

BIM Focus Group Report

Background

A roundtable event was undertaken on 17 July 2019 to bring together people from across the landscape profession to assess the state of the industry in relation to its adoption of BIM and digital design/construction. The invitees were selected from a broad sector of the landscape industry and range of BIM knowledge. This included representatives from landscape clients, private and public sector, manufacturers, suppliers and education.

The event comprised of three workshops, where each focussed on key questions in relation to BIM. The following topics were discussed:

- Workshop 1 - What does BIM mean to you in 2019?
- Workshop 2 - Delivering Digital Construction through a BIM process
- Workshop 3 - What do you see as the future of BIM?

This summary provides an overview of the key themes and areas of discussion developed from the group.

How do you feel BIM will affect your business in coming years?

An overwhelming concern was the perceived cost of implementing BIM, not only software and hardware but gaining the knowledge and expertise to deliver this. Generally, the client is not willing pay extra fees to cover the additional work required, especially when practices are learning how to implement BIM. That said, it felt there was a cost associated by not doing it and falling behind of the competition.

This perceived cost was based on the misunderstanding that BIM requires specialist software and must always be delivered in 3D. For most projects, it is the data that is most important because it adds value to the project, whereas 3D is still primarily being used for visualisation. This was confirmed by one of the client representatives that was more focussed on the data. Another client advised that they were willing to assist with the costs of learning specific software and BIM processes in their early projects, but this is no longer the case because they see their consultants are now benefiting from the efficiencies of implementing BIM, especially reduced re-working. In most cases the client will pay for ensuring the model is validated at end of construction process because is to their benefit.

Others considering and still developing their BIM processes disagreed with the suggestion they should absorb the additional cost of implementing BIM on a project. It was agreed that client engagement and education was a key part of the bidding process because, without clarity over what the outcomes are and how the deliverables (data) will be used, there was a danger that a level of confusion will continue to prevail. This concern is causing inertia with the implementation of BIM because practices are generally, and rightly, risk averse and do not wish to add additional strain or costs on already stretched resources unless forced.

It was felt that larger practices and early adopters have the advantage that they can present the efficiencies and advantage of implementing BIM on other projects, internally and externally, but for

smaller practices and those trying to implement it for the first time it is very difficult to justify, especially to the company owners where they are not seeing any short-term gain. It was recognised that case studies to demonstrate the processes and benefits of implementing BIM would be very helpful to sell the idea internally and to clients.

When considering the gains, it was suggested that we need to consider these over the next 10 to 15 years and, in terms of landscape, the project lifecycle and management of the asset(s). We should be moving the discussion away from BIM to digital construction and digital maintenance and how a good and thriving landscape has positive impacts on health and wellbeing.

Many projects are still not mandating BIM and, where they are, this is not always applied to every aspect of the design and construction process or filtering down to on-site operations and project maintenance. As construction and maintenance teams become more aware of the value of using accurate and meaningful data to make better decisions, they will start requiring this and it may provide a drive for wider adoption. There was an acceptance that this drive is more likely to originate from larger organisations rather than smaller landscape contractors and maintenance teams that are, generally, less IT literate and where onsite connectivity to remote systems can be difficult, although this may change as the ability to get inline from remote locations becomes easier.

Is BIM already impacting you, and to what extent?

BIM adoption within the landscape profession appears to be patchy and uptake slow. Whilst many projects start with the ambition of using BIM on all aspects of the project, the landscape commitment on a project, other than ground modelling, either diminishes or is dropped as the project progresses and, in some cases, it is ignored from the outset! There is a feeling this is slowly changing, and some landscape (BIM) requirements are starting to emerge.

If adoption is to progress, there needs to be a cultural shift, getting clients buy-in to the value of landscape and avoiding the old habits where the lowest price wins. Getting the client to see the long-term value a BIM-driven model offers for maintenance could be an area where better communication and case studies would help, especially where they demonstrate the benefits and value of adding more data over providing better 3D visualisations.

