

The role of precincts in innovation systems – a discussion paper

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The idea and appeal of location-based development zones or innovative precincts has persisted in industry policy. There is, however, remarkable little discussion in the literature of the function and distinctive features of such development precincts. This paper, therefore, explores:

- the various versions of geographic cluster initiatives over time, highlighting the persistence of the concept of special precincts;
- where and how notions of special habitats or environments might sit within emerging theories of innovation systems (or ecosystems); and
- what might be some of the characteristics of effective activity clusters in the 21st century.

The objective of this paper is very practical: how do we better understand why location is important and why place matters. There are many species of precinct, but this paper homes in on the type of innovation hub being promoted by PACE and the related 101 Princess Alexandra Hospital precinct. Nonetheless, there is much to be learned or explored from other species of precinct like cultural, sports or tourism precincts, and the more traditional forms of industrial district.

At the most simple level the discussion or promotion of precincts reminds us that, despite all the rhetoric about ‘virtual worlds’ and the “death of geography”², place still matters and, as the real estate agents keep saying, location is everything.

Instinctively we know that place matters. Anyone who walks out their front door must be reminded of the seemingly infinite variety and individuality of humanity. Anyone who travels abroad will be struck anew by the amazing variety and peculiarity with which particular communities shape their towns, cities and marketplaces. Each, however, serves the same collective and underlying functions. Throughout history urban settlements have evolved to provide shelter, safety and marketplaces and to house institutions, whether secular or sacred³. Yet the evidence of our eyes shows us that each place is distinctive and individual in particular ways, the differences shaped through the unique alchemy of people and place. The Romans called this the *genius loci* – the spirit of a place. Literature, the arts and rituals celebrate this individuality of people and communities. They also leave a record of how the capabilities and characteristics of people and their communities accumulate and change over time.

1. Terminology

The word precinct belongs to that class of term relating to delimiting or characterising a space and place, and its dimensioning. It has the connotation of some special zone with is bounded in some way as to establish its particular character or significance.

It denotes a particular hub of activity. By contrast, the word circumjacence introduces the notion of bounded activity along with notions of the role of boundaries (or what a precinct is

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² Frances Cairncross, *The Death of Distance*, Harvard Business School Press, 1997

³ Joel Kotkin, *The city: a global history*, Modern Library, 2006

not and the importance of what surrounds it). Between the two arises the issue of the extent of porosity across boundaries. The term precinct implies a hierarchy of agglomeration, wherein clusters of localities constitute urban forms and these environments themselves form part of wider regional conurbations. The reference to precincts focuses our attention on the possible benefits associated with localisation, whereas talk of urbanisation invokes more general considerations about the organisation of human activity.

Precinct [... from Latin, to gird encircle]

- 1.a The space enclosed by the walls or other boundaries of a particular place or building, or by an imaginary line drawn around it; *spec.* the ground (sometimes consecrated) immediately a religious house or place of worship.
b. *esp.* in *pl.* often applied more vaguely to the region lying immediately around a place, without distinct reference to any enclosure; the environs.
2. A girding or enclosing line or surface; a boundary or limit; a compass.
3. A district defined for the purposes of government or representation; a district over which a person or body has jurisdiction; a province; also a division of a city, town or parish...
4. A part of a town or community designated for a special purpose; *spec.* one from which motor cars are excluded, *esp.* to allow pedestrians to shop in safety.

The Oxford English Dictionary, Volume XII Poise-Quelt, Second Edition, 1989

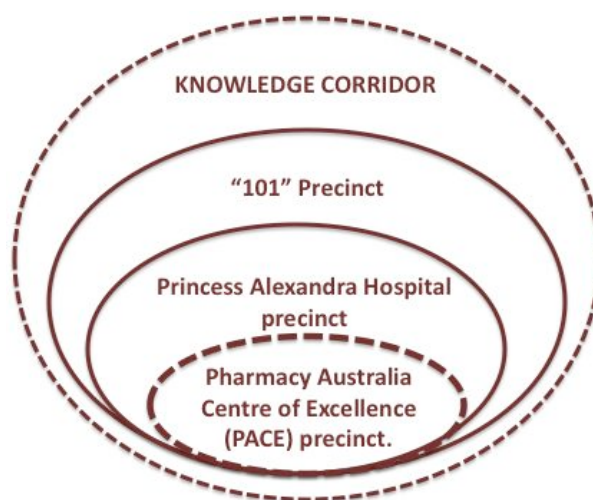
Circumjacency [...from Latin, to lie around, border upon]

Circumjacent, *a.*

Lying or situated around, adjacent on all sides, surrounding.
(1847, 'The city with its circumjacent plain'.)

The Oxford English Dictionary, Volume III Cham-Creeky, Second Edition, 1989

As a rule of social networks, interactions within a precinct (hub or sub-system) should be stronger than interactions *between* sub-systems while the overall pattern of interaction within the ecosystem is more than the sum of the parts. In the case of Brisbane, specific precincts form part of wider ambitions about knowledge corridors as economic development zones.



While this paper focuses on innovation hubs, there is a lot to be learned from looking at the experience with precincts focusing on very different concentrations of activity, such as cultural, sporting, ethnic or retail precincts.

