

Why tracing a locality's networked governance is worthwhile

Dick Osborn

National Centre for the Public Awareness of Science,
The Australian National University, Canberra.

Summary

- The transition from government to governance means that evaluating public sector performance must go beyond entities to also consider performance by a network of government and non-government institutions, where power, accountability and instruments are distributed.
- Using the formal methods and tools of social network analysis (SNA) to evaluate performance in a networked governance situation, and across all functions of government, seems to be a task for the future since no examples could be found when preparing this paper.
- Insights into the task's feasibility are provided here by tracing networked governance as it operates within one of twenty five estuary catchments in the Bega Valley Shire Council's area, and is limited to the environment protection function of government.
- The paper reports using open-source software to analyse data from the public domain, resulting in traces of a network where knowledge relevant to the environmental governance of some 350km² was transferred by some 200 actors via more than 400 relationships.
- Graph layouts on vertical federalism, on environmental risk governance, and on sustainability accounting dimensions of networked governance are provided in the hope that they encourage practitioners and other researchers to know more about SNA through also learning-by-doing.

Abstract

The transition from government to governance brings about a shift in performance evaluation. The focus can no longer be on an individual entity, but must extend into considering how an institutional collective of government and non-government institutions achieves the outcomes sought. How can this evaluation task proceed? While applying the formal methods of social network analysis (SNA) to measuring, analysing and managing networked governance may seem obvious to some, such a solution seems to have been avoided over many decades. SNA tools that non-experts can use have been released in recent past, providing opportunities in learning-by-doing among practitioners and scholars with responsibilities or interests in public sector management. The overarching aim in this paper is to promote adoption of an open-source software tool—NodeXL—as one pathway toward understanding and improving networked governance situations, and toward communicating results to others. It begins by establishing three areas of information needs held by Australia's local governments, where undertaking a pilot study could be useful. They are, local government's real positioning with other decision-makers in the networked governance that is Australian federalism; world better practice in risk governance, given the significant exposure of Australian councils to natural disaster events; and measuring change over time in governance capital, as a component in the capitals approach to measuring sustainable development. Establishing functional and spatial boundaries was a key step in design, with the choice being environment protection and natural resources management in the 350km² catchment area of the Wonboyn Lake estuary on the far south coast of New South Wales. A Web search of documents containing the terms 'Wonboyn Lake' or 'Wonboyn River' then followed. One hundred and twenty nine documents were retrieved. Analysing their contents led to identifying over two hundred institutional actors either transmitting or receiving knowledge relevant to the locality. Some 420 communications taking place between 1967 and 2011 were identified, and tagged according to year of transmission. The decision-making level

within which each institutional actor operated; and whether industry, regulator, external researcher or stakeholder were other characteristics recorded. A 421 x 2 matrix of Wonboyn data was then pasted into the NodeXL template operating on MS Excel 2007/2010. Resource materials downloaded from the Web supported the learning-by-doing element of the pilot study. Four visualisations on networked environmental governance are provided. The first shows unmodified data as a graph in random layout. Its purpose is to provide a benchmark against which some of the SNA procedures available for analysing data can be compared. Then follow three graph layouts, each designed to meet the areas of information need established at the study's beginning. Results suggest, in the author's opinion, any time invested in learning-by-doing with NodeXL will reward those wishing to understand, manage and communicate the complexity that is networked governance. Suggestions on how the Australian Centre for Excellence in Local Government, and practitioners in local councils, could be early adopters of this innovation by using data already available to them are offered, so that they may undertake similar pilot studies.

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Background

The current pace of change to how the world works is unprecedented. Two among many causes seem particularly relevant in this Forum's broader examination of transition in Australia's local government industry.

Much of the change stems from developing and diffusing information and communication technologies (ICTs). Their application enables actors—be they individuals, organisations, associations, or institutions—to add electronic networks to the means for creating, holding and transferring knowledge. Realising the potential from ICTs for more effective knowledge transfer can yield significant social and economic benefits (Castells and Cardoso 2005, Leydesdorff 2006, World Bank 2011).