This lack of understanding means clients often ask for too much or irrelevant information and focus too much on 3D visualisation, which is overloading the models because of their complexity. Whilst software can help, there is recognition that these still don't talk to each other very well. This often requires the creation of convoluted workflows to connect the data between applications. Whilst the market is looking to software vendors to provide this interoperability, it was accepted a lack of standards for defining landscapes was missing and very important because it provides a template for data exchange. Product Data Templates could help define the supplier information, but these have not been adopted by specifiers or product coordinators and suppliers and manufacturers are, consequently, not rushing to create them.

Any surprises?

There was a feeling that, if BIM was so effective at achieving efficiencies, improving the flow of information, reducing errors and, thus, saving time and money, everyone would be doing it! It was

accepted that a landscape is a more complex to model in high detail and many requests for BIM fundamentally required a 3D model for visualisation, not to engage with engineers or architects.

BIM is still very focussed on the design and construction phase of a project. Only a few are looking beyond this and using the model for the maintenance, generally because there is still a lack of appreciation around the value of data and understanding how to use it to manage the (landscape) asset. For landscape, it is generally handed over and maintained as it always has been. A recent architectural case study suggested that when an asset included information and data attached to the features, there could be more than a 10% uplift in the value of the property. Similar examples would be useful to show the value of landscape, although these are more likely to be more esoteric and qualitative rather than quantitative. Natural Capital assessments may help change this perception.

There is a desire at the highest level to move from using the term BIM and begin talking about digital construction and digital maintenance. There remains much confusion around what is BIM and changing the conversation to “digital” is more inclusive and resonates with practices who already working digitally so can see more easily how to engage. When you start talking about requirements, exchange points and deliverables, it is easier to see where systems, protocols and standards become necessary, and this is where BIM can provide a framework.

What are the key challenges (broadly and personally)?

Failure to consider the cost and benefits over a 10 to 15-year period and beyond is resulting in cheaper alternatives still being specified and substituted to reduce the cost of construction. This short sightedness, a reluctance to change within the sector, perceived costs of implementing BIM and a lack of awareness of the benefits were some of the main reasons identified for preventing wider adoption of BIM within the sector.

Most organisations don't have the mentality and structure at owner level to drive the changes needed throughout an organisation. Also, the decision makers and those that sign off projects are frequently older and less able/willing to use or embrace the new ways of working as openly as younger members. We need students to come into the profession that understand the process and benefits and can drive this through the organisation from the grassroots.

BIM is still stuck with the 3D paradigm. Sign-off can be easier with 3D models because they communicate the problems and omissions more dramatically, plus visuals are compelling. Outside the shell of the building, there are very few data-driven landscape models, other than civils. Many consultants are rarely modelling the external information and, where they are, it is often not modelled correctly.

Many contractors do not need, or want, the level of 3D geometry being provided as it creates large models. They often only need basic placeholders this data attached, not a 3D visualisation. Sharing data digitally is not that expensive or difficult to create, whereas 3D is still time consuming and requires a plethora of software and hardware requirements to deliver.

Choosing the right software and incompatibility between different software is still an issue. Whilst one client was quite specific about the software to be used on their projects for easier collaboration, another client said they accepted a range of outputs and were able to coordinate projects without being software specific.

Many clients still don't know what data is necessary, so design teams don't know what to provide. Consequently, there is too much unnecessary data being provided. This was identified as a potential issue for data storage.

Given the number of products available within to the construction sector (one supplier referenced over 13000 products!) it would require considerable work to prepare standard information, in the form of product data sheets, for all products. Also, is it realistic to ask suppliers to provide models in all formats? IFC was supposed to be the answer and the concept is, in principle, brilliant but it doesn't work at present because the definitions do not exist for landscape and IFC doesn't work with all software. This needs to improve before it is to be more widely used, especially for landscape.

What are the key benefits (broadly and personally)?

