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Wicked Problems in Public Policy

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Some of the most difficult policy problems of the modern era have been described as complex, intractable, open-ended and 'wicked'. What are the key features of such problems? And are they really very different in nature from more routine problems? Are we developing better ways to address these wicked problems? This paper sketches some key aspects of wicked problems, and illustrates the discussion with two contemporary Australian examples – recent attempts to address the causes and possible solutions to Indigenous disadvantage; and policy responses to climate change.

There is a growing literature on 'wicked problems', which are generally seen as complex, open-ended, and intractable. Both the nature of the 'problem' and the preferred 'solution' are strongly contested. This paper outlines the main features of this debate and considers why these issues have been attracting more attention in recent times, both conceptual and practical. There has been surprisingly little attention in the research literature as to how wicked problems are identified, understood and managed by practitioners concerned with policy and management. The paper suggests there are new challenges for both researchers and practitioners in coming to grips with these issues. Standard public management responses to complexity and uncertainty (markets, outsourcing, regulatory prescription) seem to be inadequate. New process responses (joined-up government, cross-sectoral collaboration, mediation and conflict reduction processes) are increasingly being tested. We appear to require some new approaches for addressing the multiple causes of problems, opening up new insights about productive pathways for better solutions, and thus gaining broad stakeholder acceptance of shared strategies.

Background: the emergence of wicked problems

The discourse around 'wicked' problems emerged more than thirty years ago. A variety of critiques had emerged concerning the perceived dominance of rational-technical or 'engineering' approaches to complex issues of social policy and urban planning. Firstly, public administration critics of complex policy programs (e.g. the US programs in the late 1960s designed to alleviate poverty, housing and unemployment problems in disadvantaged urban areas), claimed that success was virtually impossible, because the required levels of information, goal-clarity, and coordination were too difficult to meet (Pressman and Wildavsky 1973). The message was that decision-makers should be less ambitious, and should be content to tackle more carefully defined and manageable elements of large problems rather than become over-committed to a comprehensive or 'blueprint' approach.

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A second group of critics, based in social policy analysis, argued that technical approaches are bound to overlook the values, perspectives and lived experience of the stakeholders and citizens who are directly or indirectly assisted or involved in these interventions. According to this critique, the growth of scientific and technical expertise alone cannot resolve difficult policy problems. The big and difficult issues should be seen as based on competing views and value frameworks. Addressing such problems requires deliberation and debate concerning the nature of the issues and exploring alternative ways forward. This deliberative process of solution-seeking, with its recognition of perspectives and values that 'frame' the definition of problems, is quite different from top-down imposition of technical solutions, or from expertise-based solutions arising from the growth in empirical knowledge (Rein 1976, Schon and Rein 1994).

The most challenging and wide-ranging critique of orthodox planning rationality emerged in Rittel and Webber's famous paper, "Dilemmas in a General Theory of Planning" (Rittel and Webber 1973). Building on work in the 'decision sciences', they declared that the days of solving major urban and social problems through an 'engineering' approach have ended. Modern society is too pluralistic to tolerate imposed and artificial solutions. Social groups have important differences in attitudes and values that undermine the possibility of clear and agreed solutions. The finite problems tackled by science and engineering are relatively 'tame' or 'benign' – in the sense that the elements of a mathematics problem are definable and solutions are verifiable. By contrast, modern social problems are seen as 'ill-defined', inter-linked, and relying on political judgments rather than scientific certitudes. In this sense, most major public policy problems are 'wicked' (Rittel and Webber 1973: 160), i.e. they are inherently resistant to a clear statement of the problem and resistant to a clear and agreed solution. Science cannot resolve these dilemmas by filling the gaps in empirical knowledge.

Rittel and Webber (1973) identified ten primary characteristics of wicked problems:

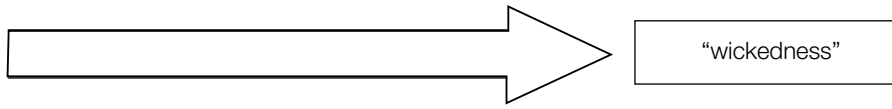
1. There is no definitive formulation of a wicked problem, i.e. even the definition and scope of the problem is contested;
2. Wicked problems have no 'stopping rule', i.e. no definitive solution.
3. Solutions to wicked problems are not true-or-false, but good-or-bad in the eyes of stakeholders.
4. There is no immediate and no ultimate test of a solution to a wicked problem.
5. Every (attempted) solution to a wicked problem is a 'one-shot operation'; the results cannot be readily undone, and there is no opportunity to learn by trial-and-error.
6. Wicked problems do not have a clear set of potential solutions, nor is there a well-described set of permissible operations to be incorporated into the plan.
7. Every wicked problem is essentially unique.
8. Every wicked problem can be considered to be a symptom of another problem.
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways.
10. The planner has no 'right to be wrong', i.e. there is no public tolerance of initiatives or experiments that fail.

