

## EXECUTIVE SUMMARY

On 26 Feb 2018, 50 senior executives from across Australia (representing planning, surveying, engineering, architecture, costing, fabrication, construction, asset and facility management, real estate sales and marketing, and local government, together with a number of local and global technology providers), met in Melbourne for a day to discuss endorsement of the Digital Built Environment (DBE). (Refer list of attendees at the end of this communique).

The DBE is envisioned as: a *secure* federated certified 3D computer model of every *relevant object* in the natural and built environment (above and below ground, inside and out). It will include all legal and contractual boundaries, with each object and boundary linked to the global position and elevation grids. The models will be on all scales required to support and speed evidence-based decision-making for investment and management across many sectors of the economy.

A 'relevant object' is anything that is the subject of, or context for a decision. It could be a city, a precinct, house, or road, or a service duct in a street, or a single piece of equipment inside a plant room, or even just a machine part, or anything else located geographically within its environment.

It can be thought of as a complete virtual model of all the relevant bits of our world, including all rights boundaries, for use in planning, designing, testing, communicating, disputing, amending, agreeing and managing - before anything is done in the real world.

*To protect private, commercial and common interests, each person, organisation and government instrumentality ought to have the same interest in and control over each DBE model, as they have over the physical property it represents. Achieving this objective is a major focus of the DBE project.*

The expectation is that, given the right framework, the DBE will be built virtual object by virtual object - *as the need for each model arises* (e.g. for a new build, or renovation, or as a marketing tool for resale). As each model is integrated, they will gradually create a complete Digital Built Environment that mirrors the real world. However, because it involves moving electrons rather than atoms, it is expected that we will build the DBE an order of magnitude faster than our real cities: in 20 years and not 200.

The DBE vision has evolved to its current stage based on extensive stakeholder interviews and conferences undertaken by Michael Haines over the last seven years (see [vanzi.com.au](http://vanzi.com.au)).

In 2016, a joint industry-government Taskforce issued a brief to write the Road Map for 3D Queensland (3D Qld), based in part on the DBE vision. Michael assembled the team of subject matter experts who were awarded the contract to write the Road Map.

The project involved interviewing a wide range of parties from across the property and infrastructure sectors, including utilities and local and state government. From the analysis of the data gathered, the economic benefit to be derived from a 3D Digital Cadastre and integrated Property Models was assessed by ACIL Allen Consulting to be in the order of billions of dollars to the Queensland economy alone. (See [3D Qld Part A report](#)). The study also exposed the existential cyber-risks arising from the integration of digital models, if no action is taken to address the risks.

During the 3D Qld project, several Federal and State Government representatives suggested that the development of the DBE framework would benefit from wide industry support. This observation became the catalyst for the meeting on 26 February 2018.

## THE CASE FOR ACTION

### To Mitigate the Risks

Right now we have ad hoc development of the virtual world at a project level, with no clear framework for managing the inter-organisational or jurisdictional risks.

Trust is becoming a major concern. Daily we see reports of claimed fake data or news, or unauthorised access somewhere across the globe. Even more worrying, already [cities are being held hostage from cyber-attack](#), even without the degree of integration that is coming. If done poorly on an ad hoc basis, the integration of public and private models with sensors linked to our utility grids will create a whole new cyber-attack surface that has the potential to bring our cities to a standstill. In the absence of a secure framework, these risks will grow exponentially, as more and more models are created and linked haphazardly by individuals and organisations for their use, without regard for the wider impacts.

Cyber-risk is in part a technology problem relating to the Internet of Things. But it is also one of 'governance' relating to our rights of access, use and trade in the virtual world, where we have competing private, commercial and common interests, the same as in the real world.

To maintain security and protect our interests, we need to know who people are (as well as their roles and especially the permissions that go with their roles) before we give them access.

### To Reduce Complexity

We also face an ever-growing list of new laws, regulations and contract terms governing the virtual world that differ from organisation to organisation and jurisdiction to jurisdiction, which also differ from our real-world property rights! Should this trend continue, the added complexity and cost does not bear thinking about.

### To Enhance Competition

It is a truism that markets work best when the rules are clear, and each person knows their rights. By establishing a common governance framework (that reflects each party's real-world private, commercial and common interests in the property that the data represents), the DBE also offers the opportunity to enhance competition in the supply, storage and representation of good quality data at least cost. Here, 'good quality' refers to 'fit for purpose', with appropriate certifications and metadata to support it. Open standards will further enhance competition.

### To Realise the Benefits

By simplifying our rights of access, use and trade in 3D data, the DBE will not only enhance security, but stakeholders have also said it will facilitate:

- a) the sharing and re-use of data by different parties on different projects, and
- b) decision-making by broad groups of people (who often lack technical expertise)

Currently, good quality data cannot be used simply because: those who need it don't know it exists, or their rights of access to it are not clear, or it is not in a format they can read. A common framework, combined with open standards for sharing data across projects offers a simple way to alleviate this problem.

**THE DIGITAL BUILT ENVIRONMENT**  
**A NEW PIECE OF (VIRTUAL) INFRASTRUCTURE FOR THE 21ST. CENTURY**

People naturally understand 3D representations far better than having to digest hundreds of pages of reports accompanied by 2D diagrams and perspectives - speeding agreement for action in the real world at much less cost, with much less risk, delivering billions of dollars of benefit to the economy.