2. The history of the precinct idea

Alfred Marshall, the codifier of classical economics, introduced the discussion of 'industrial districts' in his seminal *Principles of Economics*⁴ (1890). Marshall saw the clustering of industrial activity within particular locations as a function of specialisation, and as also locating people close to their place of employment. He anticipated later discussion of the role of place as a point of information exchanges, and talked of innovation developing through that "something in the air" which arises from people mingling and exchanging ideas. Marshall identified four benefits from localisation around precincts:

1. Knowledge spillovers from informal networking
2. Access to a common pool of factors of production, whether labour or specialist facilities
3. Facilitation of specialisation of production units within supply chains
4. Ease of 'comparison shopping' for buyers.

On the supply side, the agglomeration of activity reduces the transaction costs within intermediate markets or supply chains and, on the demand side, co-location reduces search and comparison costs for buyers and end-users ('comparison shopping'). Marshall's focus on industrial districts arose from his observations of the patterns of industrialisation in England, but subsequent development of the idea has most commonly been associated with studies of districts in Italy. Italian studies have recognised that "for certain types of productions the amalgamations of the operations provided by many small businesses, geographically close and specialised in a specific task of the production phase, can substitute efficiently the manufacturing system based on large and vertically integrated firms"⁵.

The genius of Marshall was to recognise the importance of reconciling the divergent forces of the functional specialisation of human capital, and of social capital. Within precincts or industrial districts the division and specialisation of labour is counterbalanced by the function of social networks in allowing "the reshuffling of organisational and institutional boundaries and members".⁶ The spatial dynamics of this interplay will be significantly determined by the quality of social capital – in Robert Putnam's terms those "features of social organisation, such as network, norms and trust, that facilitate co-ordination and co-operation for mutual benefit".⁷ A social network and social capital is *embedded* human capital.

Marshall's 'industrial districts' often emerged from some initial accident of location which was then consolidated within a process of cumulative and organic development. The second half of the twentieth century saw two new developments relevant to this discussion. The first was an increased interest in articulating national science and technology policies, with concomitant State investment. The second was a new rigour around urban planning which saw more granular planning codes, including the identification of 'industrial parks'. A new government interest in investment attraction saw the emergence of government-sponsored technology or science parks. These have often involved the insertion of an active "precinct manager" and highly formalised governance frameworks. The so-called Cabral-Dahab Science Park Management Paradigm⁸ has become a much-referenced set of conditions for a

⁴ Marshall may be credited with the establishment of economics as a specialised discipline, systematically elaborating on the insights of Adam Smith and David Ricardo.

⁵ Francesco Schiavone, "The Industrial District Model: An Entrepreneurial Overview", University Ca' Foscari of Venice, 2004, p. 2 (accessed via the Web)

⁶ E. Castilla and M. Granovetter, H. Hwang and E. Granovetter, "Social Networks in Silicon Valley" in C. Lee, W. F. Miller, M. Gong Hancock, and H. S. Rowen (Eds.), *The Silicon Valley Edge*. Stanford University Press, Stanford, 2000

⁷ R Putman, *Making Democracy Work*, Princeton University Press, 1993

⁸ See for example R Cabral, "Refining the Cabral-Dahab Science Park management Paradigm", *International Journal of Technology Management*, Vol. 16, 1998, p. 813ff.

successful science park, and provides a useful starting point for thinking about key success factors:

1. Have access to qualified research and development personnel in the areas of knowledge in which the park has its identity.
2. Be able to market its high valued products and services.
3. Have the capability to provide marketing expertise and managerial skills to firms, particularly Small and Medium-sized Enterprises, lacking such a resource.
4. Be inserted in a society that allows for the protection of product or process secrets, via patents, security or any other means.
5. Be able to select or reject which firms enter the park. The firm's business plan is expected to be coherent with the science park identity.
6. Have a clear identity, quite often expressed symbolically, as the park's name choice, its logo or the management discourse.
7. Have a management with established or recognised expertise in financial matters, and which has presented long term economic development plans.
8. Have the backing of powerful, dynamic and stable economic actors, such as a funding agency, political institution or local university.
9. Include in its management an active person of vision, with power of decision and with high and visible profile, who is perceived by relevant actors in society as embodying the interface between academia and industry, long-term plans and good management.
10. Include a prominent percentage of consultancy firms, as well as technical service firms, including laboratories and quality control firms.

These and other possible generic principles applicable to precinct developments will be summarised at the conclusion of the paper. However, this “management paradigm” for science parks implies a planned, ‘greenfields’ development, and also active on-going management. In fact, there now exist several associations of science park managers. A science park, however, is only one manifestation of a precinct, and often has the limitation of being strongly supply-side driven. More organic, more self-organising models of precinct evolution can be observed. New factors, moreover, also come into play when we consider the role of localisation and hubs within our contemporary economy, particularly with respect to the trends shaping innovation processes.

Before turning to this question of the role of precincts within innovation systems there remains the aspect of distinguishing between ‘greenfield and brownfield’ precincts, and between organic and planned development.