Humans have also changed ecological systems 'more extensively and more rapidly over the past half century than in any other comparable period of time in human history' (Millennium Ecosystem Assessment 2005:1). Data adjusted for population size and inflation show increases throughout the world in the number of deaths reported, persons otherwise affected, and in damage costs resulting from natural disaster events through 1974–2003; with such events impacting more on Australia than on the seemingly more vulnerable SE Asia region (Guhar-Saphir et al 2004). A comprehensive review prepared to assess the performance of global governance for sustainable development since the 1992 Earth Summit shows few positive and many negative changes to the world's social-ecological systems through 1992–2010 (UNEP 2011).

Here, five entry points for designing and reporting an experiment that combines global transitions in ICTs, public administration, social networks, and environmental concerns with a locality's governance are identified. Two overlapping sets of scholarly ideas provide a platform from which to

identify three reasons why empirical studies on networked governance seem necessary in any capacity building efforts for and by Australia's councils.

Networks in public sector reform

One set of ideas reflects a shift of focus in public sector reform from improving performance of an individual agency to achieving more effective horizontal and vertical integration within an institutional collective. Elements in this set include innovations that appeared initially as 'policy networks' (Milward and Walmsley 1979), or 'multi-level governance' (Marks 1993), or as 'networked governance' (O'Toole 1997), and remain under research and development within these or alternative descriptors.¹

Developments in Social Network Analysis (SNA)

The other set of ideas deals with how the structure of any social network is analysed and communicated with point-and-line drawings. Freeman (2000) reviews this work through five phases between the 1930s and 1990s, including significant developments in graph theory and ICTs, and foresees a future when a single software program combines the three analytical functions of SNA:

- measuring a network's overall structure and how its actors participate;
- visualising relationships between a network's actors; and
- managing the often large volumes of associated data.

Bonsignore et al (2009) evaluate an open-source software package—NodeXL (Social Media Research Foundation, undated)—developed to combine the three analytical functions identified by Freeman (2000). They suggest its adoption could extend far beyond SNA experts to a much larger community of scholars and practitioners.² Carlsson and Sandström (2008), Christopoulos (2008), Toikka (2010) and Whittall (2010) are among those promoting SNA as the most appropriate theoretical and practical platform on which to evaluate and manage situations of networked governance.

Real presence of local government in vertical federalism

Vertical fiscal imbalance is more pronounced in Australia than in other federal systems where comparison is meaningful (Warren 2006, Fenna 2007). The fiscal position of Australia's local government is the weakest within such comparisons (Walsh 1989). Intergovernmental fora are thus seen as critical arrangements where givers and takers negotiate the transfers required to discharge their joint responsibilities. Local government's representatives were present in three of some forty intergovernmental councils at the beginning of 2011: the Council of Australian Governments (COAG), the Local Government and Planning Ministers Council (LGPMC), and the Australian Council of Local Government (ACLG). COAG agreed to reforming intergovernmental arrangements during 2011. By year's end LGPMC was no more, and the future for ACLG—a body that first met in 2009—unknown. Yet 2012 sees the Commonwealth respond to advice from an Expert Panel on whether the nation's constitution should be changed to recognise local government. There is, therefore, some urgency attached to tracing how grassroots institutions connect to actors in other decision-making levels. Knowing more about how networked governance works may be an important counter to concerns over the nebulous presence of local government representatives in the often symbolic operations of Australia's vertical federalism.

¹Alternatives include but are not limited to 'joined-up government', 'e-government' and 'holistic government'. 'Networked governance' is the descriptor used throughout this paper.

²NodeXL had been downloaded some 93,200 times by 7 January 2012, with the International Network for Social Network Analysis (INSNA) recording 1,532 active members on that day.

Need to adopt world better practice in environmental risk governance

Australian local government is one of very few systems in the world reporting its outlays on environment protection in concordance with what will soon be the international statistical standard—the Classification of Environment Protection Activities (CEPA). It did so during 1998–2003 for a series of direct collections by the Australian Bureau of Statistics (ABS), as brokered by the University of Canberra through the Commonwealth’s Local Government Development Program (Coleman 1999). Results from that work are placed in context in Table 1, where centralisation of fiscal power is countered by decentralisation or devolution of the public sector’s environment protection efforts. Own-source revenues funded some 95% of local government’s outlays on environment protection and natural resources management during that time.

