
GT GARDINER &THEOBALD
MASS TIMBER
OFFICE FORUM
SUMMARY
WHITEPAPER

CONTENTS

0.0 EXECUTIVE SUMMARY

0.1 The Mass Timber Office Forum

To investigate the use of mass timber in office construction and to better understand the specific challenges being faced by the industry when using these technologies, Gardiner & Theobald (G&T) launched a Mass Timber Office Forum. The forum brought together panels of experts from across the industry to debate and discuss the barriers for using mass timber for commercial developments.

In the introductory session key challenges for clients and developers were identified and included the ability to obtain insurance, the risk of fire and water damage, access to testing data and out of date regulation in relation to mass timber construction.

These challenges were debated over the course of 12 months across 10 different panel discussions by more than 60 sector experts from fields such as insurance, building control, mass timber manufacturing and the supply chain. Not only were deliverable solutions determined, breakthrough collaborations were also formed enabling significant steps forward to encourage a greater uptake of mass timber across the industry.

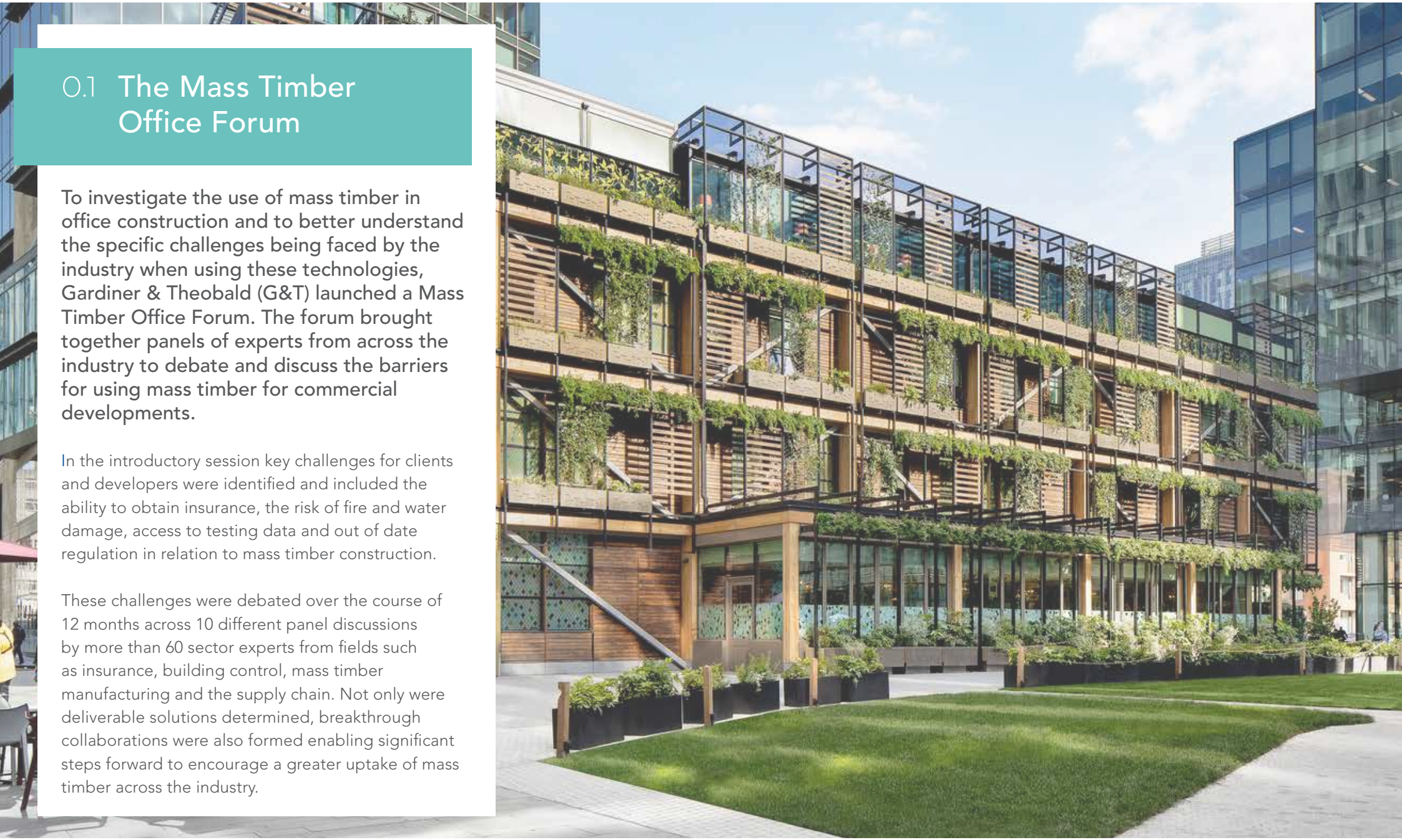


Image: Hardman Square Pavilion © Felix Mooneeram

0.2 Key Success Factors

The forums identified several key factors for ensuring success when using mass timber for office construction. These included the importance of choosing the right project team with the right experience from the outset of the project, having a robust fire and water strategy and involving building control early on in the decision-making process.

Teams were encouraged to engage with the supply chain in the early design stages to ensure that the programme and logistics strategy are aligned.

When determining areas that need to be addressed in order for the industry to tackle the challenges preventing the widespread adoption of mass timber across the commercial sector, the forums found that improvements in research and testing were required, as well as new regulations specifically for mass timber construction. Greater incentives and Government policy to reward the reduction of embodied carbon were also highlighted as being important for making mass timber a more attractive choice. This, alongside increased collaboration, education and knowledge sharing of lessons learnt by those who have already begun to use timber products, will help to increase take-up of mass timber across the built environment.

Perhaps the greatest challenge identified by these sessions was the general perception of the material - from those that may not understand its properties, to a lack of widespread expert knowledge in sectors such as insurance and fire regulation. For mass timber to become mainstream, a good educational programme (informed by findings from series such as this) will be crucial in disseminating knowledge and information across the wider marketplace.

KEY SUCCESS FACTORS

1

Collaboration

Greater collaboration and knowledge sharing is needed across the industry and between all stakeholders to ensure successful mass timber project delivery

2

Expertise

It's vital to ensure you have the right expertise within your project team before you start a mass timber development

3

Education

To overcome the current misconceptions of building with mass timber greater education about the technologies and how to use them will be needed

4

Regulation

For there to be a greater take up of mass timber new regulation and standards will be required

5

Data

Easier access to testing data will be needed by project teams to increase take up

6

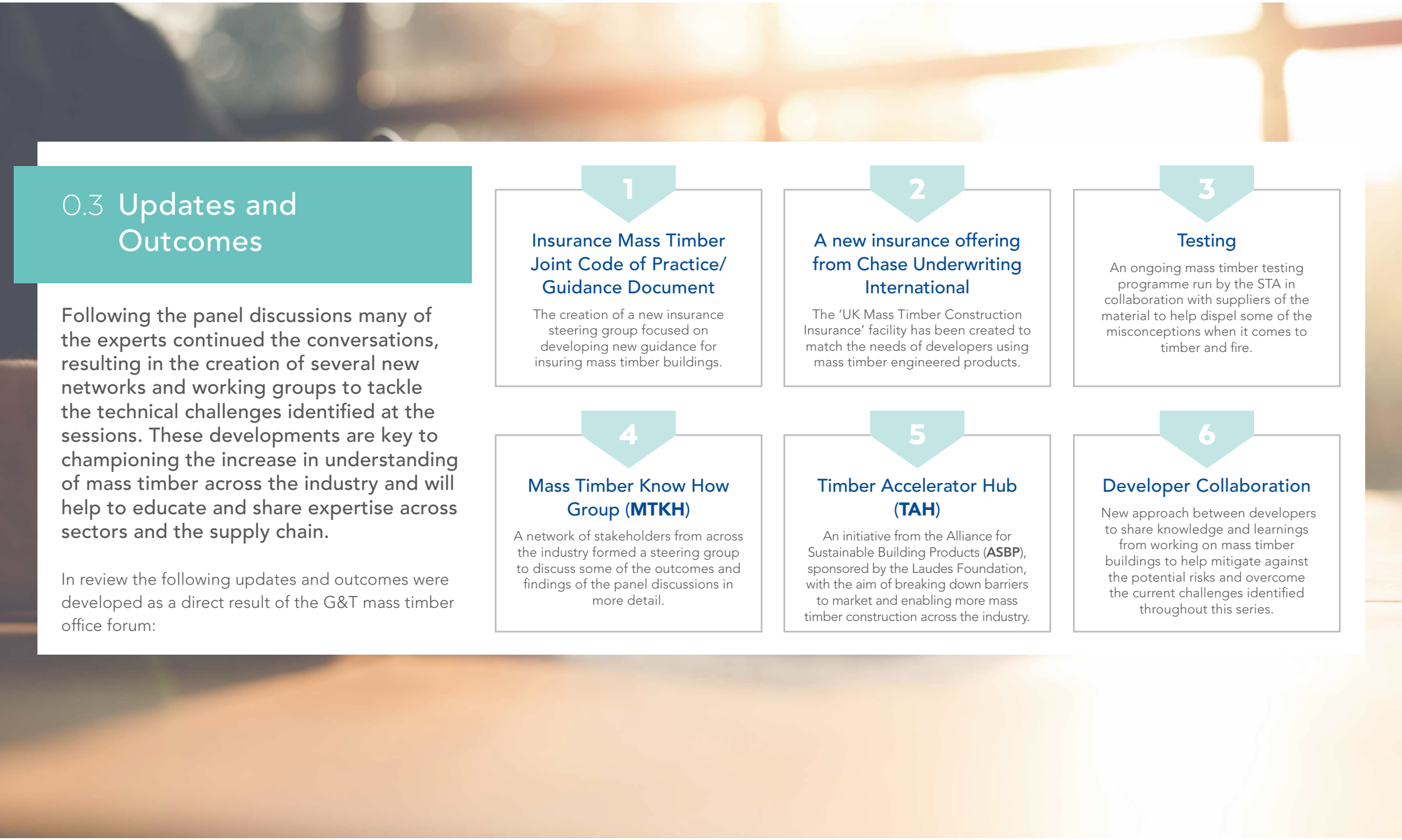
Policies

New policies that take into account the specific characteristics of mass timber will need to be developed to enable widespread use across the industry

7

Incentives

Incentives linked to net zero targets will help balance perceived increases in costs that might be incurred through the use of mass timber



0.3 Updates and Outcomes

Following the panel discussions many of the experts continued the conversations, resulting in the creation of several new networks and working groups to tackle the technical challenges identified at the sessions. These developments are key to championing the increase in understanding of mass timber across the industry and will help to educate and share expertise across sectors and the supply chain.

In review the following updates and outcomes were developed as a direct result of the G&T mass timber office forum:

1

Insurance Mass Timber Joint Code of Practice/ Guidance Document

The creation of a new insurance steering group focused on developing new guidance for insuring mass timber buildings.

2

A new insurance offering from Chase Underwriting International

The 'UK Mass Timber Construction Insurance' facility has been created to match the needs of developers using mass timber engineered products.

