception, understanding and arrangement of space/place and the relationship between the two. Therefore being *Healthy* is about much more than the absence of disease, although that is obviously part of it.

According to the World Health Organisation:

“Healthy cities are all about local involvement. They continually and actively explore ways to contribute to implementing WHO strategies at the urban and local levels. AND

“Where people live affects their health and chances of leading flourishing lives. Communities and neighbourhoods that ensure access to basic goods, that are socially cohesive, that are designed to promote good physical and psychological wellbeing, and that are protective of the natural environment are essential for health equity.”

We suggest therefore that there are 4 central aspects of health, from an holistic understanding of the term [which could equate to an understanding of wellbeing]:

- a. The physical – Functioning and healthy body
- b. The mental, psychological or emotional – Control, Safety, Security, Privacy, Comfort
- c. The social – Family and social groupings and arrangements for support, cooperation, friendships.
- d. The cultural [which includes – the Spiritual dimension] recognising that different cultures have different beliefs, customs and views that have a major impact on the perception and understanding of health as well as the perception, understanding and arrangement of space/place and the relationship between the two

These set the foundation on which our team developed an engagement process that brought in community people or “end users” as well as the more formal government and non-government stakeholders so that the WHO statement is given a life within our project.

Particular issues in remote towns that impact on health include the following:

- ☐ Crowding and demographic circumstances within community and housing in general
- ☐ Living conditions and status of housing stock
- ☐ The ability of people to control their own living environment
- ☐ The quality and reliability of social services and municipal services
- ☐ Standard of Infrastructure
- ☐ Land and geographical constraints – exposure and relation to the natural environment and the elements.
- ☐ Cross cultural history

CURRENT PROJECT

The objectives of the program, on which we have been employed, both stated and implied include the following, which encompasses the notion of holistic health to which we ascribe:

- i. Housing and Planning Outcomes – to be delivered for Public Housing Model of management and Appropriate for the people and location
- ii. Quality and Sustainability – long term vision
- iii. Socio-cultural and Economic Outcomes – Including Health and Sustainable Employment and Workforce development [skilling and training]
- iv. Time – optimum delivery and engagement framework
- v. Cost – whole of life considerations
- vi. Safety – to new Federal Safety Commissioner requirements
- vii. Environment and Heritage protection and management
- viii. Management Best Practice – project management, stakeholder collaboration and coordination
- ix. Community Acceptance and Relationships. Community people as contributors
- x. Legacy and Reputation – set a benchmark for future programs

This broad range of objectives is ambitious and has not been formally combined together before in a single delivery program, which makes it one of the most promising programs since the demise of Housing Associations in the 1980's:

We are involved in the planning and development of new Subdivisions, infrastructure and new Housing as well as refurbishing many existing dwellings - the Strategic Indigenous Housing and Infrastructure Program [SIHIP]. SIHIP is a program involving Federal and Territory governments in collaboration with the private sector in an "Alliance" aimed at improving health and socioeconomic outcomes through physical projects, which has delivered many outcomes but has, more notably, been much maligned. This is taking place in a number of remote Northern Territory towns and communities in which there is a predominantly Aboriginal population and where broad health related solutions are fundamental to the project's success.

Embarking on a new planning, housing and infrastructure project in remote communities in a cross-cultural context requires deep consideration. An innovative approach to the planning, design, procurement, delivery and ongoing management of the project required a development process that was robust, focused on the location and integrated the broad range of opportunities and constraints that exist in such situations. An Holistic view and understanding of *Health* set the scene for the Planning team to take the brief provided by government with its "parameters", approval processes and associated stakeholder requirements and guidelines, and focus on the people who would occupy new and renovated houses and live in new housing areas. Dealing with the challenges this entails required a solid commitment from the Alliance partners and importantly a comprehensive project development process with a particular emphasis on community engagement

In keeping with the World Health Organisation statement the project was framed around the principal that the end users/clients are valuable contributors to the achievement of the project outcomes and more importantly the involvement of people in a “Significant” way enables the achievement of many long term benefits and outcomes that are of significant importance to people and their health:

1. Involvement leads to a sense of ownership of the project
2. Being listened to and respected as valued members of the broader community rather than as passive ‘recipients’
3. Skill development
4. Familiarisation with project development and management principals
5. Confidence
6. Self worth
7. Business development

CONTEXT

The context into which we have been given an opportunity to work includes the following items reflected upon in a general overview:

- a. Rapidly increasing population with the under 25 cohort significantly higher than the over 50 cohort and a serious planning issue for the future in terms of services and physical infrastructure in regional and remote areas.
- b. Over time there has been a diminishing standard and condition of dwelling stock
- c. Physical Health status of population different to overall Australian population
- d. Education and economic status of population different to overall Australian population
- e. High occupancy and overcrowding of existing housing stock
- f. Changing housing management and maintenance systems
- g. Low function rating of housing hardware
- h. A need for infrastructure extensions and upgrading
- i. Opportunities as part of SIHIP objectives “to bring in line with other regional towns etc”
- j. Remoteness – overall community descriptions, tropical, coastal etc.
- k. Cross cultural protocols
- l. Common myths and prejudices regarding housing in remote areas

From previous work by our firm it is clear that many of the myths and widely held views about indigenous housing are incorrect and misplaced.

For example through the auditing of over 2,000 houses over the past 10 years it is confirmed that the failure of housing is **not** primarily due to damage by residents:

- ☐ >20% is as a result of Faulty Workmanship, poor application of products and poor construction
- ☐ >69% is as a result of routing wear and tear
- ☐ around 10% is as a result of damage but we are not in a position to determine reason or cause – accidental, deliberate or associated with some other activity.

Other observed failures of housing can be directly attributed to the following issues:

- ☒ Inadequacies in Design and Detailing
- ☒ Product and hardware selection not being adequate to deal with the use patterns and life style profiles of residents
- ☒ Poor construction and supervision
- ☒ Inadequate Repairs and Maintenance
- ☒ Harsh Environmental conditions – Climate and exposure
- ☒ High Occupancy levels and lack of support services

Therefore an integrated program that aims to achieve a diverse range of objectives to a high level of satisfaction and deals with these issues through a collaborative multi-disciplinary team cognisant of the array of issues and parameters, means, for the first time in a long time, there is a chance to make a difference.

PROCESS

It was critical that the project be planned around the achievement of the objectives and understandings of what was required in order to maximise the outcomes. A summary of the phases of the process is contained below:

- a. The team in collaboration with the client established a community engagement or “embracing” process to practically integrate people in all phases of development.
 - i. Client established a “Reference Group” [RG] as a quasi-representative body in each project location
 - ii. Initial project explanations to RG’s – objectives, opportunities and constraints
 - iii. Site investigations and discussions around cultural precepts, heritage protection and landscape with RG’s AND wider members of the population in each location
 - iv. Planning concepts developed with RG’s and discussed in formal and informal gatherings around the community.
 - v. Discussions around Housing principles and the key design outcomes given priority to achieve solutions within the program parameters set by the client.
 - vi. Ongoing monitoring of development through RG’s

- b. Background research and information concerning the location and context into which the project was to be delivered – for example previous studies and projects
- c. Interactive conversations and discussions around what is important and what works and what doesn't.
- d. Excursions into existing houses and areas to experience, feel and talk about what works and what doesn't – House, planning, siting, yard development etc.
- e. Interactive design sessions in which principals, priorities, details, layout and products were discussed
- f. Use of 1:50 models, large plans and coloured posters of plans and site development options
- g. Drawings and Photographs showing products and fitout options and ideas.
- h. Walk through new places and questioning whether the product actually achieved the objectives

This methodology has worked on many projects and together with the Alliance team we embarked on this approach. It has again proven to work in establishing relationships that are not solely based on project work but involve relationships at a personal level embodying respect, value of all contributions, trust, openness, reflection and review.

Involving people in the process enabled the team to meet people both formally and informally on a regular basis and share ideas, information and issues that could then be developed in readiness for the next interactive session. The process is much more than receiving information however it is an interactive process that involves, sharing, questioning, challenging and being open and honest at all times. Some of the general principles that came from the early engagement work reinforced and were consistent with the overall SIHIP objectives and are summarised below. The planning of subdivisions and housing need to be:

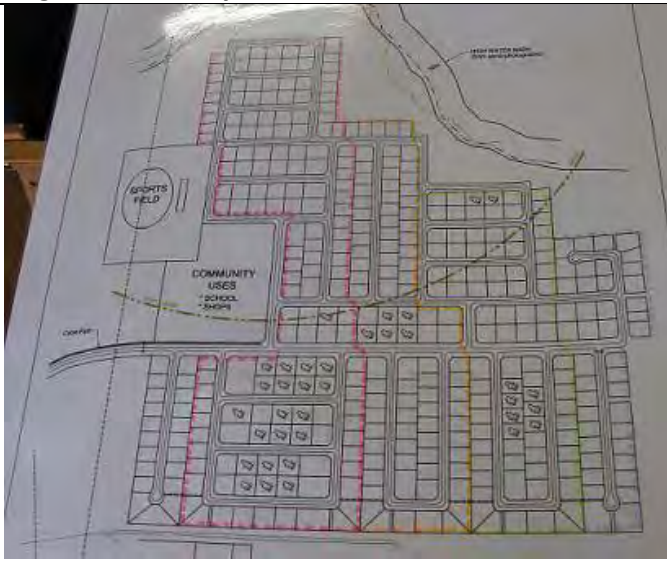
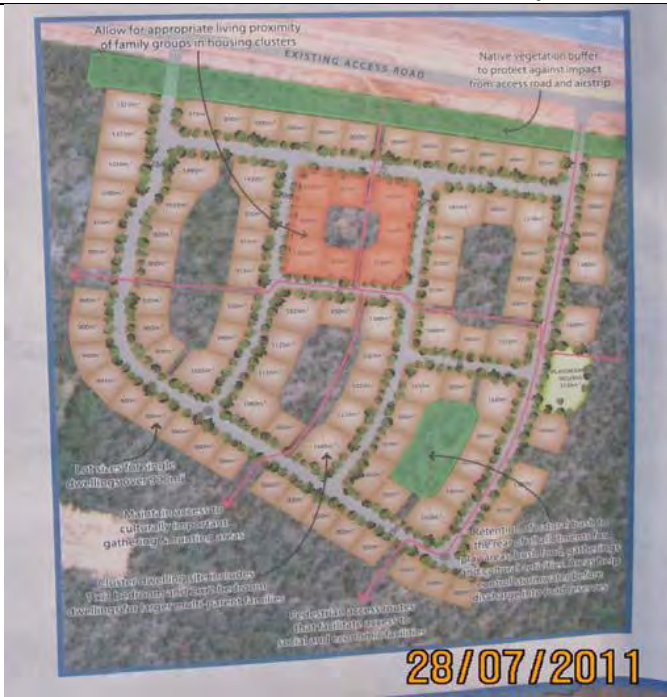
- a. Strong
- b. Culturally appropriate
- c. Safe and Secure
- d. Easy to build and maintain
- e. Sustainable - Last a long time
- f. Sensitive to the importance of natural environment
- g. Sensitive to the protection of heritage
- h. Supportive of local employment and especially of young people in all parts of the project
- i. Manageable
- j. Support local business and organisations as much as possible
- k. Cope with the increasing incidence of Disability
- l. Flexible for future extension

All these have impacted on the development of concepts and the production of final designs for both Subdivisions and Housing.

Examples of the Subdivisions and Housing and their specific features dealing with these key feedback items are detailed below.

PLANNING OF SUBDIVISIONS

The following table shows an example of what was originally proposed [by others] for one subdivision prior to our work and what was eventually developed and approved. At the end there is an aerial photograph of the new development well underway.

