SUBMISSION PREPARED BY THE 'OPENBIM ALLIANCE OF AUSTRALIA' (OBAA)

For policy consideration on the adoption of best practice open standard BIM implementation in Australia

08 June 2012

Comments on Requirements as to Storage Formats

1.   Summary
1.1   Customers should not mandate the submission of BIM data files in a closed file format. Such mandates:
    a) may discriminate against potential suppliers, particularly SMEs;
    b) are inconsistent with current government policy relating to open access to public sector information;
    c) are capable of substantially lessening competition in the market for construction related software. Any lessening of competition which occurs as a result of a procurement becomes entrenched for future procurements;
    d) undermine interoperability;
    e) undermine archival and future reuse of data (eg ongoing facilities management in the operational phase and at demolition)

1.2   These issues are primarily relevant to public sector procurement, but many are still applicable to private sector procurements.

1.3   Customers ought to require the submission of BIM data files in storage formats which are open standards. At present there is only one such format reasonably suited to the needs of BIM – the Industry Foundation Classes (IFC).

1.4   In respect of the use of storage formats for the interchange of BIM data, the BIM Vendor Alliance should:
    a) oppose the mandate of closed formats; and
    b) promote the adoption of the Industry Foundation Classes.

2.   Discussion
2.1   This report relates to the consideration of the appropriate data format to be adopted for the exchange of Building Information Modelling (BIM) data and has been prepared and presented by the "OpenBIM Alliance of Australia" (OBAA).

2.2   The "OpenBIM Alliance of Australia" is constituted of organizations committed to seeing BIM introduced into Australia using open source standards and best practice principles.

The membership comprises Australian enterprises, SME's, multinationals, legal experts and subject matter experts, each with their own constituencies covering every facet of the AEC continuum.

The combined expertise and experience of the Alliance is unparalleled within Australia and provides great scope and depth of understanding of BIM and insight into best practice usage not only locally but internationally.

Included at s13 is a list of members.

3. What is BIM?

3.1 The acronym BIM refers to a "Building Information Model" or to the process of "Building Information Modelling". Such a model can be thought of as *"a database that provides digital information about the design, fabrication, construction, project management, logistics, materials and energy consumption of a building"* although there is no settled definition for the term. [1]

3.2 BIM objects ("models") provide a digital representation of a physical object, including aspects of that object which are not merely physical (such as the object's name, supplier details, model number, the location or designation of the object "this is the reception area"). Models are inputs to software, by which they are manipulated. Models may also be outputs of software. Typically software means "authoring software" but models may also be used in other categories of software (for example, the Solibri Model Checker product[2] analyzes building information models for integrity, quality and physical safety).

4. Storage Format as a means of Data Exchange

4.1 When a model is not being utilised by a piece of software it must be "serialised" – that is, reduced to a stream of data – in order to be used later. The rules for the serialisation of a model comprise the storage format for that model. In order for software to make use of a stored model, the model must first be de-serialised (loaded) from where it has been stored. Typically, the output of serialisation will be a data file, but, in theory, serialisation could also be used (for example) for data transport without the intermediate storage of a file.

4.2 Serialised data serves the primary function of the exchange of information. This can mean both between people, but also between a single person in time:

a) if A is working on a project and saves a file, A can later open the file - A is providing information to themselves in the future. This may be "after lunch" or "in three years time"; and

b) if A and B are working on a project and A sends B a file, A is providing the information in that file to B in the present. An example of this is where multiple parties are cooperating on a construction project (perhaps co-ordinated by a purchaser, architect or lead contractor);

c) if the third party B stores the file and opens it in the future, A is also effectively providing information to B in the future. An example of this is where a purchaser or lead contractor retains information for future maintenance or demolition of a building.

1   Allen Consulting Group, "Productivity in the Buildings Network: Assessing the Impacts of Building Information Models", a report to the Built Environment Innovation and Industry Council, 29 October 2010 at pages 8 and 9.

