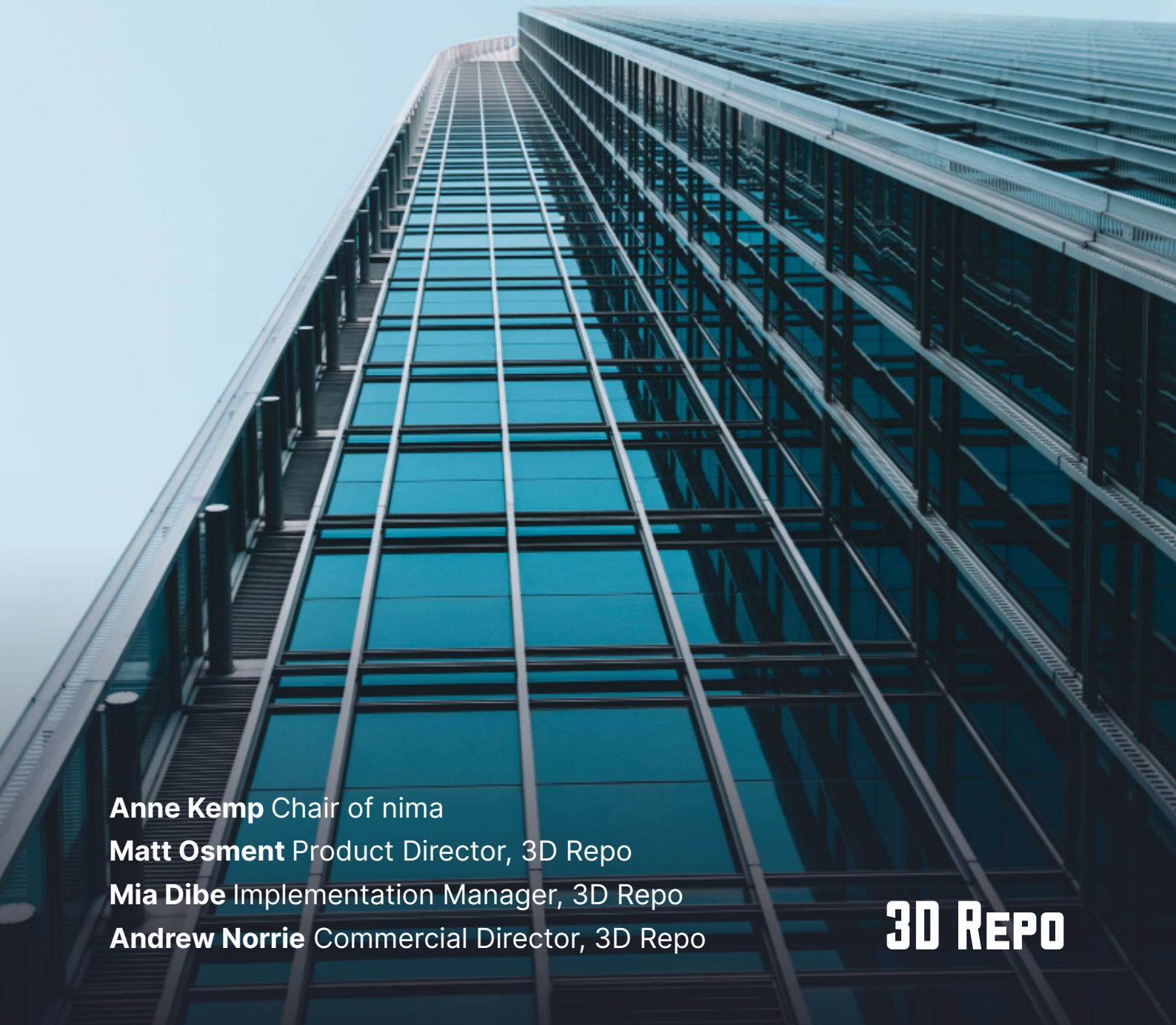
WHITE PAPER

Taking BIM to the next level:

Better Information Management



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Introduction

The UK is often held up by other countries as a leader in terms of our adoption of BIM, and there are many case studies about its successful deployment[1]. But first, let's clarify, what do we mean by BIM?

