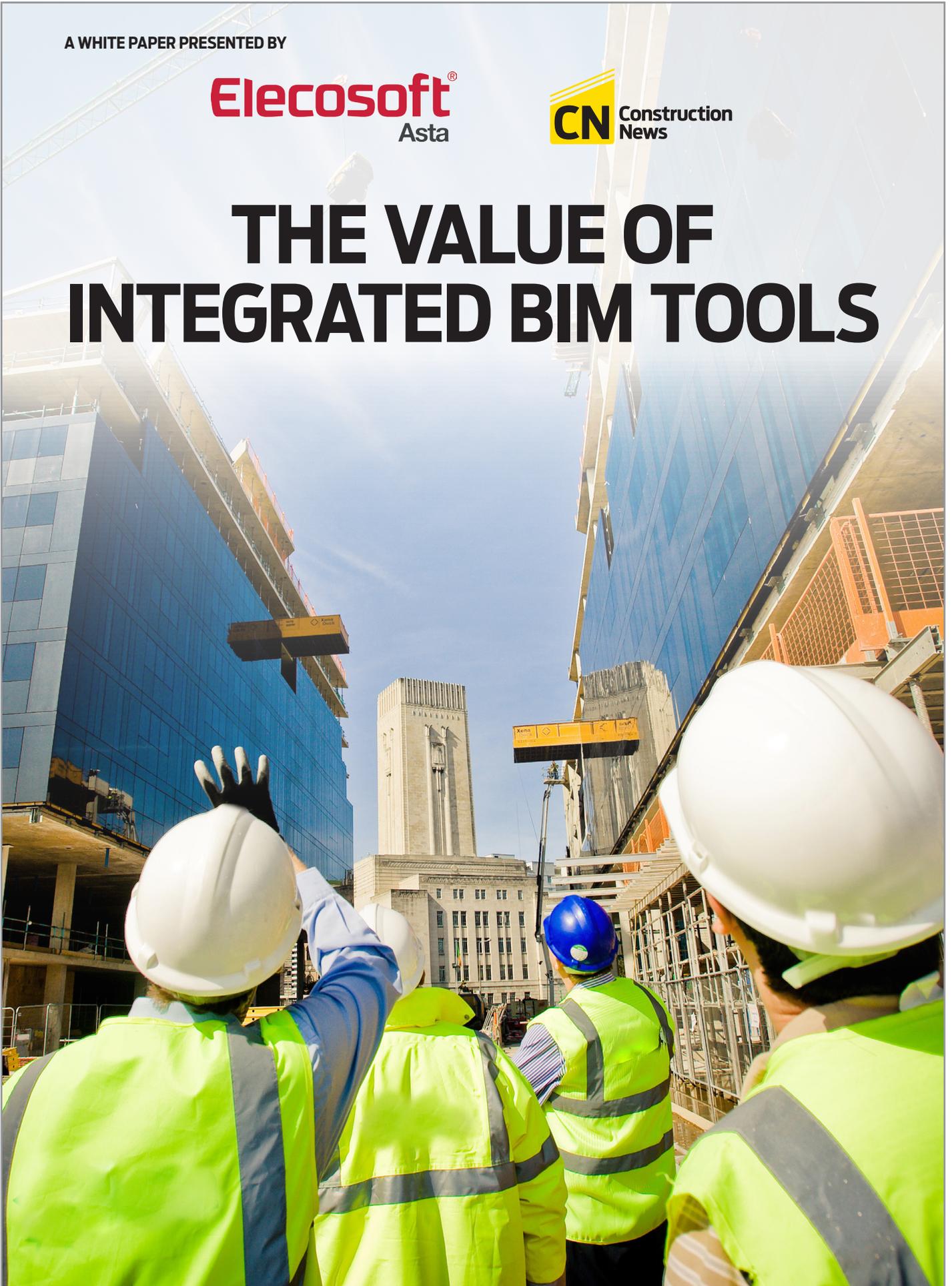


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CN Construction
News

THE VALUE OF INTEGRATED BIM TOOLS



Linking BIM to project management tools in an accessible and affordable way brings huge benefits to the planning process and the efficiency of construction. This paper reviews how this transformation is happening, the benefits that BIM can deliver and why all contractors should be embracing it.

Building information modelling is certainly picking up momentum, but so far its use has tended to be design-led. However, contractors are increasingly looking to BIM to transform and improve the very workings of the construction site itself.

