

Administrative Boundaries: Automating the Data Processing Cycle for a Critical National Dataset

Michael DIXON, Australia
Duncan GUTHRIE, Great Britain

Key words: 1Spatial, Data Automation, Data Quality, PSMA, Radius Studio

SUMMARY

PSMA Australia is a government owned company that was established to coordinate the assembly of, and facilitate access to, fundamental national datasets. The Administrative Boundaries dataset is a product that is developed by PSMA Australia, and contains critical data pertaining to Australian Bureau of Statistics, Electoral, Local Government, State Boundaries and Suburb/ Localities. This is vital information for the Australian community, and PSMA Australia recognises the need to make this data as readily available and as high a quality as possible. To do this, PSMA Australia embarked on an innovative project to automate the processing of Administrative Boundaries data.

This paper will discuss how PSMA Australia:

- Developed key international relationships to ensure the best software and support system was used for the project;
- Recognised that data automation was a core component in the future of data management, and therefore realised it was necessary to undertake this process;
- Undertook rigorous analysis and research of business requirements to ensure that desired outcomes were achieved;
- Developed a Service Orientated Architecture (SOA) and Orchestration for Spatial Data Management; and
- Took a lead position within Australia to undertake a project that had not previously been seen within the Australian and International Spatial Industries.

This innovative approach to managing the Administrative Boundaries dataset could not have been undertaken without the British software company, 1Spatial. Their insight, knowledge and support were crucial to the success of this project. The successful implementation of Radius Studio (a geospatial data integration platform) has now led to the automation of other PSMA Australia datasets.

Commission 7 – Cadastre and Land Management, Application of Innovative Technology in
Land Administration
Michael DIXON and Duncan GUTHRIE
Administrative Boundaries: Automating the Data Management Cycle for a Critical National Dataset

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010

Administrative Boundaries: Automating the Data Processing Cycle for a Critical National Dataset

Michael DIXON, Australia
Duncan GUTHRIE, Great Britain

1. INTRODUCTION

PSMA Australia has undertaken a significant project to automate the Data Management cycle for the processing of Australia's continental datasets. This award-winning project has been groundbreaking for both the domestic and international spatial communities, as Australia has been the first to achieve such an initiative and benefit from the cutting-edge technology required to automate the Data Management cycle. This paper will:

1. Explore the reasons why data automation was required by PSMA Australia;
2. Discuss the concept and technical solution implemented;
3. Provide visibility of the outcomes achieved from this initiative; and
4. Explore how the Australian spatial and international communities are benefiting from this successful project.

1.1 Background of PSMA Australia¹

PSMA Australia is an unlisted public company. It was established under Australia's corporations law and is wholly owned by each of the State and Territory Governments and the Australian Government. Each government holds an equal share despite their disparity in population and economic capacity. In line with the requirements of Australia's national corporations law, as with other country's corporations laws, the directors are required to act in the best interests of all the shareholders, which in the case of PSMA Australia, means the overall focus of the company is on the wellbeing of Australia as a whole.

PSMA Australia provides a mechanism for sovereign states to work collaboratively and yet is able to act independently within broad boundaries established by its owners – the Governments of Australia. PSMA Australia is a self-funded entity, thereby contributing to its independence and allowing the focus to be on providing social and economic benefits through the provision of continental spatial data.

¹ Excerpts taken from Paull, D. (2009) PSMA Australia's information infrastructure facilitating collaboration and delivering capability across the governments of Australia, paper presented at GSDI 11 Conference, Rotterdam, June 2009.

PSMA Australia has developed six continental datasets, consisting of:

- G-NAF[®] (Australia's authoritative reference for geocoded addresses);
- Transport & Topography[™] (over 2.2 million kilometres of road centrelines and selected topographic information);
- CadLite[®] (a graphical representation of all 10.7 million registered land parcels in Australia);
- Administrative Boundaries (localities, suburbs, local government areas, state boundaries, electoral boundaries);
- Postcode Boundaries (established in collaboration with Australia Post); and
- Points of Interest (a collection of point features to add context and detail).

The role of PSMA Australia is to greatly simplify the arrangements under which standardised and aggregated data can be accessed. There is great consumer confidence and certainty as PSMA Australia is a single authoritative source for fundamental spatial reference data (see Figure 1). The removal of duplication that has historically been in place, frees up resources that can then be focused on core business and innovation. The ability to share the costs of data conflation across all users enables a higher quality of data at a lower cost per consumer. Additionally, as the cost barriers associated with data access reduce, broader access results.