The acronym stands for Building Information Modelling, and encompasses information management throughout the life-cycle of a built environment asset; from initial planning and design, through to construction, to ongoing facilities management, refurbishment, and eventually decommissioning, dismantling or re-use[2].

A survey of over 900 construction professionals by The NBS in 2021[3] showed that 71% had already adopted BIM, 25% planned to in the next five years and only 5% said that they would never adopt BIM.

However, as company sizes get smaller, adoption of BIM tends to decrease. The NBS survey found that of the small companies, employing less than 15 people, 55% had adopted BIM with 10% saying they never would.

There is a pressing need for companies in the built environment to find appropriate and proportionate ways to manage information. The advent of the Building Safety Act means that there is a growing focus on governance in terms of products used and decisions made. Companies need to protect themselves by ensuring that the data linked to a project is stored in a retrievable and usable way, whether an asset manager mandates it or not.

According to an annual survey of readers of **Construction Management and BIMplus**[4], a focus on collaboration and good information management is the key to improving BIM adoption, with clients stipulating ISO 19650 and ensuring data is carried through the lifecycle of the asset.

Unfortunately, much of the information collected during the design and construction phases is currently not being transferred to facilities and operations managers.

"There is this big barrier between design and construction and in use," says Anne Kemp, chair of nima (formerly UK BIM Alliance). "Part of that is down to a lack of procurement, part of it is lack of collaboration and part of it is a culture thing. Until we can break that, it is quite a barrier."

Good information management can deliver a myriad of benefits to companies in the built environment, says 3D Repo product implementation manager Mia Dibe: "BIM should be a way to improve efficiency and productivity. You have to do what works for your project, for the skillset you have in your company and for the type of work you are dealing with."

So, what steps can organisations take now to improve information management and harness the full benefits of BIM?

In the report we outline **four steps** to success:

1. Break the task down into smaller chunks
2. Collaborate throughout the supply chain
3. Bring the right people on board and embrace change
4. Adopt the ‘golden thread’ with good information management

Taking the first step

Perhaps the biggest question for any company director or manager considering the implementation of BIM is just where to start.

Without in-depth experience or knowledge of working in a BIM environment, it can be difficult to figure out what information a company requires and where software providers can help. Some people don't even get past the jargon and acronyms[5].

"Prior to 2018, when we were mandating BIM Level 2, everybody felt that they were expected to know everything about the standard, but actually that wasn't the case," says Kemp. "The best approach both then and now is to break it down into bites and work out what you need to do within the overall system."

Many people, including Kemp, think that the name 'BIM' has become unhelpful. Building Information Modelling has become too attached in many minds to 3D models alone. That's one reason why the UK BIM Alliance changed its name to nima.

"If we really want to achieve whole life management of information across the built environment, the acronym 'BIM' is holding us back – unfortunately, there are too many misinterpretations of what it is really about," says Kemp. "But it's tricky. If you just say 'information management', it means so many different things to different audiences."

BIM also has connotations of all-singing, all-dancing systems, which aren't relevant or useful to everyone, says Kemp. "I don't think enough people are au fait with how to do things in a simple way without overcomplicating it," she says.

Her advice is to be proportionate, depending on the context or project and what benefits "better information management" could deliver to it. "There's no point designing to the Nth degree and blowing your budget or your time. It needs to be helpful. The intention of ISO 19650 is that you do all of it eventually. That is your ultimate aim and should deliver the best outcome, but on the journey towards that, you will get good outcomes too. Huge doses of pragmatism are required."

There are different roads that organisations can take on the journey to BIM adoption. The Environment Agency, for instance, set itself a 10-year plan, giving the supply chain a clear horizon of what was happening and involving them in the changes[6]. "The Environment Agency is a good example of how working with the supply chain makes it easier for the supply chain," says Kemp.

