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RESEARCH PAPER

Public policy as information

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Clearly, public policy-making is an activity that both generates and uses information. Both the role of public policy in relation to informational assets and the role of information technologies have been widely canvassed, But can the concept of information itself be used analytically to understand public policy-making? In pursuit of this objective, key theories of public policy are re-interpreted from an informational perspective using a process of reciprocal interrogation. From this analysis, three types of informational role are identified within the policy process: response, control and accountability; structured interaction; and meaning-making. In summary, it is argued that public policy enables collective responses to problems to be formulated and implemented through information transmission and signalling. Through institutional pattern-making, public policy structures and selects information flows. Finally, information forms the basis of meaning-making in public policy. As a result of this exploration, some suggestions are made as to how these concepts may be used to improve policy-making.

Introduction

While 'information' is an elusive concept, it is undeniable that, in order to govern, governments generate and use vast quantities of information about citizens. It is impossible to tax people in any systematic way unless you know a good deal about them. Similarly, it is impossible to support people in any systematic way unless you know a good deal about them. Scholarly interest in 'e-government' reflects not only the ubiquity of information and communication technologies, but their power to transform administration (Bovens and Zouridis, 2002; Dunleavy *et al*., 2006).

Public policy is also an elusive concept, but it, too, is clearly information related. In the most immediate sense, public policy has a role to play in relation to information as a social, political and economic resource. Characterising and following information flows between actors and organisations highlights the importance of epistemic communities in this context (Hale, 2011), but I want to suggest that the concept of information can itself be used to reveal a good deal about what public policy does. Public policy-making, as an identifiable process, uses information (in the sense of data about situations, events and people) to construct systems that will (hopefully) produce productive effects in the world; public policies communicate this information in ways that have meaning for those involved.

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Despite the obvious importance of information to, and within, public policy since the 1970s, theorists have hesitated to use this concept analytically; that is, as a basis for developing new approaches to understanding the modes of action and potentials of public policy. Networked forms of governance (and analyses that develop this idea) implicate information, but chameleon-like, information itself remains elusive. The ubiquity of technologies for information processing appears to give a more tangible form to information, particularly in the field of public administration. Agencies are, increasingly, dealing digitally with clients. However, the information 'label' does not necessarily highlight information effects. The impact of information and communication technologies (ICTs) is, for example, known to be mediated by the persistence of traditional bureaucratic structures which may disrupt or impede technology-based opportunities (Bellamy and Taylor, 1998).

At the theoretical level, analysts of public policy have shown that information *per se* has little resonance unless it forms part of routines for meaning-making (Fischer, 2003), but from a broadly positivist perspective, the analytical power of information itself has not been systematically utilised. As I hope to show, ideas about information underpin, and are implicit within, many significant theories about public policy, both prescriptive and descriptive. What happens when this implicit idea is made explicit? This is the basis for the exploratory journey undertaken in this paper.

Theories of information and their relevance to public policy

In ordinary parlance, information is what is communicated about a particular event or situation. Thus 'it is raining' and 'unemployment is 5%' are examples of information. Data (rainfall last month was 100 mm) are also information. Knowledge is accumulated information (e.g. rainfall at this level will lead to flooding), but we see straight away that in a policy world, information has no value without context. This context, in turn, is shaped by the purposes of policy actors and the relationships between them (Bozeman and Cole, 1982).

Context (although of a different kind) is important for more formal theories of information, too. The need to quantify information arose from the problems involved in transmitting information by automated means (for example, through electronic communication systems). The work of Shannon showed that information could be measured by the number of bits (yes–no choices) required to specify a particular sequence from a range of possibilities (Shannon, 1948, p.14). As Marschak (placing the issue in a more explicitly social context) puts it, 'My uncertainty about a set of alternative events is the same as the amount of information that I would receive if that uncertainty were completely removed' (Marschak, 1968/1996, p.431). In everyday language, information alleviates uncertainty.

The economic perspective on information is both multi-stranded and conflicted. Information may be bought and sold (information-as-commodity); its utility is the value of the reduction in uncertainty which its use makes possible. At the same time, economists have shown that it is impossible to understand information through the operation of markets because information defies the neoclassical rules of supply and demand (Babe, 1994, p.53). The ability of competitive markets to generate the knowledge needed for economic efficiency is compromised by the public good characteristics of information. For the public policy analyst, economic theory provides rationales for intervention in markets, but does not shed much light on the relationship between information and policy *per se*.