As the Australian population continues to grow, so does the quantity of data requiring management. This is further strained by the recognition by the population and public and private business sectors, of the importance of spatial data. PSMA Australia is a dynamic company and has historically been innovative in the development of continental datasets. PSMA Australia sees its role as an industry leader being extended in the future, as it continues to innovate to provide new continental datasets to the wider community.

2. PROJECT BACKGROUND

A number of spatial data agencies around the world are implementing more efficient geospatial production supply chains to ensure that data is made available to key decision makers responsible for new knowledge economies. The Europeans have embarked on an ambitious programme to build a European Spatial Data Infrastructure to provide harmonised and interoperable data across national borders. This is known as the Infrastructure for Spatial Information in Europe (INSPIRE) and it is now a legally mandated Directive from the European Commission. It has several phases and the most recent stage has been transposition, i.e. legally recognising INSPIRE throughout the EU 27 Member States. The next stage is implementation. There are a number of milestones to be achieved on the way towards 2018 and full implementation throughout Europe. ISpatial has been involved in providing technical guidance to the Joint Research Centre (JRC) around INSPIRE transformation network services; JRC is responsible for driving INSPIRE within Europe. Early initiatives in the United States are underway as a response to the global economic downturn. Australia, through the initiatives of

Commission 7 – Cadastre and Land Management, Application of Innovative Technology in
Land Administration

Michael DIXON and Duncan GUTHRIE

Administrative Boundaries: Automating the Data Management Cycle for a Critical National Dataset

FIG Congress 2010

Facing the Challenges – Building the Capacity

Sydney, Australia, 11-16 April 2010

PSMA Australia, is currently a world leader in the provision of fundamental continental datasets to the spatial information community. To maintain its current position, it was critical that PSMA Australia continued to develop appropriate systems and processes to support its core business activity.

The existing maintenance cycle of all datasets has traditionally taken approximately 90 days to complete, using external Data Managers to provide the technical capacity to meet the data processing requirements. PSMA Australia has developed a unique supply chain partnership of Data Contributors, which was created to meet market demand, as shown in Figure 1 below.

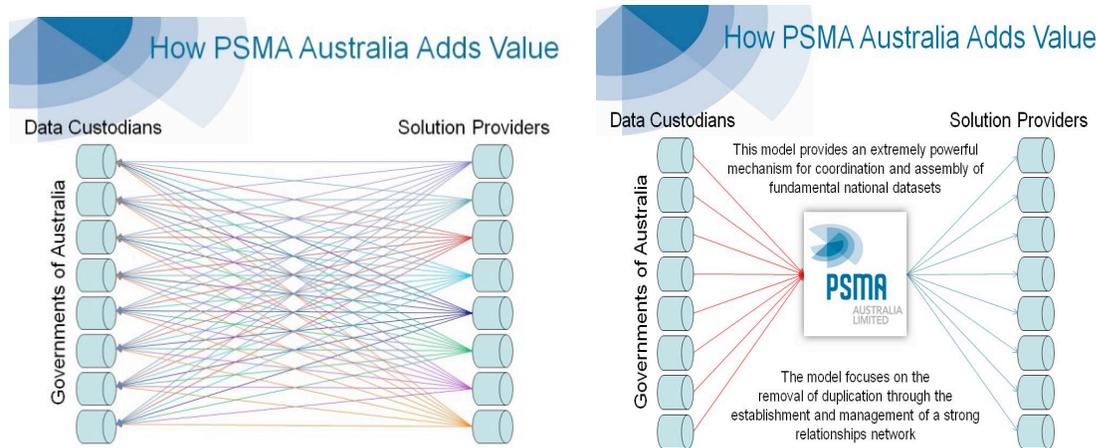


Figure 1: How PSMA Australia Adds Value to the Data Supply Chain

The temporal delay of 90 days created a number of issues for the supply chain partnership. These have been identified as opportunities for improvement. They are:

1. The data did not form a consistent source of truth (this has been documented both in Australia and abroad (Hunter, de Bruin).
2. There were no additional benefits accruing to the Data Contributors through the supply chain process, as there are not effective feedback mechanisms to correct the source data.
3. Duplicated effort to correct conflated data at each production cycle made it difficult to reduce the 90 day processing time.
4. The processing time did not support a capability to deliver new products to the Australian Spatial Industry.

As part of the continual improvement programme, PSMA Australia undertook to significantly reduce the time required to process from data supply to having the product(s) ready for market. To achieve this aim, new infrastructure was required to provide this capacity, a component of which is specific to the data maintenance and quality assurance of the data products.