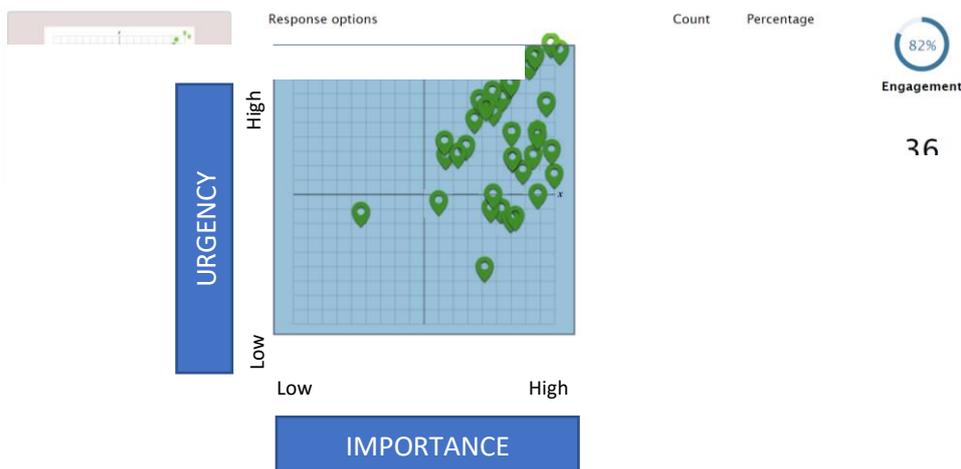
**SUMMARY OF THE WORKSHOP**

The morning involved a recap of the progress to date that resulted in this workshop being run. The afternoon focused on a Q&A interactive session using an online tool, downloaded by each participant present to enable the facilitator to gather real-time feedback from the whole audience. The Q&A covered some 35 questions with over 30 pages of responses captured that will be used in advancing the development of the DBE.

**DBE Importance and Urgency**

At the day's end, participants indicated their view that the DBE was both important and urgent.

**CLICK in QUADRANT where you would place the DBE from: Low to High IMPORTANCE on the X axis, and low to high URGENCY on Y axis**



**Tangible Value Identified**

|                                     | <b>Responses</b> |
|-------------------------------------|------------------|
| Planning & Building Approval        | 40               |
| Buying and Selling                  | 27               |
| Renovation & New Build              | 24               |
| Asset & Facility Management         | 20               |
| Emergency                           | 20               |
| Maintenance (Painting, etc.) Quotes | 20               |
| Construction & Trades               | 19               |
| Surveying and Site Set Out          | 19               |
| Finance & Insurance                 | 17               |
| Keeping Track of Data x Object      | 13               |
| Leasing                             | 13               |
| Furnishing & Decorating             | 12               |
| Health & Safety                     | 12               |
| Internal Way Finding & Logistics    | 9                |
| Other                               | 5                |

Besides the value identified for government and business generally, participants also saw value in the DBE for their own home and/or business use (to varying degrees) as indicated by the number of responses

Identified Elements of the DBE being Developed by Industry and Government:

- 3D Physical Attributes of each Relevant Object in Digital Form
- Data relating to each Relevant Object in Digital Form
- 3D Legal and Contractual Boundaries relating to the Real World in Digital Form
- Associated Laws, Regulations and Contract Terms relating to each Boundary in Digital Form
- Geo-references of each Relevant Object and Boundary tied to the Global Position and Elevation Grids
- Technology to securely capture, store, share and model the Data
- Standards governing 'interoperability' (and Translation tools in their absence)
- Standards governing 'security protocols' for devices and systems.

All the above are being worked on by industry and government to some extent, both locally and internationally.

Key Challenges Relate to Missing Elements of the DBE:

- Governance Framework covering rights of Access, Use and Trade in the \*Designated Data
- Authorised Entities Identified to hold and share the \*Designated Data, subject to the Framework
- Identity, Role & Permissions of each person based on real-world Legal and Contractual rights
- Business Model to pay for the Infrastructure of the DBE
- Business Processes to Certify, Use and Maintain the Data

\*Designated Data means any data a person chooses to lodge as part of the DBE.

The project aims to deliver these missing pieces through a collaborative process across industry and government. In the process, it will encourage the development of common standards.

It is intended that the DBE Framework is established as a piece of common infrastructure, with private and commercial participation undertaken on a voluntary basis to achieve the identified benefits and mitigate the recognised risks.

## THE WAY FORWARD

### Working Together

The meeting agreed that the DBE could not evolve through 'market forces' alone. Concerted action is required to realise the benefits and mitigate the risks posed by digitisation of our world.

Results from the Q&A during the meeting on 26 Feb confirmed that:

- 77% of the participants at the meeting want to work together to make the DBE happen
- 11% while not in a position to work on the project will actively promote it
- 9% will give moral support

### Workgroup

The major outcome of the meeting was an agreement to form a working group, now being established to guide the development of the terms of reference and scope of the DBE.

These will include:

- agreement relating to the underlying principles and required elements for the DBE
- and subsequent development of the governance framework.

The workgroup will be drawn from attendees, as well as from approximately 30 people who have expressed interest but were unable to attend on the day. The backgrounds of non-attendees include finance and insurance, as well as major property owners and developers, lessees, and those involved in emergency services, health and safety, and the law. (Refer list at the end of the communique).

