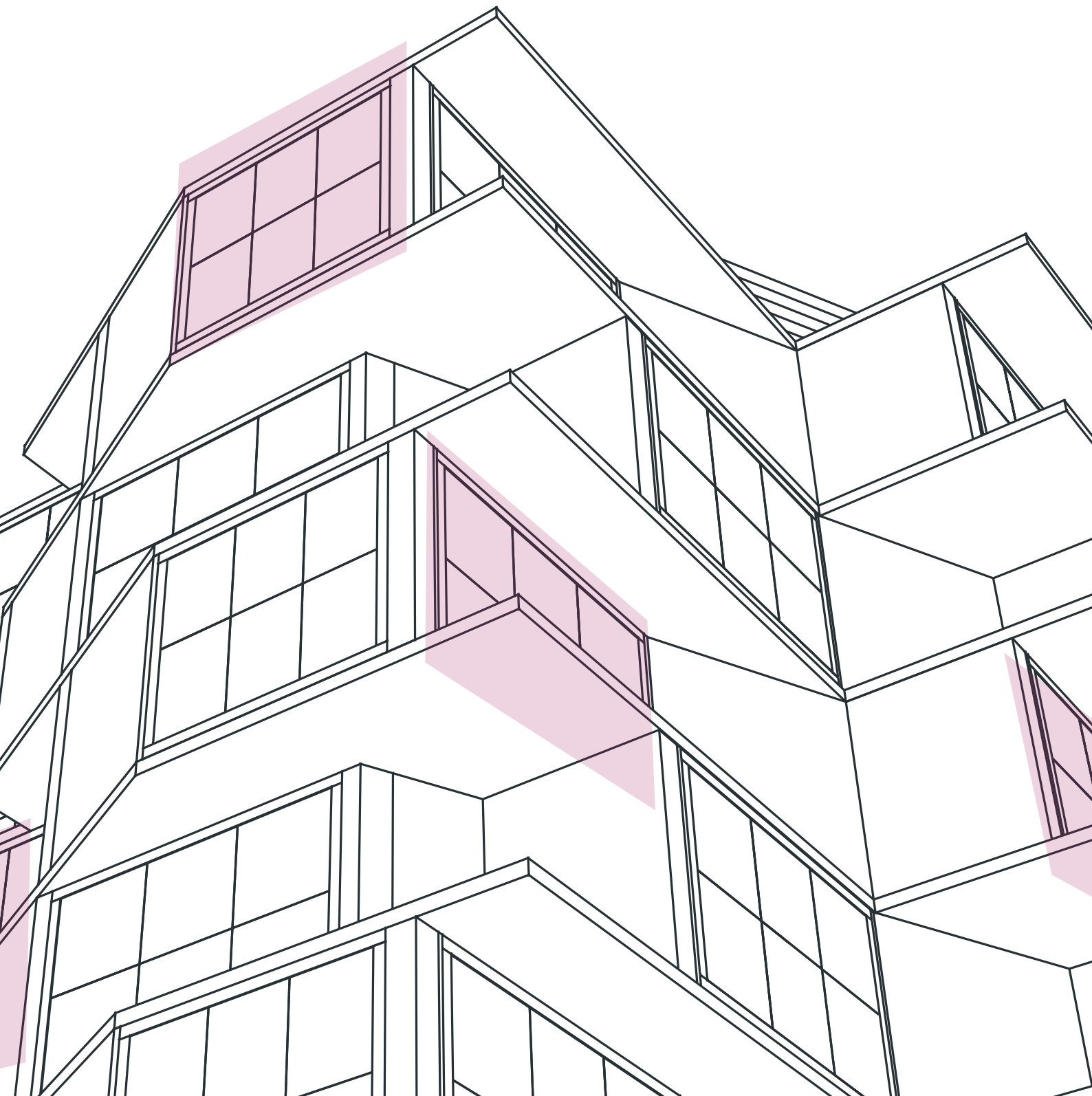


MODERN METHODS OF CONSTRUCTION

and its ability to stimulate the growth
of a sustainable later living market



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Foreword

Historically, the issues affecting life for older people have not tended to feature heavily in our mainstream media. The Covid 19 pandemic has forced new thinking in many areas of society and has had a disproportionate impact on older people. That, coupled with the long-promised (and again promised for 2021) revisiting of the funding of adult social care may mean that the dial is finally shifting in a meaningful way. At such an uncertain time it is hard to envisage what the long-term impacts – health, economic and social – will be for older people, or indeed for anyone else. However it is increasingly clear that society needs to create better solutions for the rapidly increasing numbers of older people making it up. Dealing with how people pay for social care and managing the interface between care in hospitals and in communities more effectively will be core to this. So will the creation of better and bespoke operational housing solutions for older people. Not for everyone, but for those who want it, creating a choice they simply don't have available at the moment as the market doesn't provide it, or at least nowhere near enough of it.

We at Trowers & Hamlins and at Castleoak, as later living specialists wanted to take the opportunity to bring some focus and debate to some of the areas that might contribute to those solutions. We want to take a forward looking and positively framed approach to the expansion of this important sector. To do that we have considered a range of different areas of potential debate. Our first is presented here, considering modern methods of construction. We have invited a group of true experts in this area to share their views on some simple questions.

