AMQ International

Strategic Asset Management

Issue 132, January 23, 2004

AM Comes of Age

With research, asset management 'comes of age'

In the past 20 or so years, asset management has moved from a hit-and-miss, intuitive, rule-of-thumb approach to assets *as assets*, to a systematic approach to service provision through assets and *asset systems*. It has moved from learning 'on the job' to formal, even academic, training.

It is only over the last few years, however, that we have started to see the results of PhD research in asset management. With this move, it can be now be said that asset management has 'come of age'. It can now be accepted as a significant discipline in its own right.

In this issue:

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Research – the possibilities

Research students have the interest, the ability, and the opportunity, to

1. take a **broader view** and are not constrained by the limitations imposed by current management boundaries. Thus they can look at issues that are no one person's responsibility. This is definitely the case with the research subject that we look at in this issue. These studies establish the nature of an issue but do not try to provide solutions. Indeed solutions may be beyond current knowledge. Defining the issue then becomes the first step to future solutions.

2. Or they can take a more **detailed view** of a particular, already identified, problem and try to establish a solution. This is the case with the research problem that we will bring you in the next issue – which looks at Property Booms and Busts, and the community costs incurred.

In this issue we look at ideas and techniques from Dr Ralph Godau's PhD thesis research.
The research reported here shows that the impact of asset management is far wider than just the asset itself or the services provided. For good or ill, asset management impacts the health, livelihood, amenity and aesthetic pleasure of many communities now and into the future.

Dr Godau takes a 'systems engineering' approach to asset management, which is particularly appropriate for infrastructure as complex systems. But not only is the asset itself complex, its interrelationships with the world of which it is part is also complex. This is explored in an excerpt from Dr Godau's thesis on pp 653

Future researchers will be interested in the way in which Dr Godau has structured his research and the techniques he has used. But one technique, at least – timelines – has a wider application and there are a number of everyday uses to which it could be put.

Where asset management is today - revised definition of asset management

Dr Godau's research was directed to examining the issues and relationships considered to be important by those involved in the development and management of infrastructure. After studying these relationships, the thesis concludes with a new definition of asset management that I think captures the spirit of where asset management is today.

Asset management

"a process of managing relationships with all the stakeholders through a framework that shares information and understanding about the infrastructure system and its environment in order to facilitate decisions that are an overall benefit to society in a sustainable way."

Think about it !

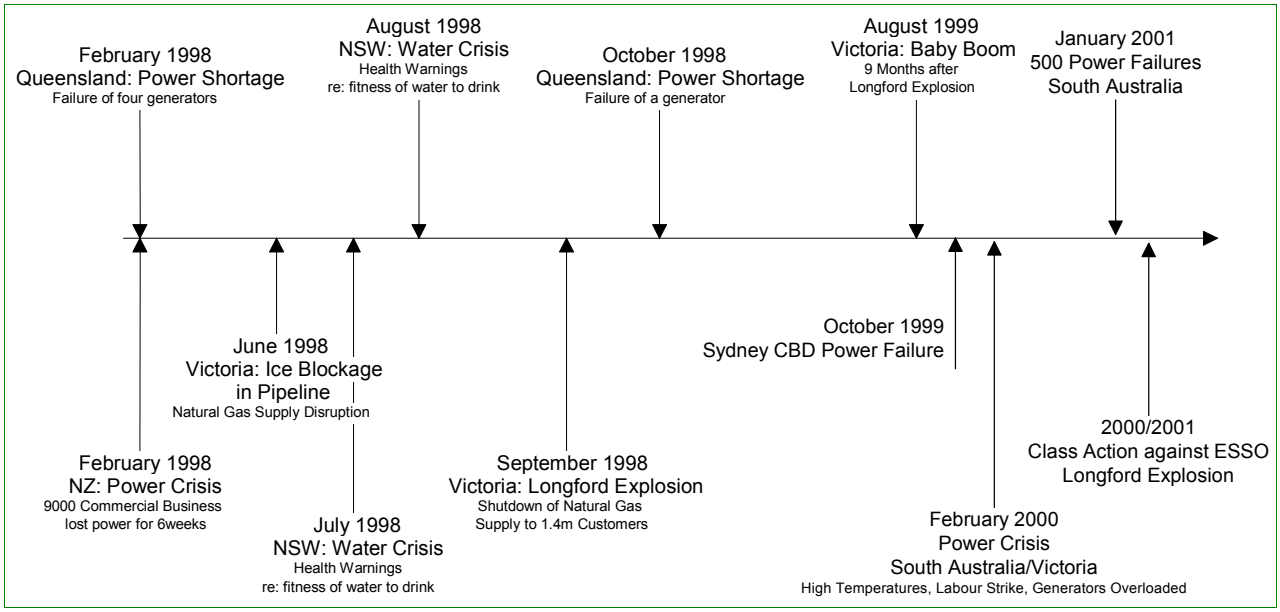
Here is a research technique that has application in everyday use.