Theories of organisation (particularly theories of organisational design) provide more fertile ground for the policy analyst in search of information-based analogues. The organisation's capacity to respond to its environment is, in the broadest sense, determined by the fitness of its decision-making structures to deal with uncertainty (Duncan, 1974). Well-known theories of organisational design conceptualise relationships between structure and information flow: hierarchies, for example, determine 'vertical' information flows. The flexibility (or otherwise) of different organisational forms, in response to changes to their environments, reflects these attributes (Mintzberg, 1979).

Importantly, information is also the agency of change. As Macdonald puts it, change is an information process (Macdonald, 1995). The boundary of the firm constitutes both barrier and permeable membrane. Managing the relationship between information that is regarded as internal to the firm, and information that is external, becomes a key part of the management of change. There are obvious links here with the organisational forms of government, and the degree to which they facilitate this kind of informational trading (Scharpf, 1994).

Management thinking, and the way information is conceptualised within this perspective, provides another set of linkages. In the formal sense, management information systems constitute the means of measurement, monitoring and control of key attributes of the firm. Management information (on profit, turnover, return on investment) constitutes a form of signalling from one part of the firm to another, as well as upwards to management. Public management (through performance measurement and management) makes similar use of these ideas.

From this overview, we can say that no one theory of information 'fits' public policy in an obvious way, but three attributes of information seem to be of relevance. First, information reduces uncertainty. Second, information is channelled through structures that shape adaptation. Third, information provides the signals that underpin management practice.

Highlighting the role of information in political and policy systems

We turn now to a consideration of forms of thinking about politics and public policy that seem to highlight information. Some of the clearest and most compelling linkages relate to systems thinking. Easton's work remains one of the key texts in understanding the relationship between information and the political system (Easton, 1965). Indeed, it is probably because of the power of Easton's analysis that the systems approach faded somewhat in the years following the publication of *A Systems Analysis of Political Life*. What more could be said?

From an Eastonian perspective, political systems legitimate themselves through the production of outputs (policies) that satisfy the demands of citizens to the extent necessary to maintain their support of the regime. Within the (idealised) policy system, elected and appointed officials make decisions that turn the information they have about citizen and/or stakeholder preferences into outputs (another form of information), both symbolic and real (Easton, 1965). In order to make these decisions, to judge their effects, and to finance the continuing exercise of administration, vast quantities of information are collected and held by public organisations. As Easton noted, without information, authorities would be completely unable to gear their outputs to any kind of support goal (Easton, 1965, p.365).

In *The Nerves of Government* (1966), Deutsch re-interpreted key political science concepts (such as political will and political power) in systems contexts. He also stressed the importance of information, communication and self-organisation in the processes of system-steering. Indeed, in going beyond simple cybernetic models, his approach highlighted government itself as a kind of complex adaptive (or learning) system. Planning theorists such as Chadwick also made this point. Government could not act just as a kind of servo-mechanism, but had to be a learning agent (Chadwick, 1978).

Vickers' *The Art of Judgment* (1965) remains significant in relation to learning because he used systems thinking to expose the importance of what he called 'appreciative judgement' in policy-making (that is, the necessity, in the management of complex systems, to be able to balance competing values). Vickers took the view that, without a further sharpening of policy responsibilities, governments would struggle to enact this balance in relation to the rapid changes affecting them (Vickers, 1965, p.233).

Other theorists have used organic analogies to illustrate the nature of responsiveness. In the 1970s, Hood developed the analogy of the nervous system of government in his *Tools of Government* (1973). Nodality (one of the tools of government) was the property whereby governments both registered and responded to change – their informational receptivity. In their 1985 book, Hogwood and Peters drew attention to a number of informational pathologies in public policy, ranging from bureaucratic blockages to over-lengthy response times (Hogwood and Peters, 1985).

As systems thinking died away, however, so too did the perception of public policy as a set of practices that used (and generated) information as a way of doing practical work. From the 1990s, public policy itself came to be seen from a constructivist, rather than a systemic (or even behavioural), perspective (see Fischer and Forester, 1993). Information formed part of the meaning-making that, increasingly, was seen as the heart of policy activity. For those interested in the generation and deployment of authority through governance, policy actors deployed information-as-knowledge through knowledge networks and epistemic communities.

As it developed, the governance perspective highlighted the role of information in the enactment of adaptive governance, particularly in the environmental field (see, for example, Nelson *et al.*, 2008). However, as a policy-analytic idea, with the exception of the important work of Baumgartner and Jones (1993), Baumgartner and Jones (2005) (to be discussed next), the role of information was subsumed within other approaches.