The questions

- What are the perceived barriers to wider adoption of MMC faced by those responsible for creating the physical assets where our older people live?
- How do we facilitate the commissioning of buildings that will be designed and constructed using modern methods of construction?
- How can we overcome these barriers in order to make sure that traditional methods will not always be favoured?
- Could MMC be part of the solution to build good quality housing quickly to meet the rising demand for retirement communities?

Our own sector expert, Katie Saunders, has then offered some concluding thoughts pulling together the themes arising from our writers.

We hope you will enjoy the various opinions being shared, and that you too will feel able to contribute to the debate.



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A summary of the benefits of MMC and OSM

Andrew Duggan, Managing Director, Castleoak OSM

The word “modern” in the description Modern Methods of Construction (MMC) suggests something new when, in fact, both MMC and Off Site Manufacturing (OSM) have not only been around for a long time but have both been defined in Government papers.

By way of confirmation of that longevity, our company has worked in this particular space for close on 40 years and our approach has been to focus on a hybrid model which we think hits a particular ‘sweet spot’, carefully balancing what is manufactured off-site with what is built in a more traditional manner on-site.

Manufacturing a timber based, panelised product, that is enhanced to include the fitting of additional products such as windows, insulation and external render / cladding systems capitalizes upon many of the benefits of MMC, which we will look at below, without encountering some of the barriers and limitations of larger scale volumetric MMC.

Experience suggests that the key to unlocking and maximizing the opportunities that MMC offers is the earliest possible engagement in the project and a truly collaborative approach.

What do we see as the key advantages of such an approach?

For ease, we have broken these down into the three bottom-line considerations – people, planet and profit.

When it comes to people related issues, MMC and OSM have, in our view, come into their own during the pandemic as they have demonstrated that they deliver a long-term operating model that ensures a safe working environment for colleagues and contractors.

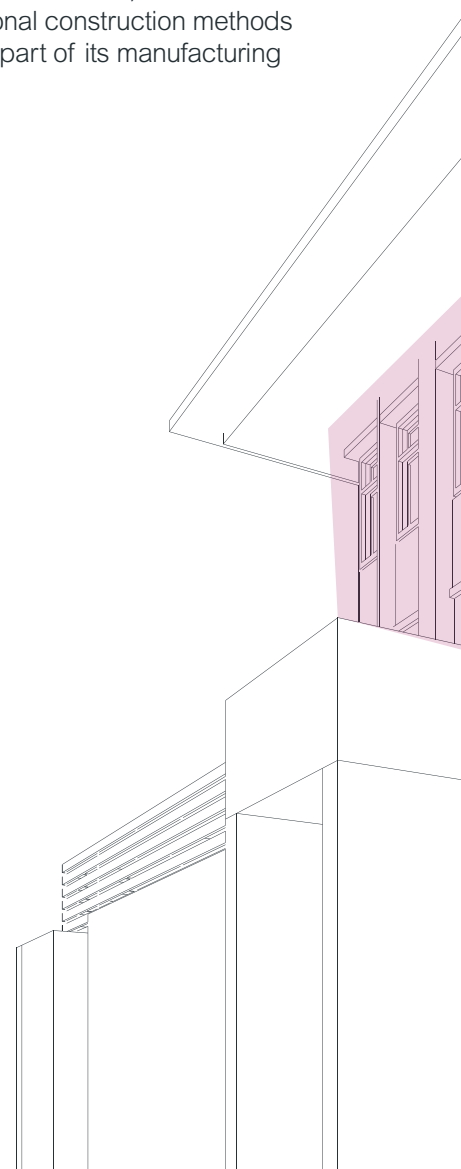
By contrast, traditional on site construction methods have presented challenges for main contractors to manage social distancing requirements. There is also an issue in relation to the larger number of contractor welfare facilities required on traditionally operated sites, once again because of the distancing requirements. This is especially the case during the winter. OSM can mitigate these factors by safely manufacturing in a quality assured, process orientated environment.

OSM also came up trumps when it came to adapting to a working-from-home environment. Earlier engagement and collaboration has accelerated a ‘design for manufacture’ principle (often pre-planning) which is providing major benefits in de-risking projects and capitalizing on the opportunities.

The benefits for the planet are obvious.

MMC delivers a sustainable product which will tick all the right boxes for developers and operators in terms of their environmental aspirations. Timber supplied from sustainable forests means that 3 trees are planted for every one that is harvested and the accurate quantification of embodied carbon within each project supports customers in their drive to demonstrate their sustainable credentials.

A fabric-first approach delivers enhanced thermal performance, reducing the impact upon the environment and reducing operating energy costs for customers or property owners whilst waste materials, which are often sent to landfill where traditional construction methods are used, are up-cycled as part of its manufacturing processes.