2   http://www.solibri.com/solibri-model-checker.html (at 23 May 2012)

5. Data Exchange as Interoperability

5.1 The National Institute of Building Sciences (NIBS) describes interoperability in this way:

"Software interoperability is seamless data exchange at the software level among diverse applications, each of which may have its own internal data structure. Interoperability is achieved by mapping parts of each participating application's internal data structure to a universal data model and vice versa. If the employed universal data model is open, any application can participate in the mapping process and thus become interoperable with any other application that also participated in the mapping. Interoperability eliminates the costly practice of integrating every application (and version) with every other application (and version)." [3]

5.2 The report goes on to say:

The NBIM Standard maintains that viable software interoperability in the capital facilities industry requires the acceptance of an open data model of facilities and an interface to that data model for each participating application. If the data model is industry-wide (i.e. represents the entire facility lifecycle), it provides the opportunity to each industry software application to become interoperable. [4]

5.3 Software interoperability is particularly important to the construction sector. In that industry there is a diverse range of specializations involved, many of which has software tailored to its needs. A build team will typically need to use "a wide variety" of software applications across which data needs to be shared. [5] A survey in the US revealed that improved interoperability is a critical factor in the decision to adopt BIM. [6] In the Untied States lack of software interoperability adds roughly 3.1% to construction project costs, a similar amount to project schedules and is perceived as an impediment to improving productivity. [7] The interoperability provided by the adoption of BIM is therefore is of particular importance. [8]

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3 National Institute of Building Sciences Final Report, *National Building Information Modeling Standard 2007* version 1, part 1 at page 7.
4 *National Institute of Building Sciences Final Report, National Building Information Modeling Standard 2007* version 1, part 1 at page 7.
5 *"The large majority of build team members frequently share data across a wide variety of different software applications."* McGraw Hill Construction 2007, Interoperability in the Construction Industry, SmartMarket Report, New York, United States. at page 10.
6 *"The promise of improved interoperability ranks among the factors that have the greatest influence on the decision to use BIM (41%)"* McGraw Hill Construction 2007, Interoperability in the Construction Industry, SmartMarket Report, New York, United States. at page 4.
7 McGraw Hill Construction 2007, *Interoperability in the Construction Industry, SmartMarket Report*, New York, United States. at pages 5, 6, 10 and 16.
8 *"…it is critical that much of this BIM data be shared between build team members. As a result, interoperability of technology is an important factor. Re-entering data from a BIM into another application or platform used by the build team creates wasteful and costly duplication."* McGraw Hill Construction 2007, Interoperability in the Construction Industry, SmartMarket Report, New York, United States.

5.4 Given the diverse and multifarious nature of the construction industry it is reasonable to assume that new niche software applications will emerge over time. Without access by these new applications to a universal data model these applications, whatever their other strengths, will be unable to meet the industry's interoperability requirements.

5.5 We stress that the needs of the building industry rely on interoperability between a variety of different software applications. Mere compatibility with a single application, or even with a single suite of applications from a specific vendor will not meet the particular needs of the building industry.

5.6 If A and B are both using the same version of the same application, there is no need for "interoperability" per se. If B cannot open A's document, neither can A. Interoperability typically only has meaning where data needs to be used within different applications. We use the term "interoperability" here to mean the ability to transfer models between different software applications, with the word "compatibility" to refer to the transfer of models between different versions of the same software application.

6.   What is "Open" in this Context

6.1 Open standards and open formats are often discussed together, sometimes being used interchangeably. However, whether a format is open and whether it is a standard are separate questions and ought to be treated separately.

6.2 The question of whether a format is open or not ought to be determined by its effect in practice.[9] In the context of public procurement this means that the effect of the use of the format must be consistent with the procurement rules relating to non-discrimination and the promotion of competition. Storage formats which tend to advantage particular potential bidders should not therefore be considered "open".