1Spatial offered software that met the requirements determined by PSMA Australia. Their geospatial data integration platform, Radius Studio, provided the capability to process the data under the mandate to find, fix, and report on data discrepancies. Through utilising Radius Studio, PSMA Australia recognised that they would be able to achieve their ultimate aim of delivering a higher quality suite of products to the market, in the shortest timeframe possible.

3. THE CONCEPT OF DATA AUTOMATION

Throughout this section, the concept of Data Automation is discussed. PSMA Australia defines Data Automation as the automating of data processing through the use of technology, so that minimal human input is required.

The decision for PSMA Australia to use Radius Studio as the tool to automate the data management cycle was groundbreaking within the Australian Spatial Industry. Historically, data management within Australia has been manually driven, with the development of management systems that were not all encompassing. The initiative of PSMA Australia to utilise a product to automate the entire data management cycle moved Australia's Spatial Industry to a higher level than is currently found in Europe. The European Union has recently dedicated over €20 Million to the research and implementation of data management within Europe. This is a very small number compared to ICT research investment in Europe as a whole - €3 Billion. This is similar to the United States, which is also funding the research into managing national data. This is quite considerable in comparison to PSMA Australia, which has self funded the implementation, integration and ongoing maintenance of Radius Studio at a substantially lower investment, and has already achieved its outcomes for the Australian geographic area.

Once the internal decision to use Radius Studio had been endorsed, PSMA Australia commenced discussions with 1Spatial regarding the applicability of their product to the current circumstances. Traditionally, the data management process for PSMA Australia had been outsourced across various companies which have employed a variety of techniques to construct the datasets. PSMA Australia recognised that with the implementation of Radius Studio, they would be able to manage the process with a single application in-house for the first time. This was a significant realisation for PSMA Australia, and work commenced immediately for it to occur.

The implementation of Radius Studio began in July 2008 with the procurement of the software and support from 1Spatial. Over the next twelve months, PSMA Australia undertook extensive analysis and documentation of its business processes. This included seeking market input into the development of PSMA Australia products.

The implementation was based on three themes:

1. **Data Mapping:** The Contributor data is mapped to a generic schema. This allows rules and actions to be applied to the different PSMA Australia datasets without duplication of the rules and actions. Part of this process is carried out in the Oracle database.
2. **Data Cleansing:** The Contributor data is subjected to a number of quality assurance checks using a common rule set. Spatial and non-spatial rules such as No Overlaps, Voids, Area Greater than 0, and Name is not Null, are implemented at the start of the production cycle. Non-conformances are fixed, or removed depending on the rule failed, and a reporting table is populated with information regarding these non-conformances. This report is then sent back to the Data Contributors in a form which can easily be overlaid on their data for rectification.
3. **Data Updating:** Contributor data is compared with the previous production cycle released data. Deletions are identified and retired, and insertions are identified and created. Information regarding these changes are stored and reported back to the Data Contributor.

The development of these three themes, and the subsequent data processing rules, were tailored to PSMA Australia's data processing needs, as well as the datasets that are developed. These rules are a core component of Radius Studio, as they are applied to all datasets and can easily be modified if changes are required in the future.

The decision to utilise an all-encompassing software product assisted in progressing the Australian Spatial Industry and advertised the potential of such products within the wider spatial community. The implementation and integration of Radius Studio within PSMA Australia could not have been achieved as effectively and efficiently as it was, without the support of the software developers, 1Spatial. Throughout the entire process, 1Spatial provided PSMA Australia with support in the forms of documentary, consultancy and helpdesk functionality. This support was crucial to PSMA Australia gaining a full understanding of the data integration project using Radius Studio:

- How Radius Studio had to be implemented within the PSMA Australia infrastructure and existing data management processes;
- Correct utilisation of the product; and
- The development of a process for the ongoing maintenance of the new data management cycle.

In the implementation of Radius Studio, PSMA Australia endeavoured to utilise the full functionality of the Radius Studio platform. Radius Studio has capability and flexibility where only specific components of the software can be used (e.g. reporting). Other organisations within Australia have taken this option and are only using particular capabilities of the software.

Commission 7 – Cadastre and Land Management, Application of Innovative Technology in
Land Administration

Michael DIXON and Duncan GUTHRIE

Administrative Boundaries: Automating the Data Management Cycle for a Critical National Dataset

FIG Congress 2010

Facing the Challenges – Building the Capacity

Sydney, Australia, 11-16 April 2010

The full functionality of Radius Studio includes the Service Oriented Architecture, Spatial Rules Engine, Metadata Recording, Knowledge Base, Spatial Data View and Reporting Functionality. As a complete package, the Radius Studio data integration platform became a fundamental component of the PSMA Australia data management cycle – an initiative previously unseen within the Australian Spatial Industry.