Original Scheme by others	Notes
	This scheme proposed a grid solution to the future housing lot needs of the community. Comments from local people included: 1. Not enough open space 2. "Too much cramped up" 3. Too close to coast, food sources and fishing grounds 4. Distance to services 5. No cultural gathering spaces 6. "is there another way?" This last question prompted the team to review the key outputs of the scheme and propose an alternative that achieved a similar number of lots but also increased local acceptance
Proposed Scheme	
	From the engagement process the questions above as well as many other needs and requirements were taken on board along with the statutory, service agency and program requirements and an alternative was produced. Some of the features are: A range of site sizes, format and shapes – to cater for diversity in the type, size and layout of housing. This enables the Housing Management agency to allocate houses to those most suitable to the house type available. Single house lots, Duplex sites [individually serviced] an cluster housing lots [3 dwellings on a larger area to cater for multi-family households The open spaces behind the houses offer flexible space for safe recreation, and other activities – cultural, social and economic. This scheme went through several iterations with all stakeholders before a final scheme was documented and implemented
Detail of a Family Group Cluster	Notes



The mix of single dwelling sites, Duplexes, and clusters enabled this proposed alternative scheme to offer the same number [in fact slightly more] of building sites as the original grid proposal.

One of the issues that arose through the engagement was that large multi-family households of up to 20 people of various ages often lived together in a 3 bedroom house. These households desired to retain a group living arrangement but able to better control what takes place in their own dwelling.

This shows a smaller section of the subdivision. There are a number of group clusters which enables larger extended families to live around a common area and offer support and participate in group activities. This is not mandatory and the open space may only be used for recreation purposes but there is the potential for the Housing management agency to allocate housing in accord with social and cultural priorities.

Within this group there are 2 cluster sites to accommodate three single dwellings [1 x 3 Bedroom and 2 x 2 Bedroom] and a duplex lot to accommodate semi-detached 2 x 2 bedroom dwellings



This aerial shows the new subdivision under construction with many new houses also under construction.

The retention of trees in the areas behind the houses is obvious and there have been many comments about how the trees have been retained and NOT knocked down.

This site is bound by the airstrip, Cultural restricted areas below the site, major infrastructure to the west and expansion areas to the east [right].

The siting of houses is based on access to the green open spaces, cooling breezes, sun protection, privacy between dwellings, and future development opportunities.

There have been comments about the siting of houses [Which way do they face, the central park areas or the street?]. The house designs mean that the entry can be either of the two or three main doors that are provided in each 3 Bedroom house. The important outcome is that residents can access the central open areas away from the main roads easily and it can become a major focus of the family group clusters. This is especially important for ceremonies and cultural

activities. Community residents have said that they did not believe that they would get their wishes incorporated into the final work that is being delivered but are now convinced and satisfied. The fact that people doubted that their wishes would be delivered is an indictment about previous engagement and interaction between decision makers and community people.

DEVELOPMENT OF HOUSING

Similarly in the development of housing, community representatives expressed strong views about many issues, items and design features that worked and didn't work in current houses and what should be considered in the new houses. This was achieved within the parameters of the project and cognisant of the views that "this is a Social Housing program and therefore we don't want people designing their own homes". Far from it BUT people have had a say about what is important for future occupancy of the houses and what isn't. Many of these have been incorporated into the designs albeit within a tight framework of parameters and cost controls.

The following table provides an overview of how the design work has incorporated many of the priority requirements of agencies as well as the residents who are going to live in the places.

Breezeway House Design [1 of 7 Designs]	Notes
 FLOOR PLAN	Two separate habitable areas to cater for different types of occupancy Two separated bathrooms Level throughout the house for disability movement in house. Wide passageways and 900 wide doorways for disability access. One bathroom and bedroom compliant for disabled occupancy Stainless Steel Kitchen fitout Louvre windows with security measures. Lockable storage cupboard in bedrooms. Bench in bedrooms that could double as a study desk. Trench drain across bathroom doors as a fail-safe against loose water from wet areas. High levels of insulation under roof and on ceiling with wide eaves to protect windows and walls from direct sun and heat.

CONCLUSION

The project parameters are tight, requiring many disparate needs and requirements to be prioritised in order to achieve “workable” outcomes. This therefore involves compromises the consideration of which included local people as well as the project stakeholders [as detailed in the Engagement Strategy]. The need for compromise led to the delivery of a set of solutions that reflect the issues, needs and many requirements in some sort of balance. Whenever there are compromises there will of course be detractors. The feedback so far, however, has been positive and encouraging. This will continue to be monitored as the project proceeds and later will be reviewed internally as part of a Post Occupancy Evaluation process; so the conclusion of the journey is yet to be documented.

Nevertheless community involvement has produced outcomes particularly attuned to the needs of people while still achieving the objectives of the program and fitting within the parameters proscribed by the Brief. This has been a successful program in many ways and has delivered in many of the objectives in a way that has not been achieved previously. It warrants support.

In no small part the result would not have been possible without the direct involvement of local people as PARTICIPANTS IN THE PROJECT rather than being **JUST** RECIPIENTS!

Some of the benefits, besides people achieving improved subdivisions and housing, and the direct impact that can have on health, has been demonstrated in the reaction of people when they visit the houses and new areas at various stages of completion. It is clear that many local requirements have been met and the process of getting to that situation has been appreciated. Some of the success has also been demonstrated in the following observations:

1. **Community members are now advocates for the project**
2. **There is a sense of optimism and ownership reappearing**
3. **There is improved access to the 9 Healthy Living Practices [Healthabitat ©] thereby increasing potential to sustain family health.**
4. **Socio-economic development opportunities have been facilitated by the work**
5. **Cultural precepts have been integrated into the planning of new areas and the design of new houses with positive responses**

According to WHO these sorts of results are indicators that there is the potential for the various locations in which we work being considered as *Healthy Communities*.

We conclude that because the development process and broad design outcomes involved local people at a participant level embodying a commitment to the four aspects of health, which has led to positive feedback from a wide range of interested parties and stakeholders including the people involved, demonstrates that there have been some broad sustainability and health benefits. The holistic engagement and implementation strategy involving a committed Alliance team working WITH local people has been central to the success of the work to date,

We pose the rhetorical question “what might have happened if the Alliance had not started this particular journey?” or in other words “what is the opportunity cost of not having a comprehensive engagement process for planning a physical environment that promotes health?”

Time to Talk about Canberra 2030 as a Healthy City

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Paper presented at the
4th Healthy Cities: Making Cities Liveable Conference, Noosa (QLD), 27-29 July 2011

Time to Talk about Canberra 2030 as a healthy city

Abstract

The ACT Chief Minister's Department last year engaged the Canberra community in a conversation about how our national capital can gain through managing long term change, rather than struggling reactively to the impacts of climate change. The Time to Talk Canberra 2030 conversations gave an emerging picture of the Canberra the community wants for a healthy future.

Maintaining Canberra's air quality emerged along with lowering Canberra's carbon emissions, reducing consumption and generally being more environmentally responsible, as a universally shared goal. A majority supported limiting sprawl and the need to work out how to use scarce land more effectively.

A small cross agency government team worked with Elton Consulting and together designed and delivered a broad, deep and intensive process of consultation.

Time to Talk Canberra 2030 reached across various sectors of the community. Its focus was to identify what the community valued and provide a common understanding for strategic policy changes responding to population and climate change.

Canberra is the Australian city with the largest houses and the city where individuals have the biggest carbon footprint. Hotter summers, neighbourhoods designed around the car with urban centres and workplaces connected by freeways leads to high energy consumption. Reliance on cars, coupled with an older population and an increasing number of more vulnerable people, mean challenges for retaining good mobility, health and social inclusion.

Using a range of engagement techniques from Twitter, online forums, public meetings, surveys and web discussion to focus groups, and by inviting people to give their views, more than 20,000 people were reached. Deep connection and input on the issues and challenges that face Canberra was achieved.

Engagement is a critical factor in promoting change to more healthy cities. As change will happen if the community understands the choices it must make and potential benefits.

Jane Jose and Gay Williamson will present the project and how the community were engaged to consider the need for climate change adaptation to keep the healthy quality of life they value, and the importance of the process of talking and listening in bringing about change.

In discussing the project they will raise the importance of community engagement to the health of the city itself and to keeping the body and soul of the city together.

Key words: Canberra, engagement, healthy cities, Time to Talk, Australia.

Introduction

“If you think about it the best things in life are free – laughter, dancing, oxygen, orgasms and games.”

Kathy Lette London based Australian writer, Wish Magazine 2011

What she forgot to add to the list is health. But perhaps that’s because it isn’t always free.

Certainly illness has a cost, both personal and financial. Increasingly our lifestyle and where and how we live, is likely to link to good or bad health. As urban development continues to expand our cities are suffering from heat stress, congested ‘arteries’ and obesity and individuals, communities and governments are having to foot the bill.

So how can we put health and being healthy back on the ‘free’; list for people and our cities?

First let us consider what good health really means? The Macquarie Dictionary Federation Edition definition is ‘Health: Noun: the general condition of the body or mind with reference to soundness and vigour’; and ‘Healthy: Adjective (1 Possessing or enjoying health; *healthy body or mind* ;)’ The focus is on both body and mind.

When we talk about a health, particularly in relation to city life and climate change, we think about the potential impact of climate change on bodies and on our physical health, and particularly the impact on the frail, the very young and aged.

As city makers and policy shapers our premise must be to create healthy cities, places that nurture body and soul. To have healthy cities we need places where people have healthy minds as well as healthy bodies.

This is a big call at a time when the daily news is full of not just the threats, but the reality of the global challenges of climate change, population growth, and food and energy security. Just in the first half of 2011 we have witnessed devastation by flooding in Queensland and by bushfire in Victoria. There have been the earthquakes shattering life in Christchurch and the tsunamis destroying Japanese cities and communities. While these events are not unfamiliar to these areas what has changed is the number of people living in these places. When Brisbane flooded last century the city was a much smaller city. The other big change is the speed by which we learn about these disasters. We watched the Japanese Tsunami while it was still hitting the coastline.

The effects of these global challenges manifest themselves at a regional and local scale. Because we are now drawn into witnessing these effects, we are acutely aware of our vulnerability and the real potential for our health and wellbeing to be affected.

Communities are beginning to understand that they must take action to manage these effects. To build more resilient communities and cities, we must encourage people to exercise their citizenship and to understand the nature of the places where they live.

Concern over climate change is real and many in our communities hold deep fears about their future and that of future generations. Most of us have lived through decades where the quality of air, water and city life has been more monitored and more carefully calibrated to maintain and improve its quality than in other generations. But all cities and citizens are facing growth and change. Talking together about the changes happening in our society and cities is a critical way to maintaining healthy minds and without a healthy mind; it is unlikely we'll maintain healthy bodies for very long.

The Importance of Sharing the Problem

For Canberra or any city to be a healthy city by 2030, we need our communities to be involved in shaping the changes and adaptations that can lead to healthy places and healthy people. The very process of the community engaging with each other and with government enables a 'therapeutic' sharing of the problem. The development of greater understanding about the real issues and threats rather than those just perceived is a healthy process. The process of talking and listening and being listened to offers a road to more peaceful minds.

Dialogue and conversation, learning and information exchange to enable people to work things out is needed now more than ever, as individuals and families respond in their own ways to the rapid social and urban change in our cities. The kind of family therapy that many people seek from the

family doctor or a friendly counsellor or psychotherapist is what's needed now for the 'community family' to work out how to get the cities we want. We need to talk together about the problems we face in urban life, how we feel, how we want to feel and how we hope the future can be shaped. Governments don't have all the answers and need community leaders and ordinary citizens to guide them. Often ideas come from the community in a common sense way that has become elusive in the modern day maze of bureaucratic decision-making.