Restoring information as a policy-analytic idea

From the overview of theories of information, three key ideas emerge: information as the reduction of uncertainty; information as the agency of adaptation; and information as the signalling agent of management practice. From the (immediately preceding) overview of information-based approaches to the analysis of public policy, three broad approaches seem to bring information to the foreground: first, an essentially cybernetic view of politics and policy, with information playing both a signalling and an adaptation role; second, information as the core of knowledge-based approaches to governance; and third, information as the substrate of meaning-making in policy formation.

There is an obvious alignment of the cybernetic view with the informational functions of uncertainty reduction, adaptation and signalling. The second perspective (information as the core of knowledge-based approaches to governance) suggests both the importance of information to the fabric of public policy, and also the ways in which policy networks and subsystems provide milieux in which information may flow and circulate. The third perspective, while it conceptualises public policy quite differently, emphasises the primacy of meaning-making in admitting information to policy contexts.

From these broad perspectives, three categories of information-related process can be abstracted to illuminate public policy-making in an active way. The three categories are:

- responsiveness, control and accountability;
- structured interaction; and
- meaning-making.

In applying these categories, the penetrative power of the idea of information for public policy analysis starts to become apparent. To guide the reader through the analysis, Table 1 summarises the relationship between the process categories, and the role played by information in relation to each category. To demonstrate these relationships in a practical way, at the end of each section the analysis is applied to the problem of air pollution control, as evidenced through the operations of the United States Clean Air Act.

Responsiveness, control and accountability

Much of the formal activity of governing ('authorised choice' as Colebatch puts it) is heavily informational (Colebatch, 2002, p.39). Governments respond to changes in the environment through a number of information-based mechanisms, some formal, others informal. Information is used by governments to respond to change, to exercise control over change and (up to a point) to be held accountable for change.

Responsiveness From the authorised choice perspective, formal mechanisms for registering change include elections; community consultation and engagement; and programme evaluation in which information about outcomes is used to structure responses. The search for evidence-based policy is an attempt to harness the forces of systematic information-gathering and analysis (in the form of policy-related research) to the activities of practical policy-makers. Informal mechanisms used by political parties include polling, media analysis and also the use of social media.

Table 1. Process categories and information roles

Process category	Information role
Responsiveness	Signalling
Control	Monitoring
Accountability	Reporting
Structured interaction	Coordination
	Agenda formation
Meaning-making	Framing

Internet-based resources add further to responsiveness in this sense, and make it possible for governments to gauge community sentiment before policies are introduced.

Much information is organised and used for purposes of signalling. A signal is a piece of information which holds particular policy relevance, and transmits information about the state of a system that government may only partially control, but is held responsible for. Just as the augurs of the ancient world inspected chicken entrails, governments look for signals (inflation, unemployment) which will tell them what is happening in the economy. Other signals are budget deficits, trade and current account balances, household expenditure data, and so on. At the organisational level, sophisticated signals are constructed through performance measurement (indicators) and management (targets).

Control As a managerialist philosophy, new public management makes extensive use of the idea of information for the control of management and policy systems (Osborne *et al*., 1995). We cannot manage what we cannot measure. Therefore, according to the tenets of performance management, if we conceptualise what we are trying to achieve in measurable terms, it should be possible gradually to approach this ideal. At the theoretical level, policy cycles are versions of this approach to the use of information, within an essentially evaluation-based perspective. Policy is conceptualised as a type of information-based control system in which outputs (or outcomes) are used as the control variables.

Accountability Information is the lifeblood of accountability. We see its importance, in reverse, when totalitarian states or oligarchies routinely constrain the free circulation of information about their activities and their effects. Information, in its media guise, increasingly determines the behaviour of elected politicians. When we investigate their behaviour, it is the perceived impact of policy and other actions (as much as their actual impact) that is uppermost in their minds (Stewart, 2008). This use (or abuse) of information defines a highly politicised system that public officials working in policy and administrative realms must understand, and adjust to, if they are to perform successfully as policy managers.