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9   Ghosh, An Economic Basis for Open Standards, Report by FLOSSPOLS Project under the Sixth Framework Programme of the European Union.

6.3   In our view, a format for which there exist potential implementers who must secure knowledge, data or permission directly or indirectly from a person or class of persons is not "open" in the sense used in paragraph [6.2]. This is because if the format is mandated then a potential bidder must secure an agreement with a competitor in order to bid on the relevant work. This preferences the competitor, not only because they have what is, in effect, a veto right on the bidder's bid, but also because the negotiation process gives them information (being aware of bidder's position) and timing (not having to negotiate saves negotiation time) advantages. These advantages can be entrenched in any contract which is finalised. The entrenchment can occur through seemingly uncontroversial provisions tying fees to units sold, and then requiring sales reporting data, potentially in advance of the bidder's sale.

6.4   These effects are independent of any cost charged for the ability to implement the standard and can still be present if there is no fee charged for the implementation. If the competitor refuses to deal there is no effective recourse for the bidder until such time as the competitor has sufficient market power to found a legal action. Ironically therefore, the absence of a right of action creates the incumbent's position.

6.5   In our opinion, requirements such as the forum in which the format is adopted and/or standardised do not go to whether the format is open per se. Nevertheless, these requirements will be very relevant in deciding whether to choose to adopt the format. Formats which have the stewardship of a recognised standardisation body are more likely to be stable. Those which have a transparent development process are more likely to cover likely use cases.

7.   Currently Available Open Formats

7.1   According to an Erabuild report from 2008, three open international standards for BIM are in development:
_*Industry Foundation Classes (IFC), to define HOW to share or exchange building information*
_*International Framework for Dictionaries (IFD), to define WHAT building information we are sharing or exchanging*
_*Information Delivery Manual/Model View Definition (IDM/MVD), to define WHICH building information to share or exchange, WHEN.*
_*IFC is the most mature standard, and has reached a reasonably advanced level of development. This standard is also implemented in a wide range of software applications. The IFD standard (ISO 12006-3) is implemented in the IFD Library, an initiative slated to have a global reach but initially ran by Norway, the Netherlands, USA and Canada. IDM/MVD is currently under development, both the resulting outcome of the methodology and the standard methodology framework itself.*

7.2   IFC is currently in the process of becoming International Standard ISO 16739, having previously been a publicly available specification. The Erabuild Report identifies 11 major BIM software applications which were certified compliant with the then current IFC 2x3.[10]

7.3   At present all BIM related storage formats have deficiencies. The market for BIM related software is influenced to a degree by the existence of earlier CAD software. The market for CAD software has adopted the "DWG" format as a de facto standard. While this standard is closed in theory, in practice all participants in the market treat it as an open standard, implementing it without the need to negotiate a licence or pay licence fees for its use. Moreover, the characteristics to be recorded by the standard are much less complex than those required for the recording of BIM models.

Part 2 – Effects of Closed Format Mandates

8.   Long Term Considerations

8.1   Part of the design expectation of BIM is that the models be used for the operation, maintenance and demolition of buildings. Therefore, the timeframe that must be considered for the retention of and access to data in the model is roughly the lifetime of the building. This would ordinarily be measured in decades. We are not aware of any closed storage format this old which is still readable on modern applications.[11]   Even modern versions of Microsoft Word cannot read files saved in earlier versions of the same program dating from the late 80s/early 90s. As software versions change, support for old formats is eventually dropped, in some cases this is a deliberate move to force users to upgrade to a newer version of the application. Moreover, old applications which saved the format are no longer available, and there is no documentation describing the old formats or how they have changed over time. This is to be compared with open formats such as txt (plain text files), html, xml, TeX, text, tar and gzip archiving formats which have seen decades of use.

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10   ERABuild, *Review of the Development and Implementation of IFC compatible BIM*, 2008 at 30.

