

# TOWARDS AN INFORMATION MANAGEMENT FRAMEWORK FOR PUBLIC ASSETS

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Research has shown that there are a variety of approaches used to manage the exchange of asset related data. The type of approach generally reflects the broader governance environment and purpose for the data exchange. In Australia over 600 local government organisations (governed by seven separate sets of legislation) currently manage community based assets. This results in 600 independent and different solutions to the management of essential similar community asset information. Aggregating data in regional, state and national models to support the allocation of central funding is a major challenge. A common system is perceived impractical. Even obtaining a common data set is extremely difficult given the diversity of community drivers. What we are looking for is interoperability of data against a common framework. In this paper we discuss an architectural framework for the exchange of information to support significant investments and grant allocations made by governments to support regional and local community assets and infrastructure development, such as road networks, drainage, water infrastructure, parks, libraries sports facilities and public space. The approach is based on a Service Oriented Architecture at two levels; firstly we build the investment framework from a service basis, based on service outcomes as defined by the community. Secondly, the information architecture that delivers the decision making support is founded on a Service Oriented Architecture. The goal of our information framework is to support sustainable investment in community infrastructure. Given the complexity of the modern urban environment the decision framework needs to support a holistic view of all of the information sets that contribute to sustained investments in community assets. We present a SOA that describes the various service components of our architecture outlining a strategy for achieving interoperability of data across diverse and disparate organisations.

**Key Words: Information Management Framework, Community Based Assets, Service Oriented Architecture**

## 1. THE NEED FOR AN INTERGRATED INFORMATION FRAMEWORK

In Australia over 600 local government organisations (governed by seven separate sets of legislation) currently manage community based assets. This results in 600 independent and different solutions to the management of essential similar community asset information. Aggregating data in regional, state and national models to support the allocation of central funding is a major challenge. A common system across Australia is perceived as impractical. Even obtaining a common data set is extremely difficult because of varying definitions and data capture methodologies. What is needed is interoperability of data against a common framework based on common standards (Reference 1).

Local governments in Australia currently manage around \$169 billion worth of assets on behalf of the community, including:

- \$105 billion in 650,000 km of roads and bridges;
- \$12 billion in community facilities, such as childcare facilities, public halls, theatres, main street-shopping strips, swimming pools, recreational facilities, playing fields, airports, senior citizen centres, public spaces, libraries, galleries, museums, walking trails and tourism information centres etc; and
- depending upon the state councils also have varying levels of responsibility for water supply, drainage and other environmental assets.

These assets provide the fabric that supports our communities; they are the foundations that make a difference to the quality of life and our wellbeing.

Over the last 35 years the composition of services provided by local government has changed markedly with local governments now providing around 20% more human and social welfare type services in addition to the traditional property based services.

### **1.1 The Problem**

Despite these increases in services the sources of revenue remain largely unchanged. For the most part local governments have serviced the increase in demand for social services at the expense of maintaining and renewing the asset infrastructure. The resulting backlog of maintenance and renewal work across Australia is commonly called the renewal gap.(Reference 2). Most assets were constructed in Australia in the '50's , '60's and '70's. The older assets are now fast approaching their economic lives. The continued sustainability of community assets and infrastructure is rapidly reaching a critical state. The crunch for local government is how to sustain what they have whilst meeting the demands for more social services, more roads, more water, and more recreational facilities.

### **1.2 Three Pillars of Progress**

A three pronged approach is recommended to address this problem. It is based on:

- smarter management of assets, more efficient and effective processes, combined with improved professional development;
- informed and empowered local communities to set their priorities; and
- an informed national debate on the sustainability of community infrastructure.

### **Smart Management**

Smarter asset management requires better detail knowledge of the assets, sharing of ideas and learning from others. Consistent business practice and definitions are the foundation of wholesale improvements. Australia is a too large and diverse a nation to mandate a common approach. Large investment has already been undertaken in existing systems. A solution is required which allows local diversity while promoting national consistency.

### **Local empowerment**

Ultimately, the purpose of renewing community assets is not to preserve them but to enable communities to achieve the outcomes they believe are important. Within this context the debate about the renewal of community infrastructure should not be restricted to a small subset of asset managers. Managing the renewal gap is an issue that goes to the heart of our aspirations for safe thriving and prosperous communities and requires input at the highest levels. In order for the debate to be meaningful it must be supported by sound information. Communities must have access to the right levels of information so as to be empowered to make knowledgeable, even wise decisions about their future.