Table 1 Australian public sector engagement in environmental protection: 1995–2003

Variable	National	State	Local
Expenses on All Purposes (AP) (\$M)	138,941	72,429	14,310
Expenses on Environment Protection (EP) (\$M)	526	1,237	2,376
EP/AP (%)	0.4	1.7	17.0
Expenses on Natural Resource Management (NRM) (\$M)	??	??	1,648
NRM/AP (%)	??	??	11.7
(EP+NRM)/AP (%)	??	??	28.7

Note: Central government estimates are averages for 1995–96 and 1996–97. Local government estimates are averages for five years during 1998–2003. Source: ABS Catalogue Nos. 4603.0, 4611.0, 5112.0.

The industry can therefore claim to be far more exposed to environmental risk than central governments, with near to 30% of local government’s expenses on All Purposes directed to Environment Protection and Natural Resources Management functions around a decade ago. The impacts on Australia’s local communities from drought, fire, flood, and cyclonic events have clearly increased since then. Encouraging Australia’s local governments to consider, adopt and implement world’s better practice in risk governance seems to be another important reason for undertaking this experiment. That means identifying a practice that is not only inside-out (as is ISO 31000: Risk Management), but also outside-in (as is the framework promoted by the International Risk Governance Council (Renn2005)).

Tracking progress towards sustainability

The author searched some 150 council Websites at random in preparing this paper. Results suggest that 95% or more of Australia’s local governments pursue a sustainability or sustainable development objective in some form, predominately through their strategic or corporate plans. They are among many of the 658,000 or so local governments throughout the world seeking balance across their economic, environmental and social objectives (Osborn 2011). They are flying blind when doing so since no universally accepted way of measuring sustainable development has emerged from four decades of endeavour (Hayles & Prescott-Allen 2002, Osborn 2011, UNCSD 2011). Work towards this aim in 2012 will include, but not be limited to:

- the UNECE/Eurostat/OECD Task Force on Measuring Sustainable Development presenting its final report, which expands on already substantial argument for using a ‘capitals approach’ to measure sustainable development; accompanied by recommendations on the ways to do so (UNECE 2009; Stiglitz Commission 2009; UNECE/Eurostat/OECD Task Force 2011);
- the London Group on Environmental Accounting submitting its principal revision of the System for integrated Environmental and Economic Accounting (SEEA) for the UN Statistical Commission to consider as an international standard (London Group 2011);

- delegates to the Rio+20 Earth Summit considering new choices on sustainable development indicators (SDIs), based on submissions by task forces, working groups, governments and civil society organisations (UNCSD 2011); and
- the Centre for Environment and Energy Statistics at the Australian Bureau of Statistics presenting a pilot land account resulting from collaboration with other agencies and universities that, *inter alia*, reflects an objective of ‘strengthening the capacity of local government land-use-planning decision-making’ (Vardon 2011).

No pathways could be identified in the public record where the needs of Australia’s local government industry to better inform its decision-making are represented in an extensive body of work at international and national levels on accounting for environment protection, natural resource management, and sustainable development; or on performance indicators for those purposes. Should these necessary pathways be absent in fact as well as belief, then the situation in Australia runs against evidence on needs.³

Aims

The overarching aim in this paper is to promote interest and further experimentation on SNA by those practitioners and researchers with responsibilities or interests in Australia’s local government industry. It does by using open-source software⁴ to analyse data on a locality’s networked governance in three ways to trace:

1. Connections between government and non-government institutions within and across multiple levels of decision-making, including within a local government area;
2. Connections between actor groups engaged in governance of a locality’s environmental risk; and
3. Change over time in the governance capital invested within a locality by government and non-government organisations through environment protection and natural resource management functions.

The locality chosen for this desktop study is the Wonboyn Lake, an intermittently open and closed lake or lagoon (ICOLL) on the south coast of New South Wales, with a catchment of some 350km². Middens and other archaeological evidence on the far south coast of New South Wales assert the locality’s significance to indigenous peoples over many thousands of years. Domestic and overseas researchers collect specimens in the locality as part of their taxonomic studies. Oyster production, recreational fishing and ecotourism are significant contributors to the locality’s economy. Spatial planning ranges from one developed by the locality’s own Estuary Management Committee through to the Commonwealth’s South-eastern Marine Bioregion Plan covering an area of some 1.6Mkm². The Bega Valley Shire Council’s Local Environmental Plan, the South Coast Conservation Plan, , sustainability strategies for the oyster industry, recovery plans for endangered flora and fauna, action plans for all coastal lakes of New South Wales, and a Regional Forest Agreement are among many other planning instruments affecting the locality’s land use and governance.