In 1996 Ann Markusen developed a taxonomy for industrial regions or precincts based on four distinct typologies⁹:

- | | |
|--|--|
| 1. The Marshallian industrial district | A clustering of small and medium enterprises with a clear supply chain or market expansion focus (examples are many of the cluster development initiatives in Australia) |
| 2. A hub and spoke industrial district | An industrial zone where one or more large companies act as a hub – as in Detroit with the automotive industry |
| 3. The State-anchored district | The situation where public institutions - universities or defence – provide a development platform; Silicon Valley or Boston provide examples |

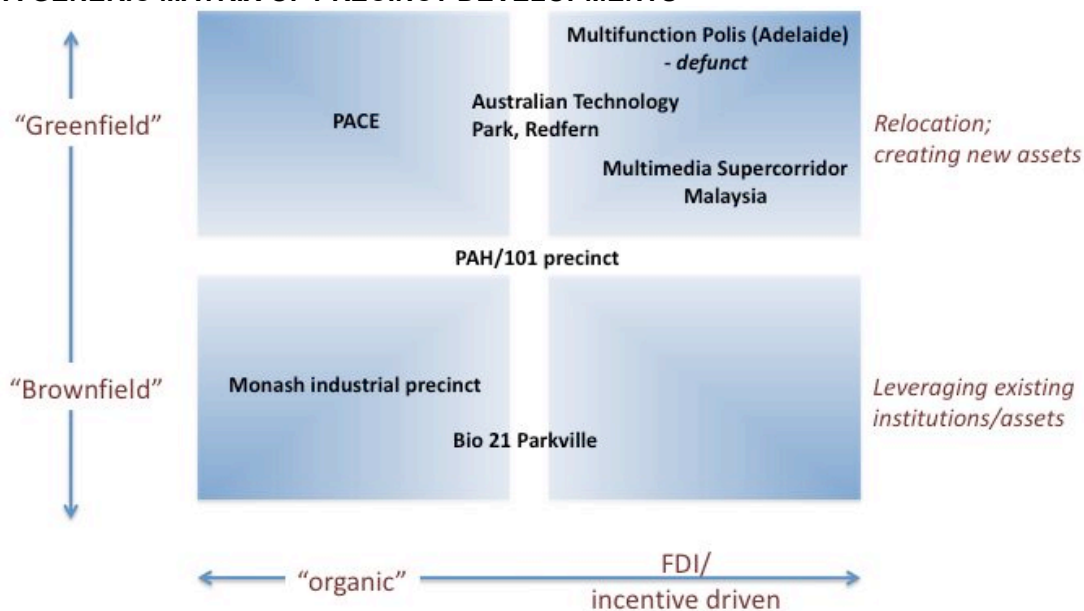
⁹ A. Markusen, “Sticky Places in Slippery Space: A Typology of Industrial Districts”, *Economic Geography*, vol. 72, 1996, pp. 293-313.

4. The satellite platform district

A concentration of branch facilities of externally based multi-plant firms, often marshalled by the State through Foreign Direct Investment (FDI) incentives. Prominent examples are the development zones in emerging economies, such as the Multimedia Corridor in Malaysia, or the Manaus industrial zone in Brazil and Bangalore in India.

These typologies for industrial development are not, however, mutually exclusive and are fairly limited in the insights they generate. An alternative is provided in the following matrix – it should be noted that the thinking behind this matrix is tentative and exploratory at this stage. It attempts to highlight two dimensions key to the consideration of policy options, and possibly to the development of policy principles: the spectrum from ‘greenfield’ to ‘brownfield’ development, and the spectrum from organic evolution to planned development and highly managed operations.

A GENERIC MATRIX OF PRECINCT DEVELOPMENTS



This matrix reinforces the precept that there is no ‘one size fits all’ model. Some case studies are instructive. An aerial photo of the Monash or Clayton precinct shows an extended industrial district, housing a significant proportion of Victoria’s light industry alongside major research facilities. Its genesis, apparently largely unplanned, appears to have been twofold. Legislation established Monash University in 1958. Concurrently, the then CEO of CSIRO applied for the grant of adjacent land: CSIRO archives record that “this request was in keeping with the belief that a great deal of mutual benefit is derived from having CSIRO laboratories in close proximity to universities”. It helped that the CSIRO CEO and the founding Vice Chancellor were friends, and they formed a committee to consolidate the locations¹⁰. It is only more recently, however, that substantive collaborations between Monash University and CSIRO have developed, including the very recent announcement (December 2008) of a joint facility to be funded under the Education Infrastructure Fund. Even so, a symbolic fence still divides CSIRO from the Monash campus. The second aspect of the wider precinct development appears to have been a function of local council zoning provisions, opening up room for light industry in what was then a largely undeveloped, fringe area of Melbourne. Much of the initial development at Clayton, therefore, could be characterized as organic and serendipitous (arising through personal linkages). In recent years Government investment has more actively leveraged the nascent precinct opportunities

¹⁰ Personal communication from the Chancellor of Monash University, May 2008

through the location there of major facilities like, for example, the Synchrotron and an NCRIS funded nanotechnology fabrication facility.

The Bio 21 precinct in Parkville, Victoria, is another example of a precinct development based on existing assets and a 'natural' grouping of existing medical research institutions. The Victorian Government has made significant investments in linkage projects and facilities between these institutions and a major "branding" exercise to scale and leverage existing assets. In terms of precinct and innovation policy, these interventions focused on enhancing the "flows" and relationships between pre-existing *stocks* of capability.

Some of the best examples of "greenfield" developments have been the government development of new cultural precincts – such as Southbank in Brisbane, or Federation Square in Melbourne. Major shopping mall complexes provide examples from the retail sector. Major urban regeneration projects also fall into this category, such as Docklands in Melbourne, or the Kelvin Grove Urban Village in Brisbane (although the later leveraged off the pre-existing and adjacent QUT campus).