Many scholars have found these features to be helpful in explaining the difficulties that have plagued some areas of urban planning, social policy, and environmental and natural resources policy (e.g. Allen & Gould 1986, Freeman 2000, Kepkay 2002, Campbell 2003, Van Bueren et al 2003, Salwasser 2004, Conklin 2006). The attraction of the 'wicked problem' concept is that it seems to provide additional insights concerning why many policies and programs generate controversy, fail to achieve their stated goals, cause unforeseen effects, or are impossibly difficult to coordinate and monitor. Even the business management literature is re-discovering 'wicked problems' as a way of understanding the role of business strategy in making sense of chaotic economic behaviour under conditions of risk and uncertainty (Camillus 2008). It is not clear, however, that labeling a problem as 'wicked' will readily assist in solving it. Nevertheless, this approach might help to generate wider understanding of strategies available for managing and coping with complex and chaotic issues.

According to Koppenjan and Klijn (2004), writing from a public management perspective, 'uncertainty' is a core feature embedded in all the institutional and knowledge aspects of our attempts to deal with 'wicked' problems. However, this approach is argued in the present paper that uncertainty is inherent in all areas of social life, and even high levels of uncertainty may not be sufficient to tip an issue into the category of wicked problems – it is also necessary to explore levels of complexity and the extent of value-based divergence among stakeholders.

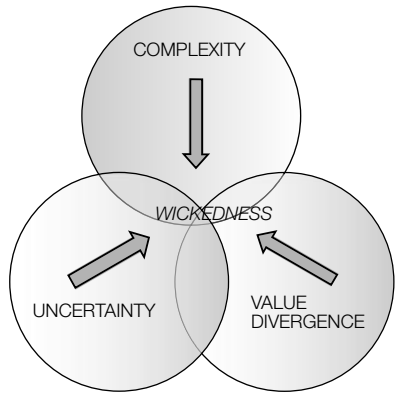
Table 1: Complexity, uncertainty and divergence

Complexity of elements, sub-systems and interdependencies	Low	Moderate	High
Uncertainty in relation to risks, consequences of action, and changing patterns	Low	Moderate	High
Divergence and fragmentation in viewpoints, values, strategic intentions	Low	Moderate	High



In principle, it should be possible to 'map' issues in terms of low, moderate or high levels of complexity, uncertainty, and divergence, as represented in Table 1. Wicked problems, on this view, would be those rating highly across these three dimensions. Complexity is clearly a constituent feature of wickedness, but complexity itself is not enough to trigger a wicked problem since there are many aspects of complexity that are amenable to scientific analysis and technical/engineering controls. There are many complex economic and social phenomena (with their respective 'maps', e.g. regional economic activity modelling) which are difficult to estimate precisely, but which are not thereby wicked. Likewise, mere disagreement among stakeholders does not make a problem wicked, but when serious disagreements are combined with complexity and uncertainty we have crossed a threshold. These reinforcing relationships, representing an intensification of 'wickedness', are outlined in Figure 1.

Figure 1: 'Wicked' as a combination of complexity, uncertainty and divergence



It is important to emphasise that these patterns could be very different across various policy issues or problem domains. The patterns will also change over time as old settlements become undermined by circumstances; new issues move into the political attention cycle; or new policy instruments are freshly applied to a wider range of areas. Responsibility for recognising and responding to particular problem-areas may also shift over time. Many issues have been re-defined as matters for *public sector* responsibility over the last century or so, but this allocation is open to debate and constantly adjusted. Thus, responsibilities for many issues are perceived as lying largely with *non-government* actors: individuals, parents, families, neighbourhoods. Some issues may be seen as best handled through *market* mechanisms (exchange, trading, pricing) where business enterprises will play a larger role. In other policy areas, not-for-profit community organisations, charitable associations and churches may be seen as having a greater role. It is also important to note that wickedness is not just about a clash of ideas and values; it is also implicated in structures, processes and institutional arrangements including power, authority, and procedural rules.