Using Timelines

"Anything before last Tuesday is pre-history!" People today move from job to job, and from organisation to organisation, so quickly that it is becoming very difficult for a manager to develop a good understanding of the events that have influenced and are influencing current thinking.

A timeline is simply a series of dated events arranged along a line. What makes a timeline so useful is (a) the selection of events (*which is where the skill is!)* and (b) the ability to see relationships at a glance. Timelines can be useful in arguing a course of action to a committee to make sure that everyone is aware of the same things. They are also useful in understanding the influences on a person or a policy (for example a timeline of events occurring in your new chief's last position could be very helpful in understanding what may have influenced him/her there, and a similar timeline of events in your own organisation can show where similarities and differences exist.)

Here is an example of a timeline from Dr Godau's thesis, looking at major infrastructure failures in Australia and New Zealand.



Timeline: Major Infrastructure Failures in Australia and New Zealand, 1998– 2001

Research methodology

Dr Godau's thesis sought to understand the key relationships that were being observed by infrastructure technical decision makers with a focus on utilities.. How did he go about this task?

The research was designed in three parts:

(1) **Literature Review.** Asset management is seen as an application of systems thinking so the author explores this concept and what it means for decision-making. Industry and Government based models and standards are explored, Australian, US, UK and NZ work. This section also includes a few non-engineering sections, such as the local government accounting reporting requirements and state and local government guidelines. Regulatory frameworks are also addressed.

(2) **Contextual Review**. He recognised the relevance of context so that part of his research included an analysis of the major events that made the news. He examined the main online news services and the national and Victorian newspapers over a two year period 1998-1999. Over 2000 articles were captured during the period (excluding local newspapers that target specific issues in council areas). His analysis showed that media reports highlighted three distinct infrastructure themes, namely, 'infrastructure system failure' (25%) developments (44%) and privatisation/ corporatisation (31%). Although the least of the three by volume, infrastructure system failure had the most, and the most lasting impact. For example, for most Australians, Longford (the site of a major gas explosion in 1998) would now be synonymous with infrastructure failure**.**

(3) **Analysis of some 54 Asset Management Papers** written during 1998-199 to determine both the perceptions of the writers and the themes addressed. This is the core of Dr Godau's research, his contribution to the field. (All PhD theses are required to shift the known boundaries of knowledge in the field of endeavour.

This analysis used some pretty nifty qualitative data analysis software, ATLAS.ti, which allowed him to map the themes addressed in each paper and their relationships to each other in a graphic format and to sort, aggregate into categories, and generally manipulate the themes and relationships in a meaningful fashion. The thesis is quite detailed on the logic and use of the software and analysis.

An example of this 'concept mapping' is given on page 651 which describes the nature of the 'Knowledge Gap' considered to have arisen as a result of the privatisation and outsourcing of infrastructure management.

Too complex, perhaps, for everyday use, but a valuable tool for researchers, is the concept mapping that Dr Godau employs. However, the exploration of "The Knowledge Gap" should be of interest to us all.