With momentum building, it is envisaged that many more stakeholders will join the push for the DBE to be built as a piece of common infrastructure, within a common governance framework that allows maximum opportunity for businesses to add value on top of it, just like the internet.

### Common Objective across Stakeholder Organizations

To accelerate development of the framework, each of the major stakeholder associations who have participated in the workshop (together with other associations to be nominated by the workgroup) will be asked to adopt as one of their strategic objectives:

*"To work with key stakeholders to develop the governance framework for the DBE by end 2019".*

Taking this route will:

1. create a working group representing a cross-section of interests
2. avoid the need to establish yet another 'industry body', while keeping a common objective.
3. facilitate coordination through a single team across multiple organisations
4. minimise costs through the contribution of in-kind support and funds

By encouraging existing associations and their members to develop the framework in a collaborative environment (supported by the people who have offered to help drive it forward over the coming months), it is envisaged that the framework will be developed by the organisations that will eventually 'own' the process.

### Government Support

Once industry demonstrates the need for, and agreement with a governance framework, it will pave the way for the Federal and State Governments to adopt a National regulatory approach to support it. This approach is similar to the evolution of the new National Electronic Property Exchange (PEXA), which the DBE will need to interface with. The form that this may take is a matter for Government.

### Storing and Curating the Data

With the Framework in place, key stakeholders will be encouraged to store and curate the 3D data being generated for specific projects for later re-use by other parties on other projects; saving future time, cost and errors throughout the property cycle, from planning to decommission. A number of businesses at the meeting indicated a willingness to host the data, subject to the new Framework.

### Common Standards

While the focus of this project is on the governance framework, it is recognised that full interoperability requires the development of common standards. Globally, there are a range of organisations working on this challenge. The evolution of the DBE highlights the importance of this work.

### Adapting Business Processes

As the amount of stored 3D data grows, businesses will adapt their processes to take advantage of third-party 3D data, with more and more using Virtual, Augmented and Mixed Reality to convey information and make decisions. They will be able to do this confidently as long as they know the data representing the DBE has been appropriately certified, locked and securely managed in accord with an agreed Governance Framework.

### Running Pilots

In parallel, several pilots are proposed to tease out the practical problems faced in bringing the DBE together. While it is open for the workgroup to consider other pilots, the opportunity exists to develop at least some of these in conjunction with the 3D Qld project. Though 3D Qld is focussing first on the development of a 3D Digital Cadastre (tied to the global position and elevation grids), it has strong synergies with the DBE. These were recognised at the meeting. Asked about the importance of the 3D Cadastre, participants overwhelmingly endorsed it as a key/central component of the DBE (71% endorsing), with the other 29% considering it at least one of many factors impacting the DBE.

The workgroup will need to explore the opportunity for joint pilots directly with the 3D Qld Taskforce, which is chaired by Peter Sippel who has been a strong supporter of the DBE vision.

## COMMENTS FROM STAKEHOLDERS

The following comments offer further insight into how the DBE will benefit us all, as well as highlighting the existential risks entailed in doing it badly. In some cases, we have had to quote 'industry sources' simply because certain organisations restrict who can speak on their behalf. In these cases, the quotes reflect the views of the general stakeholder group, rather than a particular participant.

### Benefits Throughout the Built Environment

*Michael Haines, CEO VANZI (Virtual Australia and New Zealand Initiative) and convenor of the meeting, asked attendees to: "Imagine, at its simplest, being able to get a painting quote online. Give several painters access to the 3D computer model of your house to measure up, showing them what colours you want where. Imagine if each painter can see that they need scaffolding, or if there are any access problems (by seeing your house situated in its 3D city model). With the help of their quoting software, you immediately get a fixed price without anyone having to travel anywhere. What would that save the painters quoting, and how much easier and less error-prone for you?"*

*"On the other hand, who would be happy to have anyone nosing around the model of their home, checking out the layout and contents? We have locks on our doors for a reason. Why should the virtual world be any different? But then we need to know where the boundaries are in the model, and the rights that go along with them, and also who it is that wants access."*

*"Even more concerning, without a proper governance framework and security protocols, the ad hoc linking of 3D property & equipment models with sensors linked to our energy, water and telecom grids, provides a whole new cyber-attack surface that could bring our cities to a standstill".*

In the course of discussions over many months, others too have suggested new ways in which the DBE will add value:

*Simon Cookes, Founder LARKI, has said: "You can do similar (to the painter) with your architect, local council and trades for a part renovation, or complete new build. These models will offer a much richer view of 'existing conditions' than traditional point surveys. Ultimately, we should be able to access full 3D models of your building and surrounds, as well as all underground services - saving time, errors and cost in the planning and building process".*

*Luke Brannelly, MD of V2i Realtime has also observed: "Already developers are seeing planning assessment and approval times being dramatically reduced by using virtual models to enhance understanding by all stakeholders impacted by a new development. Most people can naturally understand 3D space, particularly if they can be immersed and undertake a journey of self-discovery in that space - in a way no 50 or 500-page report can ever hope to explain. These emerging visual-based smart technologies which activate spatial memory and a true sense of presence, are enhancing equity by enabling unprecedented levels of collaboration and participation, resulting in real clarity and understanding of outcomes in real-time, across the entire project lifecycle. As more and more buildings are modelled and retained for future use, control over access rights to private spaces will become critical, if we are to protect our private and commercial interests".*

*Local Government representatives have observed that: "The ability to seamlessly integrate private models with the City's model for planning and building approval purposes offers the potential to speed these processes, including feedback from the community when required. This capability is in keeping with the trend we see for cities around the world using 3D models to provide improved*

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context for decision-making. A clear benefit of the DBE is the ability to keep separate private and public access based on the embedded rights boundaries”.