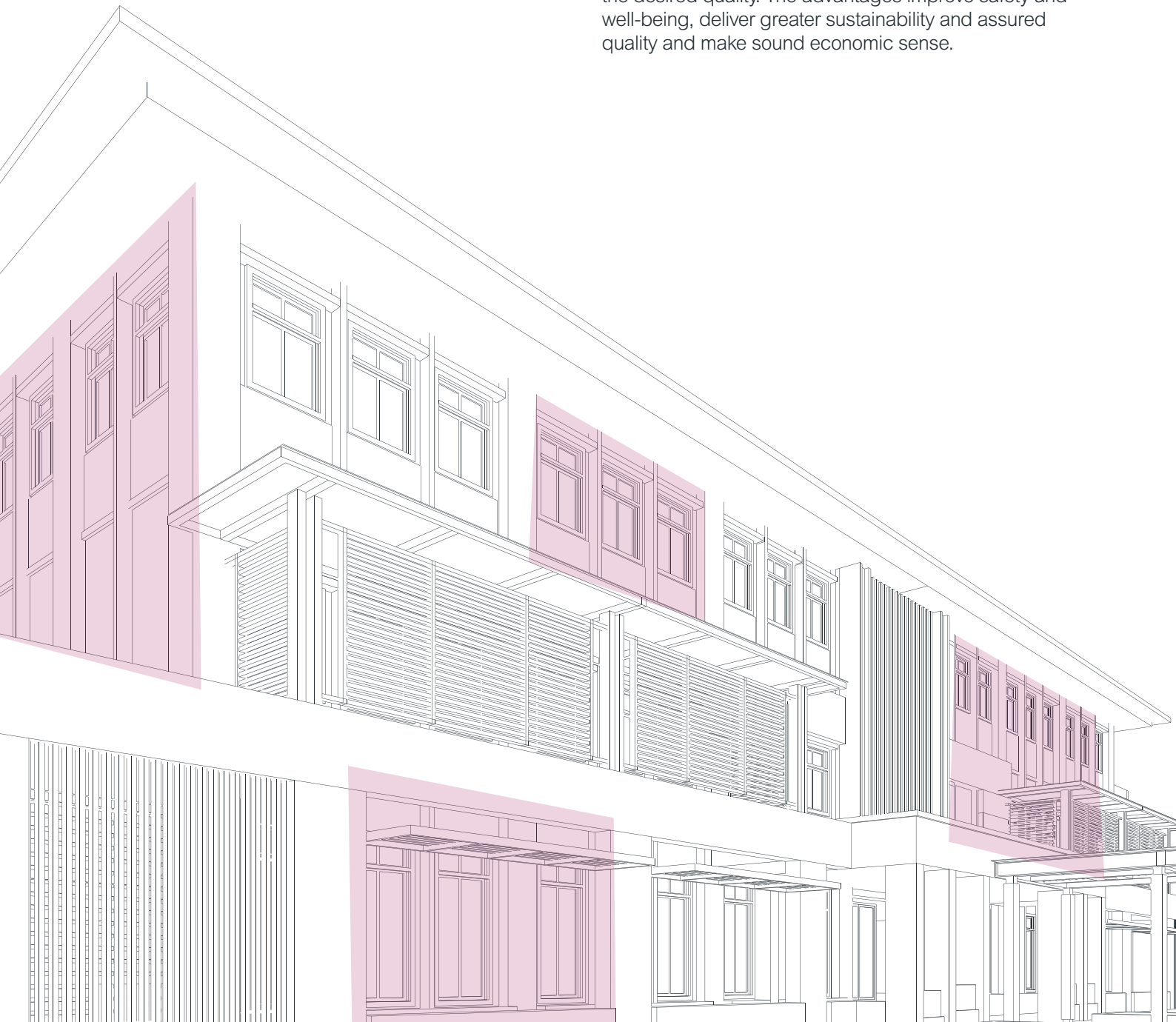


With regard to carbon reduction, in our particular case, we are a carbon neutral company and so any electricity used during manufacturing is from 100% renewable sources. Any required offsetting is managed through community-based schemes supporting the planting of deciduous woodland in the UK.

And finally to the commercial, or profit, advantages which are certainly not to be overlooked.

Perhaps top of the list is the programme certainty. It has been our experience that construction programmes can be shortened by as much as 30% where MMC has been optimized. Time saved on site means cash saved in the bank. What's more, delivering predictability and programme certainty allows operators to accurately plan for resident's arrival and, from a marketing perspective, to secure earlier sales and rental income, making positive impact upon the IRR.

In conclusion, manufacturing in a quality-controlled environment offers significant improvements over what can be achieved on-site where there is a variable environment and an ever-increasing skills gap to deliver the desired quality. The advantages improve safety and well-being, deliver greater sustainability and assured quality and make sound economic sense.



Are changing perceptions of MMC key to growth of the market?

Geoff Pearce – Swan Housing

What are the perceived barriers to wider adoption of MMC faced by those responsible for creating the physical assets where our older people live?

Despite significant progress in understanding, the perception of MMC remains a key challenge to its broader adoption. In some corners the idea persists that modular homes are necessarily of limited design and variety, and still hold the historical image of being “boxy pre-fabs”. These associations fail to recognise the huge advances in recent years of production techniques and associated software technology which support MMC delivery.