We live in challenging times for governments and their communities. Last year the ACT Government that governs Australia's national capital, Canberra, a city of just over 350,000 people and projected to grow by around 100,000 by 2030, was faced with the need for a broad set of policy changes to become a more sustainable city and community. Canberra, Australia's most planned of cities, has the largest houses of all Australian cities, and leads Australian cities as the city where individuals have the largest carbon footprint of all. Hot summers, cold winters, big houses, freeway connected suburbs and workplaces away from home, all add up to high energy consumption and production of greenhouse gases.

From the first public forums and online forums the value the community places on Canberra as a bush capital surrounded by greenery and blessed with clear and clean mountain air, came through as a value to be maintained.

Talking and understanding the need for change

The recent Australian Government Discussion Paper - *Our Cities the Challenge of Change* - on the shape of Australian cities is pretty direct about what we need if our cities are to be in healthy shape.

"We need more compact cities, more choice in housing, more social housing, more affordable housing, higher rates of public transport use – so more access to good public transport and alternative transport such as walking and cycling; reduced water consumption; efficient use of energy by households and business and increased recycling of waste."

The challenge is how to get the development sector and the community to participate actively in engagement. It will only happen if the community understands the issues and the choices it can make. The community can only understand if the government and media help in an open conversation about what we can all do together to shape a healthy future.

During the Time to Talk Canberra 2030 consultations we used a whole range of techniques of talking with the community, from twitter to focus groups and by inviting people to give their views, in ways they chose, we reached more than 30,000 people and captured their views about what kind of place they want their city to be by 2030. In designing the way to invite and enable people to join in the conversation we used social media, online forums, and a series of structured workshops, public meetings, surveys and web discussion supported by discussion papers. We invited people into the

public conversation by using TV advertising using local people to talk about what concerned them and to invite others to join in. We even used the prize of an iPad to encourage people to send their ideas on line! The Canberra Times and ABC local Radio also supported Time to Talk with opinion led discussion.

Time to Talk Canberra 2030 proved to be effective in reaching a really broad cross section of the Canberra community to talk about becoming a more sustainable city and healthy community. Many of the changes called for in the Australian Government discussion paper line up nicely with what the Canberra community told us they want. But that was only after sharing information about the challenges facing government. We explained the challenges facing government are really challenges facing them. We got deep connection and input on the issues- particularly in workshopping ways that Canberrans would need to adapt to climate change. It was clear from the beginning that the community understands Governments alone won't solve the problems of our cities. Rather it will be, to quote from a Canberra citizen "more partnerships- government letting go of some of the control and let business and community begin to innovate". Statements like this were typical: "We need change managers, a sustainable vision for Canberra and the region and more expenditure on big catalyst projects that aim for maximum liveability, maximum affordability, maximum ecological preservation and enhancement that are autonomous and self-sufficient."

Community support for a healthy 'body'

If the community is the soul of the city, the city form is the body. Both need to be healthy.

The problem for planners and for governments seeking to adapt to climate change is that it is the community who need to buy in to change. Rethinking and rebuilding in Brisbane and the post flood towns of Far North Queensland could shine a spotlight on a broader conversation about the need for less sprawl and more compact cities.

Adapting how we live in our cities and changing our neighbourhoods to be healthy places, is ultimately about making good decisions about change. Getting the thinking right and making good, and importantly, fair decisions about how everyone can live well in our cities, will be a key to our happiness and ability to thrive on and not just survive city life.

The Canberra conversation made it clear we aren't all going to opt for apartment living, but with an aging population and more people living in single households there is demand in Canberra for more housing choice, including more compact apartments in existing residential suburbs, where people have enjoyed living and want to remain living with the social connections in a place they know as home. Being able to talk about what is important to our local area is important to the health of the community and to shaping the form of our cities.

We undertook a representative random telephone survey of 1000 adult residents and gained 28% support for a more compact city and 59% support for a mix of development across Canberra and on the fringe. Only a small minority of 13% saw a more sprawling city as a desirable future for Canberra. Provided with a list of four urban planning challenges facing Canberra and asked to pick the single most important of these there, was an equal split at 33% for affordability and choice of housing with more public transport. The remaining two challenges, reducing urban sprawl and changing behaviour to reduce greenhouse gases, scored 17% and 16% respectively. These findings were re-enforced in a voluntary online survey answered by more than 1400 people with 280 young people showing a strong preference for a more compact city.

Planning and developing the healthy ‘body’

The six key findings of this broad and deep conversation have now become the objectives in the renewed strategic plan for the ACT. A Case for Change - The Draft ACT Planning Strategy, is soon to be released for public discussion.

These objectives, from the community, are critical to this strategy and the key to adapting Canberra and its citizens to a more sustainable and healthy future.

1. Manage and plan for the needs of Canberra’s growing population and changing demographic structure.
2. Conserve our use of natural resources, energy, water and land and be more environmentally responsible.
3. Provide greater housing diversity in a variety of locations, making good quality, sustainable housing more affordable.
4. Improve the choice of convenient, sustainable transport for everyone and integrating decisions on transport with employment locations, residential renewal and new urban development.
5. Establish in key locations, urban developments that provide great public spaces and contribute to the amenity of Canberra.
6. Strengthen connections and collaboration with the region and enhance the prosperity of the city and the “country”.

This draft planning strategy is different. It accepts that the metropolitan structure of Canberra – that is its many town centres, linked by inter-town arterials and the separation of the urban districts

by the landscape – is not really going to change. In fact this structure provides an excellent skeleton for reshaping the urban form and creating a well-honed, ‘fit’ city. The draft planning strategy sets out principles and strategies that provide a focus on the opportunities that change can bring to create more resilient communities and more options for sustainable lifestyles.

Canberra will grow and it must provide for the needs of all sections of a larger and more diverse society. In the next 10 years many of the older people in the community will retire and they will need younger people to step up, move in and take over. They will be the future.

Room has to be made in the existing suburbs so there is greater social equity – this allows more people to be close to services and share in the good places to live. More people staying and moving into existing suburbs can increase the viability of shopping centres and create a livelier lifestyle. Fostering a diverse demographic in each of the districts and neighbourhoods means that schools transport and services planning are relatively stable. These services can be dispersed rather than centralised: they can become the centre of community life – children can easily and safely walk to school.

Lowering Canberra’s carbon emissions, reducing consumption and generally being more environmentally responsible is important to Canberrans. This is the biggest challenge for a city that is designed around the car, which covers an area equal in size to that of greater London (yet houses only 350,000), whose residents enjoy the largest average house size in Australia and have one of the world’s largest ecological footprints. To be more environmentally responsible the city has to limit its sprawl and use land more effectively. It must do this to retain the quality of Canberra’s environment and to respect what is important to Canberrans, the city’s relationship to its landscape and bush setting. It must do this to reduce reliance on the car for commuting and make public transport more effective.

The draft strategy puts forward a series of principles intended to guide planning decisions at every scale and level. These principles respond to the challenges:

- Create a diverse urban environment to support a range of lifestyles and social needs. Diversity is critical to a more resilient city
- Design for community resilience and the lowering of consumption. The city must be designed for everyone. Our public spaces, streets, infrastructure and buildings must be designed to mitigate extreme weather conditions and ensure good accessibility so everyone has the chance to live more sustainably.
- Provide choice in safe and convenient modes of travel. Giving people choice in travel modes allows people to better manage not just their transport needs but their cost of living.

- Promote connections, continuity and resilience in the natural systems. Canberra enjoys a special social and cultural affinity with the natural environment, protecting the biodiversity and enhancing habitats will ensure future generations enjoy this affinity.
- Value the land for its best most sustainable use for now and the future

Of concern for Canberrans is the quality and local impact of change and new development. There is a general desire for green building and urban design that makes their town centres more like walkable urban villages but there is nervousness and scepticism about high rise and intensive development. People want to know how sustainable is this kind of development and when does it stop being good for mental and physical health?

Being able to talk about what's important to individuals as part of a community, to be heard and listened to, adds to collective community health and wellbeing.

The need to keep 'body' and 'soul' together

There is no doubt that urban planners and city makers know how our cities need to change. They talk to each other about it all the time. We talk about the need for more compact cities using fewer resources, doing more with the land we are already using and reserving land to grow food. The objectives and principles outlined in the draft ACT Planning strategy will help to shape a more healthy city, but are we talking enough about how change will keep the 'soul' of our city healthy? In making change we must build in meaning. We must ensure our cities respond to the essence of the place – the environment - and to our deep social values and needs for shelter, wellbeing and a sense of belonging.

Canberra is actually a city well placed to throw off the criticism that it is a city with no 'soul'. If, in responding to the global challenges of climate change, population growth, energy and food security, it looks to its strengths and the region it can become a truly sustainable, democratic city - it will be a city and community healthy in body and soul.

Building on Griffin's Legacy

American architect Walter Burley Griffin urban designer of Canberra, understood the importance of making decisions and taking steps that had meaning. His layout for Canberra was the embodiment of an ideal democratic city where people could easily understand and exercise their citizenship. His plan was based on those timeless social needs and values. They were not swayed by fashion or consumerism. There was in Griffin's plan the opportunity for successive generations to add layers to the city, making it richer but holding to the egalitarian values at its foundation.

If the effects of climate change are manifest in the region then we must look to the region for solutions. The physical form of our city must tell us about the local environment, the local resources,

with the latest global technologies being used to enhance these and not to override them. This is the magic and spirit of older cities and towns. There is an inherent understanding of how they relate to the land.

It is important that as we make decisions and take actions on change for Canberra we act, as Griffin did, to ensure we do not close off opportunities for the future. We must set out a framework that allows people and generations to understand their place in time and space, to take discrete appropriation of the city and exercise their responsibility as citizens.

This means we must create a city that will enable continuing meaningful conversations and connections to happen.

Continuing to foster meaningful conversation

If the Federal Government really wants to create healthy and prosperous cities for our long term prosperity as a nation, they'll need to help pay for the change. It is beyond the purses of even the capital city local governments. But even more important than funding is willingness to change and that means cutting through the information overload and engaging in a conversation about change.

American writer Gertrude Stein said: "Everybody gets so much information all day long that they lose their common sense."

Engaging with communities means empowering communities to choose change that will allow healthy lifestyles in healthy cities. Writer and libertine, Gertrude Stein was ahead of her time in many ways. As we face change and uncertain, even threatening times, with more extreme weather events, more people living more closely together in cities, more mobility in jobs and families, sifting through the information will be central to working out together how we are going to live well.

We need not just to survive, rather to thrive as healthy citizens, in an urban life very different to the suburban model of last century. We live in threatening times, but humans have an incredible capacity for problem solving. With our backs against the wall compassion, inventiveness, discovery, hope and courage – our best human traits are called on. History teaches us that our most difficult challenges are rarely solved alone. Solutions are rarely found in isolation.

Florey's discovery of penicillin happened with collaboration. Scientists define our humanness in many ways. But fundamentally it is language and reason that separates us from animals. Discourse about how we are going to live in cities and how we must change how we live and perhaps how our cities are shaped will be vital for the pursuit of human health and happiness for coming generations.

It's much easier to talk than it used to be. Now we don't even need to leave home. The internet blog has connected us and if it's not the blog, or online forum, it's the mobile ring or the SMS message whirling in where-ever we are, whatever we are doing.

A new kind of democracy is at work in many of our cities. Online social networks, frustrated with the political processes, are active and growing. They post their own views about urban development proposals that are not easy for developers and government to ignore.

The need for human contact

The strange connect and disconnect of this is balanced by a need for human contact. The last decade has seen the revival of the local cafe as meeting place for everyone. These are places with no class or age divide that give us the human connection that helps us stay happy and healthy. Libraries too have become important hubs for gathering. Both have become places we gather to find out what's happening in our local patch or to meet for talks or just to be quietly reading with someone around. Engaging with communities in newly democratic ways has got easier than it was a few decades ago. Twenty years ago, community activism relied on the meetings of resident societies. These civilized resident vigilante groups of local activists became foot-soldier armies of volunteers for causes delivering newsletters to get people talking about issues such as protecting heritage buildings and introducing kerbside waste collection for recycling!