3

Testing

An ongoing mass timber testing programme run by the STA in collaboration with suppliers of the material to help dispel some of the misconceptions when it comes to timber and fire.

4

Mass Timber Know How Group (**MTKH**)

A network of stakeholders from across the industry formed a steering group to discuss some of the outcomes and findings of the panel discussions in more detail.

5

Timber Accelerator Hub (**TAH**)

An initiative from the Alliance for Sustainable Building Products (**ASBP**), sponsored by the Laudes Foundation, with the aim of breaking down barriers to market and enabling more mass timber construction across the industry.

6

Developer Collaboration

New approach between developers to share knowledge and learnings from working on mass timber buildings to help mitigate against the potential risks and overcome the current challenges identified throughout this series.

The G&T forum has proved to be an essential tool in highlighting the demand for more construction of mass timber offices and focusing on particular barriers, suggesting pathways to overcome them with an impressive array of experts each month tackling specific issues and providing feedback for the development work in the TAH.

Simon Corbey
Director at Association of Sustainable Building Products

Looking to the future of the mass timber office market, it is clear to see that there is an appetite for increased demand and the networks that have been created throughout this forum will help, through knowledge sharing and increased collaboration, to drive forward the accessibility and viability of mass timber to a wider market.

The following report details the challenges identified by the experts as well the opportunities that can be created when using mass timber technologies for commercial development.

1.0 INTRODUCTION

1.0 Introduction

The climate crisis has been building steadily over the last few decades with scientists, research bodies, educational institutions and eventually governments declaring a climate emergency in 2019. These declarations were followed by subsequent changes to sustainability targets and new legislation while the COVID-19 pandemic has increased the sense of urgency to reach net zero carbon targets across the globe.

The built environment currently contributes to approximately 40% of the UK's total carbon footprint[2]. Therefore significant changes will be needed if the industry is to achieve the UK Government's target of reaching net zero carbon by 2050.

Reducing embodied carbon is a significant but not insurmountable challenge in terms of both the construction of new developments and also the production and supply of the materials being used to build them. The industry needs to find ways to adapt in order to tackle these challenges, whilst still creating spaces and places fit for an ever-growing population.

> "Clearly and unequivocally... planet Earth is facing a climate emergency[1]"

1 https://academic.oup.com/bioscience/article/70/1/8/5610806 2 https://www.ukgbc.org/climate-change/

1.1 What role could mass timber play?

There has been a significant increase in interest for using mass timber within construction projects across the UK over the last few years. A combination of the UK Government's net zero 2050 target, growing concern about the global climate crisis and people's attitudes towards the spaces they live and work in has created a substantial shift in demand.

However despite this shift in demand, mass timber is often still seen as a challenging choice for many developments when compared with more conventional building materials such as concrete and steel.

Why is this the case and are there opportunities with mass timber that the market may be missing?

2.0 KEY FINDINGS

Across 12 months, G&T brought together over 60 experts over 10 panel discussions to unpack some of the key challenges faced by the industry and discuss the opportunities that can be created by using mass timber on commercial developments. The key findings from these 10 sessions have been collated below and include four main areas of interest.

2.1 Sustainability and Wellbeing

One of the key themes across all of the forum discussions was the association between mass timber and sustainability, and how the material could impact the built environment's goal to reach net zero by 2030.

As a renewable resource, timber is believed to be a truly sustainable material in construction. Its advantages were discussed at length during the sustainability panel discussion and included its low weight, carbon-capture capability, reduced time and cost when transporting the material to site and its pre-fabrication potential that can enable shorter construction times.

The health and wellbeing qualities of timber were also discussed across many of the sessions, with panellists pointing to research studies that show increased feelings of occupant wellbeing when spending time in a timber building. Measurable reductions in stress levels and heart rate have also been proven in environments that use natural materials, partly explaining why humans tend to gravitate towards timber[3].

Sustainability is one of the main drivers behind mass timber office aspirations. Mass timber is being considered by developers more than ever as a result of a greater focus on sustainability and low carbon/carbon neutral policies. When discussing the impact this may have on sales and leasing, the panel agreed that many occupiers looking for 'best in class' buildings were willing to pay a premium and suggested that corporations who have included statements about achieving net zero in their key business objectives are likely to turn to timber to help them achieve these goals[4].

> *The pandemic has increased the importance of sustainability, health and wellbeing and incorporating biophilia into buildings. Developers are now expected to deliver these things for customers. Fortunately, mass timber buildings excel on each of these fronts.*
>
> ***Kevin Chapman***
> *Director, Offices and Origination, Development at Lendlease*

3 Mass Timber Office Forum: Sustainability, p.13 **4** Mass Timber Office Forum: Sales and Leasing, p.10

Furthermore, Anna Denell sustainability director at Vasakronan, noted that mass timber buildings tend to be leased quicker, attract more attention from financial institutions and receive very competitive funding arrangements from banks[5]. Sustainable buildings need to be sustainable not only from an environmental and social perspective, but also from a financial one.

'Green leases' that incorporate clauses where the owner and the occupier undertake specific responsibilities with regards to the sustainable operation of a property are an effective way to put principles of sustainable ownership and occupation into action.

G&T associate director Jess Pennell mentioned in the cost, programme and procurement panel that it is important to consider the sustainability project goals and how these could link with the local planning strategy, as by using a material with embodied carbon credentials such as mass timber may entitle you to some indirect savings[6].

Overall it was agreed that to produce a high-performing mass timber building that can achieve the best sustainability credentials, a skilled and competent supply chain in possession of the right knowledge and experience is essential.

5 Mass Timber Office Forum: Sustainability, p.8 **6** Mass Timber Office Forum: Cost, Programme and Procurement, p.6,18

2.2 Collaboration and Expertise

Collaboration and ensuring you have the right expertise in the project team from the outset was another key success factor brought up across all of the mass timber panel sessions. Throughout the forum series it was discovered that currently knowledge sits in silos across a wide range of experts and stakeholders, so greater collaboration at an earlier stage is deemed necessary to arrive at a well-designed and viable project.

From the opening discussion between the insurance industry experts - who noted that greater collaboration between brokers, insurers and clients would be the key to be able to collectively move forward and ensure that insurance is no longer a barrier to mass timber development - to the suppliers, main contractors and engineering panels, all of the panellists made mention of the importance of greater collaboration, transparency and the need for knowledge sharing across the industry and supply chain.

With the growth of green leases Dan Hanmer, executive director at CBRE, expects to see more interdependence between occupiers and investors/owners as they act to ensure that specific environmental targets are maintained during occupation[7]. In the leasing and sales panel discussion it was noted that this will result in a greater need to share information, such as emissions data that will have to be shared as part of building efficiency strategies.

Andy Desmond, senior vice president of Marsh, also suggested at the insurance panel that by bringing insurance brokers on board as early as possible it can help lower insurance premiums of mass timber office buildings[9]. Project teams that can collaborate well to demonstrate their collective understanding of mass timber related risks will likely improve the risk profile for insurers, which could equally lead to reduced premiums.

7 Mass Timber Office Forum: Sales and Leasing, p.16 **8** Ibid. **9** Mass Timber Office Forum: Insurance, p.10

The success of a mass timber project is, to a large extent, dependent on what you do before you get to site as there can be significant challenges faced when trying to post-fit a mass timber building. Therefore early collaboration not only encourages a greater level of knowledge sharing but can also help to mitigate against future challenges, as often mass timber office buildings adopt novel or unusual designs that may require an uncodified approach.

In relation to the development of a successful fire and water strategy, it was agreed that concerns should be discussed in an open and honest way from a very early stage. The presence of knowledge gaps with regard to fire and building with mass timber means that multiple interactions between a wide variety of professionals is necessary to circumvent these gaps in knowledge. For example, Fire Engineers and Building Control need to collaborate with the Fire Brigade from an early stage to work out potential issues[10]. It was also suggested that peer reviews should start early on and be a very collaborative process involving multiple dialogues between key stakeholders.

However, it is also important to note that early collaboration and engagement with a wider variety of experts may result in additional consultancy fees, higher preliminary costs and a cost premium on mass timber projects[11]. Although the benefits of good planning, strong design team relationships and early engagement with the supply chain, whilst considering the use of a PCSA for structures, can save time and lead to a better overall design. This then reduces mistakes post contract and saves additional costs during the construction phase[12].

On the capacity and supply chain panel, the group noted the best time to get manufacturers and suppliers involved in a scheme is RIBA Stages 2 or 3 as here you can have the most influence over the design[13]. Manufacturers and suppliers can provide specialist advice on the behaviour of the material and how it moves and changes over time. Their advice on things such as durability and moisture content can be vital when ensuring the detailing is correct and their early involvement can lead to commercial savings, a more economic design and better protection of the product going forward.

10 Mass Timber Office Forum: Fire, Testing and Building Control, p.13 **11** Mass Timber Office Forum: Cost, Programme and Procurement, p.19
12 Ibid, p.27 **13** Mass Timber Office Forum: Capacity and Supply Chain, p.16

2.3 Regulation, Standards and Testing

The lack of clear guidance and regulation in respect to timber construction was highlighted as a significant barrier in the uptake across the sector. The lack of shared testing data and the importance of standardised testing programmes was also noted across many of the panel discussions.

In relation to insurance, in the UK we don't have vast experience in evaluating risk premiums for mass timber buildings. Insurers are data-driven - they assess risk based on experience and data wherever possible, but where there is an insufficient amount of performance data and historical analysis, it's difficult to establish trends and set regulations and standards[14]. Insurers therefore tend to look at building codes, regulations and build methodologies from other territories (eg the US and Nordic countries) to help them differentiate between good and bad risk and also to help them identify what a 'best in class' mass timber engineered building looks like.

Our panellists said that an agreed code of practice, incorporating design and risk mitigation requirements would help owners, developers and insurers alike looking to build and insure mass timber buildings[15]. At the same time, they did note that there is an increasing amount of guidance becoming available (eg the Structural Timber Association's (**STA**) best practice notes and, from a fire perspective, the Joint Code of Practice on the Protection from Fire on Construction Sites – a reference point for the controls that insurers expect to be in place on any project undergoing construction)[16]. However, insurers need to understand these and build compliance with them into their underwriting and pricing methodology.

It was also generally agreed that increased regulation in the form of government policy, incentives, updated BCO standards and assessment methods would be pivotal in bringing about a step-change and accelerating the adoption of mass timber to address the challenge of embodied carbon and reward its reduction. Although BCO standards are on the whole quite prescriptive, the office typologies and grids that underpin the BCO specifications have been driven by steel and concrete design[17].

14 Mass Timber Office Forum: Insurance, p.15 **15** Ibid, p.17 **16** Ibid, p.28 **17** Mass Timber Office Forum: Structure, MEP and Acoustics, p.13 **18** Mass Timber Office Forum: Capacity and Supply Chain, p.18 **19** Ibid.

With respect to the impact that Brexit and increased regulation on the movement of materials across territories may have on the mass timber supply chain, delays experienced at UK ports during the first few months of 2021 were minimal and were managed in the programme by simply bringing in deliveries slightly earlier[18]. However, the capacity and supply chain panel noted that it is important to be aware of CE marks, making sure that suppliers understand the new UK Conformity Assessed (UKCA) marks when they do come into effect[19].