MMC offers the ability for design variety, but also the ability to optimise the benefits of repetitive processes as key functions are continuously refined and developed. Repeatability and security of demand are key factors for MMC, and a model must be developed to support these requirements.

Standardisation of aspects of production will increase efficiency, reduce risk for manufacturers, and reduce costs for all involved. A simple example of this is through the use of standardised bathroom unit sizes allowing for pre-assembled bathrooms, which have reduced plumbing programmes for each module within Swan's factory from 2 days to 20 minutes. Older persons housing presents opportunities for repeatability of some core principles, as well as providing substantial long term demand, and is therefore well placed for MMC delivery.

On a practical level there remains a lack of depth to the supply chain, with not enough suppliers and skilled personnel, and not enough education focused on addressing this moving forward. MMC operations currently exist in pockets, but this needs to become much more widespread in order to optimise effectiveness and productivity.

Funding remains a further barrier as banks continue to harbour concerns of systemic failure, albeit the position is improving as understanding of the process develops. Swan's modular factory in Basildon has been delivering CLT modular homes since 2017 and is now developing a steel frame system for building at height. Modules are manufactured in a controlled environment where the quality of the precision engineered product can be managed and monitored much more closely than on a traditional building site. The exceptional level of control and visibility offered by MMC should offer comfort to all stakeholders moving forward.



How do we facilitate the commissioning of buildings that will be designed and constructed using modern methods of construction?

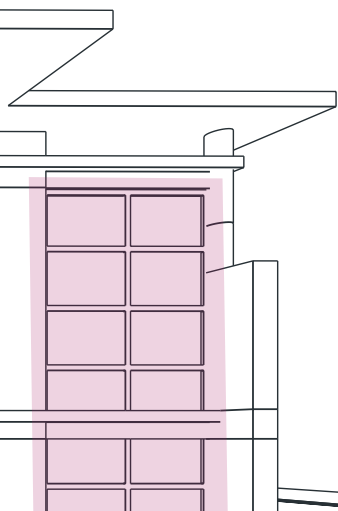
Increasing understanding and visibility of MMC will be a significant factor in expanding the role of MMC. Government focus is key, and this is gaining further traction such as through the recent announcement in April 2021 that under the Affordable Homes Programme 2021-26 Strategic Partners will be expected to commit to the adoption of MMC within their development programme with a minimum 55% pre-manufactured value.

Moving away from the current fragmented approach to MMC procurement to a single best practice model of procurement would further improve accessibility and efficiency. Related to this is the current prevailing practise of procuring contractors for “traditional” site practices such as providing foundations, and procuring a further contractor to deliver the modular elements of the build. Swan’s turnkey model for modular homes presents an option to overcome this by presenting a single point of contact for delivery of the build from inception to completion, thus increasing efficiency and reducing cost.

Early assessments of sites for potential use of MMC is important, and substantial work is being undertaken in this area. The PRiSM 2.0 Design app led by the GLA and Mayor of London is an example of new technologies supporting this aim. The app helps homebuilders assess the viability of MMC from as early as site identification, embedding design and planning data to quickly and easily model options. Expansion and further development of these technologies is required to continue improving the accessibility of MMC.

Ensuring appropriate build quality and safety is essential for all construction approaches, and this can be supported through ensuring Building Regulations continue to reflect latest technologies and methods, and standardising the accreditation process for MMC warranty providers. MHCLG has sought to provide greater clarity through work with various assurance and warranty providers, including commissioning research to identify knowledge gaps where further guidance may be required to account for MMC.

A further key factor in delivering MMC will be having the necessary skills and training in the sector. Architects and engineers are central to this and further training is required in design for manufacture, incorporating efficiency and value principles. A practical example of the benefits of this comes from recent Swan CLT development in which the design team has worked to reduce the cost of steelwork within each module from £9k to £1k, and savings of over £5k per module through more efficient routing of plumbing and services. Establishing design for manufacture principles and sharing knowledge across the sector will support continuous design and efficiency improvements to bring housing quality in line with other leading manufacturing processes.



Modern Methods of Construction – Stimulating the growth of a sustainable market

Phil Bayliss – L&G

After months in lockdown, the saying “there’s no place like home” certainly has a different meaning for a lot of us. For many, lockdown has brought challenges. With access to local amenities limited and people too scared to go out, Age UK reported a dramatic increase in the number of older people at risk.

The pandemic has pulled the rug from under so much of our older population, further highlighting the need to create specialist homes within supportive communities for the UK’s rapidly ageing population.

Currently there are more than 12 million over 65s in the UK and this figure is expected to increase by 50% over the next 20 years. Meanwhile, the number of over 80s is expected to double. We are ageing and we are ageing fast. However, only 8,000 age-appropriate homes are being delivered in the later living market each year [1], resulting in a wide disparity between supply and demand. This imbalance needs to be addressed. We need to deliver high-quality homes at an accelerated rate.

Alongside addressing policy changes which can encourage this type of housing, modernising the construction industry will be vital if we are to move quickly to overcome these challenges. It currently takes an average of seven years to complete a retirement community scheme and we desperately need a new way forward which can help speed up delivery.