PSMA Australia was delighted that the Radius Studio software platform was based on Service Oriented Architecture (SOA). A trend worldwide towards the use of SOA has been growing due to the usability of the Architecture in the business environment. As described by OASIS, SOA can be defined as the following:

“A paradigm for organising and utilising distributed capabilities that may be under the control of different ownership domains. It provides a uniform means to offer, discover, interact with and use capabilities to produce desired effects consistent with measurable preconditions and expectations”.

The fact that PSMA Australia was able to implement and utilise a software product with SOA, meant a potential reduction in costs, and the ability for PSMA Australia to respond to market opportunities more rapidly.

The documentation and development of the implementation and integration of Radius Studio was unique to PSMA Australia. Whilst the overall concept of implementation could be used by other entities, the core products that were developed could not. This development enabled the Radius Studio software to be tailored to PSMA Australia and its business needs. As also found by the Port of Rotterdam, who have implemented Radius Studio to automate their data management cycle, the implementation of Radius Studio to automate the data management process “was better at managing and maintaining the business rules in a corporate environment”. PSMA Australia wanted Radius Studio to offer wider business benefits as well as a technology gains, so that it would revolutionise data management within PSMA Australia.

4. TECHNICAL SOLUTION

The implementation of Radius Studio commenced in June 2008, with the development of the project proposal. This was closely followed by the approval of the Project Management Plan in August 2008, from which the technical implementation of Radius Studio commenced.

4.1 Radius Studio Software

Radius Studio is a collaboration tool for managing geospatial datasets, which takes advantage of Web 2.0 technologies. It is based on mathematical first order logic and is compliant to W3C, OWL and SWRL international standards. It extends the SWRL concepts (which are based on

OWL DL) to allow for rules to be evaluated, which in the strict semantic web rules arena are not necessarily decidable. It is built to provide advantage in three areas:

- In a collaborating community, Radius Studio avoids the need to write data quality assurance rules many times over for each production system. It does this through an English common language interface and allowing the rules to be exported to XML. These are key steps in building the effective supply chains necessary to support true knowledge economies.

Radius Studio builds on the work undertaken during the European ESPRIT II LaCoS project in the 1990s. This created RAISE (Rigorous Approach to Industrial Software Engineering). It consisted of a set of tools based around a specification (RSL) for software development. RSL, as a programmatic language, appears to have been adopted by a number of universities with Informatics departments (for example the Technical University of Denmark has been adopted by UNU-IIST in Macau). It is described by Bjorner², in that it takes the form of a mathematical formulation and a common language rule:

$$\forall n:\mathbb{N},s:\mathbb{S},t:\mathbb{T} \bullet s \in \text{obs_Ss}(n) \wedge t \in \text{obs_Trs}(s) \\ \Rightarrow \text{lin_seq}(t)$$

Figure 2: Equation meaning a track is a linear sequence of one or more linear rail units

With the advent of Web 2.0, Radius Studio no longer requires a programmatic language to formulate the rule. The time to create a new product is reduced significantly.

- The lead time to develop the solution is reduced. Radius Studio can conflate the producer schemas into a global schema without re-engineering the source schemas. It can therefore render the existing data as fit for purpose data in the new specification based on the rule set.
- Radius Studio uses the ISO measures for data quality by producing reports, which quantify the compliance of the inbound data and give a baseline for continual improvement. “The data quality levels in a supply chain are the area where efficiencies can be made” (Schmitz, 2008).

² A CloverLeaf of Software Engineering and Formal Methods (SEFM '05), ISBN 0-7695-2435-4/05.

Commission 7 – Cadastre and Land Management, Application of Innovative Technology in Land Administration

Michael DIXON and Duncan GUTHRIE

Administrative Boundaries: Automating the Data Management Cycle for a Critical National Dataset

When 1Spatial developed Radius Studio, it was envisaged that it would be used by spatial data suppliers to “rapidly analyse scattered spatial data to establish its operational purpose and facilitate its reuse by providing data mining, rule-based conformance checking and data cleaning capabilities. Radius Studio enables rigorous control of data quality, which provides significant return on investment by automating traditionally time-consuming, ongoing and expensive data management tasks”³.

4.2 Technical Implementation

When PSMA Australia commenced the implementation of Radius Studio, the software was still in the final development stages. Even with the software being under development, PSMA Australia was able to make full use of the product and adapt it to the spatial environment PSMA Australia had created. PSMA Australia was fortunate to be able to provide valuable feedback to 1Spatial about the product during its final stages of development. This allowed Radius Studio to be implemented smoothly and operate efficiently and effectively within the PSMA Australia data management environment.