Currently ownership of test data is spread across the STA, TRADA and TTF, which leads to a disparate source of responsibility and information[20]. With regards to fire there have been over 30 compartment tests (in the UK and internationally, where the results are publicly available), where some degree of CLT has been exposed[21]. These tests have revealed important information about the types of fire in mass timber buildings but they are generally limited in their scope and the motivation behind the work can sometimes be called into question. The STA, however, is conducting an extensive review on the current mass timber testing methods and is looking to expand the scope and scale of testing regimes in order to improve the depth and quality of publicly available information[22]. It was noted that more test data is out there but it's not from a single source and is generally owned by labs which then licence back the data to suppliers and clients[23].

The STA has produced a 16-point guide called "**16 Steps to Fire Safety**" which outlines how to manage fire on a mass timber project[24]. Fortunately from a contractor's perspective, as was mentioned in the best practice in construction forum, there is a well-established process when it comes to producing fire plans with clear health and safety guidelines available for timber[25]. However Sam Liptrott, director for OFR, said during the fire panel session that we don't currently have the test basis for timber to apply generic performance criteria to generic details[26]. There is no such thing as 'generic' when it comes to timber. Data is a pre-requisite for the development of non-generalised guidance and standards, so further research and testing will be key in unlocking the wider adoption of mass timber[27].

A lack of test data also makes it difficult to set engineering standards and regulations, prompting our panellists across many of the sessions to suggest that more publicly available test data from the supply chain would be required to optimise the design specifications and improve individual building elements, such as acoustic quality in mass timber buildings.

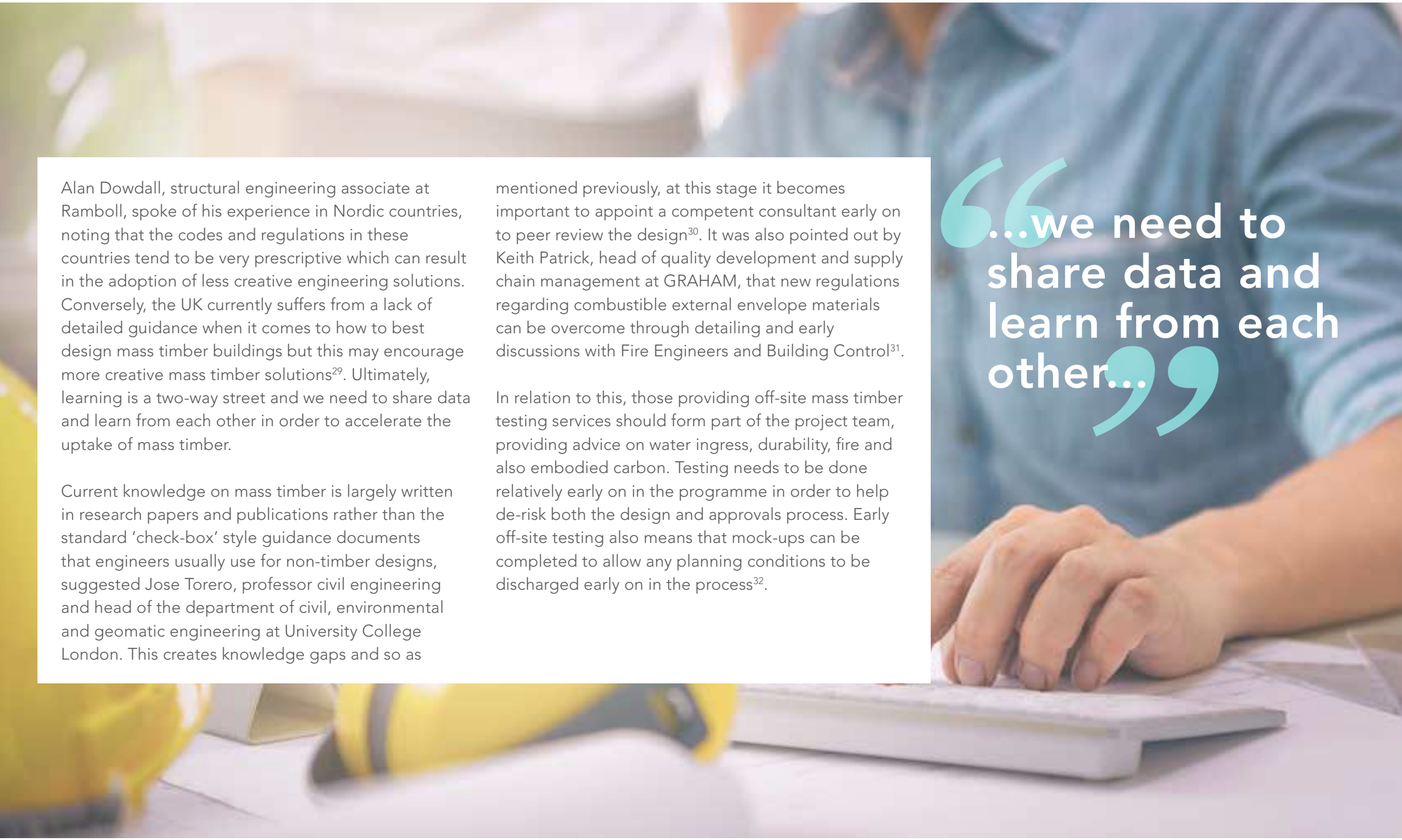
One of the overarching themes discussed throughout the engineering panel was that the more test data we have access to, the better the guidance we can produce to help optimise the design of mass timber buildings. For example, in terms of the building's structure, proprietary 'off-the-shelf' connections tend to have better test data and therefore can be more cost effective than bespoke connections[28].

20 Mass Timber Office Forum: Fire, Testing and Building Control, p.24 **21** Ibid, p.18 **22** Mass Timber Office Forum: Fire, Testing and Building Control, p.21 **23** Ibid. **24** Mass Timber Office Forum: Best Practice in Construction, p.16 **25** Ibid. **26** Mass Timber Office Forum: Fire, Testing and Building Control, p.11 **27** Ibid. **28** Mass Timber Office Forum: Cost, Programme and Procurement, p.17

Alan Dowdall, structural engineering associate at Ramboll, spoke of his experience in Nordic countries, noting that the codes and regulations in these countries tend to be very prescriptive which can result in the adoption of less creative engineering solutions. Conversely, the UK currently suffers from a lack of detailed guidance when it comes to how to best design mass timber buildings but this may encourage more creative mass timber solutions[29]. Ultimately, learning is a two-way street and we need to share data and learn from each other in order to accelerate the uptake of mass timber.

Current knowledge on mass timber is largely written in research papers and publications rather than the standard 'check-box' style guidance documents that engineers usually use for non-timber designs, suggested Jose Torero, professor civil engineering and head of the department of civil, environmental and geomatic engineering at University College London. This creates knowledge gaps and so as mentioned previously, at this stage it becomes important to appoint a competent consultant early on to peer review the design[30]. It was also pointed out by Keith Patrick, head of quality development and supply chain management at GRAHAM, that new regulations regarding combustible external envelope materials can be overcome through detailing and early discussions with Fire Engineers and Building Control[31].

In relation to this, those providing off-site mass timber testing services should form part of the project team, providing advice on water ingress, durability, fire and also embodied carbon. Testing needs to be done relatively early on in the programme in order to help de-risk both the design and approvals process. Early off-site testing also means that mock-ups can be completed to allow any planning conditions to be discharged early on in the process[32].



29 Mass Timber Office Forum: Structure, MEP and Acoustics, p.31 **30** Mass Timber Office Forum: Fire, Testing and Building Control, p.12
31 Mass Timber Office Forum: Best Practice in Construction, p.27 **32** Mass Timber Office Forum: Cost, Programme and Procurement, p.20

2.4 Hybrid Development

Over the 10 forum sessions, panellists debated the pros and cons of hybrid developments. Often it was noted that choosing a hybrid structural solution of mass timber combined with a more conventional material could be the solution to many of the challenges faced at the pre-construction phase of development.

Panellists believe that hybrid solutions should always be explored from the outset alongside developer design aspirations to show that schemes can still adopt mass timber construction and contribute to reducing embodied carbon, increasing sustainability whilst also being cost effective.

During the insurance panel discussion, it was mentioned how adopting a hybrid structural solution (eg concrete ground floor and steel/timber hybrid frames) can help lower insurance premiums in mass timber office buildings[33]. Andy Desmond explained that a hybrid solution can not only reduce the amount of timber in relation to fire load within the building but it can also increase the risk mitigation measures[34].

However, this was also debated at the fire, testing and building control session, where it was noted that regardless of whether a building is pure timber or a hybrid, the use of the material introduces a specific hazard and the same problems arise in all forms of construction when timber is present[35]. Although hybrids have benefits in that they make better use of the inherent qualities of the materials and provide the capability to come up with an optimised design. For example, using steel or concrete columns in high-rise buildings or the inclusion of concrete cores can offer additional robustness to the fire strategy as these elements can be designed relatively easy and will not be consumed in a fire[36].

Hybrid solutions can also present challenges, particularly at interfaces and in the specification of products and materials[37], but on the other hand they can also offer greater flexibility for service runs[38]. It was also noted at the leasing and sales panel that hybrid buildings are likely to see rental premiums because of the supply vs demand imbalance[39].

Image: © Paradise Building, Bywater Properties

33 Mass Timber Office Forum: Insurance, p.10 **34** Ibid, p.25 **35** Mass Timber Office Forum: Fire, Testing and Building Control, p.7 **36** Ibid. **37** Ibid.
38 Mass Timber Office Forum: Cost, Programme and Procurement, p.15 **39** Mass Timber Office Forum: Sales and Leasing, p.7

3.0 POLLS REPORT OVERVIEW

Throughout our mass timber office series several audience polls were taken to help gauge sentiment, determine preferences and to shed light on challenges and issues that are acting as barriers to mass timber uptake.

3.1 Key Drivers

During the first forum introduction session a live poll showed just how important insurance costs are both during and post construction. (Fig 1)

The results from this poll shows insurance clearly plays an important role in unlocking widespread adoption.

During the insurance panel discussion the audience was asked about the willingness to pay an increased insurance premium for a timber development.

Over half of the audience voted that they would be prepared to pay an increase on their insurance premium if it were required to insure a mass timber development (Fig 2).

Figure 1: Introduction forum

What do you think is the greatest barrier to the uptake of mass timber offices?