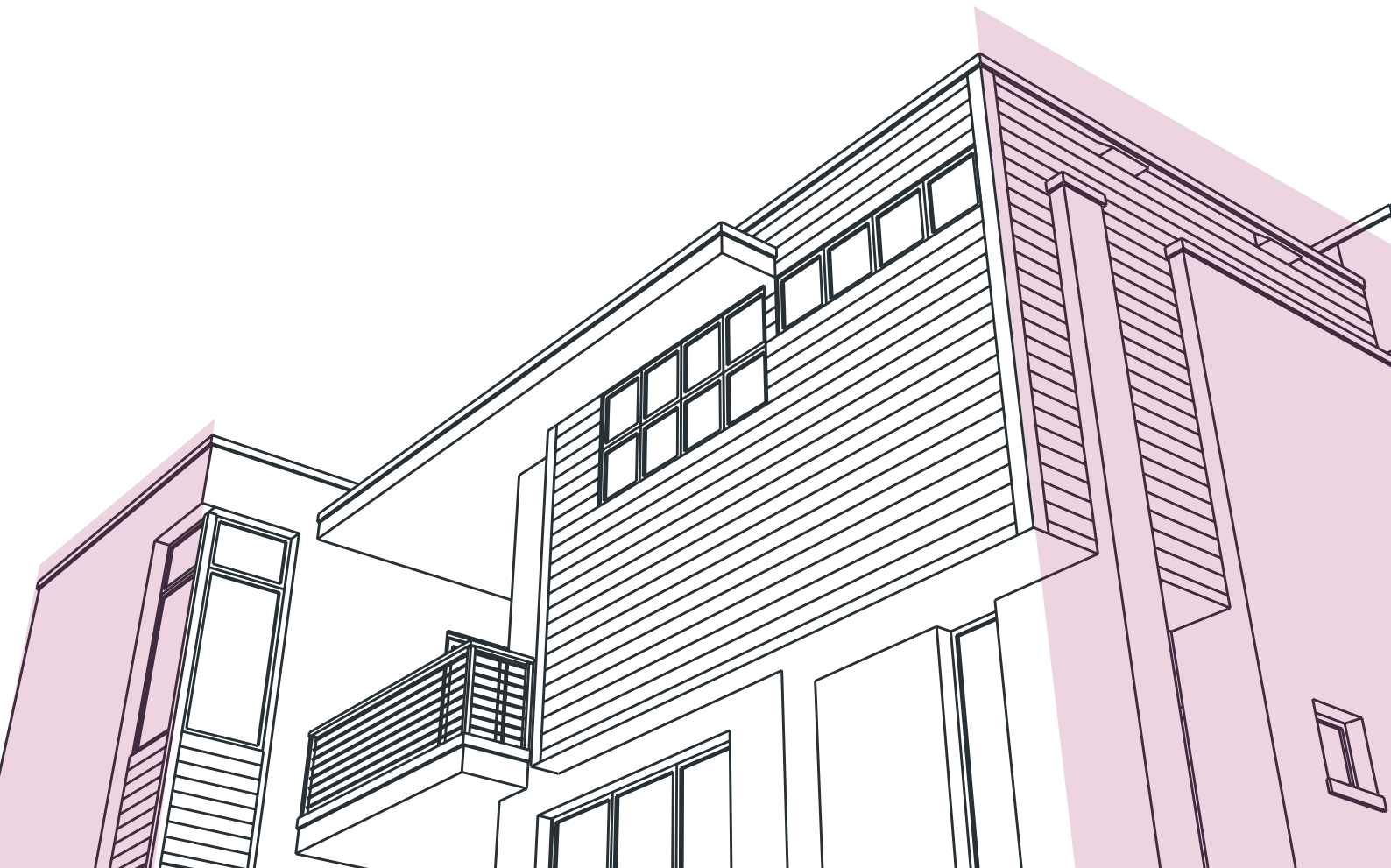
But as an industry, modular manufacturing is facing its own challenges of dated public perceptions and the absence of a regulatory framework for the sector. In order for the sector to mature from its relative infancy, there needs to be a complete re-education. It has long since evolved from the prefabs of the 1950s! Today, modules are manufactured off-site, allowing innovative design and construction at the cutting edge of the industry, and the quality which can only be achieved in a factory environment. The Legal & General Modular Homes business has a product range designed at a level of detail and robustness that traditional architects, structural engineers, mechanical and electrical consultants do not normally go into.

Whilst Legal & General is spearheading change, it can’t do it on its own. There needs to be collaboration with an ecosystem of customers and clients who understand both the benefits of modular construction as well as the design requirements, and begin to accommodate this in their specifications. The homes Legal & General deliver are high quality, energy efficient and can be plotted to create a range of different types of neighbourhood. The product range, which currently consists of 1, 2, 3 and 4 bedroom houses, alongside 1 and 2 bedroom apartments are designed to meet a wide range of applications, with details tailored to each customer. Homes and their fit out are adjusted to meet the needs of the occupier – no matter their age.