Kemp's own organisation Atkins took a different approach. It gathered a team of people from around the globe to map out its typical workflows, from receiving a bid right through to delivery. Then they created a framework based on ISO 19650, selecting or creating the technology and tools to support their workflows and processes. "Now we have a global design framework which allows us to mobilise teams right the way across the globe," says Kemp.

For companies considering how BIM – or information management – could help them, Kemp advises them first to work out where they are now and then to identify the most important business decision they need to take and determine what information could help support that decision.

"Just doing that helps you to understand what we mean by information and data and how it links to your decisions," says Kemp. "Once you get to that

understanding, you can follow that through and work out how you would like that information to be delivered, how software could come into that and how it would impact on your supply chain. Or, if you are an asset manager, you would work out how that information gets sucked along the whole lifetime of an asset."

The UK BIM Framework contains free guidance linked to every part of the information management chain which complies with all the relevant standards and codes.

Implementing the UK BIM Framework is critical to many projects. The updated Construction Playbook, published in September 2022[7], sets out policies and guidance for how public works projects and programmes are assessed, procured and delivered. It directs the implementation of the UK BIM Framework throughout the supply chain as part of this approach.

For infrastructure projects, the Infrastructure and Projects Authority, Transforming Infrastructure Performance: Roadmap to 2030 includes an updated Information Management Mandate which outlines how programmes should be delivered through the application of the UK BIM Framework[8].

The move from BIM maturity levels to ISO 19650 and the UK BIM Framework

In 2011, the UK Government announced that publicly funded construction projects should be working at BIM Level 2 from 2016. The BIM levels originated in a maturity matrix developed by Mervyn Richards and Mark Bew in 2008, which aimed to express how the industry could progress to a totally collaborative digital environment.

The PAS 1192 series of standards, the first of which were published in 2013, were written in response to the Government's BIM mandate, based on achieving BIM Level 2. PAS 1192 was then used as the basis for the international standard ISO 19650.

In 2018, the BIM levels were replaced by the UK BIM Framework[9] which is an interpretation of ISO 19650 from a UK perspective.

ISO 19650 Building Information Modelling (BIM) is a suite of standards concerning the management of information over the whole life of a built asset. It was based on the PAS 1192 series, with the drafting committee, chaired by Anne Kemp, removing some of the anomalies and changing the language in places to make it relevant for an international audience (rather than it being UK-specific).

ISO 19650 comes in several parts:

- Part 1, published in 2019, covers concepts and principles
- Part 2, published in 2019, covers delivery
- Part 3, published in 2020, covers the operational phase
- Part 4, published in 2022, covers information exchange
- Part 5, published in 2020, covers security-minded approach

The UK BIM Framework is a webpage rather than a document, reflecting the fast-moving pace of digital construction. Here you can find a list of all the relevant and current standards for BIM in the UK, UK BIM Framework Guidance which explains all the various phases, elements and links to useful resources. Although some specifications may still mention BIM Level 2, they shouldn't, as it was replaced by the UK BIM Framework in 2018.

Finding common goals

Encouraging the uptake of BIM further down the supply chain can involve too much stick and not enough carrot, says 3D Repo product director Matt Osment.

"It's our experience that the contractors who get the best results are those that sit down with their supply chain and work out how technology can deliver benefits for them too. We've seen it with some of our customers," explains Osment.

Kemp concurs, citing Crossrail as an example of a win-win BIM situation[10]. For instance, there was a fall in the number of Requests for Information (RFIs) – when subcontractors have to ask for more detail about a certain element or interface for instance - due to the use of a common data environment (CDE), says Kemp. This should mean greater efficiency and profitability for the subcontractor, as well as overall time and cost benefits for the project.