## National Dialogue

Engaging in a national debate about innovative ways to bridge the gap in local resources required to sustain the well-being of our communities will require demonstrable evidence of a consistent national problem. Unless there is a compelling national case any attempt to hold a national debate will be swamped by the multitude of competing demands. To do this we need reliable, consistent and relevant data; data that can be aggregated to the state and national level yet substantiated down to a local level. To date the ability to generate this quality of information has remained elusive.

Australia needs an integrated information framework, that:

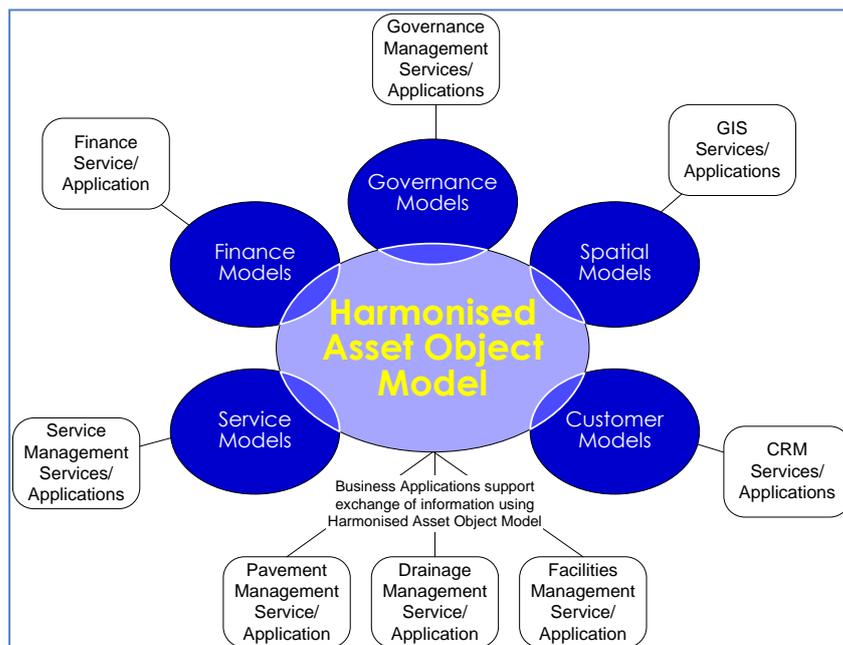
- enables information needs at community, state and national levels to be addressed;
- enables better decisions to be made on behalf of local communities;
- is consistent nationally; and
- follows a systematic approach

### 3. INTEGRATED INFORMATION FRAMEWORK

An integrated information framework is required that:

- has a harmonised reference model;
- enables the interoperable exchange and use of information relating to community assets;
- provides a mechanism for the exchange of information between the multitude of parties that have an ongoing need to access community asset data and the 600 local councils that are responsible for its collection and maintenance; and
- is an object-oriented model of assets that councils manage on behalf of their community.

The integrated information framework is not a solution to the asset renewal gap which has been widely identified in Australian local governments, but is rather a necessary service that empowers people with information to make better decisions. The core component of the Information Framework is a harmonised reference model. Essentially this is a common agreed reference model that enables the interoperable exchange and use of information relating to community assets. This is illustrated in Figure 1.



**Figure 1. Harmonised Asset Reference Model Architecture**

The framework provides a mechanism for the exchange of information between the multitude of public and private parties that have an ongoing need to access community asset data and the 600 local councils that are responsible for its collection and maintenance. The Harmonised Reference Model is an object-oriented model of assets that councils manage on behalf of their community.

The Reference Model contains:

1. Semantic Definition of the objects (people, roles, services, assets etc) that form part of the asset reference model; and
2. UML static structure class model of objects.

Characteristics of the Reference Model are:

- it is based on real world objects; as far as is possible the objects modelled are valid and readily recognisable constructs of the real world;
- it has a modular component based structure, where objects are modeled once and may have multiple relationships;
- it has the flexibility to manage inconsistencies; in building a harmonised model we recognise that there will be both a tight and loose fit between the model components and data stored in supporting business applications;
- it is responsive to being viewed from multiple different perspectives; you should be able to ask lots of different questions of the same model; and
- there is a consistent interface used to access data across all components.

The methodology for developing the reference model is based on the object paradigm and endeavours to create as realistic a representation of the real world as possible. The outcome of this process is a model that remains robust and effective when viewed from multiple perspectives. The one model is better able to serve multiple purposes in supporting a diverse range of user needs.