Government has an important role to play in how we accelerate modular construction. We need to see a regulatory framework to enable modular buildings to operate within a level playing field, including through the planning process, building standards and by dispelling perceptions that currently exists in the market. We need government support standardisations in these approaches in order to enable us to move forward.

For our older population, this type of housing –delivered at an accelerated rate and with factory-manufactured quality - is increasingly vital. Not only can it deliver more fit-for-purpose homes, more quickly, but it offers a high quality solution for those who probably spend the most time in their homes.

Progress is certainly being made, with pockets of developments and innovative designs starting to come to fruition. Momentum is building in government and local councils to make modular construction successful. But if the government is to effectively and efficiently tackle the UK's housing crisis and a fundamental lack of 'fit-for-purpose' accommodation all across the spectrum, this needs to accelerate at a quicker pace. With a sharp focus turning on how to safely house our older generation, in light of the Covid crisis, a move to dovetail regulation to support both of these sectors now seems long overdue.



Flexibility and adaptability and its impact on housing older people

Mike De'Ath – HTA Design

What are the perceived barriers to wider adoption of MMC faced by those responsible for creating the physical assets where our older people live?

One of the key attributes of housing for later living is flexibility and adaptability. In applying MMC models of high Pre-Manufactured Value there are important design considerations to ensure that resulting developments are fit for purpose and homes suitable as residents get older. Also, that it can be adapted to work for them with reduced mobility and changing needs. Careful thought to system choice and early engagement with experience designers will be essential to design this in from the outset. Each system will have its own characteristics and benefits that will impact the design and its viability.

Older purchasers will also carry with them preconceptions of past failures in 'prefabricated housing' and confidence in buying what is likely to be a final property that they may well own brings thinking about legacy and inheritance as to whether they have confidence in an MMC built product. There are however many built projects that demonstrate the leap in quality in manufactured housing, indeed at HTA we seek to ensure the fact that homes are modular is secondary to creating long lasting beautiful homes that are characterful and appropriately design to a local aesthetic, we are confident as more homes come on stream that factory made homes will be seen as a quality marque, particularly in the face of well publicised failures in traditional construction over the past 30 years.

The implications of the Hackitt Report and Building Safety Bill will rightly have an impact on all apartments built over a 18 metres and this could be potentially a barrier for later living developers in cities. Regulations introduced as a result of the Building Safety Bill will set a high standard. There is an obvious benefit in MMC demonstrating the golden thread of information and being able to document how a building has been put together. Moreover, the increasing use and repetition of proven systems will create confidence on the safety and longevity of offsite manufactured homes.

As with our build to rent and student projects, It is important to make sure that property in later living is designed as a long-term asset to maintain the income stream and therefore that it is cost effective to maintain and in use, is sustainable and does not depreciate and of course precision-manufacturer and particularly modular does have that embedded quality in the asset. This is something we at HTA are measuring through collaboration with manufacturers, universities and residents through 'post occupancy evaluation. Data is the antidote to doubters!



A real benefit to maintenance is the use of BIM with the systems being recorded and documented using digital information that can be passed to the building owner. Increasingly, investor led developments are managed to enhance the experience of residents and maintain the asset. Their interest is in predictability of design cost and quality, all of which can be achieved by repeatedly working with manufacturer and design team to hone the product based on data from its operation and supported by integrated IT approaches.

The 'elephant in the room' for modular delivery is the capital cost in a construction and procurement sector that is fragmented, transactional and short term with cost based tendering and risk transfer the primary objective for many development teams. While there are significant potential gains from on-site efficiencies, waste and carbon reduction and major benefits to programmes shortening and reduced defects, it is likely that a precision-manufactured home currently will be between 10% and 30% higher than traditional construction, without a commitment to multi-site, programmatic development. That can act as a barrier in terms of forward-funding arrangements for developers building later living apartments, which is typical in the private sector, although we are now seeing the entry of ESG funds that see modular manufacture a good fit for their mandate to invest in greater sustainability outcomes over the longer term.

How important is speed? Would it be a benefit to the later-living market? While speed of delivery is clearly important and efficiencies might be secured, this is not necessarily the most important aspect for all delivery models. However, for rental homes, particularly in larger developments where increased absorption is a benefit to placemaking, there is a great fit with modular delivery. Of course, in the sale sector, absorption is significantly slower and the 'return on capital' ethos mitigates against paying for construction before you have a purchaser, even in boom times!

A final important point is the market. As touched on earlier, Manufacturers need a clear, long term, sustainable and visible source of demand and to be able to engage with clients over more than one site to be able to scale up within the factories. There are real benefits for later living developers with a large programme to deliver in engaging with a proven manufacturer with whom they can develop their product range. In this way risks will be mitigated, productivity and quality increased and, over time, costs reduce to be lower than traditional construction.... economics tell us this is so!



Exploring the opportunities for MMC in later living

Mark Farmer – Cast Consultancy

What are the perceived barriers to wider adoption of MMC faced by those responsible for creating the physical assets where our older people live?