New digital tools that link BIM to project management software can improve site logistics, health and safety, the sequencing of the construction process – all aspects to be considered, optimised and checked as increasingly complex project plans take shape.

BIM provides an opportunity to deliver major efficiency improvements by breaking down barriers that can be prevalent in a silo way of working on construction projects. For the full benefit of this to be realised, everyone involved in a project needs access to the same live data. Being able to link project management software to BIM software is a crucial step-change in this process.

This is known as 4D planning or 4D BIM, because of the dimension of linking time with a 3D model. The purpose of 4D construction planning and scheduling is to enrich the planning process and achieve improved communications and stakeholder engagement. Construction planners can use software including Asta Powerproject BIM to create animated sequences that show a structure's components being built up, including both permanent and temporary works, and in doing so create a robust delivery approach that can be understood and implemented by the project delivery team.

These digital construction run-throughs allow 'what if' scenarios to be tested and can help pinpoint how best to accommodate major equipment and teams on site.

From 30 pages to 5 mins

Nathan Lenton is southern regional planning manager for major contractor ISG. He says: "Until very recently, planners have worked in a 2D environment with the Gantt chart, where even a typical remodelling of a city office block could see paperwork running to 20-30 pages.

"It might take a couple of weeks to understand how we'll be building the project. But with a 4D model, client and construction team can get a good idea in 5-10 minutes."

The £1.6bn turnover contractor is on what Nathan describes as a 'BIM journey' and is in the process of investing heavily in new technology and training. It is



currently using 4D planning on a number of its jobs and is looking at rolling this out as part of a wider BIM strategy across the company.

"What I'm excited about is that for every single construction project affected by change, this new technology will enable us to go back, replan and communicate the level of change and its implications to the team more accurately than ever before."

Nathan says it is early days, but he is anticipating that savings made in terms of time and resource will far outweigh the initial investment.

Chris Needham, co-founder and director of London-based construction management consultancy InCo Projects, echoes these sentiments, having pioneered 4D BIM for a number of years as a freelance planning and construction consultant. He has been using the technology widely, working directly with clients including City of London and hotel chain Accor, major contractors such as Bam Nuttall, Costain, Kier and McLaren, and subcontractors including Prater.

He says: "4D planning is an extension of what everyone has always done: looking at better ways to communicate the construction programme.

"In the past we've drawn out a Gantt chart, working

through the phasing and logistics on bits of paper and put it on powerpoint.

“Using 4D tools makes communicating the programme much easier - you are able to see the programme visually, view the space there is and work out where to put things like the scaffold, the plant or the people. You get better engagement and feedback.

“With a 4D model, the client and the team can get a good idea of the building in 5-10 minutes”

NATHAN LENTON, ISG

“Clients and contractors might think adopting 4D BIM will cost them more. But it is an investment. You will get a return by taking a bit more time to plan out the process and understand where the risks are.

And that’s where we should be going as an industry.

“By the time you get to site, the build programme should be fully tested. It’s about predicting ‘unforeseen events’ by running different scenarios. With so much engagement with the project team you can really improve the way the industry delivers projects, including clash detection and health and safety.”

At a London hotel project, InCo Projects is using 4D planning to ensure onsite logistics run as efficiently as possible. “We’re putting up a tall building on a very tight constrained site; it’s been invaluable to model where we are able to put construction materials and how we provide access and crane lifts, which is not always apparent at certain points in time.

“Anyone who has commercial interests should use the process because it will benefit them. For a small company like ours, it’s a way to better manage risk and optimise our resources - and not just for big jobs. If we can be as productive as possible, everyone will benefit.”

Driving the agenda

Improving productivity is certainly a political buzzword, both in construction and the wider industry. Chancellor George Osborne launched his efficiency plan in the July 2015 Summer Budget, saying: “The only way to sustainably raise the living standards of the citizens of our nation is to confront the challenge of our lifetime: to raise productivity.”

With construction accounting for nearly 7 per cent of GDP, the industry certainly has a part to play in making productivity gains to boost the economy, but also to improve its own sustainability. It’s not just poor financial performance emanating from legacy contracts it has to contend with; looking forward there is also the issue of a

looming skills crisis - again something that could be alleviated if the industry could work more productively.

Speaking at the recent Construction Industry Council Summit in September 2015, Mike Putnam, president and CEO of Skanska UK and a member of the Construction Industry Leadership Council, said it was essential for the industry to focus on the BIM agenda to drive efficiency and improve productivity. The government’s recent Level 3 BIM strategy document, Digital Built Britain, claims BIM has already been a significant contributor to government savings of £804m in construction costs in 2013/14.