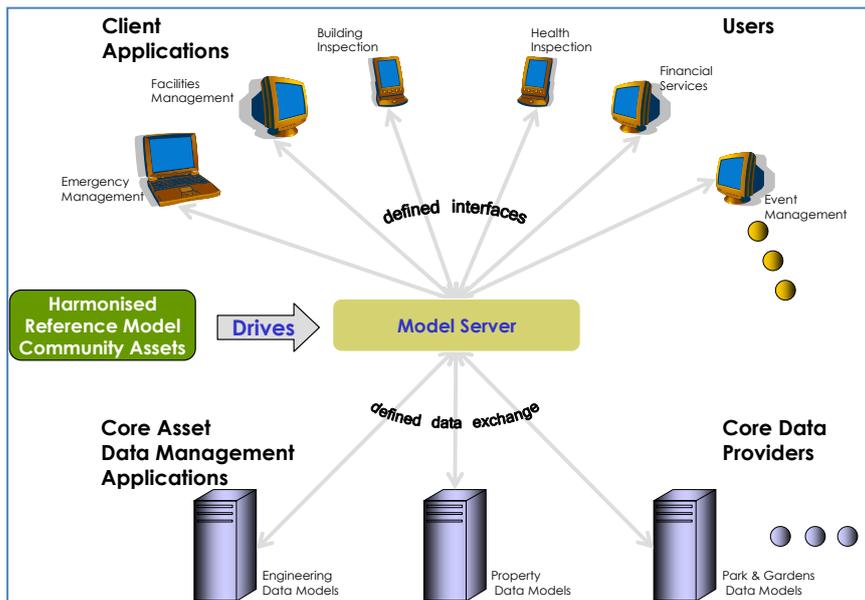
#### **4. BENEFITS OF AN INTEGRATED INFORMATION FRAMEWORK**

An integrated information framework for asset data will:

1. enable the timely and efficient exchange of data;
2. ensure the interoperability of information exchanged across internal and external boundaries;
3. enable the aggregation of data from different areas; and
4. facilitate the analysis and comparison of data.

The framework will lead to a more accurate and comprehensive understanding, at all levels of community - from local to national, of the services supported by our assets and the levels of investment required to sustain or improve the service outcomes.

The Information Exchange Framework will enable investment and funding organisations to substantiate wider planning decisions with factual data that is aggregated across organizational boundaries (Figure 2).



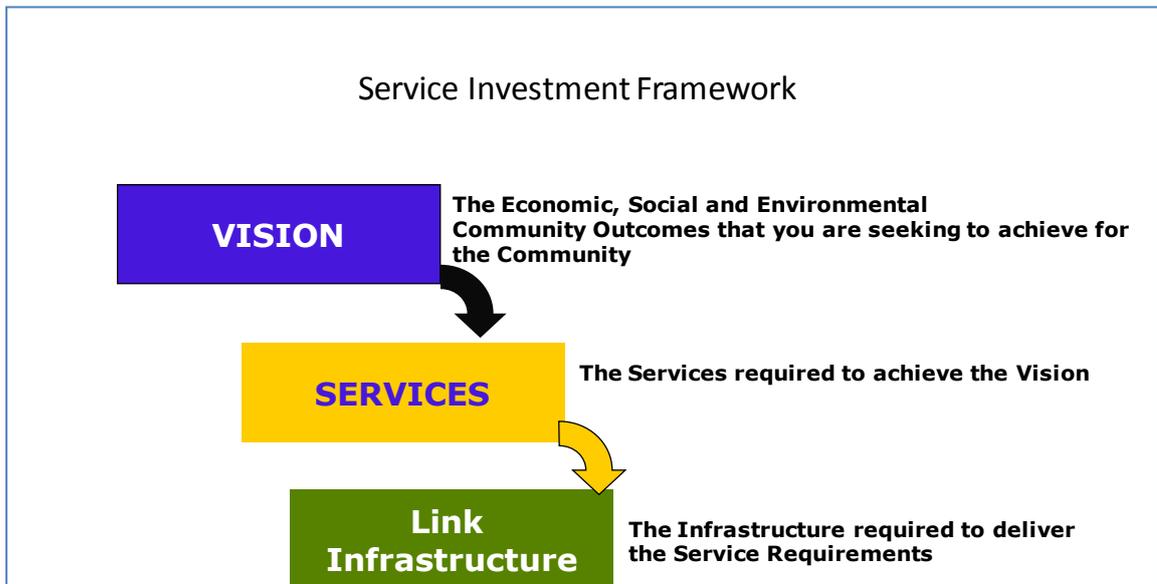
**Figure 2. Integrated Information Framework Enables Multiple Use of Asset Data**

The agreed asset management ontology combined with the facility to exchange field values will deliver a more robust and better-informed platform for making decisions; in particular, where these decisions relate to the planning of sustainable development and services within our communities and the mitigation of hazards.