*Matt Coetzee, Client Director Cities, Aurecon has long recognised that: “For large infrastructure and buildings projects, it can take substantial time to gather all the information required on ‘existing conditions’, before a project can start. A particular example of this is the location and status of underground utilities. By creating 3D models of underground infrastructure, including foundations, tunnels, basements and services, and having them readily available, we can substantially reduce delays and, ultimately the cost of construction. A few cities around the world are already working towards this goal, but continue to grapple with how to share what could be commercially sensitive data, and how to protect the data owner’s rights. I am convinced that creating an agreed governance framework, which allows parties to safely and easily share data between projects, could save considerable time and cost.”*

As an instance, in November 2017 the Australian Financial Review highlighted the delays in building a \$2.1 billion light rail line running down the heart of Sydney's CBD. The paper noted that for the past two years, the consortium has warned that it is still finding new utilities underneath the path of the tracks and that it still cannot give a fixed date when it will be running!

*Andrew Hansen, Senior Project Manager for Workplace Transformation, Westpac sees “value in a 3D Digital World helping tenants to understand how proposed changes in the workplace will affect them, and in capturing and reflecting back (in 3D) ideas from stakeholders, making it easy for people to communicate their ideas and concerns. It is also possible that a common governance framework that determines rights of access, use and trade in any model tied to each person's real-world interests would obviously simplify the process of using 3D property models”.*

*Nicholas Burt, CEO of Facility Management Association of Australia has said: “The association is working to increase the awareness of the power of 3D models to reduce the time and cost in managing the built environment. Time is wasted by people having to make explorative site visits to understand the problem, before returning with the required parts to make repairs. The use of models would improve productivity. It would also make it easier to keep track of information about assets (equipment) as a virtual object. This information could include a full parts list and maintenance history.*

*In time, the models will likely become dynamically linked to sensors, allowing managers to simulate the impact of proposed changes within a building to reduce operating costs and/or simulate FM service delivery approaches. The technology to deliver these services largely exists. What is missing is the broad understanding of the value, the expertise required to use the technology, and the framework that clarifies rights of access to the data, security and ownership of data. Development of the Digital Built Environment can be a first step to help increase awareness, as well as simplifying access while protecting privacy and commercial interests”.*

*Julie O’Donohue, Founder Next Address, foresees: “Within the next five years, many properties will be sold online using 3D virtual models. These will enable complete freedom of movement in and around the (virtual) property, enabling buyers to inspect without having to visit, except possibly for their final choice - and maybe not even then if the models are professionally certified. Drones and photogrammetry are bringing the cost down, making it easy to get your model made. It is quite possible for these sales models to become the initial bedrock of the DBE as they quickly proliferate”.*

*Emergency Services have suggested that: “In the case of a fire, emergency services could get break-glass alarm access to the model to plan their response en route, potentially enabling the fire to be*

*extinguished before it takes hold of the whole property. And, using a drone and camera, after a fire or flood or storm or earthquake or other accidents create a new 3D model to show the extent of damage”.*

*Others within the insurance industry have asked: “What if your insurer could take the 3D model of your property created by emergency services and compare it to the model of the insured building? How much quicker would it be to assess the damage, settle a claim and do a re-build?”*

*Dr James L Murray, MD of Work Healthy Australia, has said: “rehabilitation specialists spend 80% of their time on the road. Being able to see a 3D model of the property to understand trip hazards, and the need for ramps and hand holds etc. would save all this time. Specialists could specify the changes they want directly in the model from their office, or even home. Tradespeople could then quote off the model (again no travel required). And, when the work is completed, pictures could be taken to update the model, allowing the specialists to approve the work for immediate payment. These are massive savings allowing us to provide much better services to many more people, more quickly at much less cost! Of course, just as we need permission to come on to your premises to do an onsite inspection, we would expect to have to get approval to access the model as per the DBE vision”.*

*Deanna Hutchinson, CEO Spatial Industries Business Association, has noted that: “As well as being able to search semantically; with all relevant data linked to each virtual object, we will be able to locate data by simply searching for the object that the data relates to. This search can be conducted entirely in Virtual space, or in the real world using Augmented or Mixed Reality. Ultimately, we will be able to query most information by simply indicating the object or space we are interested in - which is in keeping with how humans navigate the real world. This will normalize the way we interact with data - subject of course to our rights of access. Boundaries in the DBE, including contractual boundaries (say for a plant room in a building), are important for access to the spaces in each model. And, just as importantly, for access to the data that relates to each space and object. The problem is managing who has what rights across the whole natural and built environment on a consistent basis, as people’s interests and rights in the real world constantly change; which is why the DBE governance framework is so important and urgent. By defining authorised models, prescribing their terms of use linked to real-world property and contractual rights, we can create a mirror-world for decision-making. It also raises the prospect of a whole new profession whose job it is to certify the accuracy of any DBE model for third-party use. We see this as a great opportunity for Surveyors, as well as others within the Spatial and Built Environment professions”.*

These are just some of the ways in which 3D models may be used in the future within a common governance framework to improve delivery of infrastructure, buildings, goods, services and information throughout the economy, while mitigating the risks from bad actors.