A few brief examples illustrate some of these points. In some cases, a major project initiative may be widely recognised as deeply marked by complexities and uncertainties (e.g. building a new electronic information system); but the challenges are nevertheless regarded as matters for technical experts to resolve following initial scoping discussion with a few key stakeholders (e.g. the system owner and any key clients). By contrast, the issues arising in other types of projects (e.g. building a new freeway to reduce metropolitan traffic congestion) might be regarded as involving significant technical expertise (e.g. engineering specifications, cost controls), but the overall project challenge is much broader than technical-experts can resolve because both the goals and the methods are likely to be heavily contested by a wide range of stakeholders directly or indirectly affected by the proposal. Taking a different example, uncertainty and value-disagreement may both contribute to conflict on some policy matters (e.g. genetically-modified crops), but other forms of risk and uncertainty might generate social cohesion rather than conflict (e.g. fear of external aggression could generate a widespread desire for strong central action to improve public security, even if the probability of violence is low). In another variation, some areas of uncertainty may generate strongly felt disagreements about problems and solutions, and could lead to a gridlock of fixed positions (e.g. the early debates about 'sustainable development' and the inherent 'trade-offs' between economic growth and environmental values).

Can Wicked Problems Be Solved?

There are an increasing number of policy areas where traditional approaches are seen as having failed to 'deliver the goods'. Traditional is here taken to mean both technical (expert-driven) solutions, as well as routine administrative solutions (bureaucratic business as usual). To the extent that traditional approaches to management and problem-solving are seen as having failed to provide effective or successful long-term outcomes in many problem areas, open dialogues among stakeholders and experts to seek 'new ideas' (e.g. ideas summits) are sometimes initiated to 'snowball' some possible ways forward. Where issues are more intensely important to specialised or targeted stakeholders, negotiated accommodations among key participants may be seen as necessary and appropriate. Under such conditions – negotiated goals, open processes, battling to address complex causal pathways – the effectiveness and longevity of traditional solutions may indeed be problematic.

In some cases the key challenge is to unpack and discuss entrenched differences. The pathway most commonly adopted in this instance is mediated dialogue, seeking to explore common ground about longer term goals and directions, and interim steps for moving forward together. The substantial research literature on conflict resolution (e.g. Susskind et al 1999) has analysed many scenarios and provided advice on how to address 'intractable issues'. This literature is helpful in drawing attention to the role of values, the nature of the parties in dispute, issue-histories, and the organisational context for dispute-resolution (see Table 2). All of these matters are relevant to assessing the depth and breadth of problems and the prospects for well-informed and cooperative solutions.

Table 2: Sources of Intractable Conflicts

	More Tractable	More Intractable
Parties	*Bounded* Well-organised Clearly Defined Members Roles and Mission	*Diffuse* Unorganised Loose Collective Members Roles and Mission Lacking Structure
Issues	*Consensual* Agreement on Values Disagreement on Allocation	*Dissensual* Fundamental Value Differences
Social System	*Prescribed* Well-defined Structures Clear Procedures and Rules Legitimate Authority	*Ambiguous* Ill-defined Structures Uncertainty in Procedures Absence of Clear Authority
Conflict Process	*De-escalated* Contained and Focused Commitment to Resolving Issues Conflict Cycles Broken Up	*Escalated* Growth in Parties, Issues and Costs Polarisation and Segregation Conflict Spirals

Source: Putnam and Wondolleck (2003: 45).

This research on the potential contribution of carefully designed forums – for mediation, conflict reduction, dialogue and deliberation – is highly relevant for assessing the nature of major problems. Understanding the perspectives of key stakeholders, the knowledge bases available, the extent of agreement on broad goals, and the prospects for developing shared expectations, can provide a sound basis for considering how further engagement should occur and how future decisions should be made. These processes can help address the insecurities arising from uncertainty, complexity and divergence. The role of facilitated dialogue, as an element of robust community consultation (Head 2007), is highly relevant for many elements of the 'policy cycle' including policy design and development, program evaluation and review, and in practical problem-solving to improve implementation.

Failures and under-performance are common in most areas of policy design and program delivery. How are these to be explained? It is argued here that conventional explanations usually tend to focus on weaknesses and deficiencies in the public sector's *implementation and delivery* mechanisms. These might include a lack of skills or competences, inadequate funding, poor communication and consultation, lack of commitment and persistence over time, and lack of authority to achieve the right level of coordination. These are all very important capabilities. However, the concept of wicked problems potentially adds another layer of explanation and new research questions, focusing mainly on the understandings that have shaped problem-identification and thus the frames for generating problem-solutions. On this line of explanation, failures and unintended outcomes are likely to be endemic in many complex areas of policy and program delivery, for several reasons:

1. The 'problems' are poorly identified and scoped.
2. The problems themselves may be constantly changing.
3. Solutions may be addressing the symptoms instead of underlying causes.
4. People may disagree so strongly that many solution-options are unworkable.
5. The knowledge base required for effective implementation may be weak, fragmented or contested.
6. Some solutions may depend on achieving major shifts in attitudes and behaviours (i.e. future changed conduct on the part of many citizens or stakeholders); but there are insufficient incentives or points of leverage to ensure that such shifts are actualised.

