Can BIM be Civil?

**TECHNICAL ARTICLE**

Dr Lee Gregory  
Managing Director,  
12d Solutions

Queensland is one of the first Australian State Governments to actively support Building Information Modelling (BIM) and in April 2017 released a draft policy on BIM, including Open BIM as defined by buildingSMART Australasia. The scope is to include all Queensland Government departments, agencies and statutory authorities, including all vertical (e.g. buildings such as hospitals and schools and linear infrastructure (e.g. roads and railways).

Although Open BIM has been with us for many years, its main focus has been on Buildings and Structures (Vertical BIM), and not Civil projects (Horizontal or Linear BIM). This is particularly evident if one looks at the current International Open BIM format, Industry Foundation Classes (IFC’s).

However, Queensland has been at the forefront in the development of BIM for Civil projects and in 2006, TMR, Project Services (Queensland Department of Public Works) and 12d Solutions were active participants in the Interoperable Standards project for the Cooperative Research Centre (CRC) for Construction Innovation.

IPWEAQ has also been responsible for the creation and widespread use in Local Government and Water Authorities, of one of the first Civil BIM formats, ADAC.XML.

A presentation at the IPWEAQ 2017 state conference in Townsville will explore Surveyors and Civil Designers have been using Digital Engineering/BIM on many Civil projects since the 1980’s. This presentation will also examine the fundamental differences in BIM for Buildings and BIM for Civil projects and explain how Digital Engineering/BIM was addressed in the past, and cover the progress currently being made by BuildingSMART International to include Civil BIM in the Open BIM format, IFC’s.

To hear more from Dr Lee Gregory, register now for the state conference in Townsville, 24-26 October 2017.

TRANSFORMING YOUR BUSINESS WITH ADAC

**TECHNICAL ARTICLE**

Ross Guppy  
Director,  
Technical Products, Ipweaq

The timely supply of accurate infrastructure asset data is critical to insurance schedules, risk management, accurate maintenance schedules and financial considerations such as long-term planning, depreciation and budgeting. Accuracy in these areas ultimately affects the consumer of the services – the rate payer and community.

Historically, hardcopy ‘Design’ and ‘As Constructed’ drawings are submitted to the asset owner at the completion of construction. The collection of data on this civil infrastructure is then actioned through scrutiny of the supplied plans. This approach is
broadly recognised as both time consuming and potentially prone to errors.

The last decade has seen a general awakening to the importance of accurate measurement of assets accompanied by the rise of GIS and Asset Management software to assist industry in the sustainable management of assets.

In 2001, a group of council members from the Sunshine Coast, Queensland realised this need, and decided to respond. Their goal was to develop a robust framework for the efficient and standardised capture, delivery and use of public works asset data.

Spatial technologies were being refined, and accurate, reliable and complete ‘as constructed’ information was critical for daily operational works and asset management forecasting alike.

Current work methods of reproducing ‘as constructed’ information from hard copies were no longer viable. The movement of ‘as constructed’ information from developers to councils needed to be streamlined, while maintaining accuracy.

The group decided on a number of actions that led to the development of the Asset Design As Constructed (ADAC) data standard and business improvement process.

ADAC is a framework and asset data standard that reduces the time taken to generate, supply and enter the information required for asset management. There is potential to dramatically reduce the time taken to process planning and engineering checks however in its simplest form this framework has already demonstrated enormous time savings. It provides a set of tools supported by IPWEAQ that make the exchange of standardised asset information easier between asset designers, constructors and owners.

The timely and accurate recognition, registration and valuation of donated civil infrastructure are fundamental activities for local councils and water utilities. With the considerable worth and inherent risks that come with these assets, attention to detail is paramount.

The collection and presentation of asset information for donated infrastructure traditionally starts with an external “as-constructed” survey of all newly built assets. The primary purpose of this process is to clearly establish and record any significant differences between the initial design and the actual assets that will pass over for management by the asset owner, normally a local authority or water utility. The information collected will consist of details on type, location, quantities and dimensions, all of which are used to catalogue, record and value the assets in the first instance.

Assembled information is then subject to multiple manual processes passed through numerous hands with the major activity typically involving the “deconstruction” of hardcopy drawings. Ultimately the details and critical data will finish with internal asset managers and accountants. While requirements are reasonably straightforward the overall task can often be
Extract-Translate-Load (ETL) software
- Converts ADAC XML file to destination format
- Validates file against ADAC schema values
- Performs engineering & business rule validation checks
- Performs spatial proximity checks
- Generates error reporting

With ADAC the process times for compliant data is reduced to seconds to translate and load this accurate information into internal systems.