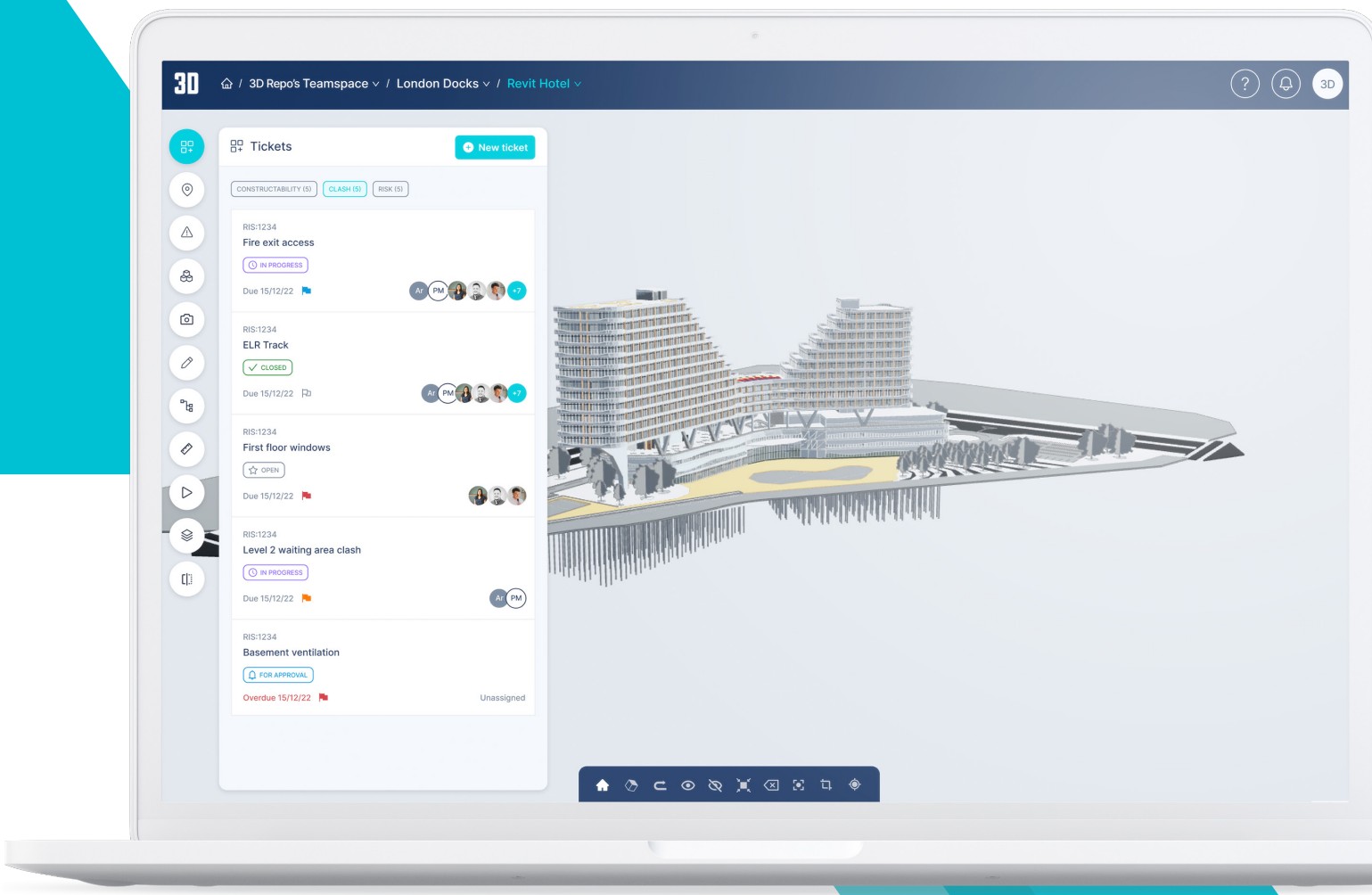
Using 3D visualisations in the planning stages can deliver mutual benefits too, allowing subcontractors to better understand the constraints and interfaces of their portion of work and possibly highlighting safer or better ways to do things. This is a concept that Mission Room takes to the next level with its big-screen display of 3D models.