Now we really don't need to join the local neighbourhood society, we can find out what they are up to without even going to the meeting.

Information moves rapidly through collaborative technologies. Filtered and interpreted by the opinions of others, most people now get a version of the news which is no longer straight facts, but rather, a kind of Chinese whispers of fact and gossip delivered by a chattering radio identity, on line or delivered like a dinner party conversation on live current affairs TV. The opinion columnists in the daily papers, on radio and TV with their conversational chatter about news, influence the political fortunes of the day and public opinion. The ABC's QANDA with its mix of opinion, chat, audience participation and twitter is now a news source not just analysis.

Meetings like the LA based, online TED Talks, where pioneers in every imaginable discipline present their ideas in an 18 minute grab are an extreme example of how much faith is now placed on human ideas exchange in solving problems in a often without face to face conversation. The individual thought leader has become the 21st century guru with his team of young genius troops thinking through and testing the ideas.

Ideas like those hatched at TED or at any international forum and face to face meeting of future thinkers in conversation invite the kind of collaboration communities need to stay healthy. We live in an age of ideas that have a rapid second life in a global online conversation. Engaging with

communities in a new open democratic dialogue is the path to shaping healthy communities and the healthy cities we need for our future. Inspired leaders, politicians or simply citizen activists, who want to lead change, need community support and willingness for community to share the problem. In Time to Talk Canberra 2030 the Canberra community showed a readiness to articulate ideas as engaged local citizens. They demonstrated readiness to think about not only changing local streets and neighbourhoods, but how to adapt to living in their city to ensure there is water and land, to grow food for the future and that the natural bush and open space environment, which stamps the Canberra quality of life now, remains protected as a backdrop as the city grows.

It will be through talking and listening, engagement through collaborative technologies, face to face conversation, and importantly translation into strategies, plans and finally designs, that the community can recognise as their own, that will give Canberra a healthy future.

While this paper has focussed on our journey with the people of Canberra it is a universal lesson for any community seeking to maintain or create a healthy city and its soul a community of citizens who are healthy in body and mind.

David Tacey in his book: *The Edge of the Sacred: Transformation in Australia* argues that the cure for our ecological disastrous abuse of the earth and our culturally debilitating racism is the spiritual renewal of consciousness.

For our cities to be healthy we need to ensure that body and soul are both nourished. If we accept Tacey's premise, then our cities must not only be environmentally, socially and economically sustainable but they must sustain the spirit.

A policy/program dilemma?

Supportive environments for health and wellbeing

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A policy/program dilemma? Supportive environments for health and wellbeing

Abstract

Planning approaches around environments for health is not a new concept, so why then is it not broadly reflected and a common understanding across the local, state and federal government policy areas? We live in an increasingly obesogenic nation, due to limited opportunities for physical activity in daily routines. Australia is getting fatter faster than any other country in the OECD. Planning (both strategic and statutory) makes a significant contribution to the creation of obesogenic environments by allowing design and implementation of plans that create barriers to physical activity in the built environment.

What can be done? What works and what doesn't And what is the role of policy versus programs? How can real change be affected if funding programs last one, two or three years at best?

Supportive environments for health offer people protection from threats to health, and enable people to expand their capabilities and develop self reliance in health. They encompass where people live, their local community, their home, where they work and play, including people's access to resources for health and wellbeing, and opportunities for empowerment. Recent events provide a timely nexus for change: with the establishment of a federal Preventative Health Agency, a forthcoming national urban policy, a COAG reform agenda for cities, and a plethora of other calls for re-envisioning cities for climate resilience, food security and consumption / pollution control. Amongst this flux of issues requiring wholesale strategic planning for sustainability, environments for health needs to be revisited. Public health professionals and all built environment professionals have a duty of care to make supportive environments for health and wellbeing a primary priority.

Keywords

Supportive environments for health, WHO Healthy Cities, governance, collaboration.

Our societies are complex and interrelated. Health cannot be separated from other goals. The inextricable links between people and their environment constitutes the basis for a socio-ecological approach to health. The overall guiding principle for the world, nations, regions and communities alike, is the need to encourage reciprocal maintenance - to

take care of each other, our communities and our natural environment. The conservation of natural resources throughout the world should be emphasised as a global responsibility (World Health Organisation 1986).

Introduction

Creating healthy living and working conditions are central goals in public health. The link between health and the physical environment has long been recognised, but has been inadequately addressed. The goal of creating supportive environments for health has far-reaching implications for both individuals and institutions. Building alliances – across sectors, disciplines, professions and organisations – is one of the key elements of health promotion and is a central political concern. Yet much remains to be done in addressing upstream determinants of health if Australia is to see reversal of the current chronic disease epidemic.

To date, a comprehensive approach to environments for health has not been adopted in Australia. However recent developments at a federal level indicate that with pressure from the appropriate sectors, real change may be possible, if silos can be dissolved and collaborations built.

The focus for this paper, creating supportive environments for health and wellbeing, highlights the policy and governance issues that have helped or hindered uptake of an environment – health framework. It draws on experience of the WHO Healthy Cities movement.

Health Promotion and the WHO Healthy Cities genesis

Health promotion is the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social wellbeing, an individual or group must be able to identify and to realise aspirations, to satisfy needs, and to change or cope with the environment. Health is a positive concept emphasising social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy lifestyles to wellbeing (WHO 2010).

The first International Conference on Health Promotion took place in Ottawa, Canada in 1986. The conference was a response to growing expectations for a new public health movement around the world. Out of this conference came the Ottawa Charter for Health Promotion, a framework for action to achieve 'Health For All by the Year 2000' and beyond.

The Ottawa Charter identified three approaches for health promotion:

- advocacy for health to create the essential conditions for health,

- enabling people to take control of the determinants of health in order to achieve their fullest potential, and
- mediating between different interests in society in the pursuit of health (World Health Organisation 1986).

The Charter outlined five areas for health promotion action under what became known as 'the new public health':

- build healthy public policy;
- create supportive environments;
- strengthen community action;
- develop personal skills; and
- reorient health services.

Also in 1986, The World Health Organisation, Regional Office for Europe introduced the Healthy Cities project to provide a vehicle for testing the application of Health for All (HFA) principles at the local level. In 1986 eleven cities were selected to demonstrate that new approaches to public health grounded in HFA would work in practice.

The global Healthy Cities movement has grown from this beginning. Healthy Cities is a long-term development project that seeks to place health at the local level. Such initiatives are characterised by a broad-based, intersectoral political commitment to health and wellbeing in its broadest ecological sense, and a commitment to innovation. Democratic community participation is an essential component, as is the resultant healthy public policy.

The Healthy Cities movement is based on the recognition that city and urban environments affect citizen's health and that healthy municipal public policy is needed to affect change. Since the concept was embraced by WHO in 1986, the movement has produced more than 10,000 initiatives worldwide. The concept is evolving to encompass healthy villages and municipalities, and has a close relationship to municipal public health planning.

Why should supportive environments for health be a priority?

A complex gamut of issues connect environments and health, including food security production and access, re-envisioning cities for climate resilience and adaptation, retrofitting cities for mental and physical health and catering for an ever growing population (by 2050 Australia will have 2 major cities of 7 million people) (Turnbull 2011). In this context, the strength of a intersectoral paradigm

(and tool) like Healthy Cities demonstrates ever increasing pertinence to tackle complex, interwoven policy issues.

The burden of chronic disease, and particularly obesity, adds further complexity and represents a considerable economic and social crisis. The increase in overweight and obesity rates in recent decades is a major public health concern in many countries, including Australia. Before 1980, obesity rates were generally well below 10%, but have doubled or tripled in many countries since then (Monash Obesity and Diabetes Institute 2011).

Quick facts (Monash Obesity and Diabetes Institute 2011):

1. Overweight and obesity affects 17 million Australians;
2. If weight gain continues at current levels, by 2020, 80% of all Australian adults and a third of all children will be overweight or obese;
3. Overweight and obesity prevalence is higher in Aboriginal and Torres Strait Islander people, women in lower socioeconomic groups and women living in rural and remote areas;
4. Obesity has overtaken smoking as the leading cause of premature death and illness in Australia; and
5. Obesity has become the single biggest threat to public health in Australia.

Furthermore, as Lang (2008) suggests, only 1.8% of the total Federal health care budget is allocated preventative health measures, whilst 50% of that budget is spent treating preventable, chronic diseases. This represents a massive policy gap that appears to be at odds with the gravity of evidence. A framework is required to address the totality of environments for health at a federal level.

In light of very recent Federal initiatives, including the creation of the Preventative Health Agency, a newly launched National Urban Policy, forthcoming Australian Urban Design Protocol and an overarching COAG reform agenda for cities, there is a real opportunity to link environments and health in both psyches and policy across government and civil society.

Marrying environments and health

What is meant by supportive environments for health?

- Supportive environments offer people protection from the factors that can threaten good health.

- Supportive environments foster participation in health and enable people to expand their capabilities and health self-reliance.
- Supportive environments are critical for a person-centred approach to health.

This approach is drastically different to the prolific focus on environmental issues *affecting* health, most of which usually have an anthropogenic source. For example, much of the literature on environmental effects on health is limited to 'end of pipeline', siloed discussions around issues including, but not limited to:

- outdoor air pollution;
- indoor air pollution;
- industrial chemicals;
- endocrine disruptors;
- potable water;
- food safety; and
- noise pollution.

Indeed all of these issues are of critical import to human physical health however represent a reductionist perspective and do not take into account the totality of environments for health. Increasingly, we realise there are social, cultural, economic and political aspects of the way the environment affects our health.

WHO HEALTHY CITIES: Providing a context for Environments to Health

WHO defines a Healthy City as one that is continually developing those public policies and creating those physical and social environments which enable its people to mutually support each other in carrying out all functions of life and achieving their full potential (World Health Organisation 1988).

This philosophy seeks to enhance the holistic wellbeing of people who live and work in cities, based on four criteria: (a) explicit political commitment at the highest levels to the principles and strategies of a Healthy Cities project; (b) establishment of new organisational structures to manage change; (c) commitment to developing a shared vision for the city, with a healthy plan and work on specific themes; and (d) investment in formal and informal networking and cooperation. The concept is founded on the moral and political beliefs that inequalities in social conditions (and therefore health) are unjustified and that their reduction should be an overriding public health objective.

Importantly, while the entry point of the Healthy Cities approach is health, its underlying rationale has always been based on a model of good urban governance, which includes broad political

commitment, intersectoral planning, citywide partnerships, community participation, and monitoring and evaluation.

The WHO HEALTHY CITY: 6 Characteristics

Healthy Cities projects have six characteristics in common.

1. Commitment to health

They are based upon a commitment to health. They affirm the holistic nature of health, recognising the interaction between its physical, mental, social and spiritual dimensions. Promotion of health and prevention of disease are their priorities. They assume that health can be created through the cooperative efforts of individuals and groups in the city.

2. Political decision-making

They require political decision-making for public health. Housing, environment, education, social service and other programmes of city government have a major effect on the state of health in cities. Healthy Cities projects strengthen the contribution of such programmes to health by influencing the political decisions of city council.

3. Intersectoral action

They generate intersectoral action. The term 'intersectoral action' describes the process through which organisations working outside the health sector change their activities so that they contribute more to health. Urban planning which supports physical fitness by providing ample green space for recreation in the city is an example of intersectoral action. Healthy Cities projects create organisational mechanisms through which city departments and other bodies come together to negotiate their contribution to such action.