Within this context the Pharmacy Australia Centre of Excellence (PACE), the planned developments at the adjoining Princess Alexandra Hospital site and the wider "101" concept incorporating the redevelopment at Boggo Road represent a hybrid situation. It leverages off the existing hospital asset, but potentially adding new capability and opportunities to it. PACE itself revolves around the relocation of an existing institution – the University of Queensland's School of Pharmacy – but whose relocation has been the catalyst for the current initiative to develop a new cluster of related activity around the site.

There have been few examples of major greenfield developments based on a foreign investment attraction model in Australia. The most instructive, if now largely forgotten, case study was the poorly executed Multifunction Polis project in Adelaide in the late 1980s. This was premised on multinational partnerships, notably with Japan, but a bidding war between the Australian States saw the development launched in Adelaide, which failed as a location to attract the Japanese. It also engaged little leadership involvement outside of government and the nominated property developer. Ironically, and it is seldom noted, exactly the same development blueprint was later adopted by Malaysia in 1996 for the Multimedia Supercorridor (MSC) development¹¹. The MSC has been developed on the basis of an ambitious FDI programme which was reinforced by a "Bill of Guarantees" (enshrining *inter alia* tax exemptions, profit repatriation, labour mobility and entry benefits, access to infrastructure, and "no censorship of the Internet"), and all underpinned by demand-side government-funded flagship development projects (such as a general purpose government smart card, eGovernment initiatives, and a "smart schools" initiative). There was also major investment in new educational infrastructure and new regulatory institutions.

What these few case studies establish is that precinct specific operating principles need to be articulated over and above any generic principles, recognising the differences in governing parameters across possible precinct developments.

¹¹ The author of this paper was associated with both projects, and continues to be a member of the Malaysian Prime Minister's International Advisory Panel for the Corridor.

3. Functions within an innovation system

The “Cabral Dahab” science park model introduced earlier articulates a set of operational parameters for a successful science park, but does not locate these principles within a wider public policy context which, as various case studies demonstrate, will shape the motivations and objectives of particular stakeholders and create specific performance indicators for impact and outcomes.

Ideally precinct developments based around innovation hubs should aim to address or at least be cognisant of some of the key trends and emerging challenges of the 21st century which will affect us all, on the ground, in one way or another. These include:

- The rise of the non-routine and complex in business and industrial practice.
- The increased competition between localities as multinational companies morph into global enterprises where the company’s country ‘flag of convenience’ becomes less and less salient to its investment decisions and their location.
- The growing awareness of the importance of inter-disciplinary and transdisciplinary frameworks and capabilities for addressing “wicked problems” like design, population health, or climate change.
- Open innovation paradigms and practices, and the growing recognition of the importance of non-linear, market-facing innovation processes, often driven from the user interface; increasingly the challenge for companies and institutions is how best to access the 98% of knowledge and new thinking generated *outside* the individual organisation.
- The growing awareness of the value of “embedded practice” in research and industry interfaces, especially where tacit knowledge and team learning is at a premium.
- The increasing recourse to models of shared infrastructure (such as with the Australian Government’s National Collaborative Research Infrastructure Scheme).
- The fundamental importance of information and social networks (*innovation flows*) in mobilising and catalysing knowledge and innovation assets (*stocks*).

There is a growing recognition that no individual, no firm and no region can “do it alone”. Today precincts are increasingly promoted as innovation hubs because precincts help address three important and inter-related functions within an innovation system, as follows.

1. The increased importance of cross-sectoral collaborations for both research and industrial outcomes.
2. The growing prominence of “wicked problems” requiring inter-disciplinary, cross sectoral and cross-functional skills and partnerships.
3. The demand for ‘interpretative spaces’ and open spaces for information exchange and discovery

Increased attention to cross-sectoral collaborations

National innovation policy in most countries now pays close attention to facilitating better linkages between different players within the innovation system, between firms, and across sectors. Particular attention is being paid to the linkages between universities and research institutions and industry. In Australia many government programmes aim to promote increased collaboration and co-investment, the realisation of which is often linked to co-location.