11   The RTF format is a borderline case, in that, while it has a closed development process, the format is documented and implementable by third parties, and its overall structure inherits from the open TeX format. When modern versions of Word save to RTF some "features and functionality" may be lost: http://technet.microsoft.com/en-us/library/cc179199%28office.14%29. aspx#BKMK_Changed.

8.2   The only institutions which have experience with a similar record keeping period are archives. The National Archives of Australia considered issues such as these relating to the preservation of documents in storage formats in a Green Paper released in December 2002 (Green Paper).[12] The Green Paper canvassed some of the issues listed above, but went further observing that the use of a record is mediated by the technology used, and that there could be no assurances of how technology would evolve over the several decades that made the lifetime of a typical electronic record. The Green Paper noted that periodic migration of data from one format to another "requires extensive cyclical work to convert objects in obsolete formats to current formats. The work increases as the digital collection grows." [13]

8.3   Having reviewed the issues relating to long term storage of electronic records the Green Paper concluded that *"Proprietary data formats are unsuitable for long-term preservation and accessibility of digital records, particularly for an organisation committed to free long-term access to digital records."*[14]   As a result, the National Archives of Australia require that documents it archives are not stored in a closed format. Rather, they are first converted into open formats. Thus, office document files that they receive are converted into the open "OpenDocument" format for long term storage.[15]

8.4   BIM data is much more long lived than other data that policy makers may be used to. Moreover, its long life is qualitatively different from long lived document files. Document files are retained largely for historical reference, they are not directly utilitarian in the way that a BIM file will be. For example, BIM files will still be of direct, practical use at the time of demolition.

8.5   The use of closed formats for data which must survive for decades is not credible as an option in these circumstances, particularly for data to be held by the public sector.

12   On issues generally relating to preservation of documents see Heslop, Davis and Wilson *"An Approach to the Preservation of Digital Records",* Green Paper published by the National Archives of Australia 2002 at page 13.
13   Heslop, Davis and Wilson *"An Approach to the Preservation of Digital Records",* Green Paper published by the National Archives of Australia 2002 at page 12.
14   Heslop, Davis and Wilson *"An Approach to the Preservation of Digital Records",* Green Paper published by the National Archives of Australia 2002 at page 15.
15   http://en.wikipedia.org/wiki/Xena_%28software%29

9. Competition Issues

9.1 The core principle of Government procurement for the Australian Government is that the whole of life costing of the procurement should provide value for money and that value for money is enhanced by (among other things) encouraging competition by ensuring non-discrimination in procurement and using competitive procurement processes.[16] The procurement guidelines emphasize that competition is a key element of the procurement policy framework.[17]

9.2 Government Agencies are bound by procurement rules to not discriminate against potential suppliers, and, in particular, not to discriminate against SMEs.[18] Thus, an agency procuring cars should not specify in its requirements a particular brand of car as that would discriminate against other car manufacturers. Equally, for example, if an agency was procuring courier services, it could not specify a particular brand of cars that a supplier is to use in the course of providing those services. Again, that would be discriminating against potential suppliers who are equally able to perform the service.

9.3 Storage formats are subject to network externalities. That is to say, the more people using the storage format, the more valuable the storage format is to people. The presence of network externalities in respect of a good tends to preference first movers in the market. Later comers will always start at a disadvantage because even a small network of the first mover is more valuable than no network. Other things being equal, if two storage formats are equivalent, the first to market can be expected to dominate in the long term.

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16 Commonwealth Procurement Guidelines, December 2008, sections 4.1 and 4.2.
17 Commonwealth Procurement Guidelines, December 2008, section 5.1.
18 For example *"All potential suppliers should have the same opportunities to compete for government business and must, subject to these CPGs, be treated equitably based on their legal, commercial, technical and financial abilities." and "To ensure that SMEs are able to engage in fair competition for government business, officials undertaking procurement should ensure that procurement methods do not unfairly discriminate against SMEs.", "Agencies should seek to ensure that procurement processes are readily communicated and accessible to SMEs and should not take action to deliberately exclude SMEs from participating."* Chapter 5 of the Commonwealth Procurement Guidelines, December 2008.