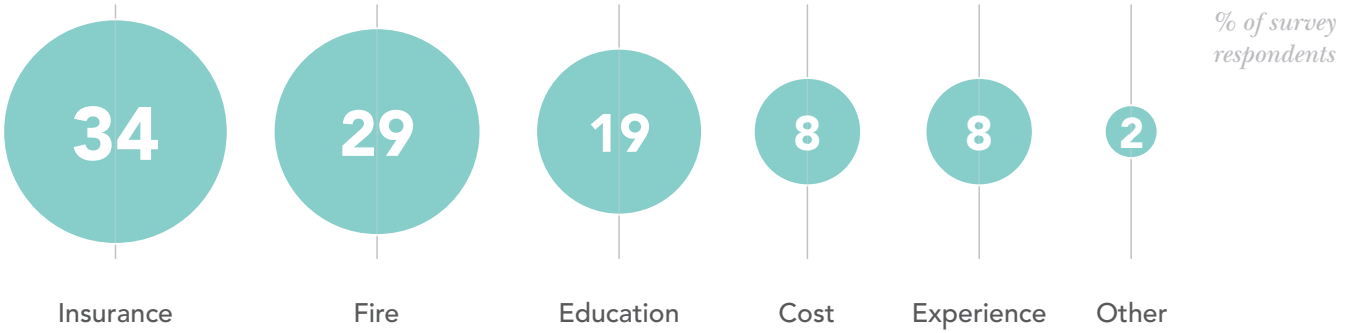
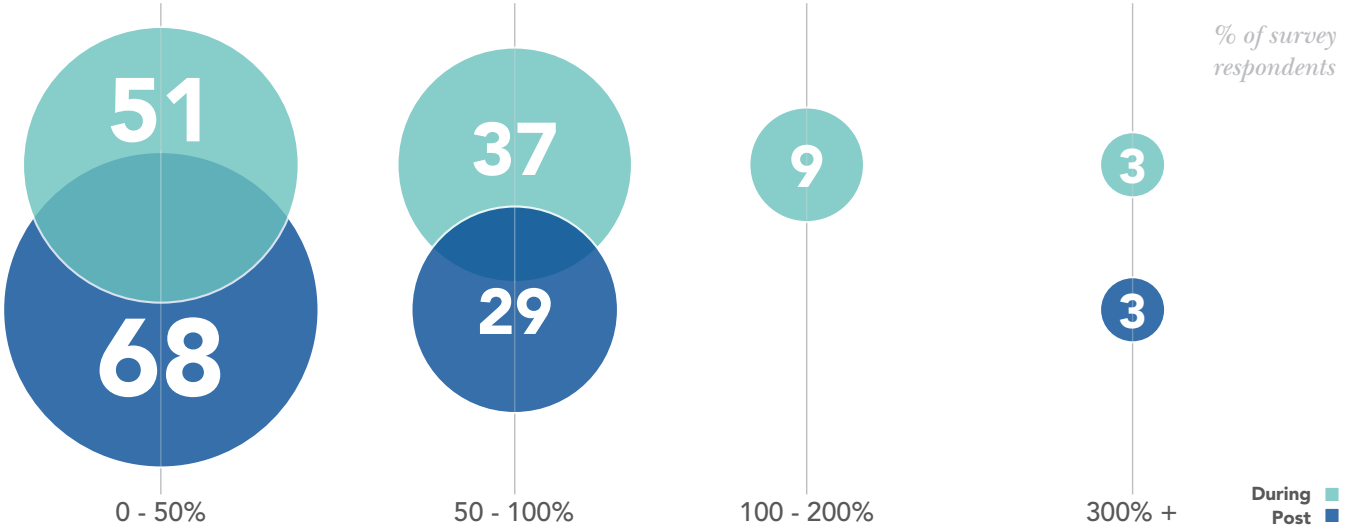
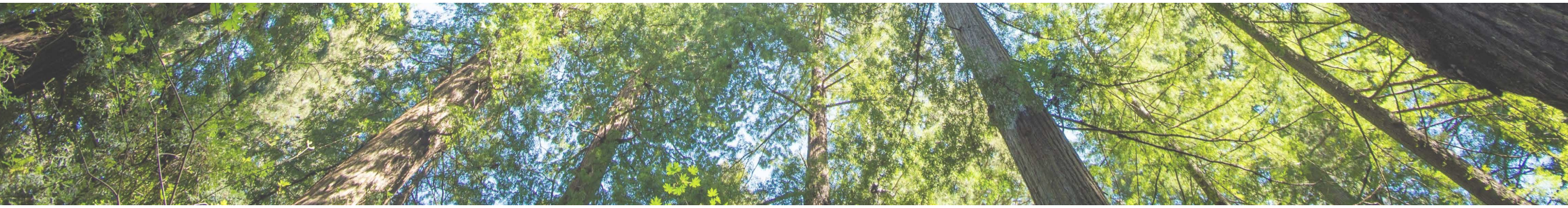


Figure 2: Insurance forum

What's the maximum uplift in insurance premium you would be willing to pay when comparing insurance for mass timber with alternative construction materials during/post construction?





If the challenge of securing insurance was removed (Fig 3) 74% of the audience members thought that between 25% and 75% of buildings would be built either partially (eg hybrid buildings) or completely from mass timber by 2030. This indicates just how important the role that insurance plays in uptake.

When asked about the key drivers behind the aspiration to build with mass timber, 77% of the audience chose sustainability or carbon reduction as their key driver, highlighting the connection between achieving net zero targets and the increased desire to use mass timber (Fig 4).

Developers are considering using mass timber more than ever as a result of the materials inherent sustainability and low-carbon credentials. Eco-conscious building owners clearly want to lessen their structures' impact on the environment whilst tenants/ occupiers want to meet their sustainability goals and lower their energy bills.

Figure 3: Insurance forum

If insurance was no longer an issue, what percentage of buildings do you believe would be built partially or completely from mass timber by 2030?

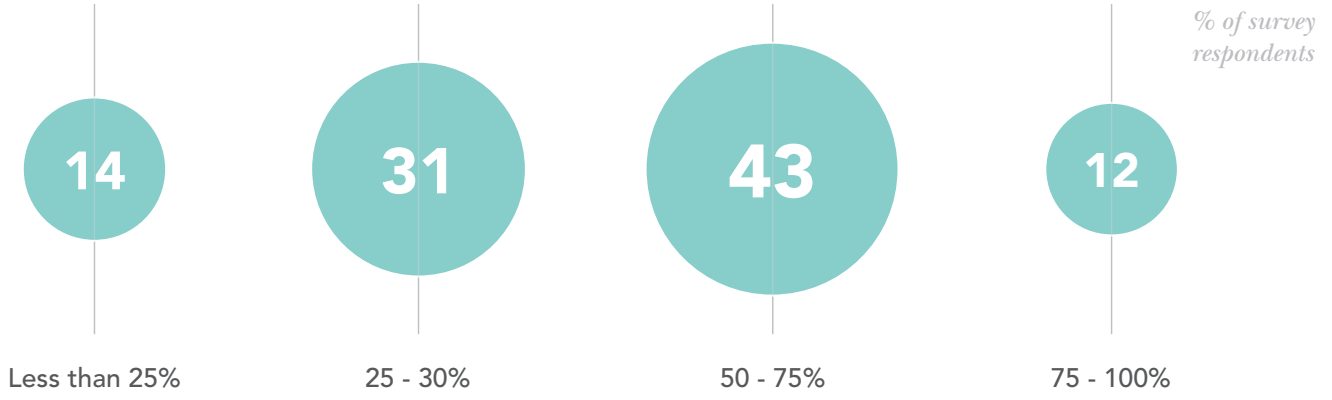
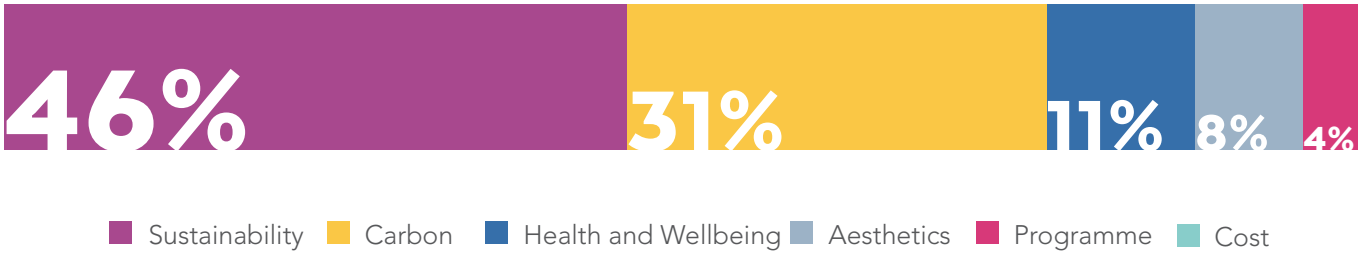


Figure 4: Cost, programme and procurement forum

What is the main driver behind your aspiration for using timber on your projects?



3.2 The Challenges

In the panel discussion with mass timber main contractors, 'competent designers' and 'main contractor experience' were considered by the audience to be the biggest challenges to achieving 'best practice' in construction (Fig 5).

Without shared learnings or clear and consistent guidance it may take longer for designers to become knowledgeable and competent in designing mass timber buildings. Without these things it may also take longer for main contractors to build up their know-how and experience in working with the material.

During the sustainability panel, 77% of the polled audience members thought that the sustainability benefits of mass timber outweigh the challenges faced in terms of both viability and cost (Fig 6).

To be truly sustainable, something has to be sustainable not only from an environmental and social perspective but also viable from a financial one too. Whilst mass timber buildings can come with a premium in comparison to other materials, the cost is actually very competitive as a result of reduced construction times, overheads and less on-site labour that comes from increased opportunity to manufacture off site.

Figure 5: Best practice forum

What do you believe to be the biggest challenge to achieving 'best practice' in construction when using mass timber?

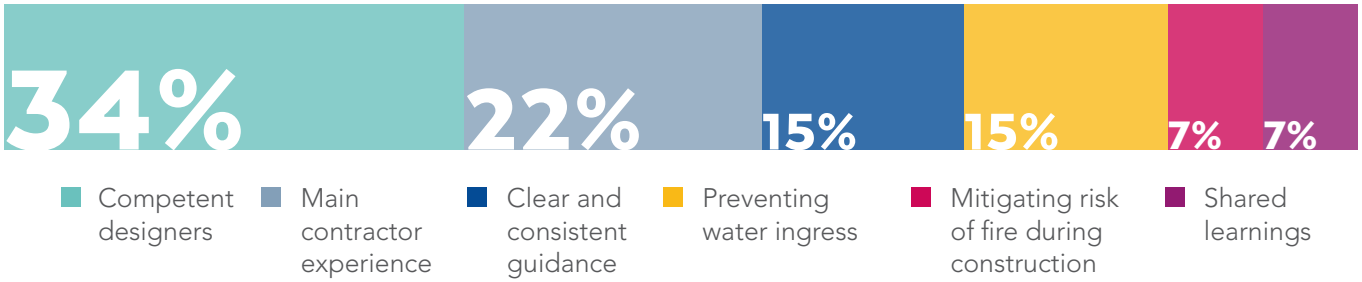
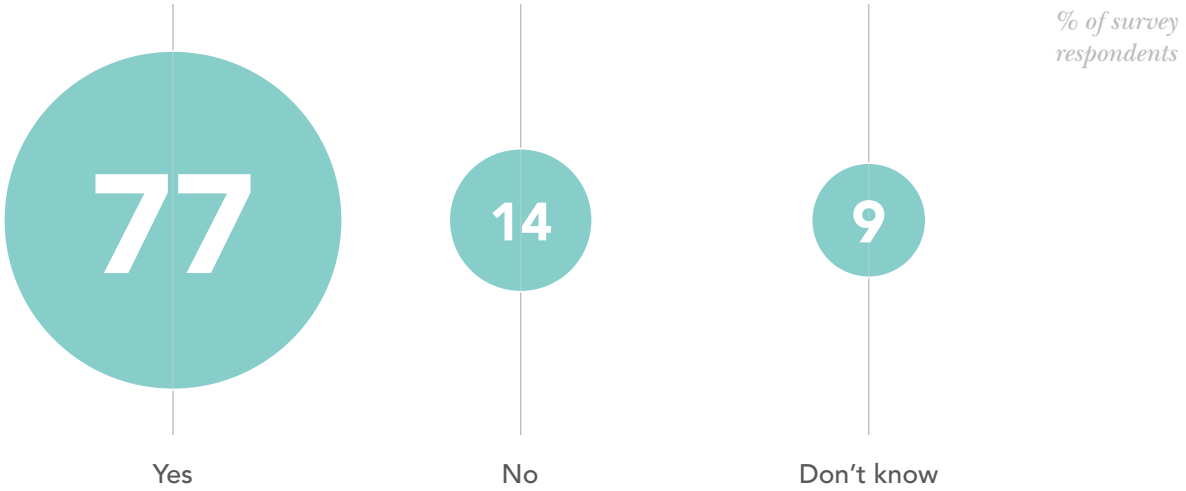


Figure 6: Sustainability forum

Do you believe the sustainability benefits of mass timber outweigh the challenges faced with viability and cost?