³ Evidence exists in the 1992 National Strategy for Ecologically Sustainable Development, in the 1992 Intergovernmental Agreement on the Environment, in the industry’s performance in ICLEI’s Cities for Climate Protection Campaign, in its relatively higher responsibilities in environment protection (Table 1), in the response by the Australian Government to recommendations by the Hawke Review on the EPBC Act, and in any survey of medium to long term objectives for local communities as held by councils and recorded with their planning instruments.

⁴ See Social Media Research Foundation (undated).

Method

Scholars seem to collect primary or secondary data for SNA in one of three ways⁵:

- A snowball or referral survey approach based on pioneer studies from decades past (Goodman 1961, Granovetter 1976, Rogers and Kincaid 1981), where an actor in a small network, or one sampled from a large network, is questioned as to other actors that he (she) (it) connects to for a specified purpose or designated period;
- An approach where content analysis of documents in the public record provides source data on network actors and their relationships (Serdult and Hirschi 2004); and
- An approach accessing data electronically through various social media applications (Hansen, Shneiderman and Smith 2011).

This experiment follows Serdult and Hirschi (2004). Four rounds of Web searches were conducted, retrieving documents containing the terms 'Wonboyn Lake' or 'Wonboyn River'. Most retrievals in the first round were documents commissioned by the Wonboyn Lake Estuary Management Committee, supplemented by other environment protection documents posted by the Bega Valley Shire Council (Bega Valley Shire Council, undated). Holdings of three other institutions—the Bega Valley Shire Council's Public Library, the Southern Rivers Catchment Management Authority, and the National Library of Australia—were searched in the second round. Documents retrieved through Google Scholar, and by combining 'advanced reading level' with 'PDF' format in Google, constituted the third round. The final round used a meta-search facility to locate documents not found through Google.

One hundred and twenty nine documents relevant to the environmental governance of the Wonboyn Lake and its catchment were retrieved from the Web through the four rounds. Analysing their content identified more than two hundred institutional actors, or otherwise indicated target groups. Scientists from universities or other institutions publishing articles on their work in the locality were assumed to be targeting domestic or international colleagues in their discipline. Further Web searches were conducted to match their parent institutions with major professional associations or learned societies. Industry, regulator, or community associations were often identified generically as target groups. Again, their institutional representatives were also tracked down through further Web searches. Illustrative examples include the Forest Industry Council (Southern NSW Inc.), the Oyster Farmers Association of NSW, Southern Councils Group, the Eden Local Aboriginal Land Council, and the Bega Area Committee established by the Council to represent community interests within its jurisdiction.

Content analysis of the source documents, plus the supplementary Web searches, resulted in a 421 x 2 matrix, i.e. 421 rows of data, each specifying a relationship between a transmitting institution and a receiving institution. Three additional characteristics were assigned to each actor:

- Government or non-government institution, and whether operating at international, national, state, regional, local or sub-local level⁶;
- Regulator, industry, external scientist, local stakeholder or other stakeholder, in concordance with actor groupings identified in the International Risk Governance Council's framework (Renn 2005); and

⁵ The availability of open-source software linked to spreadsheet applications opens up the prospect for councils and other actors to use in-house data as sources for evaluating their networked governance.

⁶ The Wonboyn Lake Estuary Management Committee is the only sub-local institution identified in this data set.

- Year in which a relationship with another actor in the network occurred.

The 421 x 2 matrix was then pasted into the open-source NodeXL template for MS Excel 2007/2010, accompanied by the characteristics data. Learning-by-doing in SNA then followed advice from developers and early adopters of the NodeXL software (Social Media Research Foundation, undated; Hansen, Shneiderman, and Smith 2011).

Findings

Figure 1 shows a random layout where source data on the locality's networked governance has not been modified in any way.

Figure 2 shows a grid layout using the 421 x 2 matrix, plus the attributes of government or non-government institutions, and decision-making level ranging from international to sub-local. Actors at the core or centre of the network structure are at the top levels of the grid, and peripherals at lower levels. The Wonboyn Lake Estuary Management Committee is represented by the black sphere.

Visualisations of federal systems typically use pyramid, picket fence or Venn diagram images that at least infer constrained relationships between levels or spheres of government based on a hierarchy of power. Coupling the transition from government to governance with SNA tools produces a significantly different visualisation. For example, Figure 2 demonstrates that international and national actors are just as important to the structure and operation of the Wonboyn Lake catchment's governance as local and sub-local actors.