Concept Mapping

Example: The Knowledge Gap

The concept of the 'knowledge gap' [see chart below] arose from the problems facing infrastructure participants after the restructuring of state utility monopolies into 4, 5 or more separate business units. Over time, as each moved to optimise its own performance, underlying practices and standards changed, becoming inconsistent with each other and with the original standards existing at the time of break-up. The loss of key personnel at this time exacerbated the loss of knowledge.

Practitioners writing at this time noted that the focus should have been on bridging the 'knowledge gap' to improve asset management capability and to ensure that infrastructure is maintained at a safe level but that strategies for retaining technical either did not exist or were not effective. Most of the commentators were from professional bodies (representing engineers), consultants and regulators concerned about the quality of infrastructure decisions

Several suggested government oversight agencies were needed to take a wider view of infrastructure to supplement the more specialised approaches now being taken by the new privatised or corporatised business units. The concept of a 'knowledge gap' between the public and private sector in this context appears to be aimed at the level of understanding of the social, technical and economic parameters needed to drive infrastructure decisions and the technical expertise necessary to manage the interactions.

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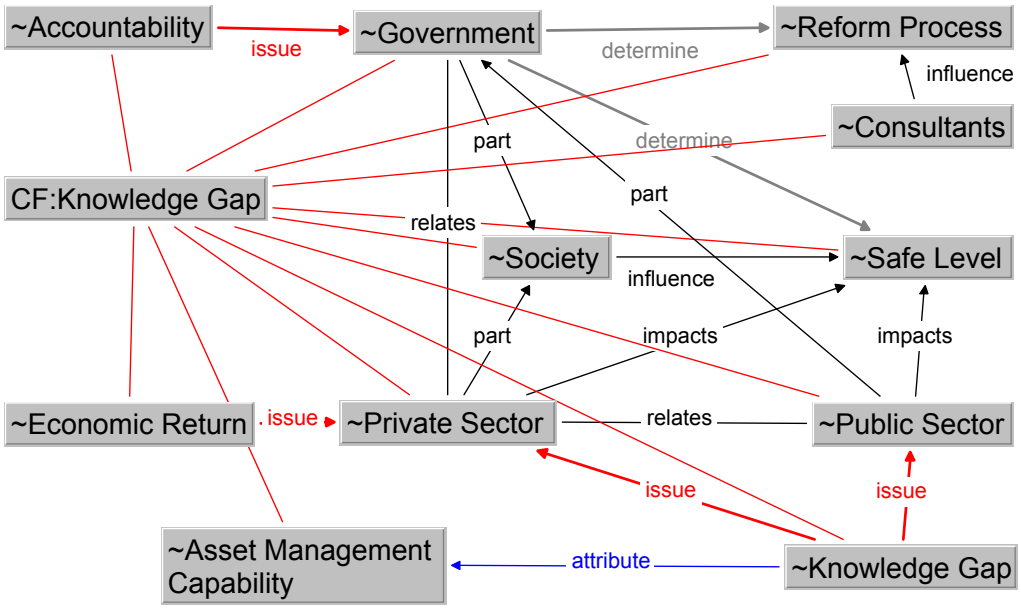

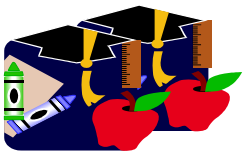

One of the outcomes of post-graduate research is thoughtful consideration of the existing literature and current problems. Here Ralph Godau considers…

Systems Engineering Thinking and Infrastructure Complexity

How general is 'systems engineering thinking'?

… amongst post graduates?

"Earlier investigations conducted by this researcher discovered that for post-graduate students undertaking engineering management studies at RMIT, only a small proportion (10-15%) enters the program with any knowledge or understanding of systems concepts. This is significant since most of the students had worked in management positions for Australian infrastructure related organisations for an average of 5 years.

This lack of understanding of systems concepts impacts on how infrastructure management and problem-solving challenges are being faced in infrastructure organisations."

What is Systems Thinking?

"Systems thinking is a way of understanding the causal relationships between the parts of the system… 'Systems thinking is seeing beyond what appear to be isolated and independent incidents to deeper patters so you recognise connections between events and are therefore better able to understand and influence them"

…. Since 1984, the infrastructure environment has undergone rapid change leading to change in the nature of relationships and a higher level of interactions. This has occurred at the technical level, commercial level, government level, customer level and global level."