If there is no single 'root cause' of complexity, uncertainty and disagreement, and therefore no root cause of 'wickedness', it follows that there is no single best approach to tackling such problems. If, for example, it is claimed that the fundamental *cause* of wicked problems is lack of scientific knowledge (e.g. about climate change), this claim already implies a solution – more scientific research is needed to fill gaps, reduce uncertainty and provide the base for clear and agreed solutions. On the other hand, if the fundamental problem is seen to be divergence of viewpoints, the implied solution is to establish processes of participation, debate and mediation that lead to a workable consensus. This analysis confirms the general point, made by Rittel and Webber (1973) and Schon and Rein (1994), that problem-definition tends to imply a preferred solution. Hence, some caution is required with all proposed methods for addressing wicked problems, as they are all likely to be inadequate in various degrees.

What are some current examples of 'wicked' problems? A long list of complex and intractable issues can be readily generated. It is useful to distinguish initially between domestic policy issues and international issues. Domestic policy areas in Australia (and similarly in the USA, Canada, etc) marked by wicked problems would include:

- Child protection policy and service systems.
- Self-harming ('unhealthy') behaviours (e.g. in relation to drugs, smoking, alcohol, junk food).
- Urban transport planning and services.
- Overcoming Indigenous disadvantage (in many related fields, such as education, health, income, jobs, etc).
- Sustainable use of natural resources and ecological assets (especially in the face of population growth and climate change).

These are big issues, which involve many aspects and dimensions. One is the spatial scale of issues and proposed solutions, ranging from very small localities, through sub-regional areas and up to the national scale. The behavioural unit to be targeted by policies will likewise range from individuals, households, neighbourhoods and suburbs through to larger regional and nationwide scales. The inter-connections between these levels are also important to consider.

At an international level, there are many policy areas marked by wicked problems, including:

- Social development in post-conflict societies (e.g. international aid programs for Papua New Guinea, Solomon Islands, Timor-Leste).
- Peace settlements in divided societies in the Middle East, and in the Balkan states.
- International or global regimes for greenhouse gas reduction.

These examples, both domestic and international, show that problems are often 'nested' and interdependent. This feature raises great difficulties both for clear analysis and for devising practical interventions to tackle the problems. Is it necessary to have a comprehensive understanding before being able to provide sound analytical commentary or being able to provide well-grounded recommendations for program improvements?

Political and Managerial Responses to Wicked Problems

Politicians are often keen to pursue 'solutions' even when the evidence is uncertain or when the citizens disagree on key issues. They will not wait for all uncertainty to subside before they choose to act. Such politicians generally like to be seen as 'decisive', by taking action to address issues. Sometimes this preference is driven by ideological zeal. However, others take a more cautious and conservative approach, unwilling to over-commit their governments to finding a solution to intractable issues. In practice, the majority of politicians tend to focus on highly visible or tangible pieces of the puzzle, rather than insisting on a comprehensive approach to issues. This preference is reinforced by administrative and budgeting processes which are predisposed towards tangible outputs and the measurement of incremental changes. Political and financial accountability systems encourage the specification of discrete and finite items rather than large amorphous interlinked outputs.

Hence, an incremental approach often prevails, even while sometimes acknowledging that many small steps are needed towards a larger end-goal. Politicians have a fondness for distributing cheques, unveiling plaques, and cutting ribbons. Funding specific facilities (e.g. roads, buildings) or specific services (e.g. extra nurses or police in remote locations) is more attractive for most Ministers than the making of vague promises to reduce poverty or overcome disadvantage. A focus on providing specific facilities and services becomes associated with a particular skill-set within the public bureaucracy, highlighting skills in project management rather than strategic leadership and policy innovation. This incremental focus on 'cherry-picking' of problems may be seen as a useful political tactic for 'coping' with complex wicked problems – deal with manageable elements today, while recognising that there will be other aspects to tackle tomorrow. However, the short-term tactics may deliver little in the longer term unless other actions are being taken, including the collection of baseline data about the nature of the issues and evaluation data about the impacts of current and previous interventions.

Public management research, taking some cues from public management practice, has begun to address not only the conceptual difficulties but also the practical challenges of tackling 'wicked problems' and complex uncertainties. Three relevant managerial trends attracting attention in recent decades have been new public management (NPM), cross-agency coordination, and more inclusive approaches to stakeholder engagement. Firstly, NPM has sought systematic improvements in the efficiency of public sector agencies and hence in their capacity to improve services (McLaughlin et al 2002). NPM has allowed some re-thinking of traditional ways to define program goals and instruments, with potential gains in resource efficiency and program effectiveness. Moreover, risk-management techniques have been used to assess and mitigate a range of risks to institutional capability and program implementation, for example, in relation to agencies' own resources, skills and capabilities, and also in relation to external threats to service delivery (Drennan and McConnell 2007). Secondly, cross-agency coordination has been highlighted as a higher priority for government, as more issues seem to require a connected approach across portfolios within each jurisdiction and across levels of government (Management Advisory Committee 2004). Coordination among public agencies (e.g. across portfolios for education, health, justice, community development) is just as important as coordination between the government sector and business and community sector organisations. Thirdly, a number of complex issues have required closer consultation and engagement with non-government stakeholders, with more collaborative and networked approaches being trialled (Roberts 2000, Mandell 2001, Goldsmith and Eggers 2004).