One of the challenges that companies further down the supply chain face is that they may be working for multiple tier 1 designers or contractors, all of whom will be using different combinations of software solutions. This can lead to time inefficiencies and increase the risk of dirty data, says Osment.

"We see subcontractors spending a lot of time outside their main workflows to satisfy a main contractor's requirement," says Osment. "A subcontractor may be using one app and the main contractor another. The best solution would be for everyone to sit down and agree on a workflow that doesn't mean anything is repeated, but instead, subcontractors often end up doing double entry."

The lack of interoperability between some software packages has long been a bugbear of the industry and recently the Government has taken steps to tackle the issue. In September 2021, the Government introduced an updated BIM mandate, the Information Management Mandate, which says that interoperability is a key component[11]. 3D Repo already addresses this issue.

Kemp is part of the Government Industry Interoperability Group (GIIG) on the "Delivering valuable data: Interoperability code of practice for technologies" which has been collecting information on how poor interoperability is negatively impacting businesses[12]. The group issued a draft code for consultation in early 2023 with the first edition of the Code of Practice planned for Spring 2023.



Collaboration on a big scale

3D Repo was created as a way for many different supply chain members to view a 3D model through a web browser. For that reason, it was designed with interoperability in mind, using application programming interfaces (APIs) to exchange data with numerous other software packages.

An integration with Mission Room means that 3D Repo's visualisations can be seen on very big screens, up to immersive cube arenas, that allow people to walk inside them. Companies including Skanska, Balfour Beatty, Network Rail, Heathrow, Volker and Highways England have used this solution which allows those who will actually be doing the work to contribute to planning, scheduling and safety measures.

The aim is to deliver benefits all round. For instance, specialist contractors can gain a better understanding of the scope and risks of a project before they sign their contract, interface issues can be thrashed out before they cause stoppages on site and designers can get a better understanding of constructability issues.

The right people

Information management is required to a lesser or greater extent in every type of construction company. And information management requires information managers.

“BIM alone is not enough,” says Dibe. “You need to get back to your own internal processes and your own internal workforce and think about the types of people you are bringing into this industry. Are they tech savvy? Are they BIM savvy?”

Unfortunately, the answer may often be ‘no’.

To date, the industry has been poaching information managers from the likes of the geospatial field, says Kemp, but says that they are now like ‘gold dust’. “As we go forward, that’s one of the blockers that we need to address,” she says. “We need new university courses and apprenticeships to be developing that resource.”

Universities are starting to respond to this need. These institutions are now offering MSc courses in BIM: UWE Bristol, Portsmouth, Salford, Middlesex, Oxford Brookes and Cardiff.

One solution that could work for smaller companies could be to identify the skills and experience needed to be an information manager. A 2020 study suggests that quantity surveyors could be good people to upskill.

And then there is the issue of the existing workforce. How can they be brought up to speed and convinced to invest time in learning how to use new tools and changing the way they do things?

“Companies tend to blame individuals who are resistant to change but changing is a skill that a lot of businesses don’t encourage,” says Osment. “The business itself is culpable for people not knowing how to change.” Change management should be part of an information manager’s toolkit of skills, he adds.

An internal study by Skanska into challenges in adopting BIM revealed that the most significant hurdle is down to people and cultural change, with technology the second biggest challenge followed by process and cost[13]. Skanska UK’s head of digital construction David Throssell, speaking at the Global Construction Summit in February 2022, reported that Skanska’s Swedish business had achieved success by converting BIM coordinators into digital coaches, with people responding best to in-person coaching.

Kemp advocates the use of a network of champions, positioned at different levels of a company. Without champions at grassroot level, it is difficult to effect change, she says.