A key business requirement PSMA Australia identified when selecting software to manage the data processing cycle, was the potential to improve the quality of the spatial data. Radius Studio was able to deliver this business requirement due to the rigorous standards that the data, when processed, has to pass through. These standards include:

- The initial review of the data for general errors. These include the automatic removal of duplicates, overlaps, voids and slivers, as well as additional data obstacles;
- A detailed review of data to detect changes between the new and existing data; and
- The generation of a detailed report to be sent to the Contributors, so that the source data can be updated with all changes that have occurred during the data processing.

The technical implementation of Radius Studio required considerable support from the software developers, 1Spatial, and the company chosen to host the Oracle site, Geometry. This provided logistical obstacles for PSMA Australia, as 1Spatial was based in Great Britain, and Geometry was based in Tasmania. Through the use of communication technologies and strategic on-site visits from their support teams, these obstacles were overcome. This allowed for a smooth implementation of the software, and for the next stage of training and integration to commence. 1Spatial now has a full-time person based in the PSMA offices in Australia.

The training that was provided by 1Spatial to PSMA Australia staff was of an extremely high standard, and consisted initially of one PSMA Australia staff member travelling to Cambridge in Great Britain, to receive hands-on training from 1Spatial staff. From this training, the next stage was for 1Spatial to provide development support to PSMA Australia, which was to assist in the

³ Excerpt from Radius Studio product description from 1Spatial website: www.1Spatial.com.

creation of data management rules. This support was provided over a six-month period, and was crucial to the success of Radius Studio within PSMA Australia. A significant benefit of utilising the Radius Studio software is the usability of the software. The programming language used in Radius Studio is intuitive and as described by Jackson & Woodsford, “is very much like English, so programming experience is not necessary”. This was significant for PSMA Australia, as limited Programming capabilities were available, and this also assisted in the fast-tracking of training and development.

4.3 Understanding the Software

As described by Woodsford, “Radius Studio is a rule based processing environment, implemented both as middleware and as a service that is used for both domain discovery and for conformance checking”. The development of data management rules within the Radius Studio environment was the core component of setting-up Radius Studio to process PSMA Australia data. According to Chris Tagg, a Radius Studio Product Manager, “The rules can be applied within a dataset, or across different datasets”. The rules were developed to be generic, so that they could be applied across all PSMA Australia datasets, but were specific to the business environment of PSMA Australia.

A Radius Studio rule is “a tree of predicates against which objects can be tested. Rules are expressed in a form independent of the schema of any particular data store. This means they can be easily re-used with different data stores” (Woodsford).

The diagram below (Figure 3), provides an example of the Rules-Definition Interface utilised within Radius Studio. As shown, “Radius Studio provides an intuitive web-based interface for defining rules and building up a rules-base. The rules builder allows the definition of potentially complex rules with an easy to use, tree structured browser interface” (Woodsford).