4. Community participation

They emphasise community participation. People participate in health through their lifestyle choices, their use of health services, their views on health issues and their work in community groups. Healthy Cities projects promote more active roles for people in all of these areas. They provide means by which people have a direct influence on project decisions and, through the project, on the activities of city departments and other organisations.

5. Innovation

They work through processes of innovation. Promoting health and preventing disease through intersectoral action requires a constant search for new ideas and methods. The success of Healthy Cities projects depends upon their ability to create opportunities for innovation within a climate that supports change. Projects do this by spreading knowledge of innovative methods, creating incentives for innovation and recognising the achievements of those who experiment with new policies and programmes.

6. Healthy public policy

Their outcome is healthy public policy. The success of Healthy Cities projects is reflected in the degree to which policies that create settings for health are in effect throughout the city administration. Projects achieve their goals when homes, schools, workplaces and other parts of the urban environment become healthier settings in which to live. Political decisions, intersectoral action, community participation and innovation promoted through Healthy Cities projects work together to achieve healthy public policy.

Evaluations of Healthy Cities programmes

Evaluations have proven Healthy Cities successful in increasing understanding of health and environment linkages (WHO 2011) and in the creation of intersectoral partnerships to ensure a sustainable, widespread programme. The most successful Healthy Cities programmes maintain momentum from:

- the commitment of local community members;
- a clear vision;
- the ownership of policies;
- a wide array of stakeholders; and
- a process for institutionalising the programme (WHO 2011).

Each Healthy Cities project must decide for itself its short, mid and long-term needs for evaluation and equip itself with an evaluation process meeting its own needs, even if it means that it is more difficult to compare with others (O'Neill and Simard 2006). Such a negotiation process and the reaching of a consensus on evaluation among the various stakeholders will probably be as important for developing a project as the results of the evaluation itself (O'Neill and Simard 2006).

Community participation and empowerment are core principles underpinning the Healthy Cities movement. In a recent international review of Healthy Cities, one-third of cities regularly consulted

with large parts of their populations and another third undertook occasional consultations (Heritage and Dooris 2009). Nearly 80% of cities had mechanisms for community representatives to participate in decision-making; and more than two-thirds of cities had initiatives explicitly aimed at empowering local people (Heritage and Dooris 2009). Subsequent research carried out during 2005 further highlighted the centrality of public participation to the Healthy Cities movement. It found that all project cities continued to support community involvement (Heritage and Dooris 2009).

Community participation is an essential part of the process of good local governance, and empowerment remains at the heart of effective health promotion. To be meaningful, these processes must be seen as fundamental values of Healthy Cities and so must be developed as an integral part of long-term strategic development.

On the negative side, the effectiveness of Healthy Cities has largely been confined to industrialised countries, for a number of reasons (Awofeso 2003). Lack of programme permanence and other outcomes-related issues have developed with little commitment from public officials or stability of local coordinators (WHO 2011). Additionally, many studies have identified that cities, particularly in developing countries, lack the resources to develop good guidance to lead the project, via the development of health profiles and sufficient evaluation time prior to starting. While several regional and national networks exist to facilitate strategy sharing, little information has been published on country profiles and actual implementation plans outside of the WHO European Region (WHO 2011).

The information available suggests that those cities with a political will and capital base to support the approach through political change, benefit from the multiple co-benefits of community capacity-building that occurs through good governance.

Australia's response for Health for All: A Policy failure?

At the time of Health for All, Australia responded uniquely to the challenge of developing a strategy to create sustainable, supportive environments for health through its National Health Goals and Targets (Nutbeam and Harris 1995). These targets, published in 1993, included a range of targets for Healthy Environments which were developed from a 'health' perspective, but in co-operation with the different sectors of government responsible for action to achieve them. These included housing, transportation, education and employment (Nutbeam and Harris 1995).

Early responses to the publication of the targets were encouraging, but required sustained governmental support to reach fruition. Critical to success in developing and implementing the targets was recognition by government, and particularly the health sector, of the legitimacy of intersectoral action for health. Nutbeam and Harris (1995) suggested:

Negotiations to resolve potential conflicts in the priorities of different sectors should ensure that attention is focused on the common ground for practical intersectoral action to improve health. The Australian Targets Report identified a series of concrete actions required to create supportive environments for health. A willingness to account for progress in achieving the targets for Healthy Environments will be an important measure of the commitment of the Australian federal and state governments to the health and wellbeing of their citizens (Nutbeam and Harris 1995).

Nearly three decades later, the intersectoral action to create supportive environments for health has dissolved at a federal level, and supportive environments appears to be a policy failure at a national level. What indicates this?

- Preventative health expenditure in the federal budget is still only a tiny fraction of the overall health budget.
- 17 million Australians are overweight and obese.
- Obesogenic environments are commonplace: reliance private modes of transport, sedentary lifestyles, lack of walking and cycling infrastructure.
- Invisibility of active transport in federal policy (including walking, cycling, and public transport).
- Siloed operation of government departments at federal, state and territory level continues to be the major barrier to joined-up solutions between transport, health, environment and planning.
- Healthy Spaces and Places, the only national level intersectoral program to target environments for health, has no ongoing funding commitment from Federal government.
- The National Preventative Health Agency's role in relation to supportive environments does not cover intersectoral action for healthy planning approaches, but rather focuses on behavior change initiatives and outcomes.

Bridge between the silos

Effectively applying such frameworks (Health For All, Healthy Cities) in practice has been problematic. Two of the most important factors in this regard are: 1. failure to actually implement approaches that are truly 'integrated' and 'inter-sector', despite much talk to the contrary; and 2. reluctance of stakeholders to tackle the issues of governance that are critical to bringing about meaningful change and success (Tamplin 2005).

Overcoming these issues is the very basis of the Ottawa Charter, offering a bridge between silos and the paradigm through which a national policy could be built, bringing together multiple agencies and departments. In bridging the silos, the Ottawa Charter remains highly relevant, whereby focus should be directed at: 1. building healthy public policy 2. creating supportive environments for health 3. strengthening community action, and 4. developing personal skills. These are natural bridges between health promotion, environmental health and the many other public and private sector stakeholders who need to contribute to resolving environment-related public health issues (Tamplin, 2005).

If used effectively, these 'bridges' can support partnerships that develop creative and holistic approaches to solving complex public health problems that could benefit from environmental health and health promotion interventions. WHO and its partners with 'healthy settings' approaches, provide some of the best examples in this regard.

PPPs to the rescue?

Internationally, there has been in recent years a significant increase in the numbers and diversity of public-private partnerships (PPPs) in public health. This is reflected in actions such as the World Bank encouraging partnership as part of its comprehensive development framework; the WHO promoting partnerships; and non-government organisations establishing relationships with for-profit organisations. Included among the reasons for this are the increasing influence of NGOs (such as the Heart Foundation) on public health concerns, and the inability of public or private organisations to resolve complex public health problems on their own.

PPPs can combine the best of both worlds: the private sector with its resources, management skills and technology; and the public sector with its regulatory actions and protection of the public interest. This balanced approach is especially welcome in the delivery of public services which touch on every human being's basic needs.

Under the Preventative Health Taskforce, convened to inform the establishment of the Preventative Health Agency, the terms of reference stated 'support the development of inter-governmental and public-private partnerships on preventative health'. With that endorsement, the federal government would do well to consider the many public-private partnerships existing as part of WHO Healthy Cities.

For example, one model that can be used to develop the PPP market is transport / urban renewal projects, which addresses many facets of liveability (United Nations Economic Commission for Europe 2007). Under such a scheme a government releases underused assets such as real estate around a transport hub (e.g. a railway station) and allows the private sector to commercialise the area through the building of shops, offices and recreational areas. The private developer can unlock value from an underutilised asset and use it to raise revenues (United Nations Economic Commission for Europe 2007).

The government gives over the asset so that the developer becomes responsible for rebuilding and then operating and maintaining it. Such innovative deals have transformed small cities in Spain. In the United States this approach has also been used to renovate ageing railway stations in inner cities, while promoting transit-oriented development (United Nations Economic Commission for Europe 2007).

What makes these partnerships work?

Cross-sector partnerships do not happen; they are built. Constructing an effective partnership among diverse organisations is hard work (Reich 2000). Collaboration is a critical element in PPPs success: the degree to which it is achieved determines to a great extent whether the partnership works or fails. In examining the challenges of collaboration between non-profit organisations and businesses, Austin (2000) suggests that partnerships confront seven organisational challenges - or the "the seven c's of strategic collaboration". Navigating these "seven c's" is not easy.

1. Connection with purpose and people;
2. Clarity of purpose;
3. Congruency of mission, strategy and values;
4. Creation of value;
5. Communication between partners;
6. Continual learning; and

7. Commitment to partnership.

Of particular importance is the challenge of creating value. To assure a sustainable collaboration, the value created must be useful to society, and value must flow to all core partners. In addition, creating a partnership is a continual learning process, with the potential for unexpected lessons (Austin 2000).

These collaboration principles must be achieved alongside good governance. Indeed, good governance is a term open to much interpretation. But overall six core principles have become widely accepted (United Nations Economic Commission for Europe 2007):

- (a) Participation: the degree of involvement of all stakeholders;
- (b) Decency: the degree to which the formation and stewardship of the rules is undertaken without harming or causing grievance to people;
- (c) Transparency: the degree of clarity and openness with which decisions are made;
- (d) Accountability: the extent to which political actors are responsible to society for what they say and do;
- (e) Fairness: the degree to which rules apply equally to everyone in society; and
- (f) Efficiency: the extent to which limited human and financial resources are applied without waste, delay or corruption or without prejudicing future generations.

New Opportunities for Australia

For the first time in recent years, the Federal Government has taken an interest in planning for more liveable, productive and sustainable cities. *Our Cities, Our Future: a national urban policy for a productive sustainable and liveable future* (Australian Government 2011) is the Australian Government's strategic policy document for the eighteen major cities of Australia. It articulates the role of the Australian Government in facilitating better outcomes in our cities, whether through direct investment or in partnership with key stakeholders, including COAG, local governments, industry, community and academia.

The objective is drawn from an agreement between each of the States and Territories to undertake reforms in our capital city strategic planning systems 'to ensure Australian cities are globally competitive, productive, sustainable, liveable and socially inclusive and are well placed to meet future challenges and growth'. Although specifically applied to Australia's capital cities, there is a recognition that regional cities and towns can benefit by sharing best practice knowledge and encouraging better quality planning and design of the built environment.

Alongside the national urban policy, the newly released draft of the Australian Urban Design Protocol provides the content for driving Australian world class urban design and architecture. The protocol will establish a framework for the practice and delivery of urban design that is supported by case studies, a toolkit for best practice and links to additional resources.

With the Federal government interest in redefining the productivity, sustainability and liveability of our cities, a clearly defined emphasis on governance and leadership has been developed, as one of the five major tenets of the protocol. Specifically, it stipulates a criterion that could bring a much needed emphasis to intersectoral action in planning healthy, liveable environments for people. The criterion stipulates the demonstration of visionary leadership and strong governance, whilst:

- working within the strategic planning and physical context;
- considering the whole lifecycle of a place, and improves over time;
- fostering a culture of excellence, innovation and leadership in design and management; and
- engaging with relevant stakeholders.

The Federal government needs to be prepared to support, seed, communicate and /or propose models that provide the intersectoral action proposed in the national urban policy, and which are required to achieve the change sought by the Australian Urban Design Protocol. The governance arrangements that will contribute to the shifts in productivity, liveability and sustainability are difficult, and should be recognised as such by Federal government, whilst providing the leadership to build new intersectoral public-private partnerships.

A WHO Healthy Cities approach could be one means that the Federal government promotes the change it seeks.