BIM as data, where the physical manifestation is less important - delivering robust data that is adding value to projects and client, sometimes in real time, which is light weight and easy to deliver.

Where BIM is used, roles and responsibilities and the use of a BIM Execution (Exchange) Plan (BEP) help define one guiding mind. Additional benefits identified included: designing more efficiently. reduction of errors and costs, accountability. There is a need to feed these benefits through the entire supply chain if it is to be widely adopted.

The ability to work from a consistent, geo-referenced base makes it easier to locate features using Easting and Northing coordinates, e.g. trees and street lighting, and these are increasingly being used by contractors for setting out. This improves accuracy and reduces waste through the supply chain because you can provide more precise material quantity take off.

Development of a digital twin means we build it twice and should lead to the reduction of human errors in information transfer at every stage of a project. If working in 3D it also means you can quickly produce multiple outputs, including 2D plans, elevations, reports, costs, phasing, etc. and a change to one can quickly updates all. It also helps spot holes in the data and 3D model, which relates back to the responsibility matrix and brings more clarity. Also, maintaining a digital model means we can add more information or refine it in the future so the model has a lifelong use, which may be particularly relevant for landscapes.

Whilst not yet fully realised, the development of a digital twin will help with project coordination, which should improve on-site management and Health and Safety. The creation of this data-rich and accurate 3D model should assist with: driverless ground working vehicles; 3D printing of construction elements direct from the model, e.g. concrete extrusion and service laying gantry's on wheels; off-site modular fabrication in factory condition environments, and, improved health and safety using smart technology to track people movement and operations on-site because construction sites are extremely hazardous places to work. Some companies, such as Hardscape, are using the 3D model to create bespoke mock-ups, where the prototype can be used for sign-off, avoiding expensive re-working.

Most practices are working digitally already and are probably already working within a BIM structure without realising it. As such, the further steps required to go "full BIM" should not be as difficult as they imagine.

On a personal level, if you have a digital model there is less need to travel to site, meaning you have more control over your time and can focus on designing and checking rather than travelling to meetings for the sake of it. Also, people embracing BIM are more likely to progress in their careers.

What's missing currently and how do we - as an industry - deal with this?

It is much easier to understand the costs associated with a project but much harder to articulate the benefits and values. There needs to be a proactive adoption of the new approaches at director level within organisations as there is still too much reliance on 'old' methods because they are tried and tested. Changes to process are more difficult, especially as there are different skills levels within and between companies. A simplification and greater awareness of the benefits of BIM are required if we are to move from "we have to" to "we want to".

The lack of additional fees and "leaning on the job" is preventing many companies adopting BIM, especially when fees are already competitive. Whilst some clients are prepared to cover additional costs when requiring BIM, most often they do not expect to pay any more fees than delivering a typical, non-BIM project. A client advised that whilst they were prepared to pay more fees in their earlier BIM projects, they no longer feel this is necessary because the consultants are benefitting significantly from the efficiencies implementing BIM has provided them.

It was suggested that consultants should not be expected to pay for the coordination model because it has value to the client, who should pay. The costs of creating an accurate model that can be used for validation, coordination and clash detection should be absorbed within the project fees because it benefits the contractor team.

Where a coordinated BIM model is being delivered, consolidated and held in a shared location, it does appear to be replacing requests for marked up plans, etc. However, often those engaged in the project lack the expertise and time to interact and interrogate the model to find the information required which defeats the purpose and cost of creating a data-rich, 3D model.

The level and value of good digital, baseline data is still an issue, for example obtaining an accurate topo survey or services plan. Software is still not allowing data to be shared seamlessly and standards such as IFC, UniClass, COBie, whilst good for buildings, are not producing the level of information required for landscape. Also, we are still too hung up on 3D modelling when a data-rich 2D (GIS) model can hold 90% of the data required and can be used as a resource to produce the information required, e.g. spreadsheets that can describe the information and that can filter easily down the supply chain. To this end, there is a lack of clarity of the information and formats required from suppliers which is, inevitably, resulting in inertia and lack of adoption of standards, such as Product Data Sheets.