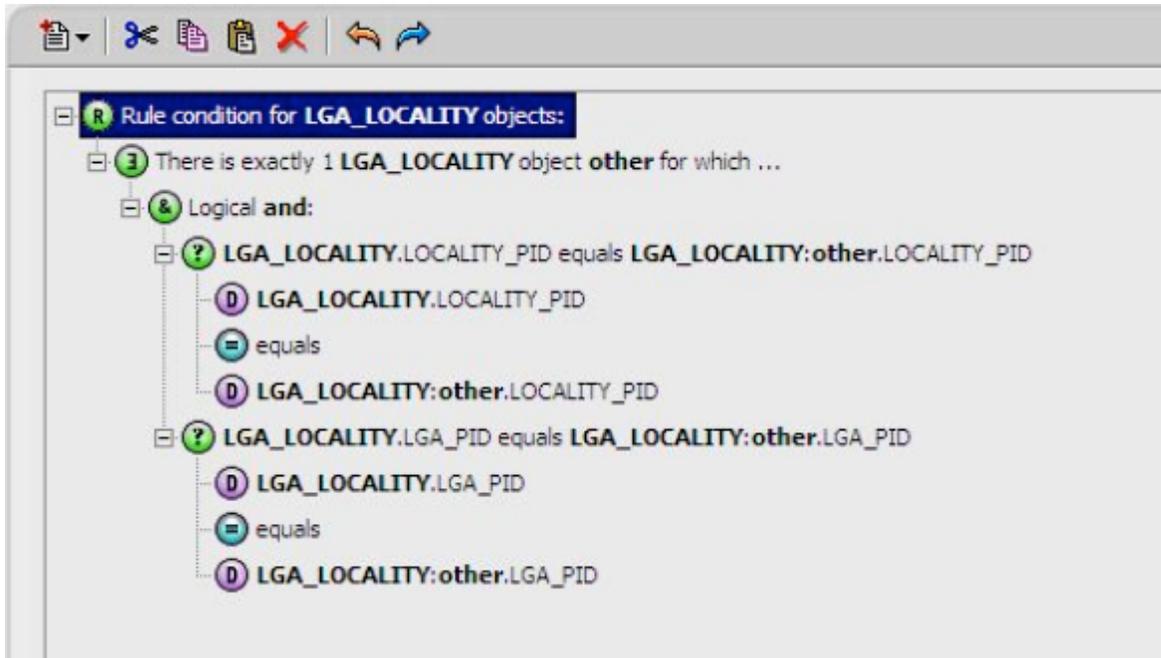


Figure 3: Rules-Definition Interface within Radius Studio

There are several key functions in the data management process when utilising Radius Studio:

- **Data Preparation**

The data store is the concept used by Radius Studio to access data. Multiple spatial data formats are supported, but for PSMA Australia the three formats that are most likely are TAB, Oracle and Shape. Radius Studio has the capacity to manage data in various formats, however to undertake the complexity and volume of data updates and checks that PSMA Australia undertakes, the optimum format is in Oracle. This requires the contributor data to be converted into an Oracle format.

- **Standard Data Model**

PSMA Australia had, in line with its own Integrated Data Model (IDM), utilised Radius Studio to standardise the data mapping across all data supplied for processing. The standardisation of data mapping allowed the reuse of PSMA Australia's simple business rules across multiple data suppliers and datasets. The Standard Data Model allowed PSMA Australia to implement three common fields to all supplier data, regardless of the naming convention of the provider.

- **Data Rule Development**

There are three distinct stages to the development of any PSMA Australia Dataset:

- Stage One: Data Cleanse
- Stage Two: Data Update
- Stage Three: Commit

Stage One – Data Cleanse

Stage One is the application of rules to ensure the data meets the basic dataset requirements. These rules address the removal of duplicates, overlaps, voids and slivers, as well as additional data obstacles.

Stage Two – Data Update

Stage Two requires rules that are both non-spatial and spatial. Stage Two manages the changes between new and existing data. From this stage, a report is developed which records any changes that have been made. This information then forms the basis of the Release Reports which are produced by PSMA Australia and are provided to the Contributors and Data Users.

Stage Three – Commit

Stage Three commits the data back into the generic Integrated Data Base (IDB), where all data is stored.

- **Reporting**

Reporting via Radius Studio utilises XML and Table formats.

XML format:

- XML provides a customisable format for information, however the level of detail provided is limited.
- XML can report content set by application. Whilst customisable, it takes more work at the beginning to do this.
- XML requires specialised skill set to create displays for returning the information to non-technical users.

Tabular format:

- Table can be overlaid in GIS applications to show easily where changes have been made.
- Table can easily include additional special features.
- Table format allows for a greater level of detail in the reporting of results.

Release reports are produced to accompany each dataset when updates are made available.

4.4 The Importance of Data Quality

During the selection of a suitable software product to automate the Data Management cycle, the importance to maintain and/ or enhance the data quality was a key requirement. PSMA Australia ensured that, when selecting the software, it was compliant with the relevant ISO and ANZLIC (the Spatial Information Council) data management standards. Radius Studio complies with the ANZLIC data management standards, and is also compliant with the “conceptual model of ISO 19115 Metadata (ISO 19115:2003) and encoded in the form recommended in ISO 19139” (Woodsford).

Radius Studio is driven by improving data quality during the processing cycle. ISpatial has included functionality within the software that enables the user to apply ‘fixes’ to the data in cases of allowable tolerances, or can alter the data at a later stage. As discussed already under “Reporting”, Radius Studio produced key reports that identify when ‘fixes’ have been implemented or the data altered, recording a data audit trail. These reports and data audit trail were essential to PSMA Australia, due to the array of Contributors providing data, and the responsibility held by PSMA Australia for the data.

5. PROJECT OUTCOMES AND BENEFITS

The outcomes and benefits that were achieved from this project extend from PSMA Australia to the wider spatial community. PSMA Australia directly received benefits from this project, whilst the wider spatial community received indirect benefits through the usage of improved data, data timeliness and accessibility. It can be said that the concepts identified for this project have been realised and the business requirements achieved.