In the era of complex and intensively negotiated 'wicked' issues, the repertoire of strategies required for senior public managers is constantly being extended. A recent Australian Government discussion paper on wicked or intractable problems (APSC 2007) suggests that the general aim of government when dealing with intractable problems should be to achieve 'sustained behavioural change' through 'collaboration' as a response to 'social complexity'. The report outlines several techniques that could be employed, emphasising that new processes and thinking are required. For example (APSC 2007: 35-6):

- *The ability to work across agency boundaries* — as wicked problems do not conform to the constraints of organisations there is a need to work across agency boundaries.
- Increasing understanding and stimulating a debate on the appropriate *accountability framework* — existing frameworks may constrain attempts to resolve wicked problems.

- *Effectively engaging stakeholders and citizens in understanding the problem and in identifying possible solutions* — there is a need to understand the full dimensions of each situation through engaging with relevant stakeholders. Behavioural changes, the report suggests, are more likely if there is a full understanding of the issues by stakeholders.

- *Additional core skills* — develop skills in communication, big picture thinking and influencing skills and the ability to work cooperatively.

- *A better understanding of behavioural change by policy makers* — although the traditional ways by which governments change citizens' behaviour will still be important (e.g. legislation, regulation, penalties, taxes and subsidies), such practices may need to be supplemented with other behaviour-changing tools that better engage people in cooperative behavioural change.

- *A comprehensive focus and/or strategy* — as wicked problems have multiple causes they require sustained effort and resources.

- *Tolerating uncertainty and accepting the need for a long-term focus* — solutions to wicked problems are provisional and uncertain, and this fact needs to be accepted by public managers and Ministers. There are no quick fixes and solutions may need further policy change or adjustment.

These suggestions indirectly point to the enormity of the challenge for the public sector in an age of complex and intractable problems. The discussion paper points to the need for major cultural and operational changes in the way senior managers and political leaders undertake their work, and the ways in which agencies relate to stakeholders and the wider community. It is clear that management education would need to be adjusted accordingly. However it is not at all clear that governments have the will or the capacity to make the necessary changes, including a whole-hearted commitment to stakeholder inclusion at the heart of policy development.

Two Examples of Wicked Problems

To illustrate the concept of wicked problems, some very brief comments are made below on two current problems attracting major attention and debate within Australia:

- Attempts to assess the causes and possible solutions to Indigenous disadvantage, understood here as a linked series of economic, social and cultural issues at national and state levels.

- Policy responses to climate change, understood here as a linked series of 'sustainable development' issues encompassing both national and state politics.

Indigenous Disadvantage

The well-being of Indigenous Australians represents perhaps the most complex series of inter-connected issues in domestic public policy. The issues pertain to every level of government in the federation, all domains of human services, cultural diversity issues, and urban/rural/remote geographies. After many decades of new programs and models for service delivery, and extensive research on the nature and extent of disadvantage – summarised by the Productivity Commission (2003 and 2007) – there is great frustration

concerning persistent poor outcomes for Indigenous people, both in rural and urban communities. The documentation of disadvantage is now considerable, and has been enormously important in galvanising political attention. Governments have made political commitments to 'closing the gap', and the Council of Australian Governments (COAG) has adopted the Productivity Commission's reporting framework on Indigenous disadvantage indicators. But the evidence concerning inequalities does not directly leverage reliable knowledge about the most appropriate policy responses.

From a 'knowledge' viewpoint, understanding the multiple dimensions, and multiple causes, of complex problems is a foundation for generating evidence-informed views about the key points of leverage to drive improvements. The general research literature on developmental well-being points to the reinforcement effect of multiple and inter-generational disadvantage, whereby a downward spiral may be generated that is very difficult to transform (e.g. Silburn et al 2006, Hunter 2007a). In the face of complex multiple disadvantage, it is important to develop clarity about which factors can leverage the most important benefits. Opinions diverge on this key point.