Former UK BIM ambassador Richard Saxon says: “Productivity is the buzzword - the industry has to grasp that. We talk about skills crisis, but there would not be a shortage of people if we could improve productivity.

“Yet there are enormous technological advances afoot. We’re already seeing a big change with software tools taking information from BIM models for planners and estimating, and that should streamline planners’ and estimators’ roles considerably. It means we can ask a lot more ‘what ifs’.

Major steps forward

For Asta Development, now known by the name of its parent company Elecosoft, it has been essential that its leading project management software has helped facilitate greater digital working. Asta Powerproject planning software is used extensively in the industry, on projects ranging from the Shard in London and the Pirbright Institute in Surrey to housebuilding projects of all sizes, and is used by 90 per cent of the UK’s leading contractors.

Elecosoft managing director Jason Ruddle says: “We’re seeing some major steps forward. And certainly mobile is something which has rapidly moved forward on sites. So if you look three years ago, then you’d always have project planning software such as Asta Powerproject in an office



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environment, and also possibly you'd have a site office where you'd have a licence to review the planning.

"But to actually keep the project planner up to date, previously you'd find that a lot of people would be walking around site, manually marking up a program, putting some notes on it, which they'd then sit down at the desk and input the information.

"There's a time element and a cost element to that, and an inaccuracy element as well. So what's actually evolved in mobile tools that we've developed, and other software suppliers have as well, is the ability to extract a look-in window of a certain part of that project, maybe a three-week period of the main project plan, and take a snapshot and actually supply that onto a mobile device, which could be a phone or tablet.

"We are compatible with IOS, Windows, Android, all the main devices, so it just means individuals are walking round site, and tapping in notes about where they are and whether the programme is up to date or taking photographs of what's been completed. Once they've finished walking round site, they can take that data and import that back into the main project plan, so they're

ELECOSOFT'S BIM JOURNEY

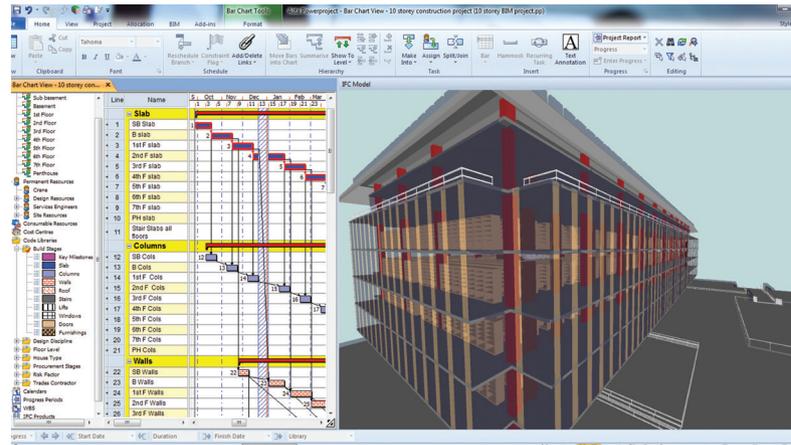
Elecosoft has been enabling BIM solutions to be linked to project planning for a number of years now. But as time moves on, clients want to work with organisations that have toolsets with the same look and feel to make it easier and more economical to use them. Elecosoft was asked by customers to simplify the process by adding in the ability to view a 3D model alongside the Asta Powerproject project plan, and link the model elements to the project plan just by using drag and drop.

Elecosoft MD Jason Ruddle says: "There are certain criteria we looked at – for example, what clients would be willing to pay for a solution, how they'd like it used in their organisation, and would they want all planners to have access to the toolsets.

"So our idea was that if a planner uses a project management tool, they all should have the ability to see a 3D model. They think 3D in their head when producing plans, so they should actually have that toolset.

"The other big thing we've been trying to do with customers is overcome how a lot of companies saw BIM as this little specialist team, that had their 3D model and a few of them would have this very expensive software. And what we're trying to do is bring BIM to everybody – all the people that are actually working, the large numbers of these skilled planners."

Elecosoft has recently accelerated into new software, with the Site Progress Mobile app unveiled in May 2014, the BIM solution launched in October 2014 and the estimating solution Bidcon revealed in spring 2015.



always having an up-to-date progress plan applied."