5.1 PSMA Australia Outcomes and Benefits

The first dataset to be released through the utilisation of Radius Studio was Administrative Boundaries, which was produced in June 2009, and released in August 2009. This release was a significant achievement for PSMA Australia, and it was immediately evident that the new data management process would begin to deliver on the desired outcomes.

The immediate identifiable change was in PSMA Australia’s understanding of the data management cycle and the content of the datasets. Through the preparation for implementation and integration of Radius Studio, the requirements of each dataset were analysed which allowed PSMA Australia to understand how the data was supplied, the requirements of processing, and what was required in the overall data management process.

PSMA Australia also found the following exceptional outcomes were evident from the implementation of Radius Studio:

- **Significant reduction in data processing time from 3 weeks to 1-2 days;**

The previous Data Management process took 90 days to process all datasets. Each dataset would take approximately three weeks from the supply of data. The implementation of a Radius Studio based process has seen this time decrease to one or two days. The decrease in processing time has had a significantly positive impact on cost and productivity within PSMA Australia and the Product Management Business Unit. This also provides a level of responsiveness to the market demands that has been unseen before in the Australian Spatial Community.

- **Exposure to new change management functionality and pioneering reporting capabilities;**

The provision of change and error reporting was a capability that PSMA Australia did not previously have. The reporting functionality that is being provided through Radius Studio allows for exception reports (reports detailing the Original Feature, New Feature, Area of Change, Class of Change) and change reports (showing where any spatial feature has changed) to be issued at the completion of the data processing.

The generation of these reports has allowed PSMA Australia to provide exception and change reports to Data Contributors. These reports allow Contributors to assess their data against PSMA Australia's business rules and determine the validity of the data. Contributors may still choose to disregard the changes made by PSMA Australia, however the reporting established a dialogue for continual improvement between the Contributor, PSMA Australia and the User.

- **Improved data quality and processing efficiency through the innovative development of consistent and generic business rules;**

In documenting and revitalising the Data Management process, PSMA Australia has been able to use the 'Build Once; Use Many' principle to publish a simple and concise set of business rules that can be applied across multiple Contributors and datasets. This now allows for a greater uniformity through all PSMA Australia products.

- **Greater contribution to the wider community through the automation of the Data Management cycle;**

Automation allowed PSMA Australia to significantly reduce processing times. This meant that the continental datasets were available to consumers sooner and with higher quality.

Commission 7 – Cadastre and Land Management, Application of Innovative Technology in
Land Administration

Michael DIXON and Duncan GUTHRIE

Administrative Boundaries: Automating the Data Management Cycle for a Critical National Dataset

FIG Congress 2010

Facing the Challenges – Building the Capacity

Sydney, Australia, 11-16 April 2010

- **Implementation of groundbreaking software, tailored to PSMA Australia's requirements, to automate the data management cycle;**

The implementation and integration of Radius Studio was tailored to the business needs of PSMA Australia, and specifically configured to support the continental datasets of Australia.

5.2 Benefits to the Wider Community

The community benefits from this Radius Studio project were centred around the outcomes of improved data quality and timeliness. It can be clearly demonstrated that end users are utilising a better quality product. But other intangible benefits include improved relationship management and visibility of Australian ingenuity in the international spatial community.

The following benefits have been identified for the wider spatial community:

- **Improved data quality within the governments of Australia;**
The data quality reports that are sent from PSMA Australia to the Data Contributors, to enable the source government data to be enhanced more quickly and with less effort. This allows the governments of Australia to utilise a higher quality of data.

- **Development of international relations that support spatial data management initiatives domestically and exposure of the Australian Spatial Industry internationally;**

A proportion of the success of this project can be attributed to the excellent relationship developed between PSMA Australia, and the British software developer, 1Spatial. This in turn, provided exposure to new tools, opportunities for collaboration and increased the profile of the Australian Spatial Industry internationally.

- **Establishment of a new benchmark for the Australian Spatial Industry and exceeding spatial data management standards within the United States and Europe.**

The automation of the data management cycle by PSMA Australia was a milestone within the domestic and international spatial community. This innovation had not previously occurred within Australia, and has not transpired within the United States and Europe, even with significant funding and international support.

6. THE FUTURE OF DATA AUTOMATION

Over the past 18 months, PSMA Australia has undertaken a significant project to progress how data is managed and quality assured. This project has successfully delivered a data management process that is quicker, more accurate, repeatable and is producing a high quality of data. PSMA Australia has:

- Implemented a data management process that includes the use of Radius Studio within the Data Management infrastructure;
- Developed and implemented a new approach to data management within PSMA Australia; and
- Set an industry benchmark for the provision of high quality data to the Australian Spatial Industry and wider community.

