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## Infrastructure Sustainability, Lining up the Pins

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**Abstract:** Engineering plays a critical role in defining investment needs and programs to deliver infrastructure to support sustainable communities. In spite of the maturity of technical practice the first Canadian National Report card identified a significant gap in Asset Management practice. Infrastructure planning, delivery and oversight have evolved in an environment of technical silos including community planning, engineering, accounting, environmental sciences, management, leadership, governance and political sciences. Sustainability requires a fundamental shift in how we put the technical pieces together. It requires a change in organizational and industry culture. When we talk about sustainability we must also look beyond the organization that is delivering the service to include those agencies responsible for regulatory oversight, and the role that key non-government organizations and professional groups play in building capacity. Alignment requires change by all stakeholders. This session presents findings from the 2011 APWA Jennings Randolph Fellowship study tour to Australia that looked at the state of practice and key success factors that are contributing to sustainable management practice in the form of regulation, incentives, national frameworks and practitioner tools in Australia.

### 1 Introduction

The ASSHO Road test is now over 60 years old. Framing the contribution of this early work in today's asset management language, they set the foundation for evaluating condition; recognized that how we measure condition technically as engineers, "technical service levels" to initiate maintenance and renewal actions is different than how the road user perceives the quality and serviceability of the road, "customer service levels". By the 90s, the North American transportation industry recognized there was a communication gap in securing funding in spite of the wealth of technical research and maturity of practice in pavement management, maintenance management, financial management, policy development, and performance monitoring and reporting. Fast forward to 2013 and many organizations continue to struggle with communicating the criticality of infrastructure investment needs to senior decision makers and City Councils.

The 2011 APWA Randolph Jennings fellowship provided an opportunity for the author to return to Australia 20 years after attending an asset management certification course to see the progress made while recognizing that there were still barriers to the adoption of good asset management practice. The focus of the study tour was on the strategic initiatives occurring at the national, regional and local council level in Australia to support sustainable infrastructure management practices, better governance, stewardship and accountability.

## 2 Framing the Sustainability Challenge and Our Performance Gap

The Oxford dictionary defines *infrastructure* as “the basic physical and organizational structures and facilities (e.g. buildings, roads, and power supplies) needed for the operation of a society or enterprise”; “the social and economic infrastructure of a country”. With this definition in mind I offer the following points that helped form my study objectives and in many cases reflect barriers to better practice:

- Infrastructure is the means by which communities deliver their social mandate. Infrastructure must therefore be viewed through the lens of the community planning process.
- In delivering its mandate communities need to be strategic and forward thinking. This means the right science must be adopted to forecast the current and future impact of our decisions. For infrastructure this means robust performance models and prioritization tools to forecast and evaluate the impact of different infrastructure policy options.
- It is the act of acquiring, operating maintaining, enhancing and renewing infrastructure that determines affordability and the environmental foot print of communities and whether they are financially and environmentally sustainable. These disciplines need to table an integrated strategy as part of program and budget development and prioritization.
- The cost of service and the environmental impact of service must be framed around the service standards that deliver community outcomes. There is a hierarchy; infrastructure delivers the community benefits through the setting of level of service standards that are acceptable to the community. The economic and environmental impact is the cost of those service standards.
- Understanding the financial and environmental sustainability of infrastructure is no longer an option, it is a requirement of any modern business endeavor.
- Infrastructure is a national need while delivery is primarily a regional and local government responsibility. Each level of government must understand its role.
- Infrastructure planning, deliver and oversight have evolved in an environment of technical silos including community planning, engineering, accounting, environmental sciences, management, leadership, governance and political sciences.
- Research has not traditionally crossed technical boundaries which typically mirror organizational structure and silos in many organizations.
- The body of knowledge to support sustainable communities has not changed significantly in the past 20 year and is bigger than any one discipline. Sustainability requires a fundamental shift in how we put the technical pieces together. It requires a change in organizational and industry culture.
- When we talk about sustainability we must also look beyond the organization that is delivering the service to include those agencies responsible for regulatory oversight, grants and the role that key non-government organizations and professional groups play in building capacity. Alignment requires change by all stakeholders.
- Accounting standards on their own have not realized the sustained benefits they were originally envisioned to drive. However they are still an important element to support government transparency and accountability.

- This shortcoming in accounting approaches should not be a surprise as the wealth of information on engineering condition assessment has not delivered the benefits it has been envisioned to provide.
- Infrastructure asset management is a journey, not a destination. Practice will evolve and there must provide be ongoing assessment of the practice as well as the infrastructure.
- Many organizations continue to have their budget and resource allocation entrenched in historically based budgeting processes that focus on budget inputs rather than service outcomes and outputs.
- We must not get lost in our own individual definitions: sustainability, asset management, infrastructure management. We are all striving for the same endpoint.

Service founded on the cornerstones of sustainability and life-cycle management challenges the status quo and organizational silos that exist in many organizations, and requires a significant shift in organizational decision making and performance reporting. The principles of life-cycle management also challenges traditional approaches to government infrastructure grant programs that generally focus on one time major capital projects rather than life cycle investment.

### 3 Aligning the Silos

The Institute of Public Works Engineering Australia (IPWEA) has characterized the critical elements that need to be advanced and aligned in a simple “one page strategic plan/matrix” in the form of frameworks, tools, and drivers applied to stewardship, asset management planning, and long term financial planning shown in figure 1. It provides important structure to pull the broad group of stakeholders together and can also help define advocacy needs. Don’t be fooled by its simplicity. The framework can be used to explain both success and failures in other countries including New Zealand, the UK and North America.