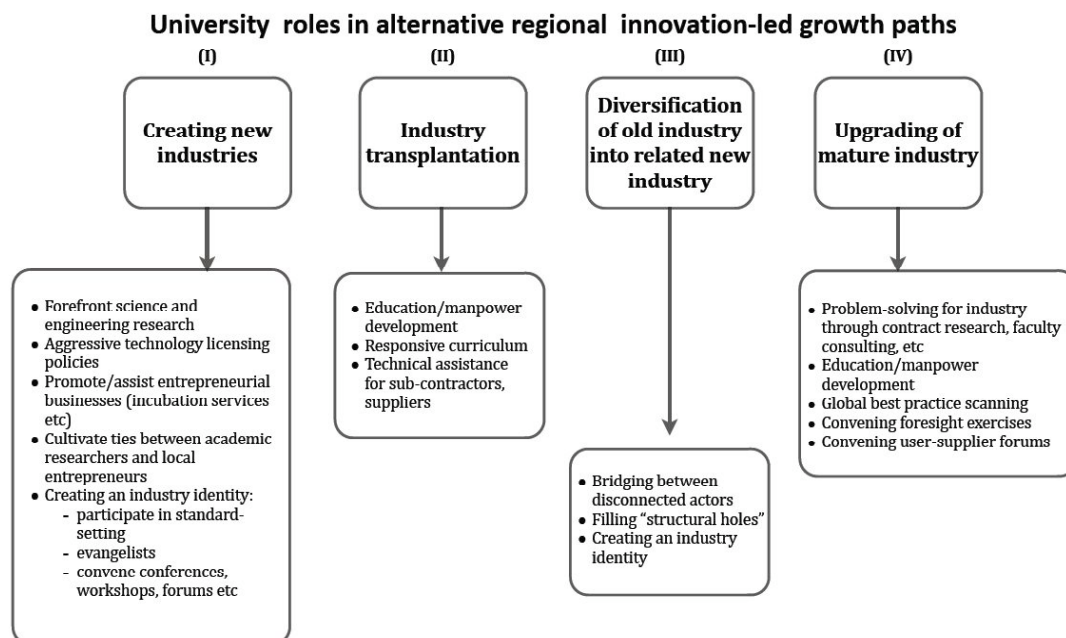
In recent years there has been considerable debate about the role of the university in economic and regional development and technology transfer. This matter received a lot of attention during the 2008 National Innovation System Review, and the issues have been best summarised by one of the international advisers to that Review, Richard Lester from MIT, in the following terms¹²:

The evidence shows that universities contribute to local innovation processes in a variety of ways. At present the major focus is on technology transfer. Many universities are seeking to exploit their laboratory discoveries by patenting and licensing intellectual property to local firms. But often this is not the most important contribution. In addition to their own discoveries, universities can help to attract new human, knowledge, and financial resources from elsewhere. They can help to adapt knowledge originating elsewhere to local conditions. They can help to integrate previously separate areas of technological activity. They can help to unlock and redirect knowledge that is already present in the region but not being put to productive use.

Very often the university's most important contribution is education. Another important indirect role is to serve as a public space for ongoing local conversations about the future direction of technologies and markets. The importance of the public space role of the university and its contribution to local innovation performance is often underestimated.

A key finding is that the university role in local innovation processes depends on what kind of industrial transformation is occurring in the local economy. New industry formation, industry transplantation, industry diversification, and industry upgrading are each associated with a different pattern of technology take-up and with a different set of university contributions.

Richard Lester provides a useful schematic¹³ of the alternative pathways for innovation-led regional growth. He distinguishes four distinct development models, which imply different patterns of collaboration and participant roles. This highlights the importance of clarity of purpose around the objective function of any interventions around precinct promotion.



Source: Richard Lester, 2005

¹² Richard Lester, *Universities, Innovation, and the Competitiveness of Local Economies: summary report from the local innovation project – phase I, December 2005*, Industrial Performance Centre, MIT, Page 3

¹³ *ibid.*, p. 28

The role of precincts in mobilising resources around wicked problems

Precincts are an important mechanism, in association with related policy instruments¹⁴, for addressing those “wicked problems”¹⁵ requiring inter-disciplinary, cross-sectoral and cross-functional skills and partnerships. These are often associated with areas of major societal concern, like population health, climate change, urban congestion, or food security. These call for sustained and continuing effort, and the mobilisation of skills and resources which are unlikely to reside within one organisation or institution. Innovation driven by “wicked problems” is therefore likely to require the collaboration and co-investment of multiple parties. Responding to these “solution seeking” challenges will give rise to mission oriented hubs of activity.

Horst Rittel first talked about wicked problems in 1973¹⁶. He described them as problems where the solution spawns new problems, not black and white answers. The characteristics of wicked problems have been subsequently defined by Jeffrey Conklin¹⁷ in the following terms:

You don't understand the problem until you have developed a solution
Wicked problems have no stopping rule
Solutions to wicked problems are not right or wrong, simply better, worse, good enough, or not good enough
Every wicked problem is essentially unique and novel
Every solution to a wicked problem is a “one-shot operation.”
Wicked problems have no given alternative solutions

Some of the great innovation challenges of our day are wicked problems: climate change, water, sustainable land and ocean management, urban congestion, population health, or food security. All six characteristics of wicked problems thwart tidy research and innovation funding processes which are more oriented to that other class of problem identified first by Rittel as *benign problems*, and later described by Conklin as *tame problems*. A *tame problem* also has six defining characteristics:

Has a well-defined and stable problem statement
Has a definite stopping point, i.e. when the solution is reached
Has a solution which can be objectively evaluated as right or wrong
Belongs to a class of similar problems which are all solved in the same similar way
Has solutions which can be easily tried and abandoned
Comes with a limited set of alternative solutions.

Benign problems or challenges are grist for the mill of individual firms or institutions specialising on a specific productive function.

Precincts, therefore, are an appropriate form of resource mobilisation around particular forms of societal challenge. They provide the opportunity to bring together *scope* (the breadth of resources required) and *depth* (the level of specialisation demanded). In attempting to operationalise and ground innovation theories it has proved useful to consider a ‘T-Bone’ policy model¹⁸. This forces attention towards two things. First, there is a ‘horizontal’ axis which spans and represents the relevant universe. Second, there is a vertical axis which represents depth or specificity as in, for example, a particular industry sector or a region. The intersection of the two axes forces attention towards the alignment and interdependencies between the generic or macro-economic, and the targeted or sectoral in the architecture of a

¹⁴ Such as government incentives and funding mechanisms (for example the Australian Cooperative Research Centre program or Australian Research Council Linkage Grants).