Responsiveness, control and accountability: applying the analysis

In the broadest sense, any policy field can be regarded as a collective mechanism for managing change, with public agencies themselves playing key informational roles. The example of air quality provides a way of operationalising this perspective. A developed system for pollution regulation uses information for purposes of responsiveness, control and accountability. We see this in the way the United States Clean Air Act operates to improve air quality for citizens.[1]

The Act itself, as periodically amended, provides the basis for the responsiveness of the system, by shaping the work of the environment protection agency (EPA). For example, in addressing criteria pollutants through national ambient air quality standards (title I of the Act), the EPA regulates a number of pollutants that are believed to have major impacts on human health. The control system works through several mechanisms, including direct powers exercised by the EPA. However, as an agency within a federal system, the EPA must work with the states to implement many control and abatement activities (EPA, 2007). To this end, the EPA examines and approves state implementation plans and monitors the reported

operation of state-based measurement networks. The types of information used for control develop over time. For example, since 1990, the EPA has focused on regulating area-based emissions of hazardous pollutants, in addition to monitoring and goal-setting in relation to ambient air quality performance.

Accountability (of the EPA) rests upon information generated by multiple monitoring sites, information which may be incomplete and difficult to aggregate. The EPA, as demonstrated through its website, deals with these problems in a number of ways, including publishing a wide range of performance-related information and, in the case of particular pollutants, by constructing nationwide trend data and (most recently) by enabling users to generate interactive maps of particular pollutants.[2]

In summary, it is useful to see the systems over which the EPA presides as being fundamentally information based. By focusing on these aspects, we see that in creating and monitoring these information systems, legislators (and the EPA) have a delicate path to tread. If demands are too strong, and reporting too intrusive, compliance suffers and outcomes will deteriorate. On the other hand, if too much leeway is allowed, the agency risks attracting criticism for failing in its primary task. Clarity about the trade-offs involved in information use may help in striking the right balance.

Structured interaction

Colebatch's 'structured interaction' describes the ways in which policy actors create meaning through a wide range of activities, involving dialogue, negotiation and interpretation (Colebatch, 2002, p.42). These activities clearly involve information in many guises, but there is a deeper sense in which the institutional patterns and tracks of public policy – who talks to whom, and in what context – are themselves informational. Institutionalist analysis describes the organisational forms, values and procedures around which policy-making activity is constructed (March, 1989). In turn, the structures of public policy exercise their influence in terms of where information may flow, and to what effect.

The move away from bureaucracy and towards more diffuse forms of governing (governance) shows these structural effects in action. As Milward and Provan put it, 'Command and control mechanisms associated with bureaucracy are being replaced by much more complicated relationships for the delivery of … services' (Milward and Provan, 2000, p.359). Where hierarchy once dominated, markets and networks have infiltrated. We can think of these major kinds of structures (markets, hierarchies, networks) as types of information-processing array, differing one from the other in the ways in which they use information to achieve coordination. The power of markets lies precisely in their ability to generate information spontaneously (most significantly in the form of prices). This information moves, and is used, in ways that are not controlled by any one mind (Hayek, 1974). Competition (market forces) provides the invisible hand of coordination. 'The competitive system', as Arrow observes, 'can be viewed as an information and decision structure' (Arrow, 1979, pp.313–14). When the power of markets is invoked by public policy, it is precisely these informational qualities that are sought (if not always achieved). Outsourcers intend that markets will generate information about price that was concealed by the organisational strictures of hierarchy (Young, 2003).

The realities of hierarchy, however, remain ineluctable. Hierarchies focus power by channelling information in particular ways. Information flows upwards (for

decision) and downwards (for implementation). Information is generated in functionally distinct parts of organisations, and who may know what is itself a significant source of power (Durant, 1992). The hierarchy coordinates by privileging some information flows over others. Networks are loose mechanisms for cooperation and collaboration. While networks may be managed in various ways, information flows are less constrained and less stylised than in the hierarchical bureaucracy. Depending on their degree of formalisation, they may form and re-form over time. Networks are based on reciprocity. In informational terms, this means they are based on information exchange (Powell, 1991). So, if we imagine a policy field as consisting of a particular balance of these kinds of structures, this over-arching pattern is significant because of its effects on information flows.

Agenda formation

The interpretation of any given message depends both upon its content and the way it is communicated, but how information is introduced into the system is another piece of information that is normally ignored. If we look within policy systems (and subsystems) we see the importance of agenda as creating and selecting information in a way that enables governments to use it (see, for example, Burstein and Bricher, 1997). The 'weight' of the agenda is expressed through informational sources, which can be used to measure both agenda (in terms of priorities at any point of time) and agenda setting (in terms of the selectivity of processes). These processes filter the vast number of potential policy signals down to those with which governments are prepared to deal. Further, change in the number and type of these signals is an important measure of change and stability in the policy system itself (Baumgartner and Jones, 1993). In later work, Baumgartner and Jones use a systems model relating input signals, information-processing costs and outputs to hypothesise that politics, by mobilising attention to certain issues, could cause disproportionate (essentially nonlinear) responses to input signals by reducing processing costs (Baumgartner and Jones, 2005).