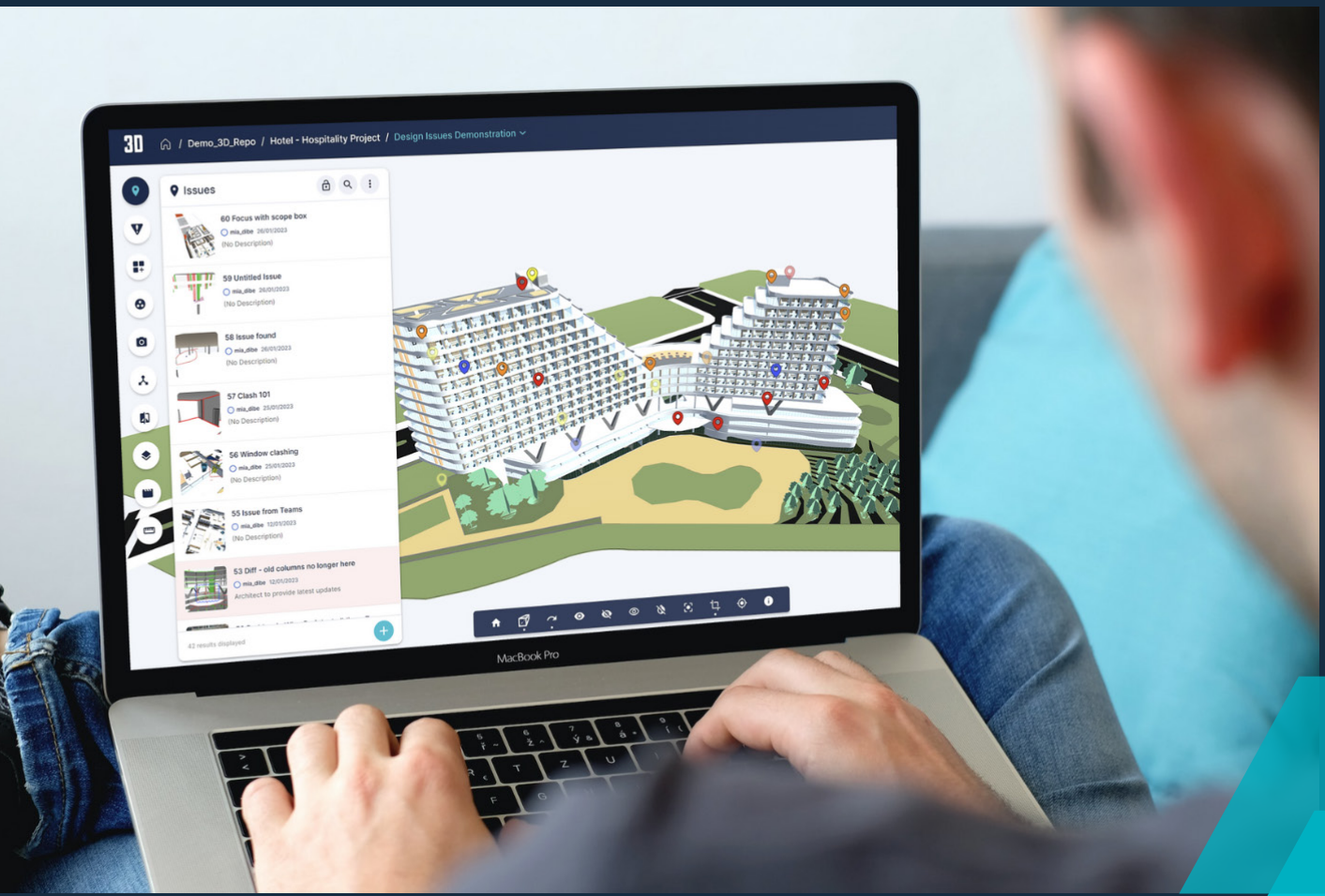
“One of the biggest challenges can be convincing the project managers,” says Kemp, “because, at the end of the day, they will be accountable for delivery on both budget and time. Introducing anything new is a risk. Why should theirs be the first project to do it?”