As well, an integrated and standards-based interoperable virtual world will help to reduce resource use by moving activity from the real world (of atoms) into the virtual world, while supporting competition at all levels between:

- vendors of hardware used to capture the data
- software suppliers who model the data
- data warehouse managers that hold and curate the data
- professions that create and certify the data

And Not Just Property.

Increasingly, manufacturers like GE and Siemens are also using digital models of individual parts assembled into virtual working models of finished products that can fully simulate their operation. In time, such models are expected to be linked to sensors embedded in buildings and infrastructure and linked to our power, water and telecom grids to provide real-time whole-of-life management of every relevant object in our natural and built environment - to save even more time, errors and cost.

DELIVERING THE BENEFITS AND MITIGATING THE RISKS

Most manufactured goods and many new buildings are already being modelled during the design process, with more and more buildings being modelled in 3D for sale using Virtual Tours. Instead of these models being discarded after their first use, they can be retained at almost no cost to form a part of the ever-growing DBE... once the framework is set up to ensure security.

Ultimately, the DBE will comprise billions of models (one for each relevant object/device) created using different hardware and software, each under the control of different entities - all tied to the global position and elevation grids for precise positioning and seamless integration.

The DBE aims to deliver the benefits and mitigate the risks by building in both technical and governance solutions to protect privacy and security at the outset.

Blockchain and Smart Contracts may have a role

*Matthew Ramage is Trimble's Segment Manager for Asset Management and the MEP Global Marcom Director. In a recent article published in the [Constructible](#) blog, he noted: In a BIM [Building Information Model] process, the model can be seen as the contract between the owner, the GC [General Contractor] and the subcontractor. The physical construction needs to match the model. If you deviate from the model, you may be asked to return and fix it. If the model has clashes or errors, you could raise a change order.*

*...Imagine the client has a budget for the entire project, and they keep it in a wallet (right now, this wallet is their bank account, but consider it a dedicated project wallet of funds). The GC also has a wallet, and so do all the sub-contractors. Some of the owner's funds go to the architect and engineers to create the 3D building model. This then goes to the GC who establishes the key milestones in the project, along with the tranches of money to be released at that point. The GC ties these to areas of the model and they each form 'smart contracts' with the owner.*

*"Smart contracts are computer programs that secure, enforce, and execute the settlement of recorded agreements between people and organizations. As such, they assist in negotiating and defining these agreements."*

*The subcontractors do the same resulting in a very long list of tasks and associated payments, each with verifiable milestones. Each of these verifiable elements will be represented on the BIM model...*

*From this, each time a milestone is completed, a smart contract is fulfilled. I install the first fix electric; the GC verifies the contract is complete, funds move from the GC wallet to my own automatically. There is no paperwork, payments are made in small amounts and not lumps, cash flow is never a problem, and most importantly, issues don't compound on top of one another... Payment amounts could also be linked to scheduling, to incentivize timely work completion.*

*Now imagine this pushed all the way up the chain. Each complete smart contract is shown as progress on the model. The GC can then track progress and spend against granular results. The owner can see their model moving gradually from virtual to reality and a corresponding spend associated with the progress. Funds are only released on verification of agreed tasks (smart contracts). In this, the owner sees their wallet decreasing, moving through GC, then subs, then materializing in the physical building”.*

Similar processes can be envisaged throughout the property life-cycle. Key is knowing what rights each person has with respect to each part of the model/building in question at each stage of its life.

#### Governance Principle

To protect privacy and commercial interests, and to enhance security, the February meeting endorsed as a key principle, that:

“the DBE include embedded legal and contractual boundaries, where the rights of access, use and trade in each model mirror each entity's rights in the object that the model represents”.

*Peter Sippel, Chair of the 3D Qld Taskforce, has long recognised the importance of a geo-referenced 3D Cadastre to the DBE. As he explains: “Having embedded boundaries in the DBE means everyone can navigate the federated model and deal with each other within the DBE - as if in the real world. This will greatly simplify interactions and avoid the need to employ a whole new profession of ‘spatial lawyers’ to interpret rights in the model, different to your real-world rights! Of course, it will be crucial that the accuracy of the models and embedded boundaries be appropriately certified – a role well suited to the surveying profession”.*

This provision is not intended to override current Intellectual Property rights. Under the proposed DBE framework, a person could only use or deal with the model to the extent they could use and deal with the property that the model represents. If an owner sold the property, they would have to sell their interest in the DBE model at the same time. This transfer of interest will be facilitated by the integration of the DBE with the National Electronic Property Exchange.

More simply, if a lessee could move partitions without the approval of the lessor, they could do so in the model. If not, they would first have to get the lessors approval (via the DBE) to change the model. In the end, it should all come back to our real-world rights.

It would, of course, be up to the parties concerned to grant wider rights outside the DBE on any terms they may agree.

Nor should the principle of ‘owner control over their property model’ negate the opportunity for service providers to create models that are leased to owners, on any payment terms agreed for third-party access.

In practice, it would mean that the same people who have to knock on your front door to get entry to your home, would also have to get your approval to access inside its DBE model. Emergency services or local government or other instrumentalities would get access as needed and/or required by law, but not otherwise.