Conclusion

A crucial feature of health promotion is the understanding that improving health is a shared responsibility. Individuals, communities, government and non-government agencies need to work together in partnership toward achieving a common health goal. Through such governance, a broader perspective on sustainability arises: one that is cognisant of the total health and wellbeing of communities, not just the benefits associated with improvements on a single health problem or program viewed in isolation.

A national framework is required for responding to the challenges of creating more liveable and supportive environments for health, and the Federal government would do well to incorporate the collaborative strengths of health promotion and environmental health. Using the WHO Healthy Cities program approach as an example, this paper has outlined the importance of tackling intersectoral collaboration to bridge the silos that relate to healthy environments.

Intrinsic to Healthy Cities projects is recognising that coordination and management of local and municipal planning engages and balances the interests of stakeholders and may best be carried out in a more decentralised manner at the local level, with policy support systems. The role of the local authorities is not only in investment, planning and management, but also in encouraging and supporting the initiatives of local communities. The projects create a shared community vision; identify and prioritise key issues that affect health and quality of life; raise awareness and facilitate community-based analysis of local issues; develop action plans, drawing on the experiences and innovations of diverse local groups and mobilise community-wide resources to meet service needs and increase public support for municipal programmes.

Healthy cities illustrates that effective partnership approaches can help overcome complexity; that health governance is a critical pathway to affecting health and wellbeing; creating and sustaining community capital is critical to enhancing health and wellbeing in urban settings; and healthy urban settings partnerships are potentially powerful mechanisms for enhancing health governance in ways that create and sustain community capital.

Disclaimer

The views expressed in this paper are those of the author and should not be taken to be the views of the National Heart Foundation of Australia.

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**The city of forgotten pedestrian:
Searching for the pedestrian identity
from the residential streets of Seoul since
1970s, applying cognitive mapping to
Gangnam area, a unique urban
residential space in Seoul**

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4th Healthy Cities: Making Cities Liveable Conference, Noosa (QLD), 27-29 July 2011

The city of Forgotten Pedestrian: Searching for the pedestrian Identity from the Residential Streets of Seoul since 1970s, Applying Cognitive mapping to Gangnam area, a Unique Urban Residential Space in Seoul

ABSTRACT: This written material in order to apply the cognitive mapping technique is one of research methods for the title of 'The city of Forgotten Pedestrians'. It includes the introduction to cognitive maps and the objectives of using this tool will be described. An analysis section part will follow the introduction and the findings or summary of this experimental application will be presented at the end of this chapter. The conclusion of this chapter will be integrated with other findings from other parts of the whole research.

According to the definition of a 'cognitive map' from Downs and Stea (1973), it is also known as a mental map, a mind map or a mental model. This type of mental processing is composed of a series of psychological transformations by which an individual can acquire code, store, recall and decode information about the relative locations and attributes of phenomena in their everyday or metaphorical spatial environment.¹⁴

The study of human cognition is not a new field since it is an essential part of the general field of psychology. As many people know well, the mechanism rats¹⁵ use to remember their way to food in a maze is the concept of cognitive map and it was first coined by Tolman (1948). In 1950, Boulding used the term 'image' to refer to the cognitive map and described it as the picture that the beholder carries of the world in his or her mind. It works as the guide of some related people's behavior. In 1960, Kevin Lynch published his book 'The Image of the City' that the cognitive mapping technique became a known research method. The human cognition nowadays expands its field to education, archaeology, planning, geography, architecture, landscape architecture, urban planning and management.¹⁶

Keyword: Cognitive Map

Introduction

There are many definitions for cognitive mapping in psychology related references. Perception and the method of investigating the cognitive map has been widely accepted by Boulding in 1956, Appleyard in 1969, Downs and Stea in 1973 and Kitchen and Freundschuh in 2000. The definition from Downs and Stea (1973) that are related mainly to urban social life and urban design are more suitable for developing this research.

Cognitive mapping concerns how we think about space, and how those thoughts are used and reflected in human spatial behavior.

(Downs and Stea, 1973)

¹⁴. Image and Environment; Cognitive Mapping and Spatial Behavior, Downs & Stea, 1973, Aldine. P.9.

¹⁵. Beyond the Cognitive Map; From Place Cells to Episodic Memory, A. David Redish, 1999, Chapter 2 & Chapter 4.

¹⁶. Cognitive Mapping; Past, Present and Future., R. Kitchen & S. Freundschuh, 2000, Routledge.

As a theory, there are four characteristics in describing cognitive mapping. The first is that cognitive mapping relies mainly on the interaction between the subject and the environment. Second, these processes of humans use their selectivity. A human decides to which elements to store, restore, cognize and recognize. Third, cognitive mapping allows for a distinctive organizing nature. Lastly, Cognitive maps asserts for accuracy and similarity.

Cognitive Mapping as a Research Tradition

Lynch(1960) was the first to use this technique in order to investigate the cognitive map of urban areas. In that investigation he analyzed the central areas of Boston, Jersey City and Los Angeles. He found five main elements which make up the image of the identity category of an urban area. Lynch defines them as follow:

- 1- Paths are the channels along which the observer customarily, occasionally, or potentially moves.
- 2- Edges are the linear elements not used or considered as paths by the observer. They are the boundaries between two paths, linear breaks in continuity.
- 3- Districts are the medium to large sections of the city, conceived of as having two dimensional extents, which the observer mentally enters inside of it and which are recognizable as having some common, identifying character.
- 4- Nodes are the points, the strategic spots in a city into which an observer can enter, and which the intensive foci are to.(explain more)
- 5- Landmarks are another type of point reference, but in this case the observer does not enter them, they are external.

How to develop the research through the theoretical base

There is tangible value in using cognitive mapping as a reliable technique to investigate the relationship between the real environments in a human's perception and thereafter reflects on she or his social behavior. Cognitive mapping is seen in many references as providing a useful tool for analyzing the impact and influence of the physical built environment on the users at different environmental scales (Downs and Stea, 1973, 1977; Kitchen and Freunds Schuh, 2000).

Lynch's method has faced some criticism with respect to the methodology of inquiry itself and the type of results it comes up with.

Kitchen and Freunds Schuh (2000) developed a frame work of proposed future use on cognitive mapping divided into three fields theory, methodology and application. Despite mentioning a huge number of possible future developments in cognitive mapping, the most important and the most repeated need they put forward is that multidisciplinary research is required because it links the various spatial knowledge techniques together.

Objectives

The author might say that the rapid growth and capitalistic endeavors have resulted Seoul as a city of forgotten pedestrians, especially in the case residential streets. The city contains both physical and social elements. People and physical space they occupy attributes to their quality of life so it is one of the most important elements to associates with a city. Since the new town development has been expanding through the southern part of Seoul 1970s. Spreading the drive for this development was the need to provide accommodations for the middle class in Seoul as the city population explosively increased. However, since the period of the property investigation boom in the 1980s, Gangnam, a city located in the southern part of Seoul, was completed without the planning of an inter-relationship with other urban elements during the structuring of the city.

Many people have expressed their desires to live in Gangnam. It is centrally located to many work places, there is overflow of shops and hospitals in the area, the quality of education is superior, high social positioned neighbors are abundant, and successful property investigation attributes heavily towards a family's economy. The residents were blinded by their thirsts for high property values so they unknowingly sacrificed a good quality of life.

The author as an urban designer will expand the physical research limitation of its outdoor space of residential streets of Gangnam into three typical residential areas. The author was motivated and influenced a lot by Jan Gehl's (1970) work 'Life between buildings'. The disappearance of an urban pedestrian's interaction of his social behaviors with residential streets has thouched the author's curiosity and academic interests.

As a result of rapid development since 1970s, the Gangnam area has serious problems such as the lack of urban space for people's outdoor activities, the problems with the co-relationship between buildings and space, the absence of a beautiful urban landscape, fragmented relations between nature and the artificial environment, and above all, there aren't any urban attractions available in order to forge a good urban elements' relationship. This kind of urban environment does not provide a qualified environment for its citizens and these citizens might lose their optimistic minds, energetic activities and vitality for urban life.

As mentioned above, many of the scholars in the field of urban design, are to quik o focus on the urban physical threat rather than to think of it as a social phenomena when challenged for solution. The author resorts to cognitive mapping for the sake of better understanding people's lives in the urban context through their perception map. The author searches the relative references about urban pedestrian identity, social relations between people on the residential streets, livable streets and a healthy environment.

Therefore, the author will lead this thesis from the people's point of view. Cognitive mapping, as a method to find out people's hidden perceptions, will focus and illustrate on what people think, how they behave and how they live in the city. Hopefully, they will draw the conclusion that they live in 'the city of forgotten pedestrians' and have been following worthless illusions rather than living meaningful lives.

The objectives of using the cognitive mapping method in the research are to investigate:

1. How all subjects recognize the Gangnam typical residential areas, or in the words of Lynch (1960), 'the composite image of what they have in mind about it'.
2. The extent to which the image is affected by visual, social or functional attributes.
3. The relationship between this image and the people's social relations, represented by the image of a typical residential district versus atypical Gangnam residential area, influenced by rapid growth.
4. How people feel from 'here' to 'there'. The perception of distances and how a car based

life pattern effects their ratios and directions from home to 'there'.

5. Evaluating and changing of the Gangnam Residential District and the people's life pattern behaviors through the mapping.

Methodology

Cognitive mapping is mainly an interactive technique which depends on finding a reasonable interpretation of the research results. In this technique the respondents do not always give the reason for their responses so it is up to research to find the reasons for such responses in order to construct the findings.

APPLY TO COGNITIVE MAPPING

On April 2011, the author collected cognitive mapping samples from Banpo residential streets where the three typical residential grid patterns were readily available. It was early spring and the weather was good but a bit windy. At the beginning of the field survey, the author prepared preparatory papers for collecting cognitive mappings. The street was calm and the people were cold. There were many reasons as to why the author could not gather enough samples.

1. Lack of pedestrian activity on the residential street.
2. People were busy with their schedules. Even people on the playgrounds were also busy taking care of their children.
3. A security guard tried to stop the author's collecting of samples and some of the people tighten their guards when they heard my reasons for collecting the information.
4. People talk a lot about how lovely their homes but they do not want spend their time helping others.
5. Housing is their biggest investment, so they do not want me to express a negative opinion about their properties.
6. People only think a lot about housing prices and hope that the price of their homes will increase. They do not mention the quality of their lives here at all.

How to collect samples

The samples the author collected are from Banpo 1Dong Catholic Church from May 4th and May 8th 2011. The reason why the author chose the Catholic Church as a field of survey is because the church has its own district. Most of the congregations live in Gangnam area and their housing types are in the author's category of three typical residential types. The author tried to ask the assistance of several other Catholic Churches and as well as evangelical churches before for asking for their help. This was the only one Catholic Church that allowed me to take a survey after their services.

The Banpo 1Dong Catholic Church has about 500 believers and after the catholic priest's supporting comments, the author took 33 cognitive mapping samples. The author collected 33 samples by one on one interviews. After the selecting sample, the author realizes that 32 samples are meaningful and only one sample is useless and out of research data.

Each participant was asked to draw two sketches. Many successfully drew two sketches, but some of them only drew one. As they were doing their sketches, the author asked for their basic information and background. About half of the participants answered easily whereas some of them didn't want to divulge any personal information.