A final note of caution from Kemp: change will most certainly take time.

What skills does an **information manager** need?

A good information manager is a special person. They must have an understanding of construction, good management and soft skills and they must also be competent in BIM workflows, BIM software and other IT tools, according to research by the Universities of Cambridge and Moratuwa in Sri Lanka which was published in 2020[14].

The researchers identified a long list of required competencies for an information manager, falling under five headings: general management and BIM; construction technology and BIM; communication and information exchange; common data environment; and IT services. They suggested that the construction professional with the best competency overlap with an information manager could be a quantity surveyor (QS) and suggest the creation of an educational programme – a diploma or MSc - which would fill in the missing skills gap.



Golden Opportunity

The concept of the ‘golden thread’ was introduced by Dame Judith Hackitt in her interim report[15] on the Grenfell Tower fire, published in late 2017. Subsequently, the Building Regulations Advisory Committee created a definition of what it meant and it became law in April 2022 as the Building Safety Act[16].

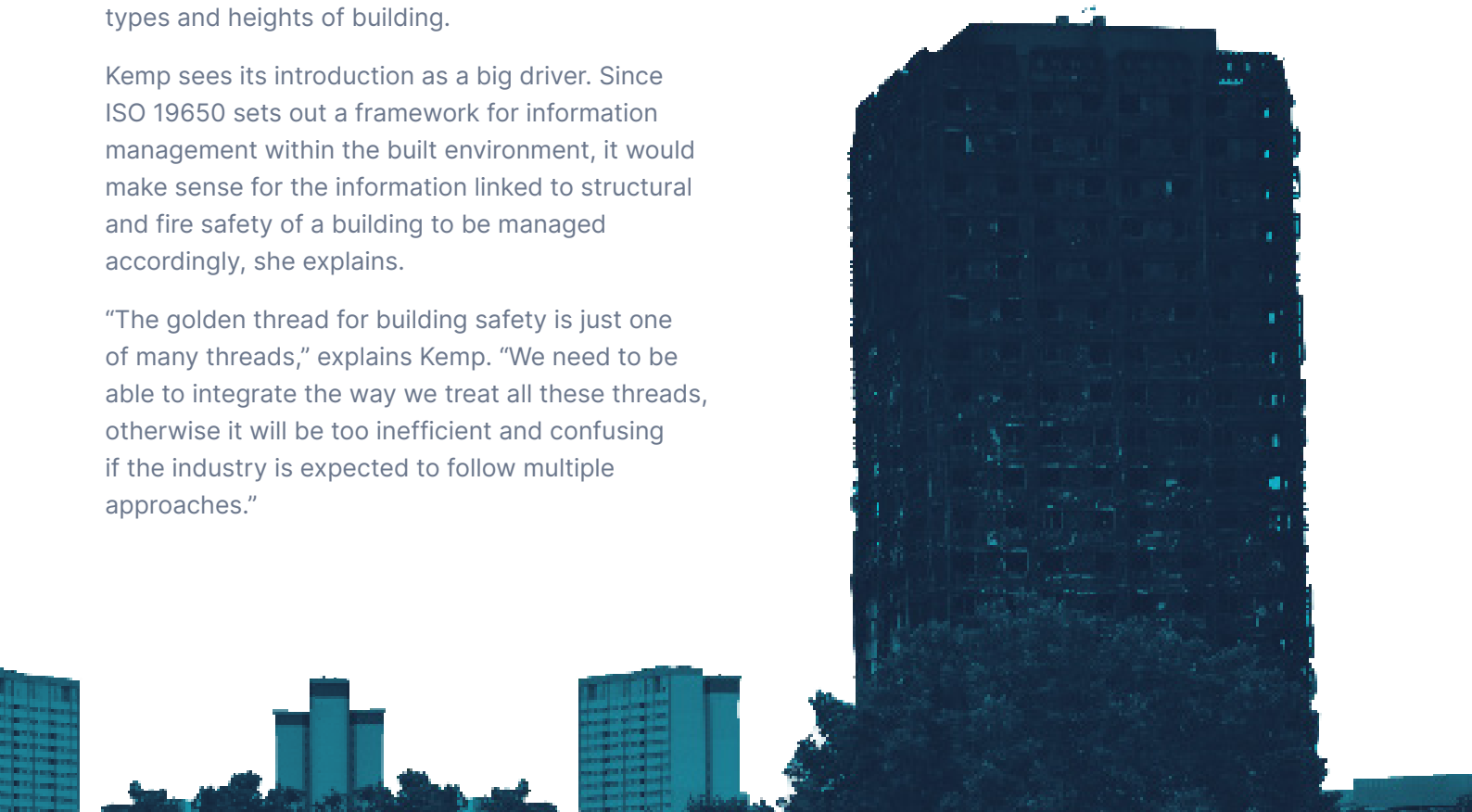
In short, the golden thread encompasses the information needed to ensure that a building is safe from a structural and fire safety perspective throughout its life and the way that information is held. The data has to be digitally stored and easily accessible and understandable for people who need to use it after construction has finished.