This approach has been extended by Workman *et al*. (2010), who analyse the relationship between power, structure and responsiveness by using an information-processing approach. They argue that all decision-makers (whether elected or appointed) are short of time; their attention spans are limited. The role of bureaucracy in governance is best understood as a process of simplifying, ordering and 'parsing' (placing) problems in specified 'solution spaces (i.e. units and subunits in agency bureaus, program offices and divisions in the bureaucracy)' (Workman *et al*., 2010, p.624).

Structured interaction: applying the analysis

To continue with the example of air quality, we can imagine that, at any given scale (local, regional, national) different types of governance shape, not only decision-making, but also information flows. Many of these flows take form through the work of the EPA, characterised by the relationships expressed through hierarchies, networks and markets. For example, the agency's formal structure employs standard bureaucratic forms of organisation (i.e. it consists of offices with mandates to administer particular parts of the Clean Air Act). In this respect, its use of information may appear to be highly formalised. Its 'parsing' processes, to use Workman *et al*.'s term, compartmentalise its responses.

At the same time, the agency ensures that it does not overly formalise the information flowing into it and within it lest it miss important changes in its environment. Senior officers maintain a regular flow of external meetings (reported on the website). While it is difficult to see, from the outside, how the agency shapes its internal information flows, clearly the web of control-based information is supplemented by a large number of formal and informal networks. Where markets are used for purposes of control (for example, through emission trading schemes), additional information is generated through price signals.

The formation of the political and policy agenda is clearly crucial for the agency's ability to respond to change, but it can be difficult for the agency to influence this agenda. Use of the media (e.g. highlighting prosecutions) signals commitment. Maintaining energetic research programmes highlights the health and long-term consequences of air quality neglect and the role of technology in remediation. Here, however, the notion of air quality itself highlights the importance of the ideational frame. What is, or is not, regarded as hazardous, and at what concentrations, reflects the agenda-setting role of information when coupled with values.

Meaning-making

Meaning-making (interpretive) perspectives alert us to the malleability of information. Interpretive accounts of public policy stress the human quality of policies: problems do not exist as unambiguous facts, but rather through our perception of them (Yanow, 1996, p.3). Fundamentally, all forms of information are policy-relevant only insofar as they form part of a world of shared (or emergent) meanings. Information (as data) becomes incorporated into regulatory policies only when it has some relationship with objectives of value.

The information that cigarette smoking causes lung cancer becomes part of the policy world when it is incorporated into a shared understanding of the state's health responsibilities. 'Every child shall have access to a pre-school' is a statement of purpose that forms part of the informational environment of policy actors. The activity of meaning-making shapes informational use. While policy systems are porous to information (Kingdon, 2011, pp.76–77), not every piece of information is taken up and used. Information helps to make a difference when it is allied to shared processes of meaning-making.

Meaning-making: applying the analysis

In the lead-up to the initial passage of the Clean Air Act, specific instances of extreme air pollution did much to galvanise public opinion. The notion of 'clean air', and what constitutes clean air, reflects profound and protracted contests over impact and responsibility in which information plays a profound role. Whether greenhouse gases should be considered a component of air pollution or a normal by-product of production is (arguably) the latest and most difficult manifestation of this debate. As years of implementation research have shown, the passage of legislation displaces rather than resolves these issues. The administration of the Clean Air Act involves constant excursions into meaning-making. Scientific research on health impacts must be understood and interpreted in ways that political executives will accept, and in ways that the EPA's clients (ordinary citizens) will understand. Web-based forms of information dissemination show how comprehensively the

agency has grappled with the task of maintaining the integrity of its information, while also making it comprehensible.

Implications for practice

The three types of informational role (response, control and accountability; structured interaction; and meaning-making) suggest that information plays a pervasive part in governance. This is a useful perspective, but there is a deeper one underlying it. I want to suggest that public policy, as a purposive activity, can also be regarded *as* information. Generalising from the example of the Clean Air Act will help to make this point.

A basic regulatory policy tells polluters that emitting more than prescribed quantities of pollutants into the atmosphere will result in a fine of a certain size. The content of this policy is based on an understanding that there is a connection between some collectively valued good, and the activity of the polluter. Public policy conceptualises this relationship in terms of its objectives, instruments and implementation. More broadly, it can be thought of as responding (in informational terms) to a perceived problem with the environment.