3.3 What needs to change?

A live poll taken during the fire panel discussion made it clear that there was a 'very urgent' need to invest in the creation of a dedicated standard to help facilitate mass timber adoption. The vast majority of the audience (Fig 7) said that this is something that needs to be done as soon as possible.

Sam Liptrott, director at OFR, suggested that a collective, organised effort would be required to fund and publish the large-scale R&D necessary to create standard guidance. Publishing 'check-box' style guidance before the experts have completed extensive research and testing programmes would be misguided and would provide little value at this stage he argued.

It is believed that a collaborative supplier-led (and funded) testing approach would allow for independent and impartial oversight by a group of stakeholders including fire engineers, the Ministry of Housing, Communities and Local Government (MHCLG), leading academics, the fire service and other interested parties.

Figure 7: Fire panel forum

How urgently do you believe investment is needed to create a dedicated standard to enable mass timber construction to be adopted?

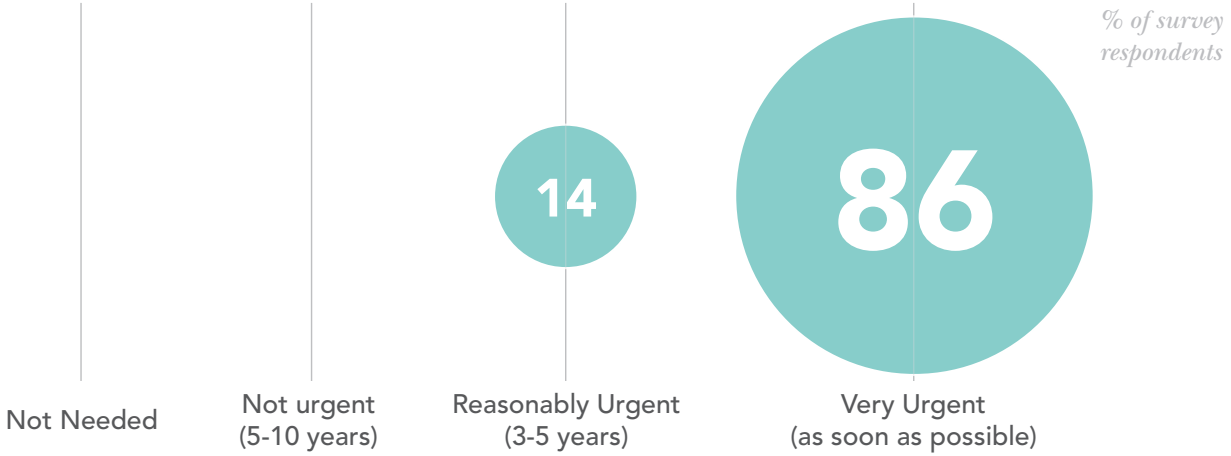
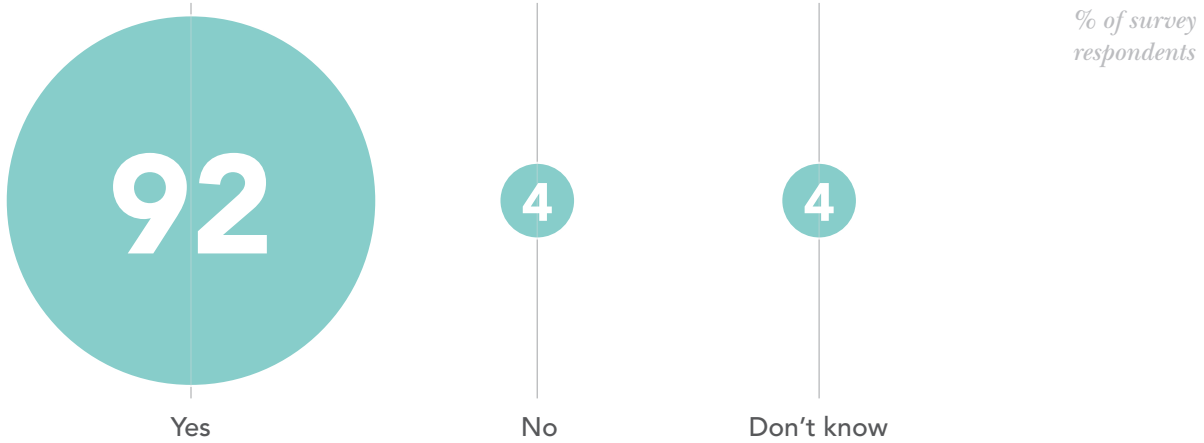
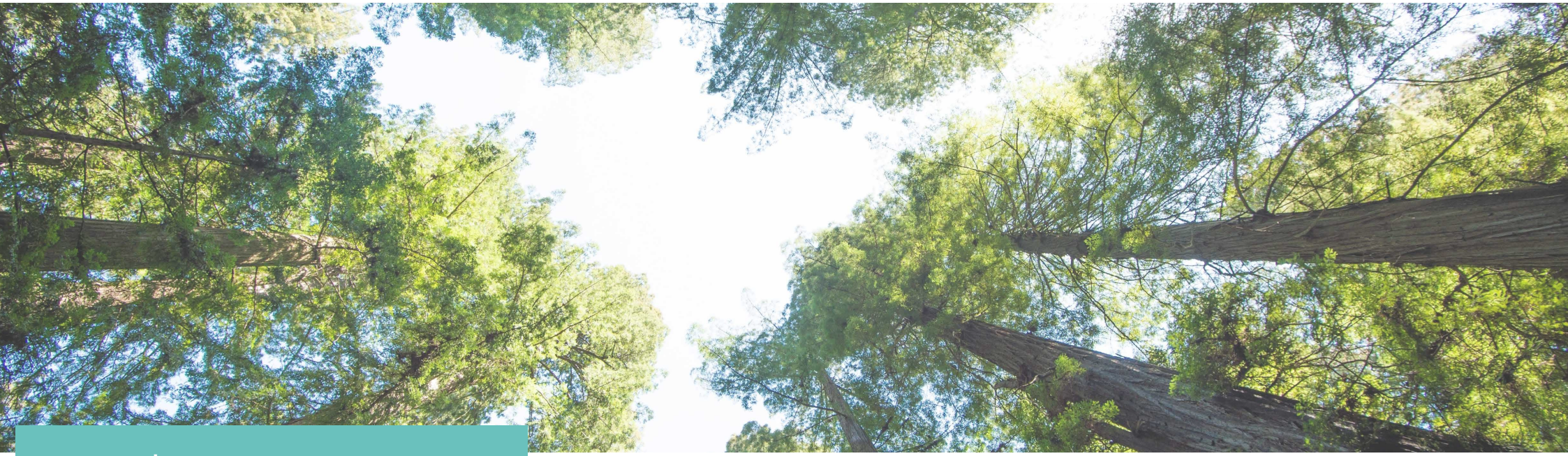


Figure 8: Structure, MEP and acoustics forum

In your opinion should there be more regulation that focuses on embodied carbon?





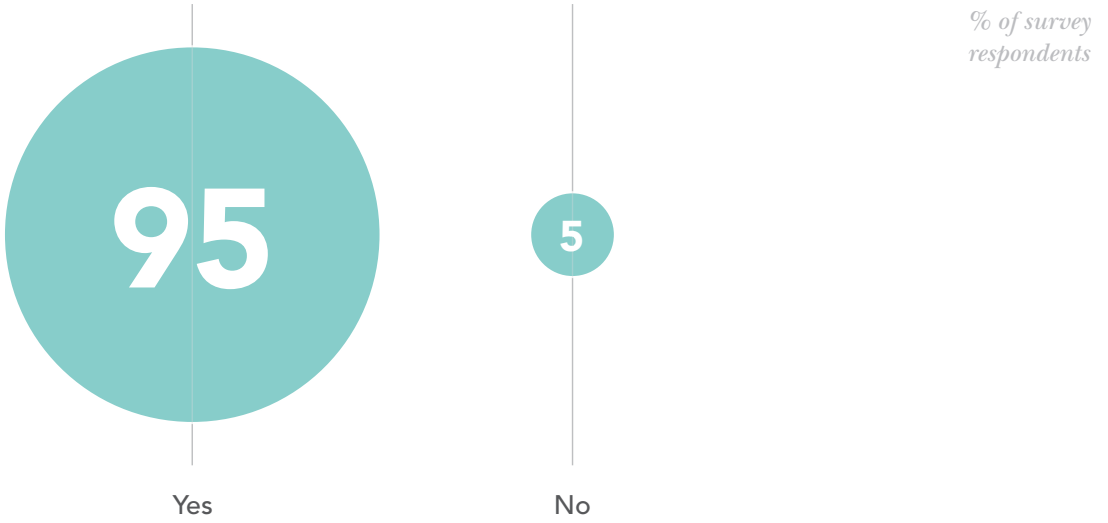
3.4 The Future

One of the most significant findings from our live polls (as shown in Fig 9) was that 95% of the audience would consider collaborating with other developers on bespoke offsite testing programmes for mass timber.