ADAC offers substantial benefits to all stakeholders involved in the project life cycle, and specifically “As Constructed” process chain. Land Developers’ Consultants that are responsible for preparing “As Con” plans and providing asset information on new urban developments now have a consistent approach when recording this information and supplying it to any ADAC participating councils.

Benefits also flow back to external providers with the ADAC asset data requirements supporting a standardisation of information as well as providing the capacity for “round-tripping” of these records in a consistent and reliable format when required by another agency.

The vision is that ADAC will become the industry standard for describing civil infrastructure asset design and as constructed data across a range of public and private asset classes.

ADAC’s strategic solutions will be explored in stream 7 ‘Digital Engineering’ at the IPWEAQ State Conference in Townsville, 24-26 October 2017.
12d Solutions has been involved with ADAC.XML since its inception, with 12d’s goal being to integrate the ADAC process into the full cycle from Design to Construction, Construction to As Built, and for re-use in future projects.

Using 12d Model’s parametric objects and hierarchical attributes, the ADAC data is fully incorporated inside 12d Model so there is no data loss.

12d Model currently supports ADAC 4.0, 4.1 and 4.2 and more importantly, the 12d Model ADAC Editors and Validators are driven directly by the IPWEA ADAC XSD’s. This minimises any implementation errors and allows for quick upgrading to any future ADAC Schemas.

12d-ADAC is NOT an additional cost. 12d-ADAC is integrated in the appropriate 12d Model modules and is included free of charge for all customers on annual maintenance.

The Benefits of 12d ADAC
Data Fidelity – the ADAC Schema is completely reflected inside 12d Model’s parametric objects and hierarchical attributes so that there is no ADAC data loss.

Contact:
Lisa Stewart
Marketing & Communications Coordinator
12d Solutions Pty Ltd
Ph: (02) 9970 7117
lisa.stewart@12d.com
www.12d.com

Keays Software
Keays Software is a Queensland software developer specialising in civil engineering and surveying solutions. ADAC-X is the first commercially available product that reads and writes ADAC compliant files through an AutoCAD interface. ADAC has been developed from the early work John Keays did around 1995-2000 on the Moreton Model.

Keays Software has worked with Redlands, Moreton Bay Regional Council, Gold Coast and Logan on strategies for the implementation of the ADAC vision for digital lodgement of as constructed data. The adoption of ADAC 4.0 file structure was first used after the 2011 floods for the worked done at Lockyer Valley for the Queensland Reconstruction Authority.

ACAD-X is a tool to be used by all departments in a Local Authority and for all engineers and surveyors who prepare data for Local Authorities. ADAC-X is a standalone product that provides viewing of data files for DA approval. ADAC-X is used to author ADAC objects while in the AutoCAD environment (while designing). ADAC-X and Keays Software can be used to convert existing design and survey files into ADAC complaint files.

Contact:
Keays Software
Ph (07) 3870 1711
adac@keays.com.au
www.keayssoftware.com.au

Sofoco Pty Ltd plus Duprez Construction Services Pty Ltd - “ADACX”
ADACX, running in BricsCAD or AutoCAD, provides a great solution for creating and editing ADAC XML files.

Work in a familiar DWG CAD environment.

Attach ADAC data to cadastral lots, pipes, pavements and all other asset geometries.

All ADAC data is contained in your drawing - no separate files to manage.

Export the project to XML at any time.

Can also import ADAC XML to create a check drawing.

ADACX code is generated directly from the 4.1 and 4.2 schemas - guaranteed valid XML!

BricsCAD is cheap, robust, very compatible and well supported.
The instant reporting capability of blackbox22 allows users to generate up-to-date relevant reports, which can be customised to be council specific.

Examples of reports include – error, asset and project costing. Reporting can be done in various file types including DWG, DXF, SHP, MID/ MIF, Excel and CSV.