9.4 Where a customer specifies a storage format for a deliverable, the ability to deal with that customer becomes dependent upon the ability to provide the deliverable in that storage format. Where the mandated format is only implemented by one software suite, then the customer is, in effect, mandating the software that its suppliers must use in order to deal with it. Such mandates are bad because:

a) they run the real risk of substantially lessening competition in the market for building and construction related software; and

b) the functional limitations of the chosen software suite limit the value that the customer can derive from its procurement. In the construction industry this is particularly relevant because of the large number of domain specialities.

9.5 Mandating a closed format is equivalent to mandating the software which reads and writes that format. If an agency specifies that data is to be submitted in a closed format which is only implemented by a single vendor, the agency is, in effect, mandating that it will only accept bids from resellers in one form or another of that vendor. Mandating of an open format has no such impact on the software used because, by definition, an open format does not require that implementers have to deal with any particular person. Indeed, open standards can ensure full competition among suppliers for a technology despite a natural monopoly for that technology emerging.[19]

9.6 Mandating a closed format has a particularly adverse effect on SMEs because they may lack the market power to force the format's gatekeeper to treat with them, or to do so on reasonable terms. The costs of negotiations has a disproportionate adverse effect on SMEs. For example, if they do not have in house counsel, they must hire negotiators at much higher spot rates, an often tenuous cash position means they have less tolerance for longer sales cycles (so a drawn out negotiation is harder for a smaller organisation) than large organisations.

19 Ghosh, *An Economic Basis for Open Standards,* Report by FLOSSPOLS Project under the Sixth Framework Programme of the European Union.

10. Hysteresis Effects

10.1 Hysteresis refers to the manner in which the past behaviour of a system affects its current state. In this context, it refers to the manner in which the mandating of anti-competitive storage formats will tend to entrench that format, thus compounding the anti-competitive effect.

10.2 While participants in the market may be able to maintain software suites, doing so involves non-trivial costs. If procurement forces the migration to a specific software suite, it is unlikely that there will be a migration away from that suite in the future. This is not only because the adoption of the software involves costs in skilling up (which are sunk) but also because of the continuing operation of the network effects which arise from the storage format used (the firm will be accumulating documents in the closed format). The adoption of new software will involve similar skilling up costs, but less benefit (in that the benefit comes not from the functionality of the new software but from the gap in functionality between it and the existing software).

10.3 If an agency mandates a closed format then, by definition, the agency will begin accumulating data files in that format. This, in turn, will mean that any future procurement by the agency will be locked into the application that writes that format. Thus, if an agency mandates a closed format then that mandate will feedback into itself in the next procurement round because of the weight of files that have been accumulated in that format. Once an agency begins accumulating files in a closed format, the agency will always have a business case to continue to prefer that format.

11. International Competitiveness

11.1 There is an acknowledged shift to the adoption of IFC as the appropriate data storage format for the exchange of BIM data. The following government real estate organisations around the world have signaled their commitment to IFC and open BIM formats by signing a Statement Of Intention To Support Building Information Modeling With Open Standards (Statement of Intention):

a) Senate Properties (Senaatti-kiinteitöt) (Finland);

b) U.S. General Services Administration (GSA) Public Buildings Service (PBS), (USA);

c) Statsbygg (Norway);

d) Rijksgebouwendienst, (Netherlands);

e) Government Construction Contracting Agency (GCCA), (Iceland);

f) Institute for Management and Appraisals of Federal Properties INDAABIN) (Mexico);

g) Danish Enterprise and Construction Agency (DECA) (Denmark);

h) State Real Estate Ltd (Estonia).