There is currently a lot of interest in later living as a specialist sub-set of the wider residential market in the UK with huge potential for growth. Historically there has been more political attention on first time buyers and enabling young people to get on the housing ladder. More attention needs to be paid to enable the market to transact and a key element of that, bearing in mind our nations demographics is enabling people to move into specialist later living accommodation that is bespoke designed, it isn't institutionalised, its actually a lifestyle choice.

There is a big opportunity here for MMC to play a part in the delivery of what is a growing market. Demographics will drive the demand, it is very much a market driven by equity. The preferred model at the moment tends to be ownership rather than rent, which is slightly different to other countries in terms of how the financial model works. The idea of trading down and owning an asset is probably the beginnings of where you have to think about the MMC challenge which is because people who want to acquire what may well be their last property are going to be really interested in understanding what security they have on that investment and maximising the investment for relatives in terms of their estate. There is an issue in terms of getting the perception of MMC aligned in the potential buyers minds and that comes back to a broader issue in the market which is the lack of familiarity with innovative construction techniques.

There is also the demographic challenge, the age profile and population that have a natural affinity with very traditional approaches to construction perhaps, bricks and blocks and tiled and slate roofs in the normal way. The demographic does not necessarily help with the perception issues around pre-fab that we have struggled with as an industry. It is not however insurmountable, Cast's work in the later living market suggests the industry and developers in the sector are starting to turn towards MMC as a solution that can address all of those concerns and also gives them benefits in terms of standardised design solutions, lower carbon performance, lower defects and high quality.

Guild Living, part of Legal & General, a specialist niche player in the senior living market looking at urban and fringe of urban solutions have recognised the opportunity around increasing pre-manufacture

value. People do not realise that actually the buildings are more manufactured than sufficiently site built because actually it is in the hybrid solution and that where that journey is starting. Cast are running a pre-manufactured value initiative with Morgan Sindall, Wates and McAlpine who are framework contractors. Combining that with some really innovate thinking from the architects and co-investor in Guild Living, Marchese (Eugene Marchese is a well-known Australian architect who is well-versed in leading edge approaches to senior living design) bringing into play is not just innovating the methods by which you build but looking at some really interesting design concepts as to how you set the buildings out, how they work internally around spatial design, how you use technology, embedded technology in the building as part of your operational protocols, sensors and all sorts of things that can help with care as well as with basic building maintenance and life cycle issues.

McCarthy & Stone probably one of the most well-known names in retirement housing, albeit may be a slightly different take on retirement and housing and is more geared towards a sort of a volume house builder model, have an MMC strategy. They are actively looking at both category one and category two MMC as part of a development programme going forward combined with use of technology and their internal development programmes as well to speed up how they build and to build to better quality.

Design and adaptations over time - does volumetric make it more difficult to adapt?

You can use category one volumetric and still have adaptation potential, this should be considered as part of your Design for Manufacturing and Assembly (DFMA) strategy. There are developers looking at a full volumetric later living, assisted living, dementia care offer which includes adaptable design configuration to enable residents to age in place. The provision of physical care in the home has to be considered quite early.

What we are seeing is more category two, category five combined applications. Inspired Villages, a Legal & General business, have used timber framing extensively on their retirement village portfolio across England. Cast are also involved in a senior living development in Kings Road in Chelsea for Auriens which is using hybrid construction, category five construction. In that build there are facades, pre-fabricated mechanical electrical services and pre-cast concrete frame elements. So again there is a mix and match to properly address some of the construction industry's wider issues and

contractors wanting to take labour off-site, particularly in a post-Covid world where the danger of further lockdowns and productivity losses are starting to focus the mind in that regard.

Forward funding

Interestingly there is actually less of an issue with finance in the later living space than there is in the mainstream market, the people entering this kind of accommodation have equity and are cash buyers and are using the balance to top up their pensions and to fund their lifestyle. Therefore there is less mortgaging in this segment of the market than you would expect ordinarily. This means that some of the issues you see in the wider market around mortgage finance and insurance issues do not appear as much.

There is however also the need to have some sort of valuation report because they want to make sure that the property is worth something when the event fee is triggered. The event fee is usually triggered on death and that means that the product comes back as bought by the original developer (secondary investor) and that value is then released through the estate. Developer finance is still a bit of a mixed bag but most of those developers at the moment are using funding not necessarily from external sources through their own internal financing.

Fire safety

Bearing in mind the typologies that are happening in Later Living so, most developments that Cast are involved with, both urban and rural or suburban, are actually less than 18 metres but nevertheless still covered by the Building Safety Regulations but less of a high-risk building. There is a wider issue here in terms of the impacts of the EWS1 form and wider insurance industry contagion on how homes are built even below 18 metres so in my experience there are very few formally defined high risk buildings in terms of the building safety bill that actually are Later Living apartments. Most of them tend to be low to mid rise at most built around a courtyard or an essential amenities facility or a very traditional retirement village concept which could be bungalows and two bed houses around a community hub. But there is definitely a concern and clearly, going back to the point about cash buyers, you're not going to have people entering this market if they've got any concern that all their equity that they've stored up in their home in their final purchase there's a legacy issue around the future value of that property. Most developers will be cautious about the methods they use to make sure they are not creating a fire risk legacy that would affect their risk around event fees as well as of course their brand, reputation and their consumer position.