Key Benefits of blackbox22
- Tailored ‘as constructed’ specifications
- Simple & intuitive data input
- Saves time & resources
- Consistent and accurate
- In-built quality control
- Customised functionalities for individual council requirements
- Error detection functionality

Contact
A2K Technologies
Ph: 1800 223 562
marketing@a2ktechnologies.com.au
www.a2ktechnologies.com.au

IMPLEMENTATION CONSULTANTS
ADAC “Recognised” Implementation partners have been screened by the ADAC Steering Group as having capabilities in ADAC assistance and implementation:

Lion Systems

Lion Systems provides specialised services to Local Councils and other asset-centric organisations. We do this by offering hands-on practical assistance to our clients, helping them in understanding and improving the fundamental processes that underpin asset lifecycle management and associated service delivery outcomes.

At Lion Systems we have the expertise to support you with a range of activities that include:
- ADAC – 20+ yrs combined Experience in Implementation and Technical Systems
- Asset Data Evaluation, Cleansing, Analysis & Improvement
- Asset Hierarchy Development (Physical & Financial Systems)
- Data Collection & Mobile Computing Tools (hardware/software available to clients)
- Process Support for Asset Information Management Systems
- Spatial & Aspatial Information Management Activities
- Operational, Tactical & Strategic Asset Management Support
- Asset Management Planning & Service Planning Frameworks
- Asset Data Bureau Services (remote data management and publication services)

The team at Lion Systems have the experience, skills, tools and knowledge to help you quickly improve your asset and data
ADAC

ASSET DESIGN AS CONSTRUCTED

TRANSFORM YOUR BUSINESS WITH ADAC

management processes, working collaboratively with your staff, at your pace and within budget. Contact us to discuss your own individual needs.

Geoff Bartholomew & Blake Slaven
LION SYSTEMS Pty Ltd
Ph: 07 5443 5050
Mob: 0409 762 790
info@lionsystems.com.au
www.lionsystems.com.au

Door 3 Consulting

Door 3 Consulting specialises in helping organisations plan and implement process and technological change. Our team has a proven track record in successfully leading and executing major change initiatives at all levels of government and in the community sector.

We can provide skilled and experienced professionals across a range of disciplines including:
- Strategic, tactical & operational planning
- Executive communication & engagement
- Stakeholder buy-in & mobilisation
- Business process re-engineering
- Program & project management

- Business analysis
- Systems implementation & data conversion
- Training & facilitation
- Staff development & support (mentoring, coaching & professional supervision)

We offer a range of flexible engagement options to help maximise the return on your organisation’s investment.

John Gorman
Director
Door 3 Consulting Pty Ltd
M: 0430 333 501
john.gorman@door3.com.au
www.door3.com.au

Bundaberg Regional Council

“ADAC provides a robust data specification that underpins asset design and as constructed data. Compliant data is captured during design and construction processes and used to populate asset component registers and Geographical Information Systems (GIS).

The system captures data from not only within our own region but complements similar data state wide and includes information on roads, drainage, water, sewerage and open space.

As new assets are designed those design components are added to the ADAC database. It then becomes a simplified process for anyone undertaking future design work in locations where assets have already been recorded.

The vast majority of our internal capital projects no longer require the production of As Constructed drawings. This is due largely to ADAC’s open data transfer via XML and as a result, Bundaberg Regional Council has achieved significant efficiencies in the entry of data into GIS and asset systems.

Bundaberg Regional Council receives a good majority of its As Constructed information for capital projects constructed by internal resources via ADAC compliant XML files.

The BRC Planning Scheme now requires As Constructed information for development works gifted to Council be submitted in the form of an ADAC compliant file. It will mean the ADAC process begins at the very start of a project with the submission of compliant For Construction asset information, not just at the completion of a project. By adopting this approach it is intended to expedite the ‘On Maintenance’ process and as a result reduce the overall cost burden on a Developer. This has commenced for all new Developments seeking approvals under the new planning scheme.

The third part of the BRC ADAC implementation (currently being finalised) will target requiring all external contractors delivering capital projects for Bundaberg Regional Council to also provide project As Constructed information in the form of ADAC compliant files.
Through membership and effective implementation, ADAC can provide organisations with the following benefits:

☐ Significant time and resource savings in the electronic processing of as constructed data
☐ Improved consistency and accuracy of detailed asset data provided to council
☐ Ability to perform “rule-based” quality control checks on asset data for completeness and integrity
☐ Beneficial for automated uploading of asset data to GIS, asset management databases and other registers
☐ Transparent asset registration and valuation processes that deliver improved corporate governance
☐ Capacity to reconcile individual donated trunk assets with planning scheme requirements and infrastructure agreements
☐ Potential to “round-trip” asset data and related information to external customers in a consistent format
☐ Property developers and consulting engineers experience consistent requirements from the Councils and asset owners they work with
Joel Cranston  
GIS Officer | Lockyer Valley Regional Council

Finally! I think we’ve found a solution to our dreaded As-Constructed plans.