Figure 1 IPWEA Asset Management Strategic Framework

Provide Framework Tools & Drivers	Framework	Tools	Drivers
<b>Stewardship</b>	Government Requirements Agreed	AM DVD: The Movie!	 
<b>Asset Management Planning</b>	International Infrastructure Management Manual		Legislation & Incentives
<b>Long Term Financial Planning</b>	Australian Infrastructure Financial Management Guidelines	Long Term Financial Planning Tools	National Assessment Model

Although long term environmental planning is not explicitly incorporated into the “one page strategic plan/matrix”, it does receive treatment in the International Infrastructure Management Manual. Australia’s commitment to environmental sustainability is also reflected in the requirement for comprehensive environmental reporting by local government and in 2011 through the introduction of a national carbon tax. If there was any single piece of advice that I would offer it would be to explicitly include environmental planning in the one page strategic plan/matrix to ensure integrated planning across all cornerstones of sustainability. In North America we have recognized this need and have developed frameworks and tools to assess environmental sustainability.

Where Australia has excelled in the last six years is in their national dialogue on infrastructure planning and investment needs. In my discussion with many council staff in NSW and Queensland I could feel the enthusiasm, optimism and certainly the support for the national and state commitment, and regulatory requirement and guidance documents:

- The commonwealth government took a leadership role in engaging the state, territory and local government and obtaining consensus on nationally consistent stewardship frameworks; asset planning and management (Local Government and Planning Ministers Council, 2009), financial planning and reporting (Local Government and Planning Ministers Council, 2007), and assessing financial sustainability (Local Government and Planning Ministers Council, 2007). These frameworks are the responsibility of each State and Territory to implement;
- Some state governments are putting in place new streamlined requirements along with implementation time frames for local government with a strong focus on integrating and aligning asset management planning and long term financial planning with community strategic planning (NSW Division of Local Government, Department of Premier and Cabinet, Australia, 2010). These new requirements simply build existing regulations that were in place since 1993;
- Local governments are reorganizing themselves and breaking down the silos and reshaping how they plan infrastructure and undertake long term financial management;
- IPWEA has developed tools and training materials to build industry capacity to implement the asset management planning and long term financial planning frameworks;
- Testimonials from staff in local government to the value of a standardized business planning approach across all business units using the asset management plan template in NAMS.PLUS.

Two gaps still facing Australia is the need to improve the use of more advanced infrastructure forecasting tools to define long term funding needs based on service levels, and operationalizing environmental costs into the infrastructure investment decision. Long term investment plans must be based on forward planning tools that incorporate engineering performance models that can be linked to community outcomes. On the second issue of incorporating environmental cost in the infrastructure investment decision there is much work needed to include it as part of the trade-off analysis between level of service, cost of service, and environmental impact of service. At the time of the study tour Sydney Water was completing the development of an investment planning and prioritization tool to evaluate and rank different carbon emission strategies.

#### **4 The Canadian Journey**

In terms of Canada’s journey towards improving infrastructure oversight, governance and capacity building the industry as a whole made significant inroads with the Technology Roadmap and the Asset Management Governance Framework for Canada. Both have been used to help guide the formation of various regional asset management working groups and national initiatives to recognize and broaden industry participation.

Certainly one of the barriers to advancing the state of practice in Canada continues to be the disparate and large number of agencies and stakeholder groups that contribute to capacity building. In 2010 this was estimated to exceed 600 agencies. Furthermore many asset specific agencies such as public works, water, and waste water continue to have stronger organizational ties north south than east west across Canada.

Much of the success that Canada realized in the past 12 years was the result of federal government leadership and financial support that pulled many of these disparate agencies together. Even the first Canadian national infrastructure report card was initially developed and tested by Infrastructure Canada. When Infrastructure Canada withdrew as the lead agency the report card was picked up by other participating national groups. The federal government provided the initial glue to bring these many agencies with their unique perspectives, mandates and internal capacity to the table.

Although Canada and Australia share a similar national government structure, there are some significant differences in terms of the scope of services that local communities provide. Specifically services in Canada that local communities partially or fully provide that are typically funded and delivered by upper tier governments in Australia include education, police, and fire. Upper tier governments in Australia also deliver some of the local government road infrastructure. Many water and waste water utilities have also been regionalized and are regulated and operated at an arm's length to the municipalities they service. In Canada this additional burden of services also raises the issue of equitable funding models where there is a broader regional or national interest in the infrastructure. Some progress has been made in Canada when you look at programs such as the Government of Saskatchewan urban highway connector program ([www.highways.gov.sk.ca/uhcp](http://www.highways.gov.sk.ca/uhcp)). Under this program local urban roads are evaluated in terms of broader regional/provincial interests. Roads that qualify are eligible to receive funding for all life cycle activities and not just capital intense grant money.

The need for a national vision and strategy to ensure appropriate oversight and capacity building is the greatest challenge to realize sustainable communities. This vision is necessary to ensure value for money and public transparency and accountability for infrastructure investment. To realize this vision clear takeaways from Australia include:

- Governance and stewardship is critical and must include external legislation and incentives to drive sustainable infrastructure management practice and sustain those practices;
- Internally communities need technical frameworks and tools to execute good infrastructure stewardship. Regulatory drivers and incentives are not sufficient on their own;
- Capacity building takes significant commitment, time and resources by all levels of government.

## **5 References**

Local Government and Planning Minister's Council, Australia, 2007, Local Government Financial Sustainability Nationally Consistent Frameworks, Framework 1, Criteria for Assessing Financial Sustainability.

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