The definition framework identifies the following 7 MMC categories:

Category 1	Pre-Manufacturing	3D primary structural systems
Category 2	Pre-Manufacturing	2D primary structural systems
Category 3	Pre-Manufacturing	Non systemised structural components
Category 4	Pre-Manufacturing	Additive Manufacturing
Category 5	Pre-Manufacturing	Non-structural assemblies and sub-assemblies
Category 6	Traditional building product led site labour reduction/productivity improvements	
Category 7	Site process led labour reduction/productivity improvements	

Conclusion

Katie Saunders, Partner, Trowers & Hamlins

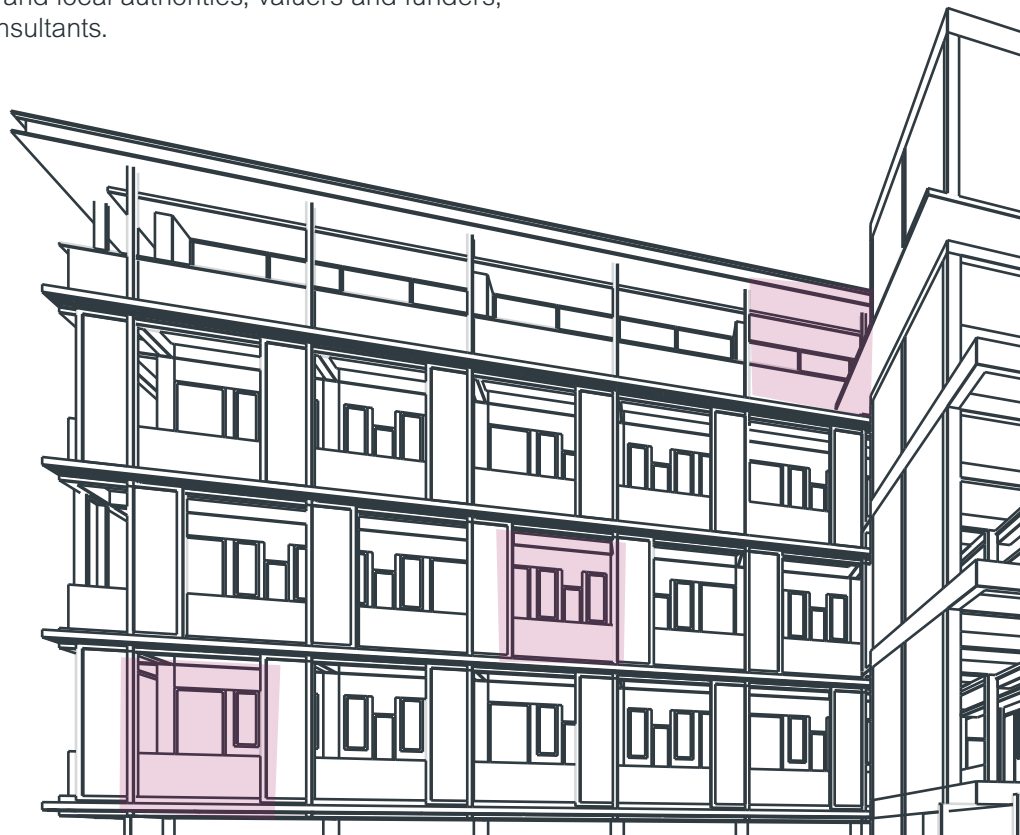
There are now so many reasons why the whole residential sector should embrace use of MMC for new homes including;

1. Its contribution to the transformation that the UK Government has outlined for the procurement of its construction pipeline (up to £37 bn in 2021) in many policy initiatives, such as the Construction Playbook and the Value Toolkit.
2. Addressing safety of buildings following Dame Judith Hackitt's reviews of building regulations and fire safety embodied in the Building Safety Bill. By actively looking to do more construction in safer, more controlled and factory-like conditions, use of MMC generally improves safety during construction and the quality of the end-product.
3. Overcoming problems in productivity, labour supply, process and material efficiency, in-use performance, information management, and risk management.
4. Contributing to sustainable development by reducing waste, reducing carbon emissions by lower transportation costs, less on site energy and water use, better energy performance cost in use.
5. Greater focus on healthy homes following the recent impact of lockdown restrictions and increased home-working.

Later living developers and providers want to develop safe, sustainable and healthy homes but they also need their homes to fit their financial and investment models. Therefore it is the funders and investors for later living projects and their valuers who need to be convinced that an MMC home is valued the same as a traditional home.

This is the missing part of the jigsaw for the sector and the piece that is taking longer to fit into place but increased uptake, more research and time will unlock this perceived barrier.

Trowers are continuing their research into funding barriers following their 2019 roundtable and report to see how perceptions have changed in the intervening time. To do this they have designed a survey to gather experiences from house builders and developers, housing associations and local authorities, valuers and funders, manufactures and contractors and consultants.







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