Being a relatively small council with fairly limited resources, especially when it comes to requesting and utilising As-Constructed plans, our current process is:
1. to request the as-con in a design format;
2. development engineers undertake the manual process of checking the as-con;
3. when the as-con gets approved its used either as a reference to and or manipulated so as to be added to our asset register;
4. And this is then displayed in our GIS.

This process is always a challenge and for the most part our As-Cons are merely designs with no real asset attributes assigned to them. This wasn’t helped by the fact that we have no real standard for what to request in an As-Constructed plan. The recent flood damage to this region has also seen our council in the position of having to record an unprecedented amount of data.

As soon as we heard that ADAC was on the move, being Council driven and backed by IPWEA, we saw this as a great opportunity regardless of cost to get on board and get involved in what streamlines and standardises the As Design as Constructed processes within Council.

By utilising ADAC in our Council we hope to instil consistency not only from As-Cons supplied by developers but consistency from our own As-Cons, even from our surveys to prelim designs right through to our asset registers. We also foresee a much quicker turnaround from ingestion to release back to the developer.

We will be implementing ADAC as our As Design As Constructed standard for all works both capital and developer in the near future and honestly there is some hard work and tough decisions to be made in the short term but definitely a step in the right direction as far as we are concerned.

Like all good things, you only get out what you put in and this is a great opportunity for all Councils out there who aren’t sure of what to do about your As-Con situation, to join the ADAC initiative and work with a team who realistically speaking make our jobs a lot easier.

Justin Mendelow  
GIS Data Officer | Queensland Urban Utilities

ADAC has allowed Queensland Urban Utilities to electronically capture our water, sewer and recycled water assets efficiently, completely and to a very high level of accuracy. The benefits of which are immediately realised by our customers and will continue for years to come.
Established in 1988, 12d Solutions is an Australian software developer specialising in civil engineering and surveying applications. Its major products, 12d Model and 12d Synergy, are sold direct and through distributors around Australia and in nearly 70 countries worldwide.

12d Model is the major land development, road and rail design tool used throughout Queensland and Australia by local government, road and rail authorities and private companies, large and small.

Being highly interactive, graphical and with inbuilt powerful terrain modelling, civil engineering, water analysis and surveying calculations, 12d Model is one integrated package that allows fast production in a wide variety of projects including mapping; site layouts; road, rail and highway design; residential and land developments; drainage and sewer design; and Environmental Impact studies.

Although comprehensive, 12d Model is modularised, so users can choose, and only have to pay, for the modules that suit their needs. These Modules include detailed alignment design, earthworks calculations, visualisation, drainage and sewer works, survey and construction, and interfaces to CAD and GIS systems. The Survey and 12d Field modules provide a total field-to-office-to-construction-to-QA solution which avoid any unnecessary data loss because 12d Model and its database is out there with you in the field.

12d Solutions is a strong supporter of the Open Data initiatives and standards, especially for Digital Engineering and BIM. 12d Model includes in its Base product the ability to not only read and write its own published 12da/12dXML format, but also the IPWEA Standard ADAC XML files that are now being used throughout Australia, most published Point Cloud formats, the International Open BIM format, and Industry Foundation Classes (IFCs).

Consequently, all this Open Data is available to any 12d Model user.

To give users totally purchasing flexibility, 12d Model licences can be perpetual and/or subscription.

12d Model, now in its twenty-sixth year, has in recent years been joined by 12d Synergy – a data management and project collaboration package designed specifically for the AEC office. 12d Synergy is the ONLY data management system to work seamlessly with 12d Model. It has been used to great acclaim on projects such as NorthConnex in Sydney and the Toowoomba Range Second Crossing in Queensland, and is being picked up by more and more companies around Australia and New Zealand.

Utilising our decades of industry experience, 12d Synergy was developed to manage data, streamline workflows, increase collaboration and worksharing, and make our customers’ lives easier and their projects run better and more profitably.

For more information contact
Lisa Stewart
Marketing & Communications Coordinator
12d Solutions Pty Ltd
Ph: (02) 9970 7117
lisa.stewart@12d.com
www.12d.com