As well as the Site Progress Mobile app, Elecosoft has added a BIM module to its suite of software, which allows users to combine scheduling and 3D models in a single application to support tendering or progress management in 4D (see box). There's also a module for linking BIM to estimating – but more of that later.

For many firms, the onus on implementing BIM in some form on projects has been driven by government strategy set out in 2011 which mandated the use of BIM Level 2 technology on all its projects by 2016 to bring about a reduction in costs. The government's 2025 industrial strategy for construction, launched in July 2013, targets an ambitious 33 per cent reduction in the initial cost of construction and the whole-life costs of built assets. A number of private sector clients have followed suit in demanding BIM becomes an integral tool of the job.

The reasons clients have for requesting BIM are varied, with some simply thinking they should do it because it is the way to work now, while more progressive ones realise the advantages that come from having access to a data-rich model and ongoing post-build benefits.

Level 2 BIM is seen as a first step on the ladder to digital collaboration. It involves parties in the supply chain using their own 3D CAD models, but not necessarily working on a single, shared model. Instead, design information is focused on being shared through a common file format, as the NBS explains, which enables any organisation to be

"There are enormous advances afoot. It means we can ask a lot more 'what ifs'"

RICHARD SAXON, FORMER UK BIM AMBASSADOR

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able to combine that data with their own in order to make a federated BIM model and carry out interrogative checks on it. One of these formats is IFC (Industry Foundation Class), which has evolved from the buildingSMART organisation – the worldwide authority driving the transformation of open, international standards and one of the key reasons Asta Powerproject BIM transfers data in IFC file format.

4D Modelling is not a requisite of meeting BIM Level 2 compliance, and although uptake isn't by any means widespread, clients are beginning to ask contractors to provide construction sequence animations either at tender stage, or as part of the contract. In addition, contractors are increasingly seeing the potential themselves and, like ISG, are electing to invest in the new technology.

Contractors lead the way

At this stage it's a little early for ROI evidence to have emerged around 4D planning, but a recent survey by McGraw Hill Construction about BIM uptake among companies in North America found that contractors are now leading all construction types in the adoption of BIM. The report also revealed that the use of BIM is linked with strong safety practices: 43 per cent of respondents reported that BIM was having a positive impact on safety.

“If contractors can get it right at the early stage, they get the buy-in from the client”

JASON RUDDLE, ELECOSOFT

The results also found that for 47 per cent of industry firms using BIM, the ability to identify site hazards before construction begins is the most effective BIM function for improving safety.

And almost a quarter of respondents (23 per cent) said finding clashes in advance rather than on site prevented potentially dangerous situations with workers from different trades in one area.

Before developing its own BIM integration tool, Elecosoft worked with leading third-party suppliers to link to Asta Powerproject to create the 4D solution; one such is Autodesk. This has paved the way for the early adopters, but there is always the added risk of data mismatch when exporting to other applications, so working within the one solution is the route chosen by many organisations.

Elecosoft's Jason Ruddle says: “Contractors are beginning to use 4D models in a number of ways and at different stages: at the tender stage, and then when they've won the contract so they get into the build process, which is when they get into the real detail of that project. The third stage is if they manage the building afterwards.

“During the tender stage, there'll be a lot of effort by the main contractors in co-ordinating the best approach to build the structure, so that when they come to present to the client to win the project work, they will have spent a huge amount of time and effort in modelling the best scenarios to deliver the scheme. If a main contractor can knock a week off the project, let alone months, it's worth millions. So if they can actually see how elements can fit together and how the different disciplines can actually deliver on those, that's a critical thing. So if they can get it right at the early stage within the tender process, they certainly get the buy-in from the client.”

This ability to reduce the project durations is where BIM can bring real benefit to contractors. The major challenge all contractors face is the way they manage change and handle the inevitable issues that will always arise during any build. With easy access to BIM models linked to plans throughout the build, potential problems can be identified and ‘what-if’ scenarios tested to find the best solution quickly. This is where crucial savings can be made that can reduce costly downtime and deliver significant productivity and efficiency improvements throughout the build process.

So how do you link BIM and project management?

Producing a 4D plan, like the 3D BIM model itself, is certainly an iterative process. “Generally an architect will produce the first stage of the model,” Jason explains. “But all he or she has done, for example, is render the ground-floor slab as just one massive element, which is ideal for the early stage, but when it comes to a contractor's build process, they need that split down into actual elements that will be used to form it in the construction process.