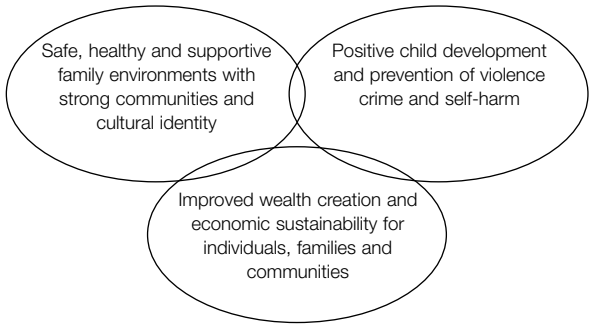
Some recent writers have urged that the key for reversing these massive inequalities is to accelerate Indigenous participation in the mainstream economy, with its attendant requirements of education and training in relevant skills (Hughes 2007). This would entail recognition that many remote communities could not remain viable as locations where residents could expect to access the full range of economic services and publicly-funded social support services. Indigenous people would need to accept greater mobility to access the real economy and ancillary services. According to Johns (2008), the impasse concerning Indigenous inequality has arisen primarily from the unwillingness of political leaders to accept a viable economic strategy for Indigenous communities – a higher level of economic integration is necessary, according to Hughes (2007) and Johns (2008), if Indigenous well-being is to be advanced. Implicitly the 'wicked' features of the policy challenge are dissolved by claiming that a remedy is available to overcome the 'confusions' of previous approaches based on self-determination and welfarism.

Other writers, equally anxious for rapid improvement in Indigenous well-being, regard this economistic interpretation as one-sided in its lack of attention to social and cultural issues and its dismissal of stakeholder viewpoints. Breaking with the past will always mean that some viewpoints will be over-ridden, but this should only occur after thorough dialogue with Indigenous stakeholders to promote understanding and support. Noel Pearson and the Cape York Institute have developed a strong critique of 'welfarism' as encouraging passivity and anti-social behaviour rather than self-management, cultural strength, and skills for the 'real world'. A range of social, economic and cultural programs have been recommended including the conditionality of welfare payments in order to provide incentives for positive parenting and the acquisition of work skills (Cape York Institute 2007). This thinking, with its high focus on education and community safety, has been influential with the Commonwealth Government and with some states, especially Queensland.

An important attempt to outline a 'program logic' underlying the necessary process of policy change is the Productivity Commission's framework, linking desired outcomes for individual and family well-being (e.g. safety, health, skills, etc) with headline indicators for the ongoing monitoring of these outcome areas. These social and economic indicators have been informed by a broad social-science research base. Most critically, the schema identifies

seven key areas for strategic action (see Figure 2). These areas range across child development, education, health, community functioning, and employment issues. These seven strategic areas are described as the key levers for delivering benefits for Indigenous Australians, and are therefore important in shaping policy thinking for all governments in the context of COAG. While a multi-layered approach seems highly desirable, and all these strategic areas are arguably very important, the wide-ranging nature of the schema raises some questions about generalisation across different circumstances, the interaction patterns between the variables, and the basis for targeted policy priorities in specific locations.

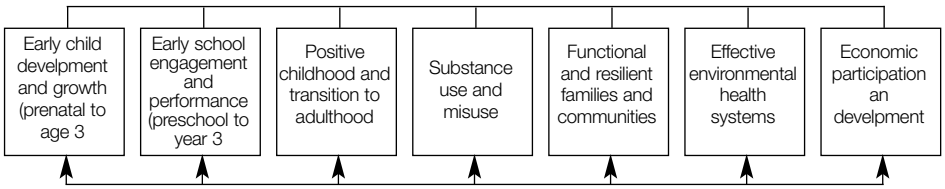
Figure 2: "Overcoming Indigenous Disadvantage" Framework



Headline indicators

- Life expectancy
- Disability and chronic disease
- Years 10 and 12 retention and attainment
- Post secondary education Participation and attainment
- Labour force participation and unemployment
- Household and individual income
- Home ownership
- Suicide and self-harm
- Substantiated child abuse and neglect
- Deaths from homicide and hospitalisations for assault
- Family and community violence
- Imprisonment and juvenile detention rates

Strategic areas for action



Source: Productivity Commission (2007).

Responsibility for outcomes has long been dispersed and fragmented across governments, leading to the COAG decision by government leaders in 2002 to jointly monitor progress in overcoming the major gaps in quality of life, health and education of Indigenous Australians. Despite the COAG framework, there remains considerable ambiguity at the political and policy levels about where responsibilities lie for funding and coordination. State and Commonwealth initiatives are both important, and there are risks that achievements in one area might be undermined by poor progress in others. Many policy initiatives have been launched in recent decades on specific issues such as healthcare, schooling, employment, housing, drug abuse, child protection, etc. There has been a massive discontinuity and reinvention of programs, as the Commonwealth and state governments have wrestled with program delivery and a variety of policy governance models (Hunter 2007b). These have

ranged from mainstream bureaucratic programs through to experiments in partial self-determination by land councils and local communities. While decision-makers now have better information about problems, knowledge about how to tackle service delivery in a more devolved and partly-collaborative context is sparse. Rigorous 'testing' of alternative delivery models (e.g. in randomised controlled trials) across different communities has not been practicable, and the results of some pilot schemes have not been released. Part of the challenge for government has been to better coordinate and integrate its own disparate agencies and activities (Hunt 2007).