Subdivision	Cognitive Maps			
Scale	Map1		Map2	
The Questions	Please draw a map of nearby residential areas including your residence. Pretend as if you have a guest from abroad visiting Seoul. Draw him a map for so that he or she can come and find your residence easily.		There are many outstanding places or land marks in your surroundings. Please choose these areas as many as you want that you already know about. Also detail the distances from your residence. (Example: The Han River, parks, streams, the express bus terminal, Banpo high school, Mido park, Eongubi park, Seongmo Hospital, Catholic University, the courthouse, the police station, Parangsae park, Saewha girls high school, The Banpo Stadium, Seoul Palace Hotel, Sinnonhyeon subway station, Sinsa subway station, Banpo subway station, Sapyeong subway station, the post office, etc...)	
Total Responses	32 People		32 People	
Data collection Type	Sketch	Verbal	Sketch	Verbal
Number of Cases	31	18	26	16
Samples Total (%)	96.875	56.25	81.25	50

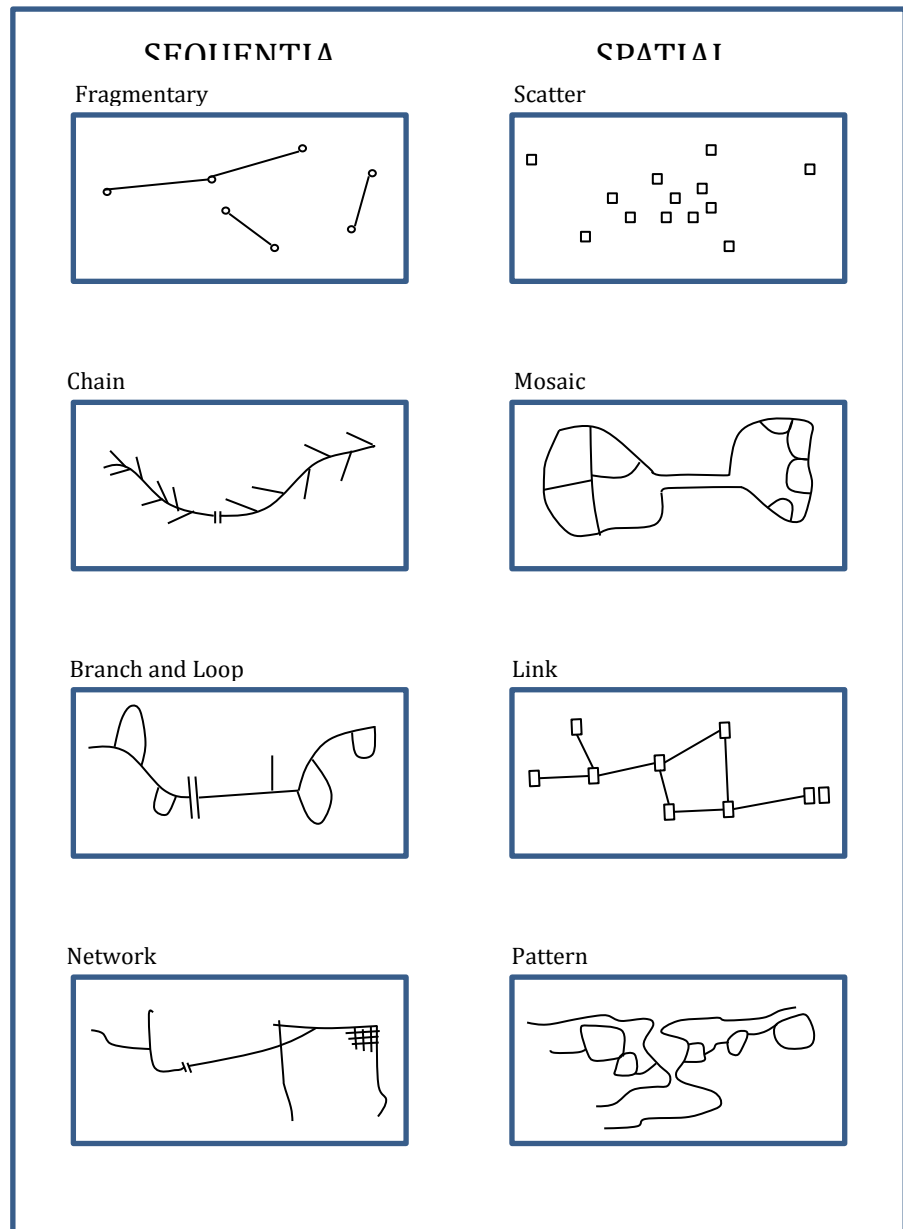
Table 1. Levels of the maps used in the analysis.

Appleyard's Categories on Map1

The first analysis tool is established by Donald Appleyard' (1969) (See figure. 1). He found that there are eight categories for the most frequent methods of structuring the urban areas when subjects draw their mental maps. He placed these eight categories into two groups, sequential and spatial, each ranging from being topological to being positional. Using these categories as follows;

1. Fragmentary: There is a principle road available and few major spots at rare intervals near the road or nodes
2. Chain: There is a principle road available but it does not connect or meet other principle roads.
3. Branch and loop: There are both the principle roads and branch lines available on the map.
4. Network: The shape of the map is netted by roads.
5. Scatter: There are several specific or outstanding places, scenery, landmarks marked as scattered form.
6. Mosaic: A districts or areas have boundaries and it is shaped like a mosaic.
7. Link: linear elements and spatial elements available in a map but much stronger in its spatial character.
8. Pattern: Line based features, almost linked with many elements and highly developed.

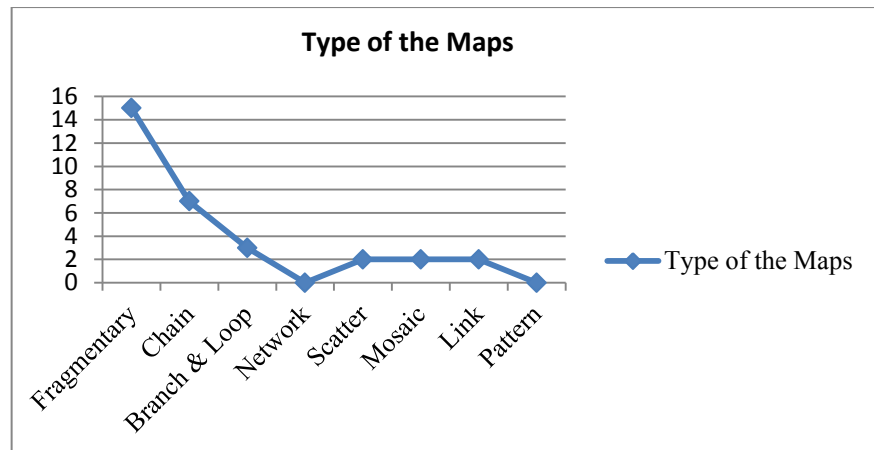
Figure 1. The most frequent methods of structuring the city when drawing mental maps.
Source: Appleyard D. (1968: P437).



Division	The Type of Cognitive Map		Total (%)
Sequential	Fragmentary	15	48.387
	Chain	7	22.580
	Branch & Loop	3	9.677
	Network	0	0
Spatial	Scatter	2	6.451
	Mosaic	2	6.451
	Link	2	6.451
	Pattern	0	0
Total Samples		31	100

Table 2. The Type of Cognitive Map-Result from Collecting map1.

Figure 2. The distribution of Sketch map according to structuring categories



From these results it is clear that the image of the urban residential space that residents have in their minds is most recognized as fragmented (48%) and chained (22%) routes. Moreover the maps were sequential rather than spatially structured. This asserts to Gangnam being more legible on its macro, overall scenery level. Thus, pedestrians within the Gangnam residential space cannot recognize what they have passed by and what is ahead of them.

Network and pattern type results were not evident from the collected materials. Those two types of cognitive mapping, when it is present in the collected materials from a city, tells that the city is legible on its micro, small scale of city scenery. Also, people recognize what they have just passed by and what is ahead of them.

On the other hand, there were several of maps drawn which could not be classified into one of Appleyard's categories. The samples from someone who lives in a brand new high-rise apartment complex, seems to recognize this entire apartment complex as one landmark. Therefore, it marked numbers to indicate where to live. From a residents' subway station to someone's homes, these are the major roots for the people in Gangnam in their everyday lives. Therefore when they arrive at a subway station for the ride back home, it acts as the starting point in their memories of their residential space and walking in the human-scaled streets, it is hard for them to code themselves to their surroundings. When they arrive to their apartment complexes they evoke numbers from their memory in order to find their residence

Lynch's Categories on Map1

The second analysis tool is established by Kevin Lynch (1960) (See figure. 3). He found five main elements which make up the image of the identity category of an urban area: landmarks, edges, paths, nodes, and area. Lynch defines them as:

1. Paths are the channels along which the observer customarily, occasionally, or potentially moves.
2. Edges are the linear elements not used or considered as paths by the observer. They are the boundaries between two phases or linear breaks in continuity.
3. Districts are the medium to large sections of the city, conceived of as having two dimensional extents, which the observer mentally enters inside of it and which are recognizable as having some common, identifying character.
4. Nodes are the points, the strategic spots in a city into which an observer can enter, and which are the intensive foci to and from where he is traveling.
5. Landmarks are another type of point reference, but in this case the observer does not enter them, they are external.

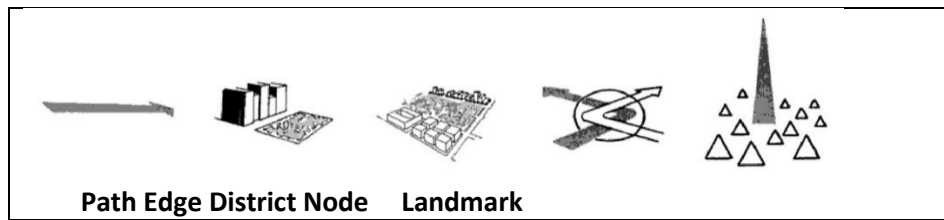
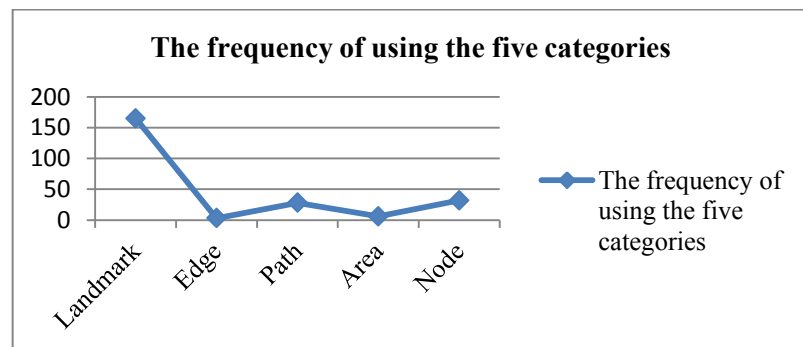


Figure 3. The five elements make up the image of the city

Category	Total Frequency	Percentage (%)
Land Marks	165	70.512
Edges	3	1.282
Paths	28	11.965
Areas	6	2.564
Nodes	32	13.675
Total	234	100

Table 3. The Frequency of using the five categories-Results from Collecting map1.

Figure 4. The distribution of Sketch map1 according to structuring categories



The composite map shows some interesting results. Landmarks were mentioned 165 times, which is about 70% of all the elements drawn in all maps. The second most popular category was nodes, with 32 responses and a percentage of 13%, followed by path (28 and 11.9%, respectively). Area scored 6 and 2.5% and edges 3 and 1.2%.

As usual, landmarks were associated with huge commercial buildings, schools, hospitals and governmental public offices. One outstanding result from this survey is that there are many brand new apartment complexes which became huge landmarks in the context of Gangnam scale. This is the reason why one of Lynch's categories, landmarks, appears so frequently in the cognition results. The author has come to know that in Gangnam there are a lot of landmarks when compared to the other four elements.

The category edge doesn't appear on Gangnam people's cognition which means there is a lack of open spaces between the phases in Gangnam. This is the one most important urban problem of Gangnam, as the author predicted. However, the residents of Gangnam want to hide this kind of negative evaluation. They want their housing price to continually increase. Cognitive mapping is the most effective research tool to evaluate and prove the reality in Gangnam using logical process.