“So you find that contractors have skilled individuals who take the architect's model and then break that down into

building sections of areas of how you'd actually build that structure. Again, this is something we've learned very quickly over the last 12 months. We've added enhancements to our tool to allow them to split building elements down, without having to go back to another application. So if you open up the model, and it shows a column from the ground floor to the fifth floor, then the planner now has the ability to split that down the way they want to."

ISG's Nathan Lenton says integrating planning information and information from the 3D BIM is straightforward, moving information from one to the other using drag and drop. But generally the process is a team effort regardless of the program. "Planners don't work in isolation; we work with other specialists, from health and safety and operations to the design manager."

Information is transferred in the standard IFC file, which is the open standardised specification for BIM.

Chris Needham from InCo Projects says: "If you take a 3D model that's available on a project, it's generally just rendered in a block; or structure prepared by the structural engineer." He says that generally what the planner will have to do is split the model into constituent building components according to the programme. This has involved the planner working with a modeller.

"At the moment, this process can be slow, as you are working in a way that duplicates effort. As the planner, you need to communicate the way you want the model split up in line with the programme to the modeller, but this needs to be flexible enough when you need to change your plans (which will happen). So there is delay in iteration."

What Asta Powerpoint BIM does is make modelling more accessible to all, so that planners without 3D modelling skills and expensive software can more easily work on this process themselves. As Jason explains: "What we're trying to do is bring BIM to everybody - all the people that are actually working, the large numbers of these skilled planners."

THE CHANGING ROLE OF THE PLANNER

Construction planners rarely find themselves in the spotlight, but good ones are worth their weight in gold. As Elecosoft MD Jason Ruddle points out: "They're the ones doing the hard graft associated with managing - getting the materials on site or making sure the project is sufficiently resourced to be completed on time and within budget."

"In years gone by you would walk into a main contractor office and you'd have project plans all over the walls, which had been plotted out by a project planner. That's long gone now. Everything is state-of-the-art, at the fingertips, so a change can be done instantly and sent through to site immediately by the touch of a button."

But with the march of technology, will estimators and planners become superfluous? "No, I think you always need the estimators and planners; you'll never be able to have model data which is accurate enough; you need industry knowledge and the intuition," he says. "In some of our initial BIM meetings, we've had those who are worried that their roles will disappear. But I think that suspicion is fading away now; people are realising that it's just about making it easier for all to work together and share the information. It also means people have more time to take on more projects."

InCo Projects' Chris Needham adds: "If anything I would say that the new technology has extended the role of planners. Planners and estimators are certainly not going to disappear."

Widening the access to BIM and giving all involved access to the same live data helps break down those silos to improve efficiency. Instead of separate teams working sequentially and having to wait for their colleagues to finish before they start, they can all work in parallel and complete tasks faster.

To allow this to work smoothly in terms of use and development of 4D planning, more developments are expected to come through to maximise these efficiencies by standardising what users understand 4D BIM to be.

In a collaborative working environment, teams are asked to produce information using standardised processes and agreed standards and methods. PAS 1192-2 provides the framework for collaborative working and information management in a BIM Level 2 environment.

5D BIM – the cost dimension

As well as linking BIM to project management, there is another dimension: so-called 5D BIM. This involves linking not just time but costs as well. So it is possible to divide construction spend into the terms of the cost plan and pinpoint where the peaks in spending are likely to arise, gaining a more accurate and automatic

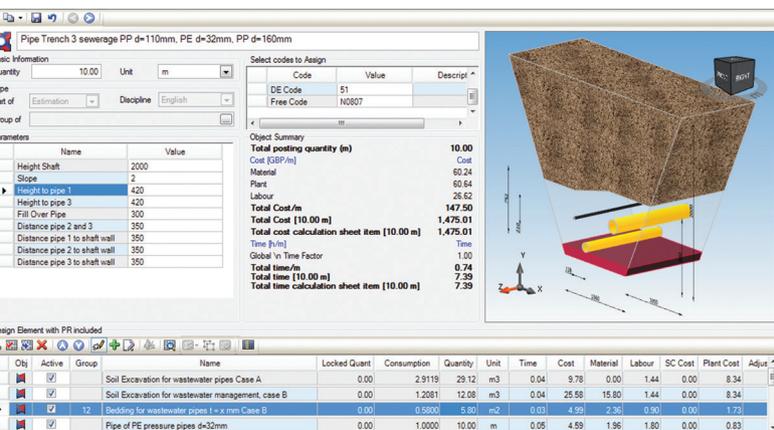


figure of how this might change with specifications and programme alterations.