Underlying the divergent approaches to addressing Indigenous disadvantage are major conceptual differences concerning mainstream services versus self-determined local services, the role of 'welfare' payments in communities where paid employment opportunities are rare, respect for cultural heritage, and the economic viability of remote communities where costs are high and services difficult to deliver. The policy debate remains highly polarised between market-based and rights-based approaches. At one end of the spectrum, some critics have argued that overcoming inequality requires integration into the mainstream economy (with requisite employment skills and moving to locations where full-time work and social services are available). At the other end of the debate, some insist that respect for cultural differences and traditional ties to country are fundamental to the wellbeing of most Indigenous people, and that insistence on economic assimilation implies cultural assimilation. Neither of these value-based positions can be either validated or disconfirmed by progress reports under the COAG framework for monitoring disadvantage. We are a long way from a consensual approach about the problems, the responsibilities and the solutions.

Responding to Climate Change

The debate in Australia on climate change has been strongly contested over many years. There was a long struggle before 'ecologically sustainable development' was recognised as a strategic framework by governments in Australia (adopted at the December 1992 meeting of COAG, together with a brief National Greenhouse Response Strategy). The 'greenhouse' (or climate change) challenge has always been the most difficult and contentious theme in the sustainability debate in Australia exacerbated by the special standing of the coal industry (Lowe 1994, Taplin 1994). While these early frameworks were developed through an extended process of bargained agreement among stakeholders, the agreed actions were not onerous (e.g. grants programs, research projects, education). Moreover, the implementation process allowed for many reinterpretations and revisions of policy priorities at both the Commonwealth and state levels. The 1998 National Greenhouse Strategy remained a bland document which required little change in behaviour by corporations or citizens, and emphasised efficiency in resource use rather than structural change. The Howard Government produced a framework of adaptation responses to climate change (Australian Government 2007), but failed to encourage large firms to anticipate the need for major changes in technologies and in carbon pricing.

The science concerning climate change has partly focused on forecasting changes/variability in climatic conditions, at both a global and regional scales; and partly focused on identifying the specific human-induced contributions to rapid changes (e.g. the impacts of industrialisation on atmosphere and thus on temperature). Both the scientific inquiry process and the policy implications are massively complex and difficult to manage. This has elevated the role of international bodies in brokering an ongoing expert review of scientific evidence (the IPCC

was established in 1988) and in brokering an international treaty (the Rio Framework Convention followed by the Kyoto Protocol), thus creating the basis for international dialogue and future regulatory arrangements. In Australia, the unwillingness of the Howard Government to ratify the Kyoto Protocol during its term of office from 1996 to 2007 became a political symbol of fundamental differences. The key dimensions of debate have included clarifying the nature and urgency of the problem, determining the most cost-effective actions for emissions reduction, allocating responsibilities for effective action, and the distribution of cost burdens and possible compensation.

There are several reasons why climate change policy is a 'wicked problem'. Firstly, it is actually a series of linked problems, none of which can be resolved in isolation. Secondly, the short-term and long-term calculations of impacts, costs, and benefits of interventions, are highly variable. Thirdly, the impacts are global, national, regional and local simultaneously. This makes the understanding of impacts, and the choice of useful adaptive behaviours, very complicated. Fourthly, in relation to the science or knowledge base, the extent of climate change, and especially the human contribution to the causal chain, has been hotly contested, with scepticism being fanned by some industry sectors. However, there has recently been a growing consensus (IPCC 2007; Stern 2006) that has finally convinced large sections of industry to accept the need for major changes. Fifthly, the allocation of responsibility – to levels of government, to corporations, to citizens – for changing their behaviours and investment decisions is inherently difficult. This is true both within each country (industries, localities) and across groups of countries (developed, developing, small, large, etc). Sixthly, equity issues around the pattern of burden-sharing and the necessary pace of change are significant. Seventhly, the choice of instruments is contentious – what forms of regulatory mandate and which market-based mechanisms are most likely to be not only effective but also politically acceptable? Finally, there is a serious debate about the distinctive or separate interests of Australia vis-à-vis other nations. Australia's global role is contested both within this country and internationally – should Australia play a 'leadership' role by requiring and encouraging large investment in best-practice technologies, or should Australia 'hide' behind other nations by agreeing only to incremental changes that minimise adjustment costs in the short term?