#### Certification of Data and People

It is envisaged from research undertaken that the DBE can be created so it is accessible via a ‘self-sovereign identity’ (with defined roles and permissions backed by authorised certifications). It

would mean having to log into the DBE, just as you log into your bank account – potentially without having to manage a hundred separate passwords to get access to all the data that will make up the DBE!

In addition, processes will need to be developed to ensure all appropriate certifications are made by the relevant authorities and qualified professionals, with the certified models locked against change. The use of blockchain may offer a way of securing this trust without the need to set up a new central authority.

*Louise Mercer, the Head of Australia | New Zealand | Singapore for Everledger, a fast-growing blockchain and emerging technology company, says: “blockchain likely has a significant opportunity to improve government management, support urban planning, underpin the collaborative economy and contribute to sustainability policies in the framework of smart cities. Everledger has been pioneering the use of blockchain to enable the benefits of gathering information from widely diversified participants, and tempering this with the security and privacy enablement of cryptography. Incorporating blockchain into the development of smart cities will create a cross-cutting platform that connects the cities' different services, adding greater transparency and utility, while still preserving required privacy and security. Everledger is excited about the DBE extending the digital world into the private sphere based on secure rights boundaries and the possibilities ahead for the digitisation of the built environment.”*

#### Operation of the DBE

It is envisioned that:

- the data will be held by Authorised Entities (as defined within a Common Framework)
- subject to the rules outlined in the Common Framework,
- possibly managed via a Distributed Ledger.
- Once registered, each person would get As-of-Right access to all the data they are entitled to view without the need for searching. This would include all relevant legislation and contracts covering the property in question. (For this to happen, all laws, regulations and contract terms will need to have their applicable ‘legislative and contractual boundaries’ geo-referenced and made digitally accessible within the DBE Framework).

Authorised Entities may include:

- the State responsible for a large scale geomorphological model
- the City responsible for its city model,
- and Utilities responsible for the models of their infrastructure,
- as well as Commercial entities set up to hold third-party DBE models in accord with the agreed governance framework – say for homeowners, as well as smaller councils, utilities and commercial property owners.

*Lodging a Model In The Network Will Be Like Depositing Your Money In a Bank... Only More Secure!*

#### Standards and Common Framework

In addition to a common governance framework, to make it work seamlessly, we need standards and processes to facilitate interoperability.

*George Havakis, Managing Director of GISSA International and founder of A-SPEC, says: “technology is not the issue – it will come and go, and data sharing will not solve interoperability. Fundamental to*

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*its success will be to establish the structure of the data that is to be harvested from the various models created and stored as part of the DBE and ingested into the various information systems by the users. This will provide certainty and confidence. Therefore, the DBE has to be technology agnostic. It will also be important to have an agreed set of processes for validation and verification. This is where technology will be valuable particularly with the advent of AI”.*

*George has also observed, “Finally from our experience, of utmost importance will be to win the hearts and minds of the people who ultimately will be responsible as authors, creators, editors and analysts of the DBE. Key take away: it is 5% technology, 95% psychology. Which is why I support engagement through the existing stakeholder bodies, as they and their members must ‘own’ the DBE if we are to make it work”.*

*Brian Middleton, Vice-President – ANZ at Bentley Systems concurs: “technology is not the inhibitor. While challenges remain, these are being and will be overcome in the near term. The biggest struggle is agreeing what problem are we trying to solve; namely how to store and share data from multiple sources in a way that protects privacy and commercial interests within a highly secure environment, where the rights of access, use and trade are straightforward and uniform across all jurisdictions. We support this DBE initiative as it offers a clear path toward the goal of a connected data environment under a common governance framework”.*

#### *But Who Pays For It All?*

In simple terms, the DBE will be paid for by its users to secure the benefits and cost savings it provides.

The biggest cost (namely creation of each model) is not a factor in the DBE, as the upfront cost of each model will have to be justified on first use, e.g. for a new build, or renovation, or for sale, etc.

It is expected that as costs fall and the technology becomes simpler to use, the creation of a 3D model for many different purposes will be the norm, underpinning the development of the DBE.

At present, most data has to be generated from scratch for each new project using site visits, and paying for paper documents and pdf's that have to be re-input into other systems. This process often results in delays and transcription errors – assuming you can even find the data, or having found it, that you can be given legal access to it! The DBE solves all these problems.

Rather than adding cost, it is expected to reduce costs by facilitating the re-use of models and data that at present languish forgotten on disk drives (once their initial purpose has been fulfilled).

The cost of the underlying DBE infrastructure (that holds and shares the models) will most likely be paid for via fees for access for any commercial purposes, e.g.: when providing access to a DBE model to a financier or insurer, tradesperson, architect, planner, decorator, lessee, or courier, etc.

Just from the small sample at the meeting, there are a number of national and global organisations ready to offer their services to hold 3D models on a commercial basis within a common framework.

Once the framework is in place to regularise the rights of access, use and trade - enabling most of the process to be automated - these organisations expect to be able to provide a lower cost compared to users re-generating the data from scratch.

No doubt pricing structures will evolve as the amount of stored 3D data grows.

Initially, organisations storing the data may get little return, but this is not seen as a problem where the storage can be offered as an adjunct to the existing business. The payoff will be like the telephone network, the more data that is accumulated by more parties, the more valuable it will become.

#### How Will Each Model Be Kept Up To Date?

Fortunately, this is easily solved by simply changing our business processes to require delivery of *both* the object and its 'as-built' model before payment is made. Whether it is building a new rail line, or moving a partition, delivery of the in-process and as-built models will, in time, become mandatory in every contract.