From the organisation's (policy target) point of view, the policy is an important piece of information ('signal') in its environment. It must be incorporated, through management information, into the firm's behaviour (adaptation). If we look more broadly (beyond the firm) we see that regulatory policy is institutionalised through information flows that are both hierarchical and networked; and of course the legitimating substrate of this information development and use relates to a context of meaning-making and (to a greater or lesser extent) of conflict and contestation.

We see, therefore, that public policy both conveys a certain kind of authoritative information to those whom it is intended to affect, but it also *is* information, in the sense that it communicates which issues are salient; and through organisational structures and relationships, creates a set of information flows, contexts and practices. Information is interpreted and communicated through processes of meaning-making, and is operationalised through signals, stocks and flows. In summary, public policy enables collective responses to problems to be formulated and implemented in the following ways: through information transmission and signalling; through institutional pattern-making and structuring of information flows; and through the use of information in meaning-making.

Making better policy: the problem of informational pathologies

By using policy and information in a form of reciprocal interrogation, some important analytical possibilities have emerged, but the results of the exploration also suggest some ways of improving public policy. If public policy is a system of signalling, interpretation and response, we see that, as far as responsiveness goes, there are many places where information flows may be blocked, displaced or misinterpreted. If public policy patterns or selects, in what ways might these results be less than optimal? If information and meaning-making are inter-related, how might the connections be made clearer, and more flexible?

It is necessary to consider how informational problems manifest themselves *in situ*. Hogwood and Peters (1985) identify a number of specific informational pathologies (and possible remedies) including failure of information to reach

Table 2. Information roles and corresponding pathologies

Information role	Pathologies
Signalling	Overload
Monitoring	Stereotyping
Reporting	Gaming/cover up
Coordination	Silos
	Blockages
Agenda formation	Bias
Framing	Restrictive framing

decision-makers (for example, patterns of behaviour obvious to service-delivery staff will struggle to be transmitted 'up the line'); memory failures; failures to communicate adequately with clients of policy; failure to channel information appropriately; and failure to learn from evaluations. Improvements in the supply of information are not necessarily productive as they could produce overload. Ultimately, using information well is a behavioural issue as much as a technical one (Hogwood and Peters, 1985, ch. 4). In (partial) contrast, the analysis developed here suggests that informational problems may manifest themselves in a variety of ways. Each of the informational roles identified earlier suggests a type of policy pathology (these relationships are set out in Table 2).

Overcoming silos

Since Hogwood and Peters (1985) described their informational pathologies, concern about one aspect of bureaucratic behaviour has become pervasive – the tendency for bureaucratic organisations to fragment the information needed for policy, and to prevent necessary forms of information exchange. This is the problem almost universally known as bureaucratic 'silos' (see, for example, Dawes *et al*., 2009). Of course, the rigidity and inability of the traditional bureaucracy to learn is overplayed in many ways. If information were as circumscribed as the theory suggests, these organisations would scarcely be able to function at all. Empirical work shows the importance of intra- and inter-organisational networking in getting things done (Provan and Millward, 1995).

Within hierarchies, however, information that might lead to action repeatedly gets 'stuck' (see Borins, 1998, ch. 4; Termeer, 2009). Attitudes towards risk derail the information flow necessary for innovation (Benveniste, 1991, p.150), and the division of labour that enables agencies to stream and to specialise their functions repeatedly produces confusion for citizens and coordination problems on the ground. Repeated calls for whole of government solutions reflect growing concern at the mismatch between what governments do and the needs of citizens (Christensen and Laegreid, 2007). On the other hand, hierarchy may be appropriate for some purposes. How do we know when the balance is a good one? Fitting designs to specific purposes, to use Golembiewski's phrase, is a complex task (Golembiewski, 1990, p.495). The analysis presented here suggests that part of the answer lies in understanding the balance of response, control and accountability that different structures entail.

Responsiveness (that is sensitivity to need and to change) implies unimpeded information flow; control implies restriction in the interests of coordination and

clarity. The more sensitive the policy to its target population, the more interconnected its components. To that extent, structures that facilitate the generation and exchange of information will be more effective than those that do not. Networks and hierarchies each have a role to play. Moreover, an information-based perspective reinforces well-known messages about the importance of adaptive techniques for managers working at the local level, and for flexible brokerage roles for public managers (Lawless and Moore, 1989). It also suggests the importance of flexibility in the most significant form of information of all – money.