Figure 3 shows a layout using the 421 x 2 matrix, plus the attributes of actor groupings in concordance with the framework promoted by the International Risk Governance Council (IRGC). Duplicate connections between actors have been merged; i.e. the more frequent the connections then the wider the line joining points.

An organisation following the principles and guidelines for ISO 31000: Risk Management will assess and manage risks through an inside-out approach, where it will report the internal adjustments it has taken to its stakeholders. An organisation following the IRGC's risk governance framework will undertake internal and external assessments of risk, i.e. inside-out and outside-in. The scope of actor involvement varies according to the situation being assessed, i.e. the simpler the situation the smaller the number of actor groups involved; the more complex or ambiguous the situation then the larger the number of actor groups involved. Industry and regulator actors are expected to resolve simple situations. Industry, regulator, external researcher, affected stakeholder, and civil society actors are expected to participate in assessing and deciding on the way forward when confronting ambiguous situations.

Estuaries are complex ecosystems, and under the IRGC framework would involve industry, regulators, external researchers and affected stakeholders. Figure 3 presents the Wonboyn data set classified according to the IRGC framework. Actors have not been labelled in the analyses for this paper, but readers may note the institutions representing oyster farming, recreational and commercial fishing industries are located at the core of the network, with dairying and forestry at the periphery. Note also that not all external researchers are located on the periphery of the network.