#### Trading Platform

Perhaps most significantly, the DBE network also has the potential to become a major trading platform for most goods and services. For example: If you want an architect, tradesperson or furniture, or just about anything else; or you want to lease or rent or buy a property. Simply log on and search for what you need. This search will be made much easier as AI assistants are developed to help narrow the field. Suppliers would not need to pay to advertise, only a small fee for making a sale (to pay for the DBE service).

#### Potential To Reverse Adverse Psychological Effects

While it is only a pipe dream at present, this business model has the potential to reverse the adverse psychological effects now apparent in a whole digital generation who is kept glued to their screens by behavioural triggers aimed at increasing screen time for advertising dollars. Without advertising needed to pay for the service, people will be freed to engage online for their benefit, not the benefit of the platform.

#### World First

The DBE project represents a world first that aims to bring together not only public and private 3D data sets with precise positioning but also the rights boundaries governing access, use and trade in the models themselves (and all related data). All within a common governance framework designed to protect private, commercial and common interests within a highly secure network that pays for itself out of transaction fees on commercial use.

It is seen as perhaps the most important piece of shared 'infrastructure' to be created this century. With the potential to deliver better outcomes, more quickly at much less cost across many sectors of the economy - realising \$billions of savings for Australia alone, while mitigating the existential risks arising from the integration of the models with sensors and our utility grids.

Importantly, the DBE will be able to be used as a template on a global scale, as the governance structure adapts to whatever local laws apply to the property being modelled. It will then be truly interoperable.

[For further details, or to join the Workgroup, or otherwise contribute](#)

**Contact:** Michael Haines [m.haines@vanzi.com.au](mailto:m.haines@vanzi.com.au)

People and Organisations represented at the Inaugural Meeting of Stakeholders on 26 February 2018;

| <b>Name</b> | <b>Surname</b> | <b>Role</b>   | <b>Organization</b>          |
|-------------|----------------|---|------------------------------|
| Steve       | Appleby        | BIM Practice Lead ANZ   | AECOM                        |
| Rohan       | Bakker         | Local Functional Manager Survey & Spatial Solutions           | SMEC                         |
| Luke        | Brannelly      | Managing Director   | V2i                          |
| Stuart      | Bull           | Lead for Digital Engineering Australian Hub                   | Laing O'Rourke               |
| Nicholas    | Burt           | Chief Executive Officer                                       | FMA Australia                |
| Alistair    | Byrom          | Chair Spatial Industries Business Association and Chair VERIS | VERIS                        |
| Dr Louisa   | Carter         | City Executive S.E. Qld                                       | Arcadis                      |
| Peter       | Clack          | Director  | Ralph Beattie Bosworth       |
| Matt        | Coetzee        | Global Leader Planning and Environment                        | Aurecon                      |
| Simon       | Cookes         | Founder   | Larki                        |
| Steven      | Coyle          | National BIM Technical Lead                                   | Arcadis                      |
| Mark        | Deuter         | Managing Director   | Aerometrex                   |
| Dorte       | Ekelund        | Principal Advisor Smart Cities                                | SMEC                         |
| Riccardo    | Geppert        | Sales & Marketing Manager                                     | V2i                          |
| Max         | Godley         | Digital Delivery Lead   | GHD                          |
| Sam         | Griffiths      | Survey Manager  | Jacobs                       |
| Michael     | Haines         | Chief Executive Officer                                       | VANZI                        |
| George      | Havakis        | Founder-Director  | GISSA International          |
| Alan        | Hobson         | BIM Consultant  | Brisbane Airport Corporation |
| Belinda     | Hodkinson      | Digital Engineering Strategy Lead                             | SMEC                         |
| Deanna      | Hutchinson     | Chief Executive Officer                                       | SIBA                         |
| Daniel      | Kalnins        | Regional Director & Head of Digital Enterprise                | Ridley                       |

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|           |             |  |  |
|-----------|-------------|--|--|
| Craig     | Lamont      | Business Director - ANZPac Markets   | BECA   |
| Daniel    | Lea         | Digital Engineering Lead   | Jacobs   |
| Scott     | Maclean     | Director and Data Scientist Specialist   | Nulink Analytics   |
| Robert    | Marigliani  | Regional Director  | Bentley  |
| Braith    | McClure     | General Manager Surveying  | AAM  |
| Louise    | Mercer      | Director of Innovation   | Everledger   |
| Megan     | Motto       | Chief Executive Officer  | Consult Australia  |
| Brian     | Nicholls    | Executive Director   | AAM  |
| Julie     | O'Donohue   | CEO/Founder  | Next Address   |
| Ryan      | Pearce      | Regional Business Manager  | Pointerra  |
| Guy       | Perkins     | Strategic Sales Director   | Spookfish  |
| Jim       | Plume       | Director, Co-Chair and Member of various bSA International workgroups  | buildingSMART Australasia and bS International working with OGC Standards Groups |
| Alan      | Rees        | General Manager  | Urban Circus   |
| Peter     | Sippel      | Consulting Cadastral Surveyor and Chair 3D Qld Taskforce   | VERIS  |
| Alan      | Smart       | Chair Tasmanian Spatial Council and ex Principal   | ACIL Allen Consulting  |
| Warwick   | Stannus     | Group Engineering Manager  | A G Coombes  |
| Shannon   | Thomas      | Executive Director   | BIM-MEP Aus  |
| Esteban   | Valdebenito | Industry Consultant BIM ANZ  | Aconex   |
| Simon     | Vaux        | Director Digital Engineering TNSW and Chair of the National Inter-Governmental Working Group for Digital Engineering (IWG NDE) | Transport for NSW  |
| Bernadene | Voss        | Port Phillip Mayor and Member of Fishermans Bend Ministerial Advisory Committee  | Port Phillip Council and Fishermans Bend Advisory Committee                      |
| Grant     | Warner      | Chief Executive Officer  | Australian Institute of Quantity Surveyors                                       |
| Stephen   | Watters     | Regional Functional Manager Urban – SMEC Southern  |  |