¹⁵ This outline draws on the helpful discussion in the submission to the 2008 Innovation Review from RMIT University’s Spatial Information Architecture Laboratory (SIAL), and discussions with its Director, Professor Mark Burry.

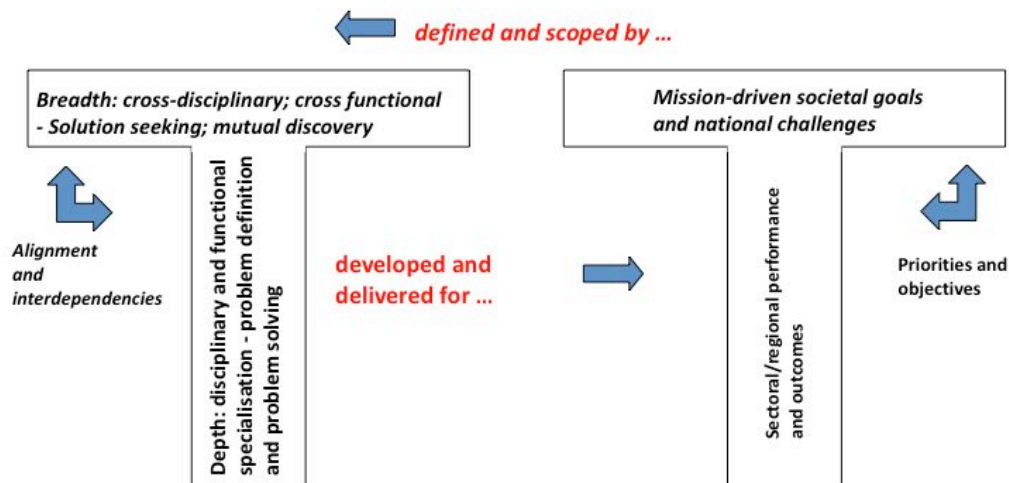
¹⁶ H. Rittel and M. Webber, “Dilemmas in a General Theory of Planning”, *Policy Sciences*, Vol. 4, 1973.

¹⁷ J. Conklin, “Wicked Problems and Social Complexity”, CogNexus Institute, 2001. Online at <http://cognexus.org/wp/wickedproblems.pdf>.

¹⁸ I am indebted to John Wilbanks, the CEO of Science Commons at MIT, for this metaphor and construct. IBM also talks about the “T model people” requirements of services science.

policy framework. A further aspect involves considering the best ways of linking and aligning capabilities or inputs on the one hand, and desired outcomes, impacts or results on the other. In the case of precincts this represents the alignment of human and social capital.

A 'T-BONE' POLICY MODEL FOR MATCHING CAPABILITIES TO OUTCOMES

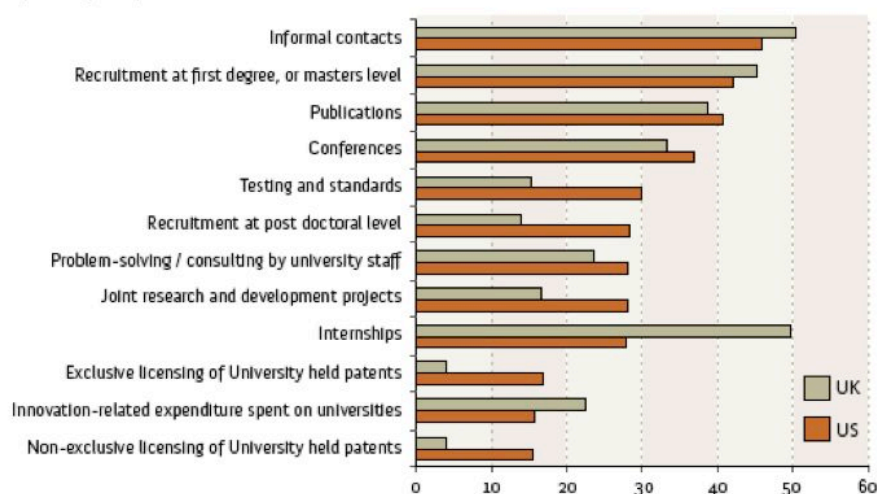


The need for 'interpretative spaces' and open spaces for information exchange and discovery

Richard Lester from MIT, makes a strong point about the different modes of innovation associated with analytical problem solving, the focus of much of the work in applied science and technology, and what he terms the interpretative or *solution seeking* processes around wicked problems. These interpretative processes are most useful when the possible outcomes are unknown and the task is to create them and understand their properties. This is where we need to call on the creative imagination and open-ended information exchanges and dialogue. We need places and forums that facilitate these processes¹⁹. Surveys of firms in the UK and the US have shown firms place a premium on informal interactions with universities, and it is clear that geographic proximity and ease of access to open forums will promote these type of interactions.

TYPES OF UNIVERSITY-INDUSTRY INTERACTION AROUND INNOVATION

(per cent of all companies)



Source: A. Cosh, A. Hughes and R. Lester, *UK PLC Just How Innovative Are We?* Cambridge MIT Institute 2005

¹⁹ See Part 2 especially of Tudor Rickards, Mark Runco and Susan Moger (eds.), *The Routledge Companion to Creativity*, Routledge, London and New York, 2009.