Figure 1 Random layout of Wonboyn data

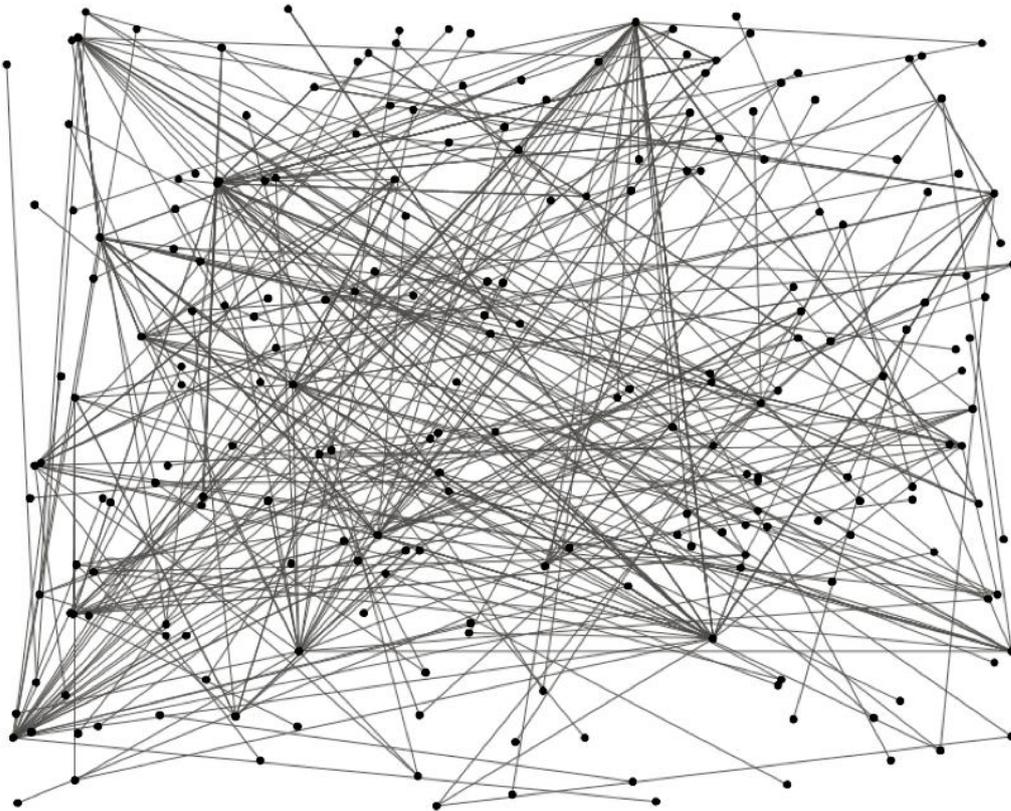


Figure 2 Wonboyn Catchment's multi-level governance

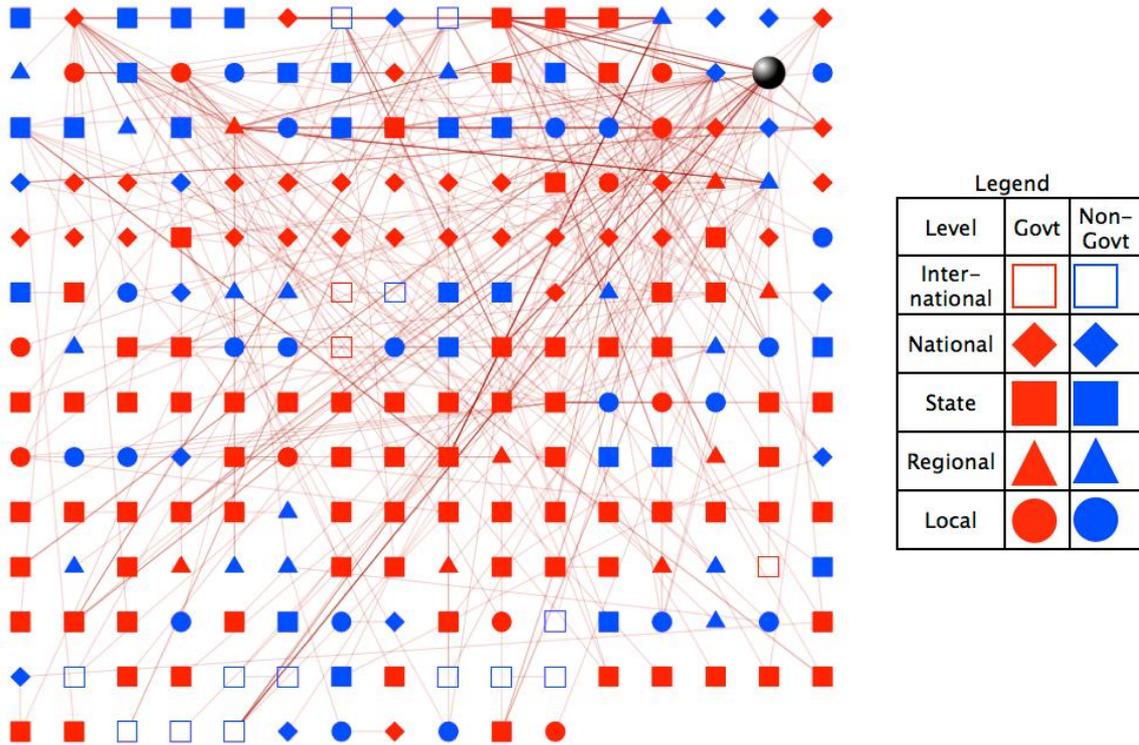


Figure 3 Actors associated with Wonboyn Catchment's risk governance

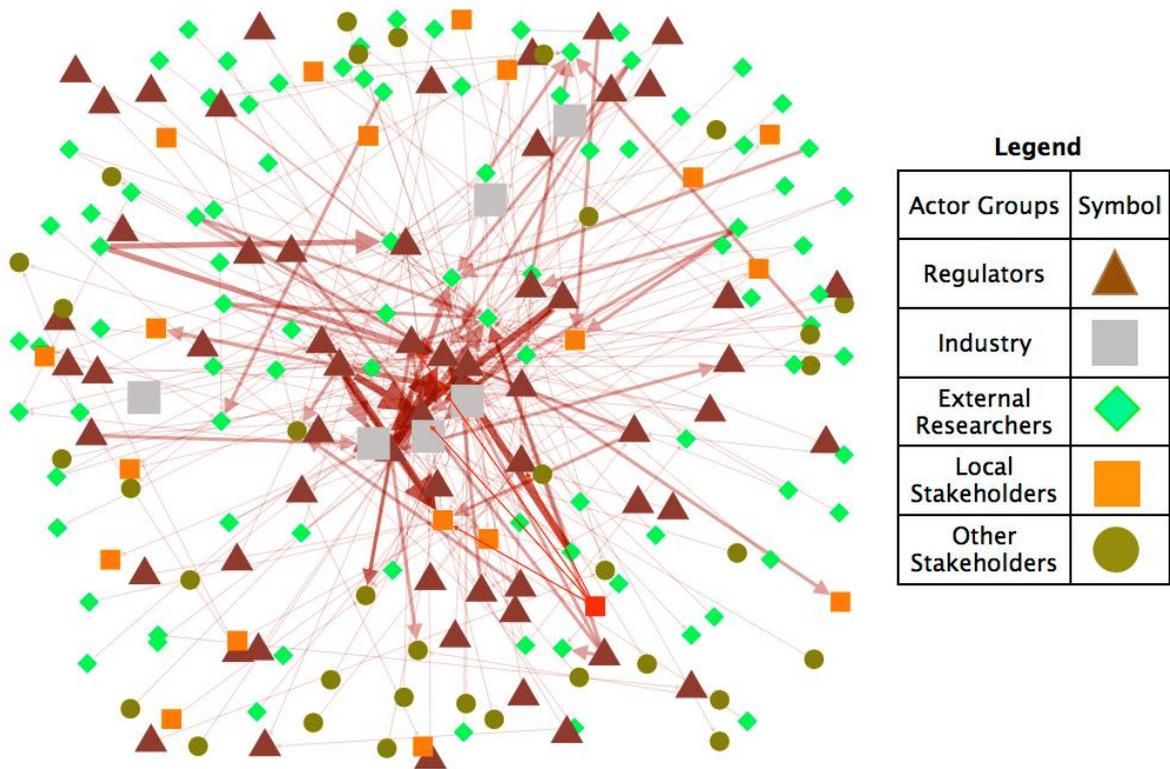


Figure 4 Wonboyn Catchment's governance capital

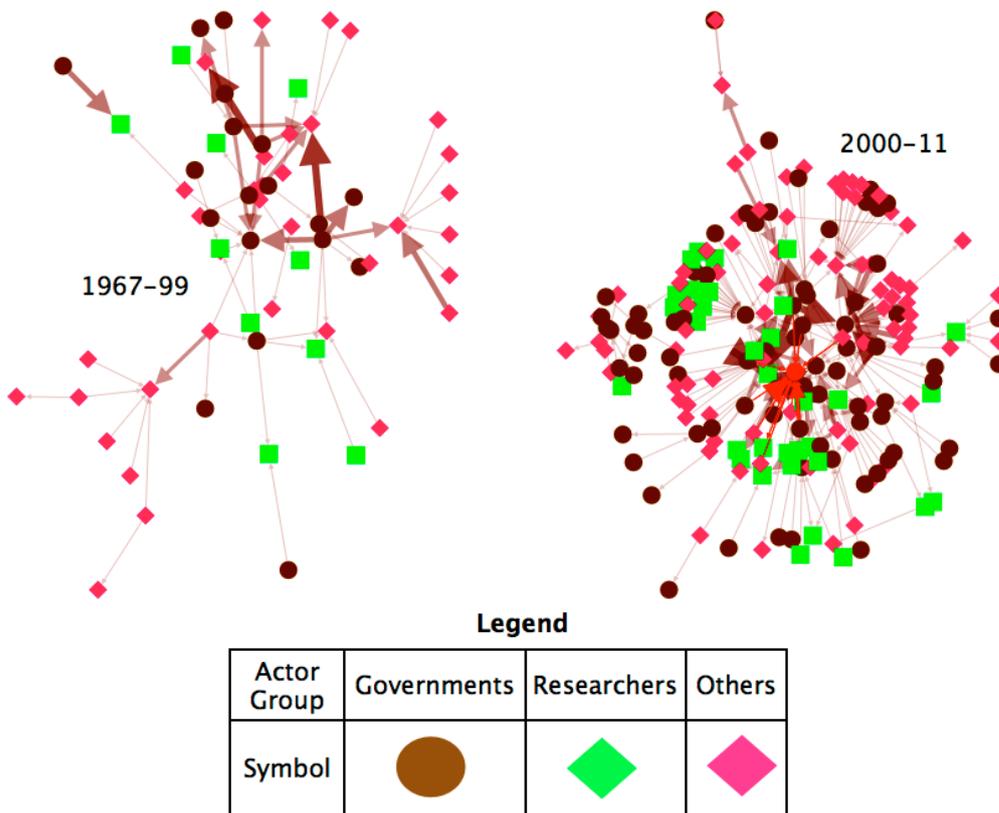


Figure 4 shows a layout using the 421 x 2 matrix, plus the attribute of year in which the connection between actors occurred. That year will, in most cases, be the year when the document was posted to the Web, with knowledge thus assumed as transferred from transmitting to receiving institution. A lag of some time between transmitter and receiver can exist, for example, when consultants reporting to the Lake's Estuary Management Committee cite work from other places and other times. The work may have been transmitted by a worker in a research institution via a journal to colleagues in a domestic or international institution. The transfer will thus appear twice in the data set; initially received by professional colleagues via publication date, and later by practitioners in the Lake's Estuary Management Committee via its consultants.