11.2 The Statement of Intention was originally signed in January 2008 with five signatories, but was expanded by an amendment in September 2011 to the current eight signatories. In the Statement of Intention the signatories agree: *"to support, to the extent legally and practically possible, the use of IFC-related BIM solutions in public construction works. Each Governmnent Agency listed as a 'Signatory' will issue its corresponding BIM requirements, open standards mandates and adoption schedule. Our intent is for all major projects to use open BIMs based on IFCs on a regular basis but no later than [2011]".* As a result requests for tender from these organisations have begun to require that successful tenders use the openBIM/IFC for the submission of data.

11.3 In addition, the US Department of Veterans Affairs and the State of Wisconsin both require that data be provided in IFC compliant format.[20]

11.4 There is clear momentum in international jurisdictions to the adoption of IFC as the preferred storage format for interchange of BIM models. It seems likely that IFC will become the standard BIM storage format internationally, and therefore the standard format for international interchange. The mandate of a format other than IFC would reduce the ability of Australian vendors to compete internationally.

12.   Inconsistency with Government Open Data Initiatives

12.1 In Australia and around the world Governments have set up initiatives to open public data that they hold.[21] The Australian Information Commissioner has recommended that, by default, public sector information should be free, based on open standards and fully reusable and transformable (among other things).[22] These requirements are becoming widespread in government directives on openness around the world.[23]

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20   Department of Veterans Affairs, The VA BIM Guide v 1.0 April 2010 section 1 – this requirement applies to projects over $10 million. *"BIM Authoring software shall be compliant with the latest release of the Industry Foundation Classes (IFC) as certified by the buildingSMART Alliance";* Division of State Faciliites, Department of Administration, State of Wisconsin, Building Information Modeling (BIM) Guidelines and Standards for Architects and Engineers., July 2009 section 1.5.

21   See, for example, http://data.gov.au/, http://data.gov.uk/, http://www.data.gov/ and http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/1524&format=HTML&aged=0&language=EN&guiLanguage=en, Government Information (Public Access) Act (NSW) 2009.

22   *Principles On Public Sector Information May 2011*, published by the Office of the Australian Information Commissioner.

23   See, for example, http://www.whitehouse.gov/open/documents/open-government-directive, the UK Government's "Open Source, Open Standards And ReUse: Government Action Plan" published in February 2009 *"The Government will use open standards in its procurement specifications and require solutions to comply with open standards."*

12.2 The UK Government's ICT Strategy sets out clear requirements for open standards to prevent vendor lock in.[24] Its current consultation paper on open standards states *"Citizens, businesses and delivery partners must be able to interact with the Government, exchanging information/data across in the software package of their choice and not have access costs imposed upon them by the IT choices which the Government makes."* [25]

12.3 Thus, even in the absence of requirements to not discriminate and to promote competition, the adoption of closed formats is inconsistent with Government access to public sector information requirements on the data it holds. When the Government comes to release BIM data in line with its mandates, it will find that it is unable to do so effectively because of the format it has adopted. Re-use of the data will be implicitly limited by the functionality of the application chosen to standardise on. If the data is stored in a format compatible with an old version of the application then, when the data is released it may be literally unusable because of incompatibilities with the current version of that application.

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24   Paragraphs 36-40 of UK Cabinet Office ICT Strategy March 2011, http://www.cabinetoffice.gov.uk/sites/default/files/resources/uk-government-government-ict-strategy_0.pdf

25   *Open Standards: Open Opportunities,* UK Cabinet Office consultation paper March 2012, at page 10.

OpenBIM Alliance of Australia Constituent Summary (OBAA)

Graphisoft Australia

Graphisoft Australia, operating since 1991, is the exclusive distributor of ArchiCAD BIM solutions, delivering the most effective time and cost saving software platform for the AEC industry. By distributing ArchiCAD, Solibri, Artlantis and Cinema 4D, Graphisoft continues to build upon ArchiCAD's strength with innovative solutions in BIM software technology which has driven global demand for over 20 years.