Currently, the golden thread applies to buildings that are 18m or seven storeys and higher that contain two or more residential units, and care homes and hospitals above the same height thresholds. In time, it could be extended to other types and heights of building.

Kemp sees its introduction as a big driver. Since ISO 19650 sets out a framework for information management within the built environment, it would make sense for the information linked to structural and fire safety of a building to be managed accordingly, she explains.

“The golden thread for building safety is just one of many threads,” explains Kemp. “We need to be able to integrate the way we treat all these threads, otherwise it will be too inefficient and confusing if the industry is expected to follow multiple approaches.”

What the Grenfell Tower tragedy, and the ensuing enquiry have highlighted is that designers, contractors, specifiers and suppliers need to have a much tighter grasp on the information linked to new buildings or refurbishment projects. They need to record exactly what products were used, whether there were changes in specification or substitutions and how those decisions were taken and how the installation process was checked and recorded. In short, they need a robust information management framework – which is what ISO 19650 offers.



10 Steps to Better Information Management

1. Identify your biggest business decision – what information would help you better make that decision?

2. Quantify and communicate the benefits. Does it reduce risk? Increase productivity? What's in it for the board? What's in it for the individuals who will be expected to change?

3. Think about how you would go about getting that information and how you might use it.

4. Assess software and digital tools based on your business needs and how you will use the information.

5. Make sure that you are working in line within ISO 19650. The UK BIM Framework has lots of guidance to help.

6. Who is going to look after information management in your company? Can you train someone up or do you need to hire someone new?

7. Mandating change makes people grumpy. Consider converting any enthusiasts into coaches.

8. Talk to your supply chain early in the process. Try to find solutions that make their lives easier – not more difficult.

9. Don't try to do everything at once. One step at a time.

10. Just get started!

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Anne Kemp

Chair of nima (UK BIM Alliance)

Anne is an experienced Chair with a demonstrated history of working in the civil engineering industry, particularly with Atkins. She is also a qualified coach, with a PhD focused in Geography from Bristol University.

Matthew Osment

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Matthew is the Head of Product at 3D Repo. Previously, he has been consulting in the construction industry in various forms for over 5 years, focusing predominantly on innovation and efficiency in Planning and Commercial activities, with a focus on BIM.

Mia Dibe

Implementation Manager, 3D Repo

Mia is an award winning (MIT Innovator under 35) multi-disciplinary architect, smart cities and product professional. She works across digital products & strategic project delivery, advisory and implementation within BIM and the AEC industry.

Andrew Norrie

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Andrew is a construction software professional with over 10 years of experience in the 3D CAD/BIM industry, having previously worked for industry leadders such as SolidWorks and Graphisoft.

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