The category of nodes and paths appeared quite often on people's cognition. The reason being is that, Gangnam has been structured as a car-based new town development since the 1970s. Therefore, street networking is highly recognized by the people's cognition and this mindset applies to public transportation as well.

Finally, with the category of area, interesting result surfaced as well. The construction of huge apartment complexes were being categorized both as landmark and district simultaneously by the residents. The residents oftentimes confuse the differences between districts and landmark in

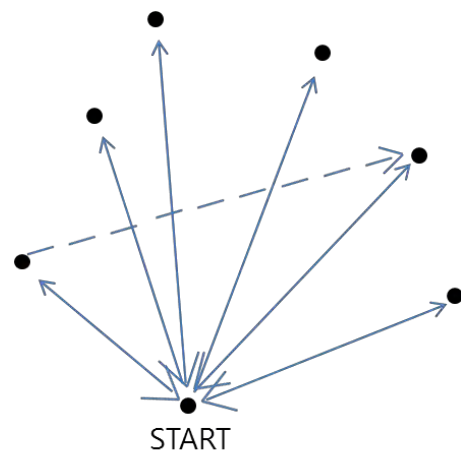
Gangnam. A common practice there is that the central courtyards are built like any other recognizable scenery there. Without the numbers on the buildings, people would often lose their way.

Hill and Gaunet & Thinus-Blanc's Categories on Map2

The third analysis tool, established by Hill (1993) and Gaunet & Thinus-Blanc (1997) looks at the exploration strategies used by blind participants as they learned a large scale layout of four objects in a large room similar to that of Rieser (1982). From the observation of the participant's behavior, each of these studies identified a number of strategies used to learn the experimental layouts; these are explained below.

1. Perimeter-Explored the boundaries of an area to identify the area's shape, size and key features around its perimeter, by walking along the edge of the layout.
2. Grid- Investigated the internal elements of an area to learn their spatial relationships, by taking straight line paths from one side of the layout to the other.
3. Object to object- Moving repeatedly from one object to another, or feeling the relationship between objects using hand or cane.
4. (Missing the category name)- Moving repeatedly between an object and the perimeter
5. Home base to object- Moving repeatedly between the home base (origin point for exploration) and all the others in turn.
6. Cyclic- Each of the four objects visited in turn, and then returning to the first object.
7. Back and forth- Moving repeatedly between two objects.

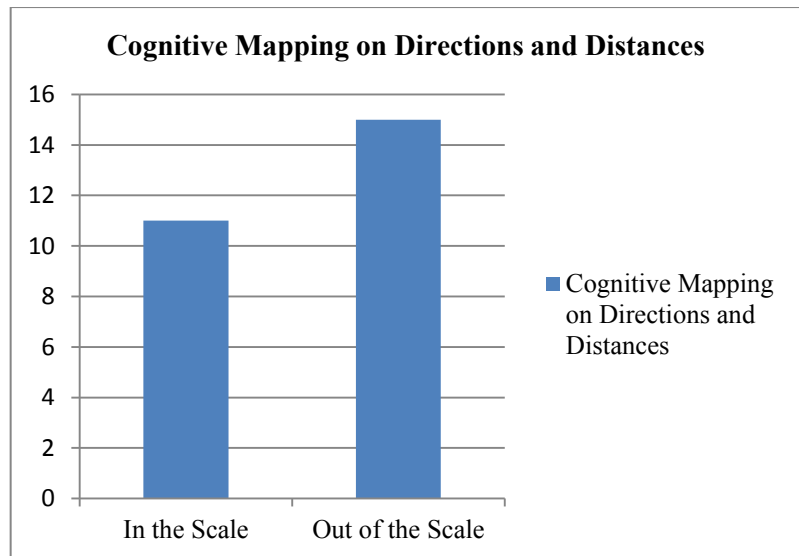
Figure 5. Layout used by Rieser, Guth and Hill (1982; 1986, based on a diagram in Thinus-Blanc and Gaunet, 1977). Solid arrows represent paths used to learn layout. Dotted line shows one example of an inferred path.



Division	Landmarks, Directions & Distances on Mapping 2		
Collected Materials	In the Scale	Out of the scale	Total Samples
	11	15	26
Percentage (%)	42.307	57.692	100

Table 4. The Frequency of using the five categories-Results from Collecting map1.

Figure 6. The cognitive mapping on Directions & Distances on Map2



The author gave the respondents some information about their list of distinctive landmarks when they received their questionnaires. Some people referred to the information and marked one of those places on the cognitive map. However many of them didn't follow the author's information and they marked their own landmarks on the Map 2. They had their own landmarks on their cognition and an interesting result surfaced.

Only 42% of the people drew their cognitive maps directionally correct with accurate distance ratios between here to there. More than 57% of people's drawings are out of scale. Some were in the wrong direction and others were out of range in the distance scale. There must be some reason as to why people chose their landmarks in spite of incorrect cognition when they drew map 2.

The analysis tool motivated by blind participants as they learned a large scale layout of four objects in a large room is basically an experience-based cognitive mapping. The experience must be based on lots of trial and error, and eventually the spatial information will become stored in the people of Gangnam's cognition. When a person feels closer to somewhere, the place must be familiar by frequent visits. Otherwise, when people draw their distance between two points closer than the actual existing ratio, people might visit the place once or often. It usually denotes that this is not a visit by their own walking experience at all. The author might say that this is possibly due to the car-based urban moving culture.

For example, people only got good inspiration from the Han River. The journey to the river must be comfortable and only take a short time there by car. Only road and traffic signs remained people's cognition. It is possible to argue the author's opinion.

What people think Landmarks from their surroundings on Map2

The author selects some meaningful information from cognitive mapping 2, which is the topic of 'what people think of their landmarks from their surroundings'. During the drawing process, people selected several of their own landmarks they think are important to them the most. So, the author analyzed the characteristics and frequency of the landmarks stored in Gangnam people's cognitions.

Items	Frequency	Percentage (%)
Subway stations	43	28.104
Banpo 1Dong Catholic Church	19	12.418
Commercial Buildings	17	11.111
The Express bus terminal	17	11.111

Schools	17	11.111
The Han river	11	7.189
Hospitals	7	4.575
Parks	4	2.614
Hotels	4	2.614
Apartment	3	1.960
Bridges of the Han river	3	1.960
The Court	2	1.307
Civic Service Center	1	0.653
Bank	1	0.653
The Stadium	1	0.653
Street or Road	1	0.653
Post office	1	0.653
Evangelical Church	1	0.653
Total	153	100.000

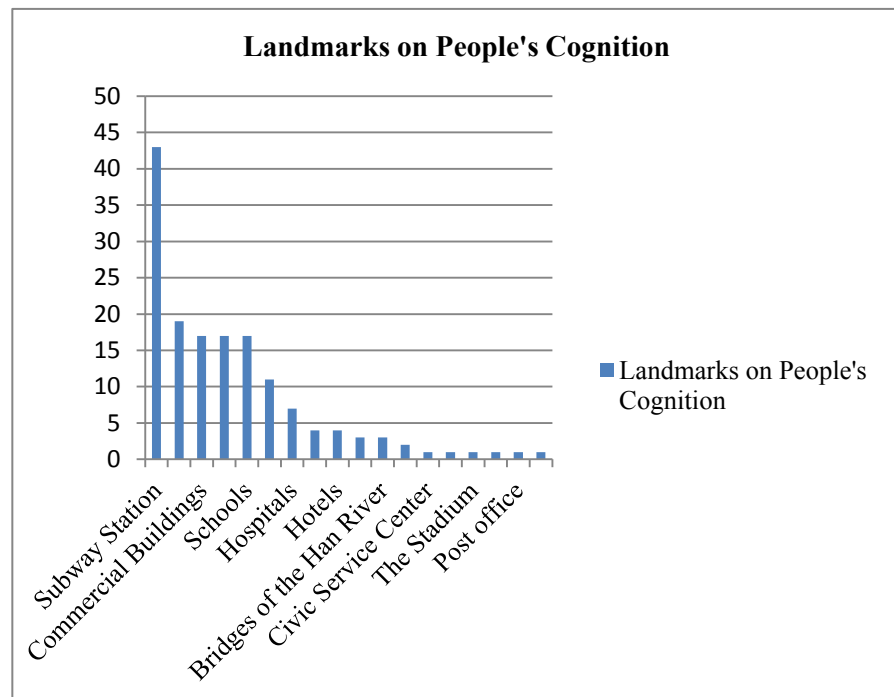
Table 5. The Frequency of using the five categories-Results from Collecting map1

Subway stations are the most well recognized landmark to the people in Gangnam, which is used daily by the people in Gangnam. Banpo 1Dong Catholic Church is the second most common landmark for people's cognitive mapping of Gangnam. The author collected all these cognitive mapping materials from the church, so all the samples come from the believers, and therefore these outcomes are reasonable. Commercial buildings include a high-rise department store and a huge landmark business building Kyobo, the company's headquarters. Gangnam is often associated with the express bus terminal, located only 5 minutes away from the church by car. Most adults have children, so schools are recognizable and people store these facilities into their cognition. The Han River, as a symbol of Seoul, situated itself into people's cognition as well. In spite of its fame, the Han River ranked only 6th place from top. The author might say that if the Han River was easier to access from residential areas, the river might rank higher in people's cognition.

There are many different items stored in people's cognition as landmarks, and all these landmarks are related deeply to the people's lives in the city. Therefore, the landmark should be functional, well used by people's daily lives and it must have an outstanding feature from the distance or overall scale.

Figure 7.

The
Landmarks
in People's
cognition,.
Map2



The author has come to know that the most popular landmark in people's cognition is directly related to the priorities of urban person's life. Actually, landmarks such as subway stations, Banpo 1Dong Chtholic Church and other commercial buildings are closely related to a pedestrian's necessary activities. The author not only explains the frequency of visits to these landmark but also the characteristics of people's activities.

Parks and the Han River ranking lower in its frequency explains that people in Gangnam do not behave on the streets or there must be lack of open spaces. If the people willingly participated openly on residential streets often, the author might say that a street provides for good quality of life for their residents.

FINDINGS

The following is a summary of the findings of the cognitive mapping analysis with all interpretations.

1. Gangnam is more legible on its macro, overall, sensory level than on its micro, immediate, sensory level. The scale of the area under consideration is relatively huge which is out of the human scale.
2. Gangnam has its image as fragmented, chained and sequential forms in people's cognition. So, even though many people live in Gangnam, many of them do not read their residential space clearly.
3. The category edge doesn't appear on Gangnam people's cognition which means there is lack of open spaces between the phases in Gangnam. The site was highly developed for the purpose of profit, so there must be lack of communal open spaces.
4. Huge and brand new apartment complexes were possibly categorized both as a landmark and a district at the same time. Therefore people were confused between districts and landmarks in Gangnam.
5. In the middle of Gangnam apartment complexes the shape of buildings are the same and without the presence of recognizable scenery available, without the numbers on the

- buildings, people might lose sense of direction.
6. Only 42% people drew their cognitive maps correctly in the right direction and thought about the distance ratios between here to there. More than 57% of the people's drawings are out of scale.
 7. Car-based life pattern results in the people to lose their cognition about space. People get inspiration from travelling to the Han River by car that people only store their cognition as roads and traffic signs, none of process in acquire, code, store, recall and decode of the space.
 8. The most popular landmarks in people's cognition are much related to urban people's daily lives.
 9. Subway stations, Banpo 1Dong Catholic Church and commercial buildings closely related to a pedestrian's necessary daily activities. Therefore, Gangnam need to create a pedestrian's optional behavior and social activities on their residential streets.
 10. Gangnam need to have its own open spaces and pedestrian social activities must revert back to their residential streets.

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