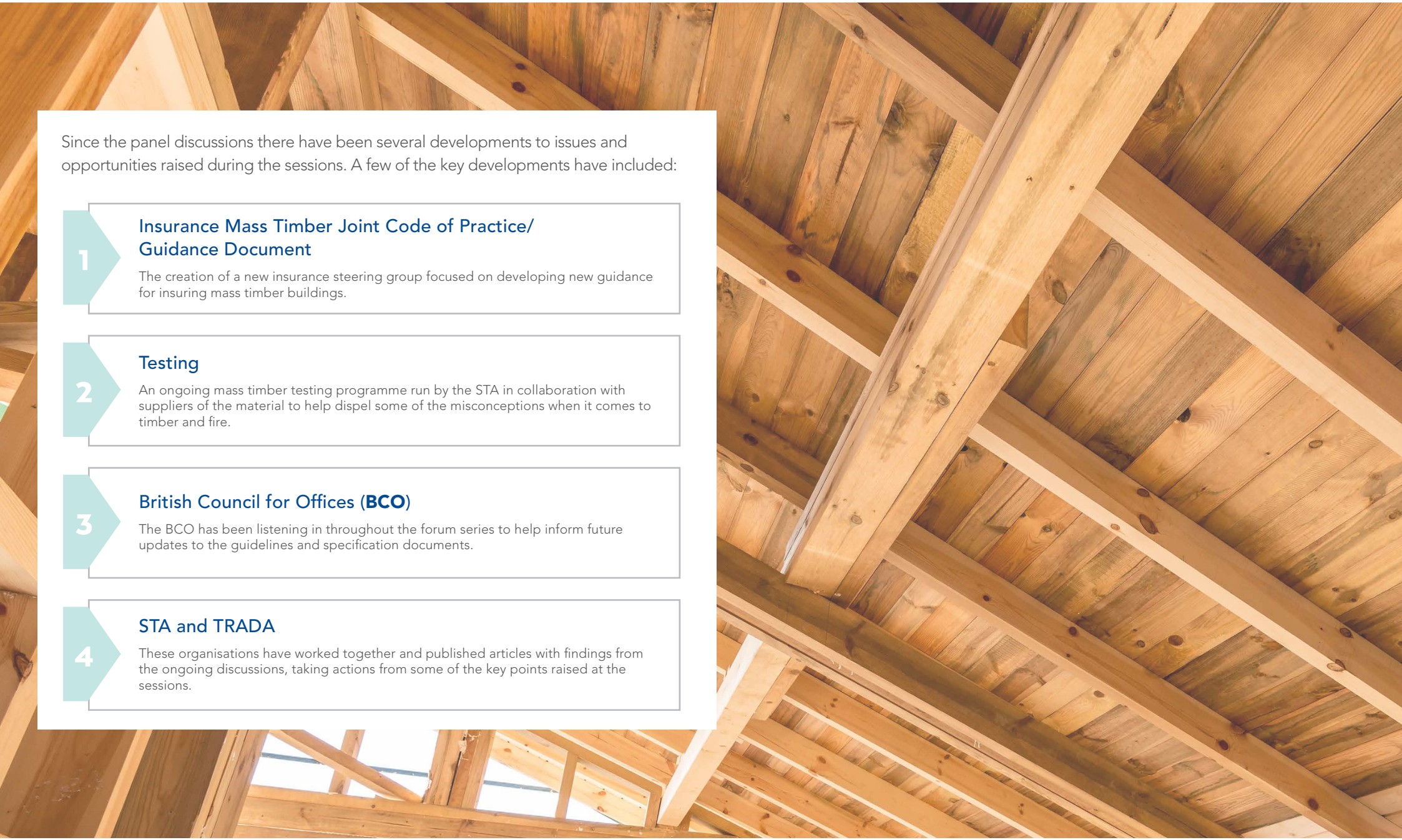
The primary incentive for doing this is reduced cost but it also helps to de-risk the design and approvals process. The response also demonstrated a common interest to work together in order to unlock the remaining barriers to the uptake of mass timber.

Figure 9: Cost, programme and procurement forum

Offsite testing can be expensive. Would you consider collaborating with other developers on a bespoke testing programme for these materials?



4.0 UPDATES



Since the panel discussions there have been several developments to issues and opportunities raised during the sessions. A few of the key developments have included:

1

Insurance Mass Timber Joint Code of Practice/ Guidance Document

The creation of a new insurance steering group focused on developing new guidance for insuring mass timber buildings.

2

Testing

An ongoing mass timber testing programme run by the STA in collaboration with suppliers of the material to help dispel some of the misconceptions when it comes to timber and fire.

3

British Council for Offices (**BCO**)

The BCO has been listening in throughout the forum series to help inform future updates to the guidelines and specification documents.

4

STA and TRADA

These organisations have worked together and published articles with findings from the ongoing discussions, taking actions from some of the key points raised at the sessions.

5.0 OUTCOMES

Since the forum first began each discussion has created a network of new communications, collaborations and activity. The mass timber office forum has allowed for the following industry activities and significant developments in the future of mass timber office construction:

1

Mass Timber Know How (**MTKH**) Group

A network of stakeholders from across the industry formed a steering group to discuss some of the outcomes and findings of the panel discussions in more detail.

2

Timber Accelerator Hub (**TAH**)

An initiative from the Alliance for Sustainable Building Products (ASBP), sponsored by the Laudes Foundation with the aim of breaking down barriers to market and enabling more mass timber construction across the industry.

3

Developer Collaboration

A new approach between developers to share knowledge and learnings from working on mass timber buildings.

4

Testing, Research and Knowledge

Shared knowledge on research, testing and expertise between stakeholders from across the mass timber market that can help to inform the industry of best practice approaches when using mass timber for commercial construction.

"The G&T forum has proved to be an essential tool in highlighting the demand for more construction of mass timber offices and focusing on particular barriers, suggesting pathways to overcome them with an impressive array of experts each month tackling specific issues and providing feedback for our development work in the TAH. I would like to thank the team at G&T for convening the forum and I am delighted that Oliver Booth joined the TAH project team to assist with shaping our work."

Simon Corbey
Director at Association of Sustainable Building Products

6.0 NEXT STEPS

The key messages highlighted in this report were echoed across almost of all of the panel discussions. Sustainability and the momentum behind achieving net-zero is the driving force behind developer appetite in exploring mass timber/hybrid offices.

The panellists noted that there is much to be considered from the outset when choosing mass timber/hybrid technologies. Good preparation and project management skills are essential to successful outcomes on mass timber/hybrid projects and the importance of appointing and engaging with the key stakeholders early on in the project was also considered to be vital for a successful outcome. It was shown that you must ensure the organisations/ individuals appointed have the suitable knowledge, experience and competence and increased guidance, regulation and availability of testing data will help to unlock the current challenges faced in the market.

Hybrid solutions should always be explored alongside developer design aspirations to ensure that schemes can still adopt mass timber construction and contribute to reducing embodied carbon, increasing sustainability whilst also being cost effective.

Looking to the future of the mass timber office market, it is clear to see that there is an appetite for increased demand and the networks that have been created throughout this forum will help, through knowledge sharing and increased collaboration, to drive forward the accessibility and viability of mass timber to a wider market.

If you would like to find out more about the mass timber office series, or want access to any of our panel summary reports please contact us:

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APPENDICES

A Forum Background

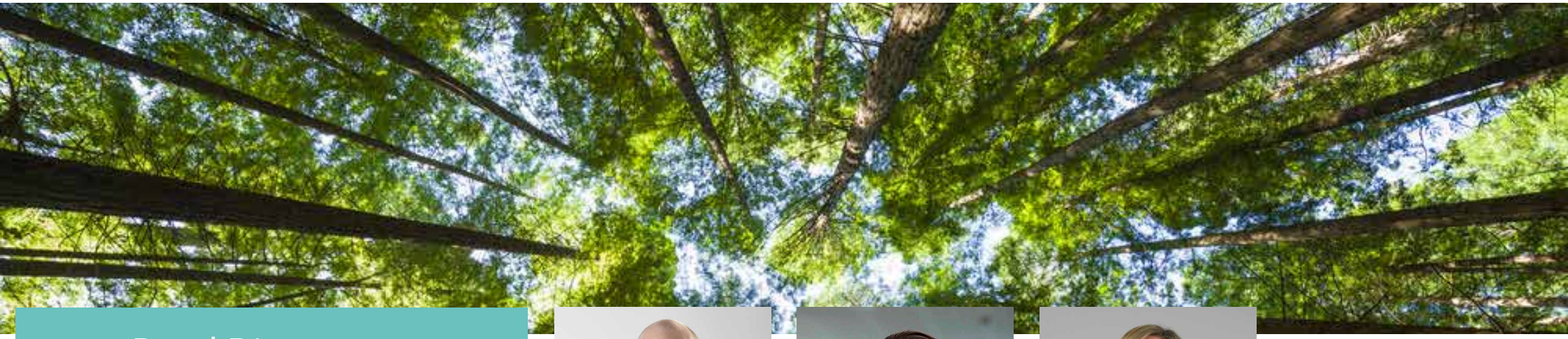
In January 2020, G&T was approached by several industry-leading developers to facilitate a forum focusing on mass timber and hybrid construction, specifically relating to the commercial office market. The main purpose of the mass timber office forum was to bring together experts and stakeholders from across the industry to discuss and debate the barriers of using mass timber in office construction.

The popularity and uptake of mass timber and hybrid structures has been rapidly increasing in the last five years for many reasons, but more recently the urgency to address the climate crisis and an increased focus on improving the health and wellbeing of the end users has propelled the mass timber and hybrid office to the forefront of commercial developments across the UK.

Originally due to be held in person at G&T's HQ, the series had to pivot and reorganise digitally due to the impact of COVID-19 and the first national lockdown that was implemented in March 2020. However, this challenge presented the opportunity to host these sessions as webinars that could be recorded and distributed to a larger audience with the knowledge and experiences shared across a wider network.

The Timber Research and Development Association (**TRADA**) and the Structural Timber Association (**STA**) were also part of the forum audience, ensuring the learnings from these sessions are disseminated across the wider industry.

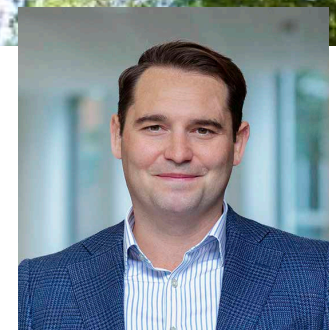
The forum was co-hosted by G&T partners Matt Holman (Chair) and Oliver Booth and the sessions, held once a month, focused on hot topics to help share knowledge and information that can be referred to when considering mass timber for commercial office projects.