Elecosoft has developed software that makes this possible: Bidcon, produced by a sister company in the Elecosoft Group. The software allows estimators to take off quantities from an IFC model and share the bill of quantities with Asta Powerproject BIM.

“What we’re trying to do is bring BIM to everybody”

JASON RUDDLE, ELECOSOFT

“What QS would previously have done is either have access to a model or they just look at paper drawings,” Jason says. “If there’s been a revision, say, to the number of doors, the QS would have had to have gone round plotting manually to check this.

“But by using a 3D model, because each element in the building is given its own tag identity, then they can actually run this off the schedule and get an automatic change to cost.”

What needs to happen now?

Contractors are increasingly getting to grips with new technologies and ways of working – as is the rest of the industry. But for some, there is still a tendency to put off proper implementation.

“I think inertia is a big problem; we do things one way and it sort of works and while you might see there’s a better way, the temptation is to stick to the way you know, rather than taking time to learn how to do something differently,” Jason says.

“A customer said to us the other week that they bought several licences of our BIM software and they thought it was great, but they have not used it much yet because they’ve not had time to sit down and look at it. It’s only when people really take the time to do it better that they will become more efficient and save time and money.

“We operate in an increasingly competitive world, so if you don’t and others do, then they’re going to be better. It’s worth considering, too, that good project planners are hard to get. And if you’re not giving them the latest tools, they’ll go and work for a company that is.”

Elecosoft has introduced several new products recently with its mobile app, Asta Powerproject BIM and the estimating tool Bidcon – all aimed at making BIM more accessible and affordable.

Ongoing releases will see further enhancements, responding to customers’ needs and helping contractors accelerate their BIM programmes with the full benefits that brings to construction: improving communication, health and safety and, most crucially, productivity and efficiency, which will transform the construction process.

BAM BIM COMBO BOOSTS ARENA EFFICIENCY



Positioned in the heart of the city, the newly completed £60m Leeds Arena is a world-class music and entertainment venue with a capacity for 13,500 people. It has been designed with easy modification in mind to meet the changing requirements of a diverse schedule of events, which could be anything from theatre to indoor sports.

The build itself was on an enormous scale, requiring thousands of tonnes of structural steelwork and featuring a single-span roof of 70 m at its widest point, supported by 14 trusses each 7 m deep. A huge 55 m-long and 10 m-high proscenium beam sits at the opening to the stage.

The build was so large and complex that contractor Bam determined that using BIM, linked to its default programme management software Asta Powerproject, would be the best possible way forward, so it could build it virtually first and iron out any errors before they appeared on site. Senior planner Douglas Robertson said the busy city centre site was one of the reasons why very careful planning was required. “We used Asta Powerproject throughout the construction phase to understand how and when we could get materials.



“Constructing the programme virtually and identifying potential problems well in advance led to the success of this project. As you are going along you can see six months ahead to any particular stage of a build – it’s really powerful. We can view it as a video and see the build go up before it is even constructed. We simply link the Asta programme into the model and with the press of a button it’s all there – it really is that simple.”

At the planning stage, Bam calculated that a job of this size would typically involve 1,000 major site-based conflicts and that 90 per cent of these would be discovered during the design phase. It estimated that each clash would cost an average of £3,500 to resolve on site, adding up to a potential cost upwards of £350,000.

He said: “We are still in the embryo stage, but Asta Powerproject is proving to work well with 3D modelling – so the path ahead for BIM is looking good.”

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About Elecosoft

Elecosoft UK Ltd is a leading international developer of project, portfolio, resource management and BIM software. Its flagship product, Asta Powerproject, is widely recognised as one of the world's leading project management software solutions for construction.

Available in standalone and enterprise versions, it is the preferred software of thousands of construction professionals throughout the world because it combines easy-to-use drag-and-drop functionality with powerful feature-rich capability.

It is also available with a BIM version, which brings 4D planning within affordable reach by combining 3D

planning and scheduling in one application.

Asta Powerproject BIM incorporates features that enable 4D planning, drive greater collaboration, and deliver communication, time and efficiency benefits.

More information about Asta Powerproject can be found at www.astapowerproject.com

Elecosoft UK Ltd is part of Elecosoft plc, which develops and delivers software and services to architectural, engineering and construction industries. Elecosoft plc is listed on London's Alternative Investment Market (AIM:ELCO). More information about Elecosoft plc can be found at www.elecosoft.com