Each graph layout from a NodeXL application is derived from calculations applied to input data. Results are available to the user as measures of the network's overall structure, and as measures of relationships between actors in the network. Their availability provides another pathway towards the goal of measuring sustainable development.

2012 should see the positions of key international agencies continue to converge towards adopting and implementing a capitals approach for measuring sustainable development. The unit of analysis (nation, government, place, community, landscape, business) cannot be progressing towards a state of sustainable development or sustainability if assessment shows the sources of its future wealth, i.e. its portfolio of capital stocks, are declining over time (UNECE 2009; World Bank 2011).

The World Bank's model identifies natural capital, produced capital, human capital, social capital and governance (or institutional) capital as the stocks determining a nation's future wealth. Natural capital and produced capital are recognised in the World Bank model as the only stocks capable of being quantified in money terms within the present state of knowledge. Other disciplines and tools can, however, offer alternatives for quantifying change in stocks declared intangible by economists and accountants. For example, in preparing Figure 4 the metrics calculated by NodeXL indicate a three-fold increase between the intervals 1967–99 and 2000–2011 in the number of institutional actors operating in the catchment's networked governance. One obvious question for practitioners obtaining such a result would be the effects on the catchment's balance sheet; i.e. does a gain in governance capital offset, say, losses in natural capital during the same period?

Conclusions

Through case studies using a snowball survey approach, Horn (undated, 2007) creates mess maps for the functions of aged care in California, and for climate change in the UK. Readers will find their viewing instructive as his mess maps are also computer-generated visualisations of networked governance. But they represent the peak of a technological development phase in visualising information that began in the 1960s. Already in the 21st Century, the next phase of technological development in this field has reached a point where specialist skills and significant resources are no longer necessary for analysing and communicating networked governance, or other social networks. Investing time into learning-by-doing plus access to MS Excel 2007/2010 are the only essentials required to go beyond the tentative steps taken in the study reported here. The examples based on the author's understanding of information needs in Australia's local government industry should encourage some readers to start that journey.

Recommendations for policy and practice

Policy

The Australian Centre for Excellence in Local Government (ACELG) seems well-positioned to add its weight to the aims of this paper, by being an early adopter in Australia of the NodeXL innovation. ACELG is a knowledge network where its own actors are closely linked to key actors in the local government policy network, to communities of practice, to the knowledge networks operating in five Australian universities, and to international interests. Its responsibilities include promoting innovation through its Innovation and Knowledge Exchange Network (IKEN) located in the University of Canberra. Activities where ACELG uses NodeXL can be envisaged as follows:

1. Represents itself as a social network of actors from various institutions;
2. Considers how COAG reforms will impact on its network structure;
3. Uses Vardon (2011) and other sources to identify and visualise Australian and New Zealand representation on international and national work programs in the fields of environmental accounting, natural resource accounting (land, energy, water), sustainability accounting, and on SDIs;
4. Identify and consider creating any relationships(s) necessary to bridge between the networks in 1) and 3);
5. Visualises the International Risk Governance Council's organisational network (at <http://www.irgc.org/-Organisation-.html>), and that of the Integrated Risk Governance Project (at <http://www.ihdp.unu.edu/article/read/irg>); and
6. As with 4), asks how to bridge between the networks at 1) and 5) in order that local governments in Australia and New Zealand can be informed on world better practice in risk governance for natural disaster events.

Practice

Practitioners in councils can probably test the worth of SNA and NodeXL to their operations in many ways. Those obvious to the author again link to the major task of measuring sustainable development, by visualising and quantifying the social capital and governance capital held within their communities. Their Annual Reports and Community Directories seem to provide sufficient source data for conducting pilot studies. Councils declaring 'sustainable communities' or 'sustainable cities' as an objective in their strategic or corporate plans are particularly encouraged to do so, as adoption will probably give them a best chance, and low cost way, of being lead contributors to universally accepted practice within the next decade.

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