Our client's including Woods Bagot, Hassell, Rice Daubney, FJMT, Fender Katsalidis, Project Services Queensland and the Sunshine Coast Regional Council have been industry leaders in many major projects including The Eureka Tower and Melbourne Convention Centre in Melbourne, and Coca Cola Place North Sydney.

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Aconex

Aconex is the world's most widely-used online collaboration platform for construction and engineering projects. We've over 10 years' experience working with top owners, construction and project managers, contractors, architects and consultants on projects of all shapes and sizes.

On retail, residential, and infrastructure projects, and in energy, mining, oil and gas, the online Aconex platform allows people to collaborate securely, efficiently and easily. They work smarter, organizations see reduced risk and improved returns, and everyone delivers a more successful project.

Successfully deploying BIM (Building Information Modeling) on your project means being able to manage models, processes and communication across a large team. Aconex already helps clients to manage over 115,000 BIM models. Sending and receiving large files, highly structured review processes, linking models with the underlying information, creating a powerful audit trail around your model: Aconex can do all of this for you right now. And it's just the start. Aconex pioneered online collaboration over a decade ago and we're investing to take your business into the new era of BIM.

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Founded in 1984, Bentley has nearly 3,000 colleagues in more than 45 countries, $500 million in annual revenues, and, since 2001, has invested more than $1 billion in research, development, and acquisitions.

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OzCAD

OzCAD is the sole Australian distributor for the Vectorworks® range of design software that is widely used in the architecture, building, interior design, landscape architecture and urban planning industries in Australia and around the world.

Vectorworks is developed by Nemetschek Vectorworks, Inc, who is a major partner in the OpenBIM alliance and has been developing software since 1985. The Vectorworks line of software products provides professional design solutions for more than 450,000 designers in the AEC, entertainment and landscape design industries. With a tradition of designing flexible, versatile and intuitive CAD and Building Information Modeling (BIM) solutions, Nemetschek Vectorworks continues to be a global leader in 3D design technologies.

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ProjectCentre

ProjectCentre provides an online project management solution to support efficient delivery for large or complex construction and engineering Projects and to assist all parties to meet their strategic objectives of Time, Cost and Quality Management.

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12d Solutions

12d Solutions Pty Ltd, is a totally Australian owned company, that produces, sells and supports, Civil and Surveying software, with staff and distributors throughout Australia and internationally.

Its main product, 12d Model, is a powerful terrain modeling and civil engineering tool that allows fast production in a wide variety of projects including mapping, site layouts, road, rail and highway design, residential and land development, and environmental impact studies.

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Pacific Computing

With offices in Brisbane and Perth, Pacific Computing (Australia) Pty Ltd has been the exclusive distributor of Tekla Structures in Australia and New Zealand since 1996, subsequently it also become a reseller of FabTrol and Blue Beam and more recently Intergraph's ICAS product range of piping and plant design software. In addition to selling industry leading software we also provide local support and training for the software we resell.

We are a growing firm with 15 staff, all of whom are highly skilled in their chosen field. Collectively, Pacific Computing boasts a wealth of 90 years in CAD experience, and more than 70 years in 3D CAD/BIM experience.

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Open Source Law – Legal Advisors
Brendan is the principal of Open Source Law, a boutique legal practice based in Sydney Australia specialising in technology law, with a special focus on open source and free software. Brendan was entered on the roll of barristers and solicitors of the High Court of Australia in 1993. He worked as an employed solicitor for 10 years, first at the Sydney offices of Mallesons Stephen Jaques, then at Gilbert + Tobin before establishing Open Source Law. Brendan is a past president of the NSW Society for Computers and the Law, and spent several years as an editor of its journal Computers and the Law. Brendan was a founding member and director of Open Source Industry Australia Limited and served as the chair of its board for its first five years of operation.

Brendan is on the editorial panel of the Internet Law Bulletin and the International Free and Open Source Software Law Review. Brendan has spoken at international conferences on free and open source software and has provided advice to government in relation to open source issues.

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