B Panel Directory

G&T Timber Forum Team

Matt Holman
Board Partner
Chairman



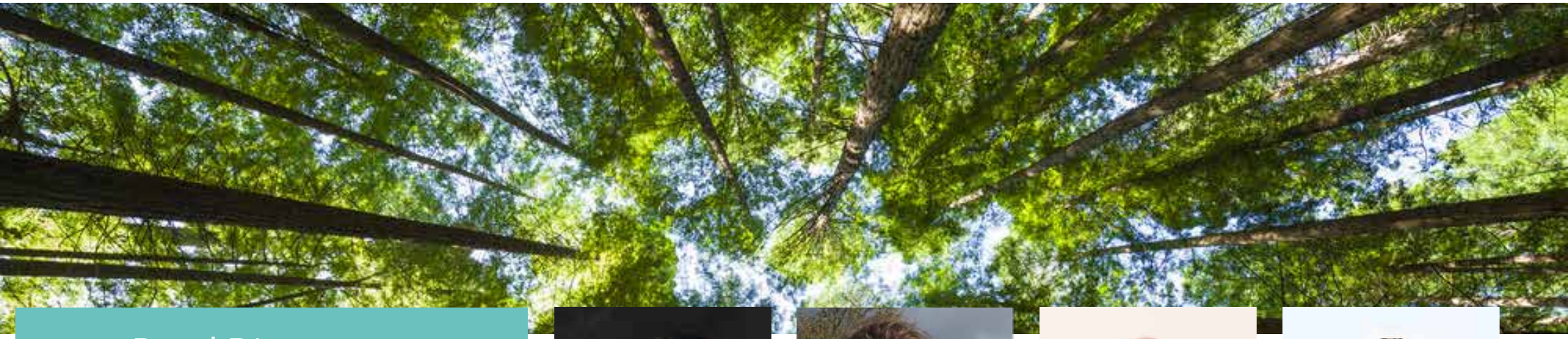
Oliver Booth
Partner
Timber expert

Jess Pennell
Director
Forum Coordinator

Jack Lewis
Associate
Forum Coordinator

Laura Le Boutillier
Associate
Communications

Michael Urie
Senior Market Analyst



B Panel Directory Session 1
Insurance

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Andy Penny
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B Panel Directory Session 2

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Director
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Judith Schulz
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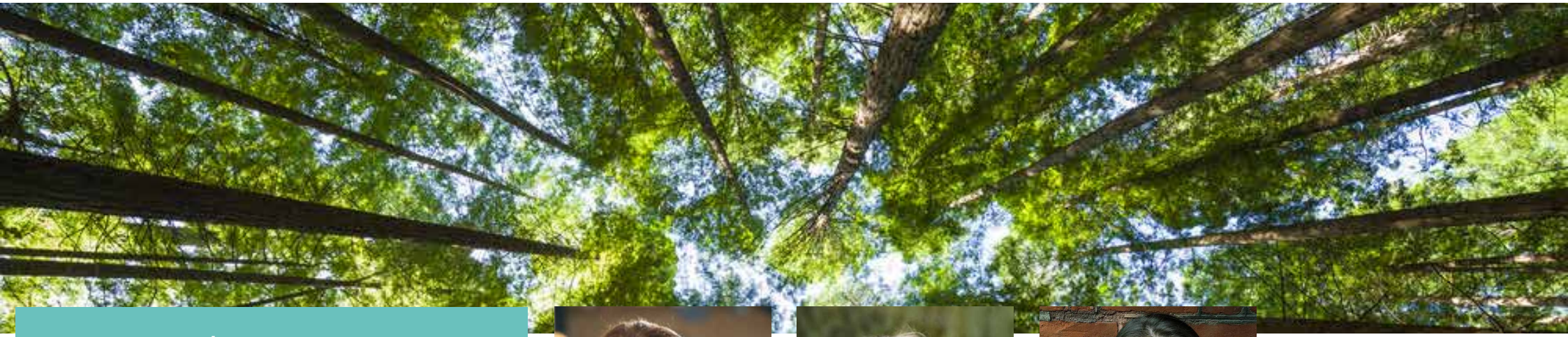
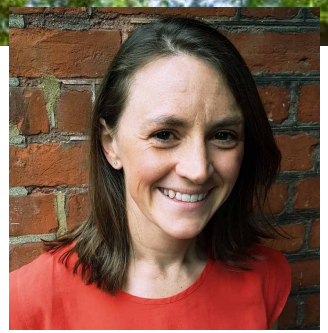
Prof. Civil Engineering & Head of the Department of Civil, Environmental and Geomatic Engineering
University College London



B Panel Directory
Session 3
Sustainability

Anna Denell
Sustainability Director
Vasakronan

Simon Sturgis
Managing Partner
Targeting Zero



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Modomo

Alan Fogarty
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Cundalls

Dr Ed Suttie
Director of Strategic Advisory
BRE

Richard Francis
Sustainability Consultant
G&T

B Panel Directory Session 4

Best Practice in Construction

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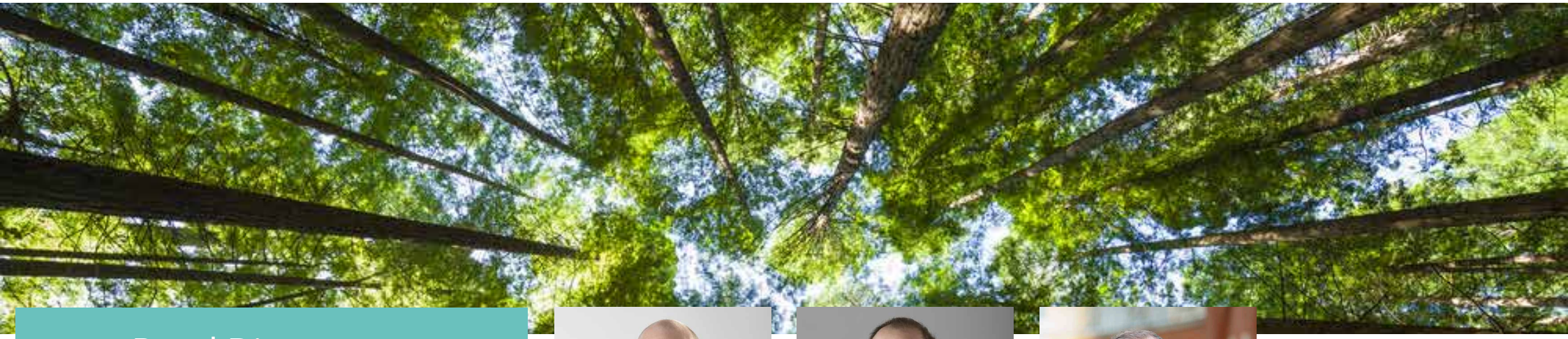
Graham Barter
Construction Director at Mace

Steven Hearn
CEO at Mid-Group

Louisa Finlay
Managing Director at Kier

Keith Patrick
Head of Quality Development and Supply Chain Management at GRAHAM



B Panel Directory
Session 5
Cost, Programme and Procurement

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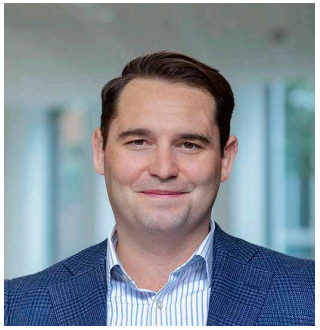
Steve Bennett
Partner (QS)
Gardiner & Theobald

Paul Robinson
Partner (Programming & Logistics)
Gardiner & Theobald



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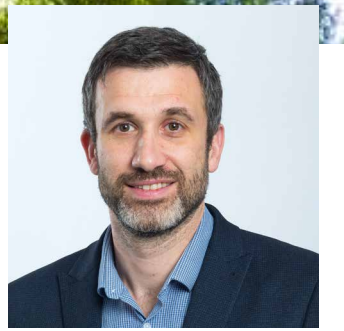
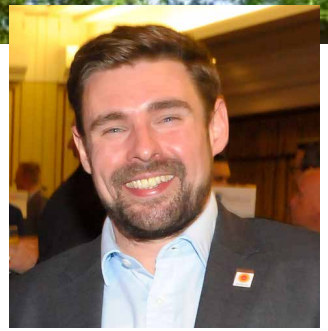
B Panel Directory
Session 6
Capacity and Supply Chain



Greg Cooper
Managing Director
William Hare

Wayne Probert
Head of Sales
Binderholz



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Andrew Goodwin
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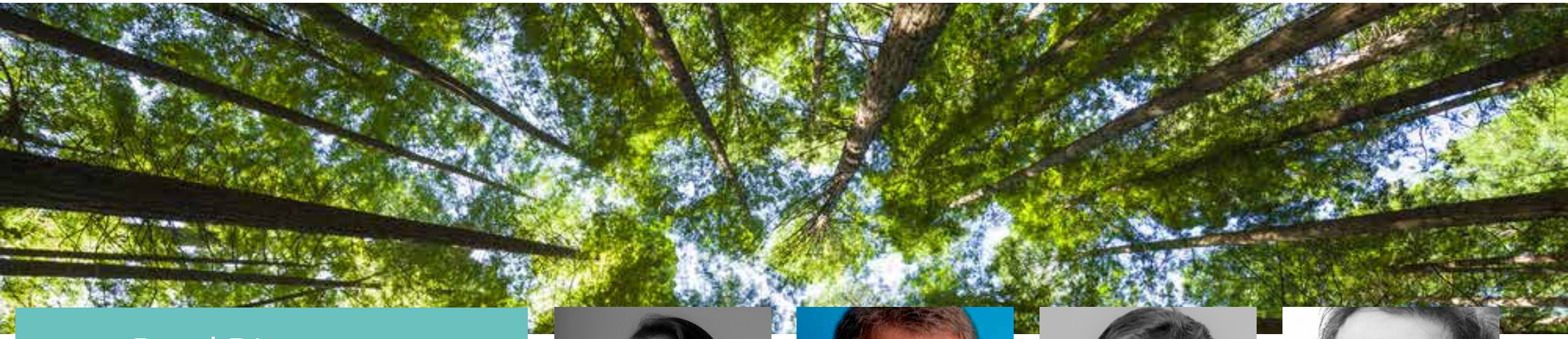
BKS

Nic Clark
Managing Director
KLH

Mark Berridge
Regional Director
HESS/Hasslacher



B Panel Directory
Session 7
Structure, MEP and Acoustics

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Whitby Wood

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Arup

Alan Dowdall
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Ramboll

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Barry Jobling
Partner
Hoare Lea

Michael Beaven
Director
Arup

Andy Heyne
Director
Heyne Tillett Steel

Gary Elliott
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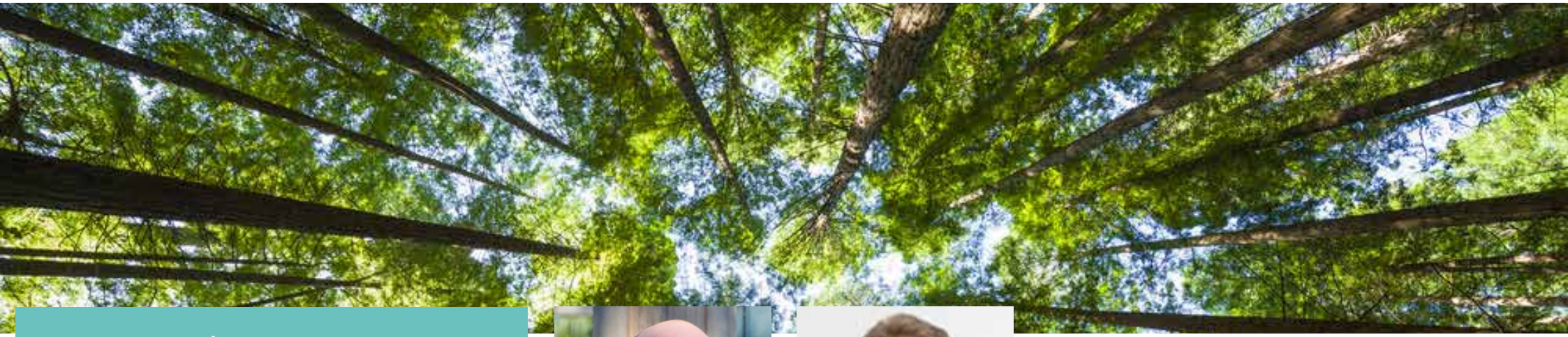
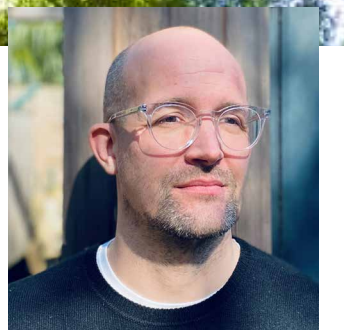