Innovation breakthroughs increasingly occur at the interface with end-users and customers. Precincts provide structural mechanisms for the practice of embedded innovation and research.

First principles for a successful innovation hub

I have stressed that each precinct will be unique in some manner. Ensuring success and monitoring progress and impact will involve clarity about the distinctive function of the particular precinct. There are however, some first principles that appear to have general application.

1. There should be clear common and shared purposes and strategic intent. The purpose and rationale for co-location must be able to be articulated. By contrast, many co-investments or partnerships can be pursued on a distributed basis (as in global supply chains).
2. The major precinct proponents should be able to articulate and subscribe to core operating values and principles which establish concordance around the 'rules of the game' and effective and appropriate - and proportionate - governance frameworks. The objective is to develop a space free from internal contradictions or from undue constrictions on the patterns of activity which are needed to give life to the spatial elements.
3. Demonstrated potential for added value. That is, there is a greater benefit for a participant from co-location - in terms of doing something better, faster, cheaper - than on a standalone basis. This benefit may be immediate, or prospective. In the case of prospective benefits participation may provide future growth options which might not otherwise exist. The test question is what might a participant be able to do beyond that which was possible previously or on a standalone basis.
4. Transaction and co-ordination costs should be lower within a precinct than would otherwise be the case, as a function of trust and social networks minimising the requirement for institutionalised contracting and risk-shifting²⁰. A sustainable precinct must combine investments in both innovation *stocks* and in innovation *flows* and non-traded interactions.
5. Generic program or policy design principles - adapted to particular circumstances - are applicable to precinct initiatives. [See annex attached].
6. Some 'natural' market organiser or 'curator' of a putative precinct is needed who functions to broker and facilitate relationships. This role may vary, in function and assignment, over the life cycle of a precinct and may be formal or informal.
7. There is a need for mechanisms to ensure ongoing motivation through champions and achievement reports²¹.

²⁰ Issues around this challenge of reducing barriers to collaboration are comprehensively addressed in Brian Fitzgerald and Anthony Austin (eds.), *Legal strategies for streamlining collaboration in an e-Research world*, Queensland University of Technology, Brisbane 2008

²¹ This wording is taken from J. Pope and J. Lewis, "Improving Partnership Governance: Using a Network Approach to Evaluate Partnerships in Victoria", *Australian Journal of Public Administration*, Vol. 67, No 4, December 2008, p. 453

Annexure: General design principles and evaluation criteria²²

Adherence to clear design principles is the best way to avoid flawed developments and unintended consequences. Well-designed initiatives should reduce inefficiencies in the innovation system and the extent of ‘innovation regulatory red tape’. Too often basic design principles and *ex ante* evaluation criteria are simply not observed nor applied thoughtfully.

Designing sound initiatives essentially revolves around identifying the best solution to a problem or opportunity. Gary Banks, the Chairman of Australia’s Productivity Commission, recently provided a succinct overview of the key steps in good policy development.²³

Key steps in best practice policy development

Developing the best policy approach to a particular social, environmental or economic issue requires systematic processes to ensure that the ultimate decision is as well informed as possible and therefore unlikely to have adverse or unintended consequences. The key steps are:

- *Understand the nature of the problem or issue and its causes.*
- *Determine why some form of policy intervention is called for and thus specify the policy objective.*
- *Outline the range of possible policy options (including non-regulatory approaches).*
- *Assess their relative efficacy in addressing the problem, and their impacts (costs and benefits) across different parts of the economy and sections of the community.*
- *Choose the option that maximises net social benefits, taking all impacts into account.*
- *Develop an effective implementation strategy to avoid undue transitional costs, and monitor the outcome.*

In 1998 Australia’s Productivity Commission undertook a comprehensive survey of design principles for business programs,²⁴ the so-called Lattimore Review. This provides an excellent reference point and resource, and continues to be a reference model in Productivity Commission reviews. The following checklist is adapted from this framework, and its further elaboration in the recent Commission report on public support for science and innovation.²⁵ Some agencies have developed guidelines for specific purposes – for example, CSIRO has useful templates for evaluating possible joint ventures and third party relationships – and there is scope for greater syndication of best-practice approaches.

²² This outline developed work initially undertaken by the author for the United Nations Commission for Latin America and the Caribbean and refined during the 2008 Review of Australia’s National Innovation System.

²³ Gary Banks, *Public inquiries in policy formulation: Australia’s Productivity Commission*, address at China-Australia Governance Program, Beijing, 3 September 2007

²⁴ Ralph Lattimore, Barbara Martin, Alan Madge and James Mills, *Design Principles for Small Business Programs and Regulations*, Productivity Commission Staff Research Paper, Canberra, August 1998

²⁵ Productivity Commission, *Public Support for Science and Innovation, Research Report*, Canberra, March 2007, see Chapter 10.1

Design principles for innovation programs and initiatives

Clarity about the problem or opportunity to be addressed

Is there a clear and unambiguous statement of objectives and rationale? Does the policy or program target the problem effectively?

Inducement effect (additionality or behavioural change)

Is it clear how policy or program incentives will affect behaviour? Will it induce the desired new or different activity? Is it likely to have acceptable take-up? Is the scale of the program or initiative consistent with the desired outcomes?

Contestability and transparency

Should there be contestable funding or incentive arrangements? Deliberate choices should be involved in deciding between contestable or non-contestable arrangements.