There was a deadline for level 2 which focussed everyone's mind, but this is lacking for level 3 although there was a reported target date of 2025. At the top level, there is a desire to stop talking about the levels of BIM, which had a purpose for focussing minds at the time. The desire now is to move the conversation towards digital construction, managed by BIM process, which more people can relate to.

When dealing with the Public Realm, there rarely a single client. Complying with the differing requirements at central and local level can be a challenge, especially when the information requested is difficult to source, e.g. data on distances travelled, Biosecurity, ethical sourcing,

traceability, storm water movement, etc. The development of Open BIM platforms may help but these seems to be focussed around proprietary formats (most typically Revit) and Government must be even handed and not favour any particular supplier, although this is not always the case in other countries, such as China.

Asset managers not knowing or advising on how they need the data and for what purpose is frequently missing. This means that much time is spent producing information that has little or no value and is delivered in a format that cannot be used, especially if this is a large, impenetrable, 3D digital model. This making it difficult for specifiers and suppliers alike as they don't know the best approach to take. Consequently, some are spending time building 3D models to meet designers needs now whilst others, with let resources, are biding their time.

Teaching BIM at the right level within Universities needs to be reviewed as often there is confusion or a belief it is using a single software solution. We need to teach all built environment professions that BIM is not just 3D or a piece of software and promote the value of coordination and leadership around data, demonstrating how connecting this helps make better, informed decisions, i.e. where connected BIM is embedded throughout the process.

There may be some benefit running a similar roundtable session with people that aren't using or have little awareness of BIM as this may be more outward looking and identify the gaps in knowledge that need to be addressed. This is an action the Digital Practice Group should consider.

How can BIM help reduce the impact of climate change?

Data enables communication of landscape requirements and enables discussions at UK/Global level with decision makers. Providing a greater understanding and use of BIM across the supply chain should ensure products are fit for purpose, reduce specification and project errors and, ultimately, produce better performing projects. This is particularly relevant for landscapes that often improve over time, unlike other assets.

BIM should allow us to work smarter. The emergence of the digital twin associated with BIM, where the digital "trial" allows us to build virtually before we build it for real, will minimise waste, which is a significant factor on construction sites and result in the better use of increasingly scarce resources.

3D printing from the BIM model should reduce errors as we can prototype before delivering on site.

Offsite fabrication, coordinated from the model, means we can apply the benefits of using manufacturing techniques and production efficiencies within the construction process. Working in a controlled environment has many advantages because you are less affected by the weather and daylight/working hours in the Winter, can produce more consistent products, ensure materials stay dry and are stored correctly, reduce costs through mass production and maintain safer and healthier construction conditions.

We are already seeing some benefits of implementing BIM on-site, including using the model to "drive" autonomous earth moving and other vehicles on site. This means that vehicle movements are optimised to save fuel and they should be where they need when they are needed, reducing standing time and waste.

There is likely to be an increased use of drones in construction. These are already playing a part, undertaking pre-development and post-construction (as built) site surveys and supporting project management, where daily sweeps (scans) of the site are used to assess progress and undertake cut and fill calculations. This reduces the need visit the site and minimise the need for multiple professions to visit the site, each for different purposes, because the accuracy of drone surveys should be able to reveal more about the site than tomes of notes and thousands of photographs.

Paperless working is a significant benefit. The adoption planning applications submitted digitally and the ability to assess these virtually has already reduced the need for printing.

Currently accurate information is held in silos and rarely shared. This means that we start from scratch every time. If we were able to link digital information (through a Planning portal?) it would offer better access to data captured for the current or adjacent developments, reducing the need for revisiting the site to survey it and help build up city models of the future. If this was available as open source data, it could be used to make better decisions about biodiversity, storm water management, etc. and result in more joined up thinking. Concern was raised that storing increasingly larger, data-rich models will require the use of more servers and infrastructure that will impact on the demand for electricity and resources to build more computers!