B Panel Directory
Session 8
Leasing and Sales



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Kevin Chapman
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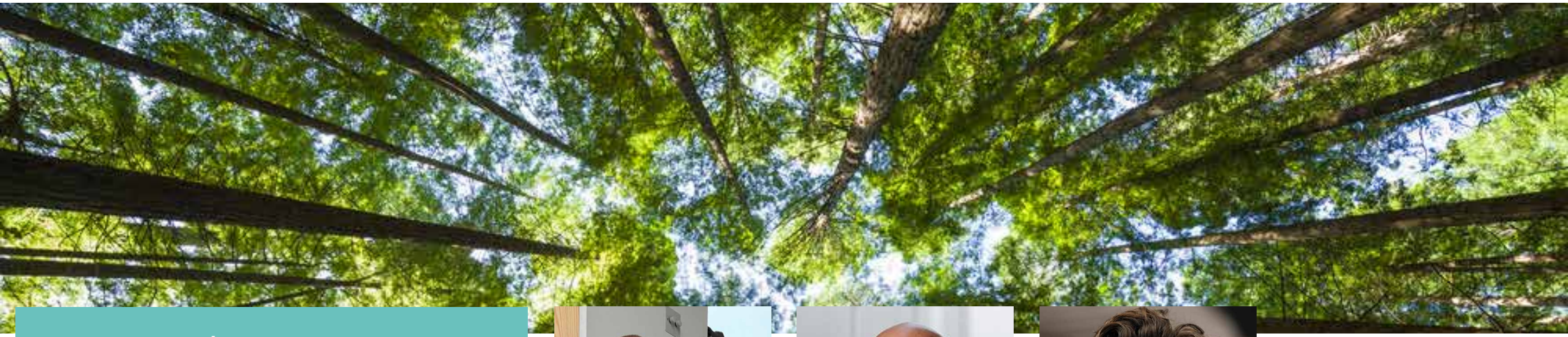
Michael Davies
Head of JLL Unlimited at JLL

Dan Hanmer
Executive Director at CBRE



B Panel Directory
Session 9
Architecture and Design

Andrew Waugh
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Andy Young
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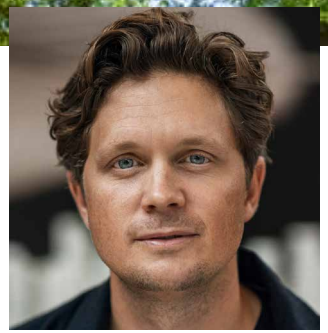
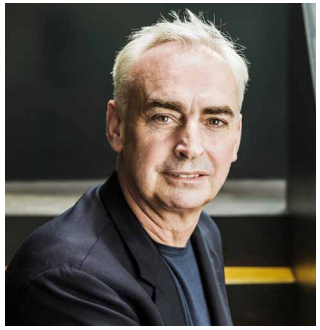


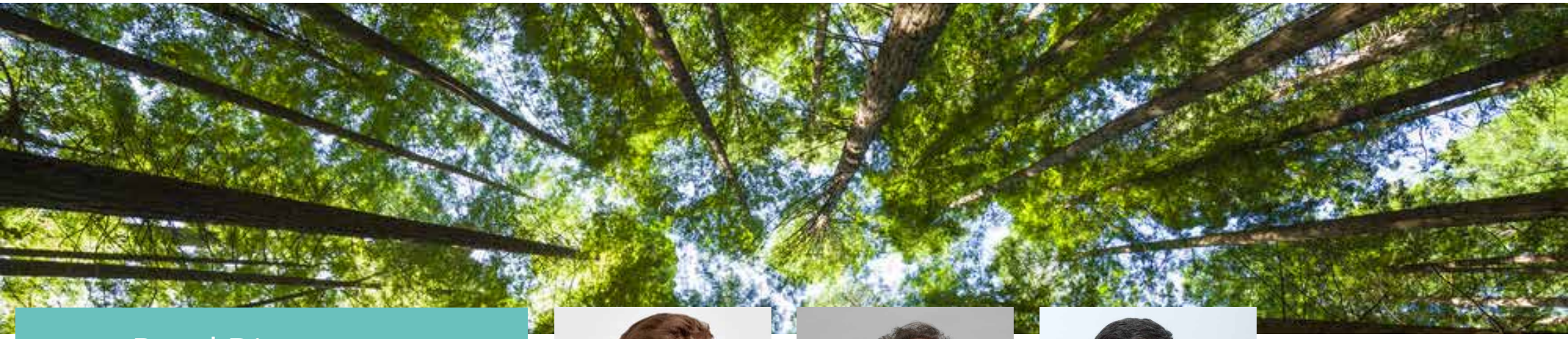
Audun Opdal
3XN

Nick Jackson
Arup



Paul Monaghan
AHMM

Roger Hawkins
Hawkins Brown



B Panel Directory
Session 10
Mass Timber Forum Revisited

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Gallaghers

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Fire Protection Association

Greg Cooper
Hybrid Structures/ William Hare

Kelly Harrison
Whitby Wood

Sam Liptrott
OFR

Nicky Gavron
Former Deputy Mayor

Richard Francis
G&T

C Further Reading

References

Association for Sustainable Building Products (**ASBP**)
https://asbp.org.uk/

Cross Laminated Timber: A Design Stage Primer - Nick Crawley

Structural Timber Association (**STA**)
https://www.structuraltimber.co.uk/

Timber Accelerator Hub (**TAH**)
https://asbp.org.uk/asbp-news/timber-accelerator-hub

Timber Research and Development Association (**TRADA**)
https://www.trada.co.uk/

UK Green Building Council (**UKGBC**)
https://www.ukgbc.org/

Discussion Recordings

01 Insurance
https://www.youtube.com/watch?v=O99UYvXXFx8&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=3

02 Fire, Testing and Building Control
https://www.youtube.com/watch?v=EIITUO4dIV4&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=3

03 Sustainability
https://www.youtube.com/watch?v=gBFsqui8OOk&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=4

04 Best Practice in Construction
https://www.youtube.com/watch?v=hzXK2HJuzMc&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=5

05 Cost, Programme and Procurement
https://www.youtube.com/watch?v=vptSiNwWBzY&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=6

06 Capacity and Supply Chain
https://www.youtube.com/watch?v=-oCJ3K49KYQ&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=7

07 Structure, MEP and Acoustics
https://www.youtube.com/watch?v=BRK5vbVpyy4&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=8

08 Leasing and Sales
https://www.youtube.com/watch?v=iiaQffI5Lxk&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=9

09 Architecture and Design
https://www.youtube.com/watch?v=MgLhjB7UrEA&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=10

10 Summary
https://www.youtube.com/watch?v=ZwsatfTqTQU&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=11

11 Mass Timber Office Forum: Revisited
https://www.youtube.com/watch?v=78zbwGSvUPk&list=PLrFwHvNZGKkFtYI2f8IMEYT7JpMwWI7Kn&index=15

C Further Reading

Full Reports

If you would like to receive any of the session's full reports, please contact the team at

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Summary Articles

01 Insurance
https://marketintel.gardiner.com/bulletins/gt-launches-mass-timber-forum-commercial-offices

02 Fire, Testing and Building Control
https://marketintel.gardiner.com/bulletins/the-impact-of-fire-when-building-with-mass-timber

03 Sustainability
https://marketintel.gardiner.com/bulletins/how-sustainable-is-mass-timber

04 Best Practice in Construction
https://marketintel.gardiner.com/bulletins/best-practice-mass-timber

05 Cost, Programme and Procurement
https://marketintel.gardiner.com/bulletins/mass-timber-in-office-construction-does-it-impact-the-cost-and-programme-of-your-project

06 Capacity and Supply Chain
https://marketintel.gardiner.com/bulletins/the-capacity-and-supply-chain-of-the-mass-timber-industry

07 Structure, MEP and Acoustics
https://marketintel.gardiner.com/bulletins/structure-mep-acoustics-considerations-when-building-with-mass-timber

08 Leasing and Sales
https://marketintel.gardiner.com/bulletins/leasing-and-sales-of-mass-timber-offices

09 Architecture and Design
https://marketintel.gardiner.com/bulletins/key-design-considerations-for-building-with-mass-timber

D Glossary of Terms

Glossary of Terms

Castellated beams	An 'I' beam which has cuts within the web that follow a specific pattern
CNC cutting	Computer Numerical Control Cutting. The process of automated machine control cutting via a computer, which is coded to follow a particular design.
Deflection (Floor Plates)	The amount of displacement an element, in this case the floor, takes under load.
Frequencies (Floor Plates)	The vibration within floor plates and how sound moves around the building.
Delaminate	The failure of the adhesive glue between the layers of lamellae in mass timber technologies. This failure causes the lamellae to peel away from each other and the bottom layer to fall off.
Ductile	A material that is able to undergo change of form without breaking.
Lamellae	Defined as a thin layer/membrane. Within mass timber, this refers to the different layers that build up to form mass timber products.

Mass Timber Technologies

CLT (Cross Laminated Timber)	This is a panel system where each panel consists of layered lumbar boards stacked and glued on top of each other at a 90-degree angle. This pattern provides structural strength across two axis.
Glulam (Glue Laminated Timber)	This is a system where the layered timber boards are stacked in the direction of the grain and run parallel with the longitudinal axis then glued together. Glulam is commonly used for columns and beams.
LVL (Laminated Veneer Lumber)	The utilisation of multiple layers of thin wood, stacked in the direction of the grain running parallel with the longitudinal axis and glued together.

D Glossary of Terms

Multiple cyclical flashovers	Events in which combustible surfaces are left exposed and can ignite. In regards to mass timber, due to delamination, the flashover event can occur multiple times.
OSM technologies	Off Site Manufacturing.
Pyrolysis	The thermal decomposition of materials at elevated temperatures in an inert atmosphere involving a change of chemical composition.
Sequest	The process in which trees absorb CO2 from the atmosphere for photosynthesis. This CO2 is then gradually stored throughout the lifecycle of the tree. When a tree is then cut down, the stored CO2 stays within that tree and a new tree can be planted to replace the old to carry on the sequestration process.
STA	Structural Timber Association.
Thermal Mass	The ability of a material to absorb and store heat energy.
Thermoplastic	A polymer, which under heat becomes soft and pliable. When it is cooled it becomes hard
TRADA	Timber Research and Development Association.
TTF	Timber Trade Federation.
WELL Building Standard	A sustainability certification based on building performance outcomes.