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|       |          |   |                   |
|-------|----------|---|-------------------|
| Frank | Weiss    | Vice President BIM                        | Aconex            |
| Kevin | Weller   | Founder & Spatial Systems<br>Consultant   | Modern geoSystems |
| Craig | Wingrave | Business Development Manager<br>Australia | Aconex            |
| Mark  | Wisely   | Senior Consultant                         | Aurecon           |

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People and Organizations unable to attend the meeting who have expressed interest in exploring the development of the DBE

| <b>Name</b> | <b>Surname</b> | <b>Role</b>  | <b>Organization</b>                                     |
|-------------|----------------|--|---|
| Nathan      | Beplate        | BIM Project Manager  | Lend Lease  |
| Andrew      | Birmingham     | Editor   | Which-50  |
| Michelle    | Blicavs        | Chief Executive Officer  | Consulting Surveyors National                           |
| Jamie       | Casas          | BIM Manager  | Jacobs  |
| Dr Ben      | Coorey         | Director, Parametric Design Specialist   | The Institute of Digital Design Australia               |
| Robert      | Coorey         | Corporate Relations  | The Institute of Digital Design Australia               |
| Elliot      | Duff           | Robotics Research Consultant<br>Board Member Australian BIM Advisory Board                       | Data61  |
| Scott       | Falvey         | National Development Manager (Office), Commercial/Industrial                                     | Stockland   |
| Michael     | Fraser         | Visiting Professor UTS and Solicitor   | Michael Fraser  |
| Mark        | Freeburn       | Chief Executive Officer  | AAM   |
| Amir        | Girgis         | Principal   Sustainability Manager   | Northrop  |
| Dr Ben      | Guy            | Managing Director  | Urban Circus  |
| Andrew      | Hansen         | Senior Project Manager for Workplace Transformation  | Westpac   |
| Mohsen      | Kalantari      | Senior Lecturer and Co-Founder   | Melbourne University and Faramoon (a Melb Uni Start-Up) |
| Michael     | Kilgariff      | Managing Director  | Australian Logistics Council                            |
| Andrew      | Maher          | Chief Digital Officer  | Aurecon   |
| Adam        | Matteson       | National Property, Construction and Engineering Portfolio Manager                                | Suncorp   |
| Robert      | McGauran       | Founder of MGS Architects and Member of Fishermans Bend Ministerial Advisory Committee           | MGS Architects and Fishermans Bend Advisory Council     |
| Ian         | McGregor       | Strategic Accounts Director (ANZ)  | Trimble   |
| Brian       | Middleton      | Vice President ANZ   | Bentley Systems   |
| John        | Mitchell       | Ex-Chair   | buildingSMART Australasia                               |
| David       | Mitchell       | Chair of buildingSMART, and Founder at QSx Technologies  | QSx Technologies  |
| Dr James    | Murray         | Managing Director  | Work Healthy Australia                                  |
| John        | Naughton       | Business Area Manager  | Trimble   |
| Tim         | Newman         | Director   | Comspec   |
| Sumit       | Oberoi         | Executive Director   | AMCA  |
| Max         | Ott            | Lead Confidential Computing  | Data61  |
| Kumar       | Parakala       | Global Digital Leader  | GHD   |
| Chris       | Penn           | Deputy Chair of buildingSMART, and AIM Manager Royal Adelaide Hospital, Spotless Health Division | Spotless  |
| Chris       | Pynn           | Regional Digital Engineering Lead  | Laing O'Rourke  |

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|         |            |   |   |
|---------|------------|---|---|
| Abbas   | Rajabifard | Professor and Head, Department of Infrastructure Engineering, The University of Melbourne | Melbourne University  |
| Haydn   | Read       | Head of Infrastructure Programmes (DPO) at Auckland Council                               | Auckland City Council   |
| Chris   | Richardson | Business Area Manager - Construction Software   | Trimble   |
| Hugh    | Saalmans   | Location Engineering Director   | IAG   |
| Pru     | Sanderson  | Regional City Executive Melbourne   | Arcadis   |
| Elliot  | Simmons    | Manager Geospatial Intelligence and Co-Chair EMSINA                                       | NSW SES   |
| Richard | Simpson    | Founder and Chief Executive Officer   | Meta Moto   |
| Mark    | Tait       | Group Executive and Head of Development   | Investa   |
| Geoff   | Ward       | Chair Fishermans Bend Taskforce   | Fishermans Bend Taskforce<br>Department of Environment,<br>Land, Water and Planning |
| Arron   | Wood       | Deputy Lord Mayor   | City of Melbourne   |