Whether data-sharing within and between agencies will reduce siloing (thereby aiding responsiveness) is a complex issue. Much will depend upon the purposes for which it is introduced, and the kinds of relationships between citizens and government that it entails. Depending upon the context in which it is implemented, integration of information may increase, rather than reduce, rigidity. For example, if information systems replace human responsiveness where that form of responsiveness is needed, they will simply create new informational pathologies. IT architectures may need to be loose in some instances and tight in others. While IT enables information exchange, whether it does so in fruitful ways will depend on the needs of the policy terrain in which it operates.

Identifying and correcting overly-restrictive framing

Meaning-making involves framing (that is, defining policy by defining boundaries). We can extend this perspective by showing how limited informational perspectives obscure interconnection. Agencies frame problems in ways that are consonant with their mandates. So, an employment agency will see a dysfunctional community in terms of employment issues, whereas it may be that educational problems are preventing people from taking up jobs.

The implication is not that we should attempt to understand all possible interconnections when making policy. Most problems are too complex to be amenable to comprehensive forms of mapping. Accepting that we do not know what we do not know, however, suggests a greater sensitivity to the informational aspects of the ways in which problems are framed. How often do we discover (for example) that solutions that seem obvious are anything but? For instance, reducing energy use by boosting the use of public transport requires forms of thinking that address the many obstacles to public transport use that may arise. These obstacles may have very little to do with transport as such. This is why (for example) mapping transitions to new kinds of systems using smaller, local and unheralded linkages may make more sense than grand schemes.

Overly-restrictive framing may also result from the success of a policy. Public managers may be so focused on achieving politically-desirable objectives (such as improvements in issues of interest to voters) that they ignore or overlook negative signals emanating from these same policies. In Australia, for example, policies to increase the number of childcare places by making subsidies available to private operators were so successful that policy-makers were not alert to the risks posed by dominance of the sector by one particular provider.

Framing may overlook the problem of endogeneity; public agencies are themselves part of the systems they are trying to influence. Moreover, any given policy space is inhabited by many agencies, each with its own perspective and interests. Each agency (as with any interest) sees the problem from its own point of view and

it sees the system as external to itself, but if we are part of the system we are trying to influence, we must (knowingly) become part of the knowledge formation of that system (Crozier, 2008).

Avoiding positive feedback

A further issue is the stylised nature of feedback, which makes it difficult for policy systems to respond to complex and rapidly-evolving situations. Positive feedback (that is, a signal that reinforces itself, causing the system to expand unsustainably) is a case in point. Governments are good at making rules and providing resources in order to respond to citizen preferences, or to change, but these same rules are not themselves readily adaptable. We see this by considering, from an informational point of view, a simple administrative policy – paying citizens an entitlement-based benefit, for example.

As the citizen's circumstances change, the payments that must be made also change. To get this right is challenging enough, but if the rules themselves are inappropriate, or are being evaded or ignored, it takes much longer for the system to respond. Moreover, the overall performance of the system is difficult to judge in other than aggregate ways. Information that is organised in particular categories may conceal more than it reveals. Some citizens may have benefited from the policy, others may not. Needs are complex, but administrative systems operating on the basis of entitlement must fit the citizen to the rule, not the other way around.

Moreover, when changing the policy (for example, to meet a new or changed need) there will be considerable uncertainty about the effects of the change. *Ex ante* modelling necessarily relies on guesses as to how citizens will react (for example, to additional means testing or requirements to work). *Ex post* evaluation gives further information, but this information will necessarily be qualified by the ambiguity inherent in all programme evaluation: measured results will always be intermixed with the effects of other variables. As policies are implemented, persistent errors may creep into the system as the outputs of the system start to become inputs. In some circumstances, rapid, unpredictable changes known as 'tipping points' may be reached, forcing either major efforts to regain control where this is affordable, or cover up where it is not.

There are many examples of this kind of traditional system control going wrong. Say we make tax deductions available to people to invest in sustainably-managed pine plantations. More and more people take up the offer, and companies spring up to harvest the funds that are available. However, many are poorly managed and go broke. Policy-makers respond to these situations by tightening the rules or, if the situation has become totally untenable, by abandoning or altering the tax deduction. The result is that well-managed plantations are caught up in the consequences of attempts to control those that are not.