The BIM model can be used for sequencing and consideration of changes over time which means we can better assess the impact of our decisions. Robust data models should be of real value to the client because it is easier to assess the impact of maintenance changes in the future, especially when considering embodied carbon. This whole life view on all aspects of a facility – materials management, assets – inputs into BREEAM assessments, that could provide a useful structure.

Some practices are seeing the value of implementing digital systems by encouraging more remote meetings, offering home working, providing better project coordination and contributing to the paperless office. However, this is driven by improved business processes and better use of resources rather than being attributable to BIM. This culture change is being adopted more widely within the profession and allows employees to achieve a better work/life balance. To ensure this, we need to set expectations otherwise it can impact on the workforce's ability to interact and collaborate and may encourage a tendency to adopt unhealthy working behaviours by work longer hours, at weekends and working overnight. This impacts on family life and leisure time and concerns have been raised about the impact of increased stress and the isolation home working can have on mental health and personal wellbeing.

What lies beyond Level 2?

A greater understanding and use of BIM across the supply chain was a hope. Small changes, such as moving from working inside Outlook to the Common Data Environment will help with collaboration. The wholesale behaviour change necessary can only be achieved if we can demystify the process and produce worked examples that demonstrate tangible benefits. Whilst the number of BIM projects is increasing from the client side, it is more likely to take off when we see it being driven by contractors who choose to implement BIM because of the benefits and efficiencies it offers them in project and operations management.

Data through life of the project and connectivity into Smart Cities is likely to be the future. Linking the Digital Twin with the real world, through the Internet of Things (IoT), will provide real-time

feedback and a 360 degree approach to project delivery and management, where the digital model can be used to identify issues before they occur and to test the impact of proposed changes. To be successful, the digital city information needs to open to encourage the sharing of data. Ordnance Survey already offer a range of open data and it is believed they may be moving towards the creation of smart cities, potentially where as-built models can add granularity and where projects can be uploaded to fill in the gaps over time. This could be a valuable resource, especially for landscapes that are more ubiquitous.

It is likely that digital realities (Virtual, Augmented and Mixed) are going to play a more significant role in design, communication, construction and management, especially when the technology becomes cheaper and mainstream. There are already examples in Finland where a VR environment allows you to view BIM images online and the likes of Google Earth are offering more useful 3D content with every update. The UK National Digital twin project is expected to provide another route to encourage the creation of city models.

The ability to visualise the 4D (time) world is more valuable for landscape and allow clients to see everything coming together into synchronised models. However, we should seek to provide a framework to capture and graphically represent change over time if it is to be accurate and contribute to the decision-making process.

The use of complex/robust data to define added value early in a project will be extremely valuable to clients and asset managers, encouraging improvements in all aspects of projects management, such as Health and Safety, meeting carbon targets, reducing operational costs and project programming,

There is no doubt that BIM, Smart Cities and the wider adoption of digital systems will continue to affect the way we work, especially reviewing and commenting digitally. Time savings associated with this should provide space to undertake more creative work but must be managed so change notifications, when sharing a single model, do not become overwhelming. It may be possible for multiple professions to simultaneously work on a live project, allowing synchronisation and instant detection of clashes, but designing in a truly interactive environment, when others are also making changes, will be difficult to control. This could be an issue during the early stages of a project when changes are quick and frequent. One proposal was that each profession check-out the “layer” of work for which they are responsible and to publish back changes to the model at which point any clashes are detected and need to be resolved and verified before they are committed back to the federated project model.

Companies represented at the event:

Arboriculture Association	Arcadis
BALI	BCU
Birmingham City Council	Fabrik
Fira	GreenTech
Ground Control	Hardscape
Haydens Arboricultural Consultants	HS2
Keysoft Solutions	Kings Landscapes
Marshalls	One Creative Environments
Treework Environmental Practice	Vectorworks
Vestre	