Consistency and strategic fit

What are the possible interactions with other initiatives or public policies? Where does this policy or initiative fit within an overall portfolio of policy and activity?

Duration

How long would the initiative or program need to be in place to begin to produce the desired outcomes, or to produce sustained results? It is also worth considering whether there is scope or benefit in investment 'tranches', as in a venture capital model of migration through a development cycle.

In addition to program duration, there is an ancillary question about the presumed lifecycles for participation by individual entities (this refers to expected or desired churn or turnover in participation).

Calculated risk

The foundation of risk criteria is the understanding of the nature of risks and the difference between risk and uncertainty.

Lattimore *et al* express risk criteria in terms of 'the avoidance of risk' and this can lead to a policy or industry culture of risk aversion. The more basic foundation of risk criteria is *the understanding of the nature of risk*. Research and entrepreneurship entail risk by definition. In science, for example, progress is made by the falsifiability of the current state of knowledge, with as much learning arising from null hypotheses as from proofs. There is inevitably waste within a robust innovation system, but the key issue is how to capture the lessons from apparent failure. Most things involve risk. The appropriate test revolves around assumptions about the profile of risk and the potential return: is this worth the risk? Good public policy formulation will explore the appetite for risk and proceed on the basis of calculated risk. Some assessments of high risk and high return might, for example, lead to policy models built around experimentation, or pilots. These are standard processes in leading-edge industrial innovation, which often proceeds through a cycle from proof-of-concept (does it work in test conditions?) to pilot plants (can this be scaled to industrial strength?). Public policy discussions sometimes conflate these notions of experimentation and piloting to the detriment of appropriate outcomes.

Nonetheless, there are some special aspects of risk that are usefully addressed by design principles.

**Risk management:
(i) Adverse
interactions with
other programs**

This calls for attention to the possibility of conflicting signals arising from different programs or policies.

The flipside is to look for ways in which different programs might be rendered more complementary and mutually reinforcing. This is particularly important where program interventions or undertakings occur at specific points in a value chain. Both the potential positive and negative impacts on upstream or downstream activity or behaviours needs to be examined. The risk of isolated interventions at a single point of the innovation system is that outcomes may become stranded or orphaned, with no path to impact.

**Risk management:
(ii) Unforeseen
liabilities and 'moral
hazard'**

The biggest pitfalls arise from inadequate attention to possible 'contingent liabilities' for individual participants, or the 'moral hazard' of policies that might leave individual participants captive to the claims of sectional interests.

**Risk management:
(iii) Strategic
behaviour by firms**

This is code for the risk that parties may be able to 'game' the system. Poor program design may leave the way open for unexpected behaviours, some of which might undermine the integrity of a policy or initiative.

The real risk in public-private partnerships often arises from the mutual incomprehension of the operating context and culture of the other. Where one party sees an opportunity to take advantage of blind spots on the part of the other, this risks undermining the intended alignment of interests in certain outcomes. It will also breed suspicion and lack of trust.

The design test is to ask how a self-interested, commercially savvy party would seek to optimise the private benefit from a public program or initiative. There are several ways in which this can be done. The first design strategy is the 'hacker challenge' in computer software, where developers co-opt hackers to fireproof a system design. Where the stakes are high, this strategy can be used in public program design. Retain the smartest commercial operators to tell you all the ways they could find to 'rort the system'. More generally, it is valuable for private sector participants in public-sector governance or evaluation processes to provide a sense of how programs might operate in the real world. For example, anyone with a business background would quickly point out that a small incremental tax benefit with high compliance costs is unlikely to have much industry impact. Another example is in the area of judging the points at which 'additionality' might kick in as the threshold below which a firm or entity would be likely to undertake an activity anyway.

**Administrative and
compliance efficiency**

Although this is an obvious design principle, it is frequently ignored in practice. Problems arise when there is a mismatch between an incentive instrument or funding mechanism and the administrative framework, such as where a small initiative or aspect of a development involves complex rules and assessment procedures. A proportionality principle should apply.

Accountability and transparency	<p>The strongest mechanism to promote accountability and transparency is the timely and open reporting of activity. The default position should be full public disclosure unless there are sound reasons for the introduction of limitations (such as privacy implications or commercial sensitivities). Where commercial sensitivities limit disclosure there should be robust audit or review processes to provide assurance about the integrity of programs and initiatives.</p>
Compliance with international or other regulatory obligations	<p>There has been increased focus on compliance with international treaty or other regulatory obligations in policy design. Unfortunately, often little expert knowledge is brought to bear on such compliance, leading to unnecessarily barren policy frameworks or development initiatives. On occasion a misrepresentation of regulatory rules will be used either as an alibi for inaction or to unnecessarily limit the freedom of action of third parties.</p>
Evaluation, monitoring and reporting	<p>The key principles here are:</p> <ul style="list-style-type: none"> • developing evaluation criteria and reporting requirements <i>ex ante</i>; • requiring <i>ex ante</i> and <i>ex post</i> performance data; • ensuring the independence of the review function as an audit process; and • achieving proportionality. <p>In monitoring frameworks, there is scope for greater attention to be given to lead as well as lag indicators.</p>

Annexure: Barriers to interaction: Fence around CSIRO campus at Monash University



Photo courtesy Dr Rod Hill, Monash University, 2008