Many traditional processes stifle systems thinking.

For example, the traditional practice of breaking apart the elements of a system into ever smaller, simpler parts to reduce complexity until one believes they have identified the causes of the problem. This gives the illusion that problems become easier to understand and solutions easier to develop. The process ignores the way in which complex systems work (causes may in fact be the effects derived from a cause elsewhere in the system) or finding solutions that support the overall objectives of the system.

Ed: *In Universities and other teaching establishments, and in technical manuals, subjects are 'broken apart' to make the teaching easier. It is assumed that, on graduation, students will be able to put the bits back together again—but they are not taught how to do so!*

The World is becoming more complicated

"The two different ways in which something can be complicated are:

- Having many different parts (complexity of detail); and
- The many different ways parts relate to each other (dynamic complexity)

For example, Dr Cobb of Foreign Affairs, Defence and Trade Group, Parliament of Australia (reflecting on the importance of infrastructure to the digital world and recent power shutdowns in South Australia) was quoted as saying

> 'growing complexity and interdependence, especially in the energy and communications infrastructures, create an increased possibility that a rather minor and routine disturbance could cascade into a regional outage. Technical complexity may also permit interdependence and vulnerabilities to go unrecognised until a major failure occurs'. "

Why understanding the system may not follow from examination of the sub-systems alone

[Other authors] describe the development of systems as the process of trading off and optimisation, and the inherent complexity resulting from this task for the decision-maker. They argue that even though the process of optimisation could be achieved at a subsystems level, the ability to attain overall optimisation requires a great deal of understanding about how the subsystems are structured and relate to each other.

This counters the view that the best possible system is made up of optimal subsystems. It is this inherent complexity, which is not generally well understood by those involved in infrastructure management. *[Ed: also see "Is Competition the Answer" on the next page]*

These principles of complexity and interdependence should be embraced by infrastructure managers and incorporated into infrastructure management practices. However the application of the principles and gaining an understanding of the relationships that bind the parts together relies on how well infrastructure managers mentally interpret the principles. As such the ability for managers to understand and deal with these types of notions plays an important role in determining their effectiveness at addressing issues of problems within their control."

(All of these excerpts and the illustrations on pages 648—653 are from R.Godau. *Key Relationships Perceived by Decision Makers in the Technical Management of Infrastructure.* 2002. Unpublished research thesis, printed here with his permission)

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For Comment

What is your view on the following? Important? Irrelevant? Can we do anything about it?
Use our soap box at **www.amqi.com/forums**

1. Is Competition the Answer?

Systems engineering thinking argues that optimising sub-elements leads to a de-optimisation of the whole. I suggest that this throws serious doubt on the effectiveness of the current practice of breaking up integral units in the name of 'competition'.

Competition, *if it works*, will make the sub-units more efficient (ie more 'optimal') but if more efficient sub-units do not necessarily generate a more efficient whole, then the basic reasoning behind the current 'reform' process may be critically flawed.

What we are missing is an effective integrator. With the current structuring of infrastructure such as power and rail into many, so-called, competing units,

- Whose responsibility is it to understand, let alone deal with, the problems of the whole?
- Who is it that needs to understand holistic systems engineering thinking?

2. The Dark Side of Competition

Is the 'divide and conquer' approach to infrastructure, in the name of competition, affecting our humanity? Consider the following:

> "The Potter's Bar rail crash [UK] brought the worst out in the National Express boss, Phil White. [He] admits to Andrew Clark in The Guardian "What your first question should be is: Who's injured and are the staff alright?" But because of the way things are, your first dreadful thought is: "Was it the wheels or the track?" He concedes there must be something wrong with the industry if his first thought is to wonder whose fault it was. "We are a huge rail player and we love that business, but we've been frustrated by it over the last few years. It's been a very, very poor product for our customers and that hurts us…. You don't feel proud of the business like you do with our buses and coaches." *The Week, 20 December 2003*