Over the next 12 months, PSMA Australia will be taking the work performed with Radius Studio to the next level. This will occur through the commencement of a suite of activities that will enable CadLite and Transport & Topography datasets to be processed through this new world-leading data management system. Through research, innovation and a goal to transition data management processing to the next era, PSMA Australia has laid the foundations for cutting edge data processing within the Australian Spatial Industry.

REFERENCES

Hunter, de Bruin, Bregt, (2006) Improving the usability of Spatial Information Products: An Australian Case Study.

Jackson, M, Woodsford, P (2008) Spatial Database Challenges for Framework Data and Location-Based Services, Beijing, The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Services, Vol 37, Part B4.

Paull, D (2009) PSMA Australia's information infrastructure facilitating collaboration and delivering capability across the governments of Australia, paper presented at GSDI 11 Conference, Rotterdam, June 2009.

Schmitz (2008), Using Supply Chain Management to Enable GIS Units to Improve Their Response to their Customer's Needs, paper presented at FOSSAG Conference, Cape Town, 2008.

Tagg, C (2007) Radius Studio: Measure, Improve and Sustain Spatial Data Quality, Position Magazine, August, 2007.

Commission 7 – Cadastre and Land Management, Application of Innovative Technology in
Land Administration

Michael DIXON and Duncan GUTHRIE

Administrative Boundaries: Automating the Data Management Cycle for a Critical National Dataset

FIG Congress 2010

Facing the Challenges – Building the Capacity

Sydney, Australia, 11-16 April 2010

Woodsford, P.A, Spatial Database Update and Validation – Current Advances in Theory and Technology, paper presented at the ISPRS Workshop on Updating Geo-spatial Databases with Imagery & the 5th ISPRS Workshop on DMGISs.

Wortel, J, Managing Spatial Data Quality Through Automated Validation by Business Rules at the Port of Rotterdam, Article, Port of Rotterdam.

A CloverLeaf of Software Engineering and Formal Methods (SEFM '05), ISBN 0-7695-2435-4/05

OASIS (2007) WS-BPEL 2.0 – Web Services Business Process Execution Language.

www.1Spatial.com

BIOGRAPHICAL NOTES

Duncan Guthrie joined 1Spatial in 2002 in the role of Sales and Marketing Director, after previous senior management roles within the finance and spatial industry. Since joining 1Spatial, Duncan's focus was the successful re-structuring of the sales environment to grow revenue streams through existing accounts whilst introducing indirect sales model for the company's new Oracle based solutions. Within his role, Duncan has initiated 1Spatial's entrance into the Australian marketplace and in November 2009, opened 1Spatial's first Australian Office. Duncan is based at 1Spatial's head office in Cambridge, United Kingdom.

Michael Dixon is the Business Manager for the Product Manager Unit at PSMA Australia. Michael has previously held the role of a Product Manager for several national datasets, including Administrative Boundaries, Transport and Topography and CadLite. As part of his current role, he oversees the quarterly data maintenance cycle, and is also the leader of technical development for new data management processes and new data products. Michael has significant industry experience with a long history in local government, coupled with a Masters Degree with Spatial Specialisation from UNSW.

Commission 7 – Cadastre and Land Management, Application of Innovative Technology in
Land Administration

Michael DIXON and Duncan GUTHRIE

Administrative Boundaries: Automating the Data Management Cycle for a Critical National Dataset

FIG Congress 2010

Facing the Challenges – Building the Capacity

Sydney, Australia, 11-16 April 2010

CONTACTS

Mr Michael DIXON

PSMA Australia Limited
Level 1, 115 Canberra Avenue
GRIFFITH
ACT 2603
AUSTRALIA
T. +612 6295 7033
F. +612 6295 7756
E. Michael.dixon@psma.com.au
Web: www.pdma.com.au
Affiliations: SSSI Member

Mr Duncan GUTHRIE

1Spatial
Tennyson House
Cambridge Business Park
CAMBRIDGE
CB4 0WZ
UNITED KINGDOM
T. +440 1223 420414
F. +440 1223 420044
E. Duncan.Guthrie@1spatial.com
Web: www.1Spatial.com

Commission 7 – Cadastre and Land Management, Application of Innovative Technology in
Land Administration
Michael DIXON and Duncan GUTHRIE
Administrative Boundaries: Automating the Data Management Cycle for a Critical National Dataset

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010