The politics of decision-making and community engagement on these issues in Australia has shifted recently with a change in federal government and a major inquiry into an effective emissions trading scheme (Garnaut 2008). But the hard decisions on greenhouse gas reduction strategies, using a range of instruments to meet clear targets, will be part of the political and economic landscape for the foreseeable future. In this sense, the wicked problems are managed, debated and constantly renegotiated rather than solved.

Conclusion

Policy development occurs across a range of contexts, from the settled routines of 'business-as-usual' through to 'crisis management'. Under conditions of crisis, with strong pressure for immediate action, the need for conspicuous action may tend to overwhelm the opportunity for new thinking. Rather than a positive and thoughtful 'paradigm shift', there is a significant likelihood of reinforcing past practices, e.g. 'group-think' about tactical responses and use of top-down styles of emergency coordination (Boin et al 2005: 47). Institutional learning, addressing the long-term causes of the problems, tends to occur – if at all – only when the immediate pressures have been alleviated.

Public managers are considering a range of strategies to increase public sector capacity and effectiveness for dealing with complex and intractable problems. Both the traditional bureaucratic focus on authoritative processes to resolve issues, and the modern NPM focus on greater efficiency in achieving outputs, have been widely used. Each of these has important limitations (Head and Alford 2008) when dealing with problem-complexity and attempting to manage issues that are marked by divergent expectations. In some circumstances, not all leaders wish to adopt a problem-solving stance, with attendant risks of failure. Some prefer to steer towards calmer waters rather than tackle the wild rivers. In one sense, this is simply to recognise two ongoing truths of public policy – the inherently political nature of decision-making, and the impossibility of resolving all problems through government activity.

The three most widely recommended approaches to wicked problems – better knowledge, better consultation, and better use of third-party partners –deserve closer attention in future research. Investment in more research to address gaps in knowledge is necessary, especially in relation to understanding causal links; since better knowledge can contribute both to 'evidence-informed' policy (Head 2008) and to good processes for increasing the scope of consensus. Such knowledge should address institutional and social structures, processes and relationships as well as knowledge about attitudes, values and cultural expectations. Knowledge needs to be more than the documentation of deficiencies (which might provide an impetus towards problem attention). The emphasis needs to shift towards developing and disseminating knowledge about innovative approaches with strong prospects of success. Program evaluations and pilot schemes that assess the effectiveness of current and previous interventions could be very useful sources of applied knowledge, providing that key decision-makers are willing and able to learn from experience and that evaluation reports are publicly released (Head and Stewart 2007). However, 'more' knowledge, even if well targeted, is never sufficient to manage the politics of complexity.

The widely recommended strategy of more effective consultation and closer 'collaboration' among stakeholders as a process solution is also important (Roberts 2000; Mandell 2001; Management Advisory Committee 2004; Goldsmith and Eggers 2004; and APSC 2007). It is essential that consultation be regarded as an ongoing process rather than a one-off event. But rigorous consultation and dialogue might not be sufficient to achieve progress in tackling some intractable problems that require good social analysis as well as improved consensus-formation and exchange of information among stakeholders. Sometimes the 'best' policy strategies may require very detailed analyses of complex causality, in order to gain a clearer

picture of how processes and proposed interventions are inter-linked. This understanding could be a useful precursor to stakeholder dialogues.

There is increasing reliance on third parties (e.g. NGOs and corporations) to develop programs to address 'difficult' and dependent groups, especially in the human services. There is an assumption that outsourcing service delivery ('contestability') will tap into innovative and cost-effective ideas and new service delivery skills. However, the quality and shaping of such programs depend largely on public sector budget models and program design. Thus, innovation is constrained by the prescription of specific 'funded outputs' for clients, service standards for many areas, and workforce quality issues.

In conclusion, the fundamental challenge for researchers is to develop new thinking about the multiple causes of problems, opening up new insights about the multiple pathways and levels required for better solutions, and gaining broad stakeholder acceptance of shared strategies and processes. (See, for example, the analytical and conceptual work leading up to pilot programs in developmental and early intervention: Developmental Crime Prevention Consortium 1999; Homel et al 2006.) New strategic thinking needs to be championed within the public sector. This requires organisational learning and cultural change – perhaps a bridge too far for most government agencies, which are obliged to expend almost all their energy on immediate tasks to ensure delivery of their budgeted outputs. The public agencies cannot be expected to move to a different paradigm without the insight, support and long-term commitment of political leaders. It is too easy to blame the risk-averse organisational culture of public agencies for our lack of innovation. Public managers need to be encouraged by far-sighted political leaders who are capable of working effectively with the business and community sectors in developing new approaches to major issues.

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