## 5. SERVICE INVESTMENT FRAMEWORK

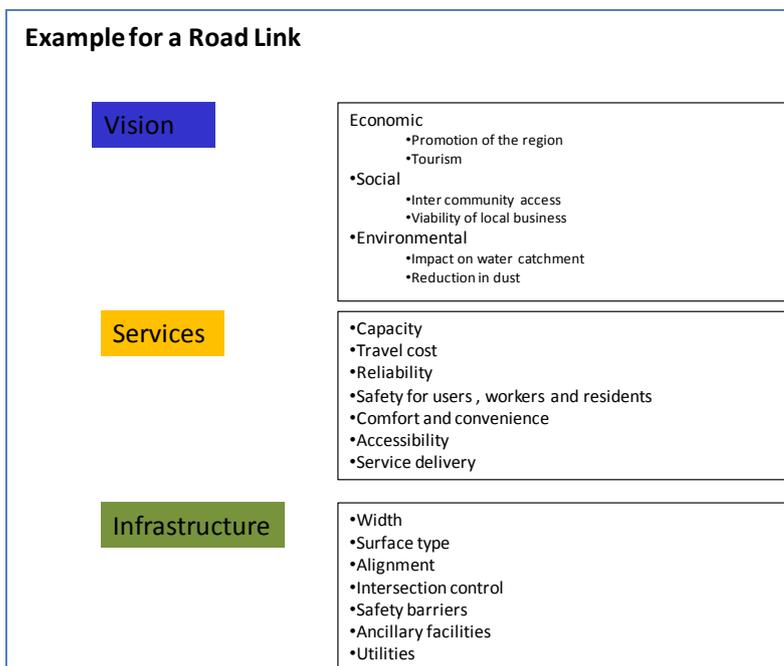
The goal of the Integrated Information Framework is to support sustainable investment in community infrastructure across Australia. Given the complexity of the modern urban environment, the decision framework needs to support a holistic view of all of the information sets that contribute to sustained investments in community assets. The approach is based on a Service Oriented Architecture (Reference 3) at two levels; firstly we build the investment framework from a service basis, based on service outcomes as defined by the community. Secondly, the information architecture that delivers the decision making support is founded on a Service Oriented Architecture. Service Oriented Architecture allows different applications to exchange data with one another. The aim is to promote a “loose coupling” of services with operating systems, programming languages and other technologies which underlie software applications.

Communities determine (in consultation with their residents) what services that they will provide for their communities and the service delivery standards or service levels for each service. These standards are commonly called customer service standards. These standards can be varied for different areas. It is common to adopt desirable and minimum standards. Minimum standards are based on safety or equity principles and may be linked to state or national guidelines. e.g. Australian Drinking Water Guidelines



**Figure 3. Service Investment Framework**

This framework will be used to develop reference models for local roads, drainage, irrigation networks, public furniture and signage. An example for a road link is illustrated in Figure 4. In developing the frameworks for each asset group, It is intended to build on existing projects which are compatible with the project approach. For example, for roads, the work undertaken by the Queensland Road Alliance will be utilised (Reference 4).



**Figure 4. Example Service Investment Framework for Road Link**

#### **4. CONCLUSIONS**

Local government in Australia is facing an ever increasing renewal gap between what it needs and what it has to sustain services. Communicating this need in a comprehensive and objective manner to other levels of governments in Australia has been frustrated by the lack of quality information on community based services.

In Australia over 600 local government organisations (governed by seven separate sets of legislation) currently manage community based assets. This results in 600 independent and different solutions to the management of essential similar community asset information. Aggregating data in regional, state and national models to support the allocation of central funding is a major challenge. A new approach is required which provides for smarter management of assets, more efficient and effective processes, informed and empowered local communities, and an informed national debate on the sustainability of community infrastructure.

An architectural framework for the exchange of information is proposed to support applications for significant investments and grant allocations for road networks, drainage, water infrastructure, parks, libraries sports facilities and public space. The approach is based on an investment framework with decision making support founded on a Service Oriented Architecture. The Information Exchange Framework will enable investment and funding organisations to substantiate wider planning decisions with factual data that is aggregated across organizational boundaries

#### **5. REFERENCES**

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#### **5. ACKNOWLEDGEMENTS**

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