Emissions trading schemes provide a notable example of the problems that arise when systems are constructed under political pressure. In the initial period, the desire to avoid applying too much pressure to business by issuing too few allowances leads to an over-assignment of allowances, and a consequent fall in the price that mutes necessary investment signals. Many regulatory systems show this characteristic; they produce an accelerating error signal that, by the time it is detected, has become almost impossible to manage. Problems that are more catastrophic in their effects (for example, asset price bubbles and crashes) have similar fundamental

characteristics. Policy adapts too late. One way of avoiding this fate may be to place less reliance on signals that inevitably stereotype a complex reality.

Counteracting cover up

Stereotyped controls have a part to play in cover up as well. Performance information is supposed to enhance accountability, but failure to meet performance targets may simply cause the indicators to be changed, or the targets to be re-set. Performance games may take over (de Bruijn, 2002). Structural changes may also increase the incentives for cover up to occur. For example, the removal of tenure for public servants in Westminster systems makes speaking the truth to power more difficult. Ultimately, the main problem with politicisation may be the adverse effects on information flow that it entails.

Informational deficiencies of conventional policy systems

If one of the main roles of policy is to produce effective responses through the generation and use of information, there are considerable deficiencies in the capacity of public policy, as conventionally understood and practised, to achieve this. The relationship between public policy and the systems it is designed to influence seems too simplistic to manage effectively the risk of counter-productive action. The exploration reported here has suggested that informational deficiencies are at the heart of the problem.

Four kinds of deficiency have been highlighted: first, there are deficiencies related to the structure of information channels and the flow of information within them (too much – or too little – hierarchy for the nature of the problem at hand); second, there are deficiencies related to information framing (when the need to simplify and to exclude complicating factors produces advice that is insufficiently nuanced); third, there are deficiencies related to information collection tools (when performance measurement and management become too stereotyped and/or when information is of poor quality and lacking in fitness for use); and fourth, there are deficiencies related to information misrepresentation and cover up when political pressures and fear of retribution keep vital information away from decision-makers and/or the public.

We know, from the empirical literature, why these issues matter. The informational perspective shows more clearly *how* they matter. Addressing these problems is not easy, but at least lies within the remit of public managers. In the technical sense, informational pathologies that relate to the collection, framing and channelling of information can be counteracted by managers. More deeply, however, we see that any action that is taken involves a trade-off between information and power. Power, particularly centralised power, is significant precisely because those wielding it are able to control information flows by determining what is (and what is not) relevant to the issue at hand. Devolution shortens information pathways, and allows different framings, but at the risk of vitiating coordinated responses.

There are implications, too, for longstanding debates about the costs of providing citizens with enhanced access to information. To the extent that transparency and open government are seen as being inimical to effective management, the approach outlined here offers a corrective. It suggests that at the ‘big system’ level, the issue of transparency in government matters, not just normatively, but because

if information is concealed, both responsiveness *and* accountability may suffer. Further, the informational perspective highlights the relationship between flexibility and control highlighted by Duit and Galaz (2008). Networks can be expected to accentuate flexibility, but bureaucracies that rigorously channel the formal information that underpins management may find them difficult to accommodate. In general, the informational perspective supports the intuition that it is complexity that vitiates control-based uses of information. By focusing on ways of avoiding the pathologies of the control-oriented facets of information use, it may be possible to allow a better relationship between the two. Better 'eyes and ears' may be a useful general nostrum.

Conclusion

Public policy is defined in the process of interrogation. In this paper, information is employed as the interrogative idea. This turns out to be quite a powerful process, as concepts of information can be shown to underlie a range of theoretical perspectives on public policy. Three types of role for information have been put forward: response, control and accountability; structured interaction; and meaning-making. Each role shows the importance of information in linking the work of public policy with the work of management.

Conceptualising public policy as information also facilitates a critical perspective (in the sense of suggesting remedies for improved practice). We have seen how policy-making (and policy-makers) may reduce effectiveness by distorting, impeding or stereotyping information flows. Remedies can be imagined, but from an informational perspective the trade-off between responsiveness and control will always be exigent.

As an exploration, the paper has been suggestive rather than conclusive in character. However, it is hoped that the analytical framework sketched here may at least help bring together conceptualisations of public policy that are usually thought to be quite disparate. The framework may form the basis of future empirical work that will further illuminate the possibilities involved.

Notes

1. Information on the EPA and its operations comes from *Summary of the Clean Air Act*, available from http://www.epa.gov/lawsregs/laws/caa.html [accessed July 2011]; and from *Six Common Air Pollutants*, available from http://www.epa.gov/airquality/urbanair/ [accessed July 2011].
2. Information on recent air data reporting comes from http://www.epa.gov/airexplorer/ [accessed July 2011].

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