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Design to Thrive

MORE VERSUS BETTER: exploring the tension between quality and quantity in housing, and the opportunities offered by alternative approaches.

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Abstract: This paper translates the seven goals of the Wellbeing of Future Generations (Wales) Act into an agenda for housing. It recaps the findings of the recent More | Better report (2017), which concluded that there is no single silver bullet to ‘solve’ the housing crisis in Wales, but that higher quality homes could be achieved through a combination of innovative delivery pathways and construction techniques, along with a broad range of other benefits. However, the depressed Welsh housing market creates a particular tension between the need for *more* housing and drivers for *better* homes. The paper identifies ways in which approaches that focus on ‘better’ might also deliver ‘more’ in economically challenging areas, both within Wales and more widely. There then follows a discussion of the catalysts for such a ‘step change’ in housing quality and quantity. The paper concludes with an account of the next steps that are currently being taken in Wales, through the actions of the Innovative Housing Programme.

Keywords: housing, housing crisis, housing supply, construction techniques

Introduction

Homes for Today and Tomorrow was published in 1961. In that moment, it was considered “timely to re-examine the kinds of homes that we ought to be building, to ensure that they will be adequate to meet the newly emerging needs of the future, as well as basic human needs which always stay the same.” The landmark report proposed space standards (later termed ‘Parker Morris’) that were mandated for all new social housing in the UK by the end of the 1960s, but abolished just over a decade later in 1980. Recently these standards have risen back to prominence in a number of emerging housing standards, alongside the same desire to build new housing that is truly forward thinking...

WFGA: a Welsh perspective on the future of housing

Existing and emerging drivers for ‘better’ housing include increasingly stringent limits on energy consumption and CO₂ production, and an increasing aspiration for quality of placemaking, design, workmanship, fuel efficiency and longevity. The Well-being of Future Generations Act (WFGA) came into force in Wales during April of 2016, and demands that all future Welsh Government (WG) activities prioritise long term gains over short term expedience. When we were commissioned by WG to investigate the potential of alternative approaches to inform and improve housing delivery in Wales, one of our first actions was to translate the new Act’s seven well-being ‘goals’ into a set of aspirations that are specific to new housing:

A globally responsible Wales	Setting higher standards – reduced carbon footprints and energy-positive communities
A prosperous Wales	Developing an integrated all-Wales supply chain using local resources and a sustainable economy
A resilient Wales	Future proofing with long term flexibility, adaptability, ecological value and climate resilience
A healthier Wales	Reduced pressure on the health service through homes that promote physical and mental wellbeing
A more equal Wales	Eliminating household poverty by delivering affordable housing for all
A Wales of cohesive communities	Stronger neighbourhoods that support co-housing, self-build and cohesive communities
A Wales of thriving culture and language	Promoting diversity through Wales’ unique cultural heritage, context and landscape

Figure 1. Aspirations for housing in Wales, drawn from the Well-being of Future Generations (Wales) Act.

The MORE | BETTER study

There is a clear need for diverse, high quality, low energy housing in Wales that is not being met, and is not likely to be met through established methods (PPIW, 2015). Key factors limiting the supply of new homes include the availability and financial value of land, the cost of building new homes to contemporary standards, and the limited flexibility of approaches adopted by a relatively small number of national housebuilders, who dominate the supply of housing in the UK, but are increasingly unlikely to operate throughout much of Wales. Less is known by the industry at large about the range of alternative approaches to house-building that exist in the UK, some established and others that are emerging. Some of these approaches relate to construction techniques, others to delivery pathways (including commissioning and procurement). Each has particular benefits and limitations. Together, they could significantly increase our national capacity to build more homes, better.

The More | Better report (Green et al., 2017) was commissioned by Welsh Government’s Homes and Places division, to inform decision-making by commissioners of housing in Wales. It provides thirteen themed essays¹ from expert contributors coupled with a comparative study of thirteen ‘best practice’ case studies. Together, they describe the complexities inherent in housing delivery, and analyse the potential of alternative approaches to realise wider benefits. The report concludes that there is no single silver bullet to ‘solve’ the housing crisis, but that *more, better* housing could be produced through a combination of innovative delivery pathways and construction techniques, along with a wide range of socio-economic and environmental benefits. The report was presented at the Innovative Housing Conference in Cardiff (CHC, 2017) and accompanied an announcement from Cabinet Secretary for Communities and Children Carl Sargeant that WG will invest £20m in an Innovative Housing Programme, commencing in 2017 with support for a first phase of innovative new homes across Wales.

¹ Themes include Standards (Passivhaus, FEEs / zero carbon, Living Building Challenge), Thinking Local (cooperation makes housing better, better buildings better resources), Making Places (accommodating growth, edge of settlement) and Building Alternatives (commercial alternatives, modular, open source and DDM).

Findings 1: exploring BETTER | benefits and considerations

The More | Better project assessed a range of alternative approaches that included both delivery pathways and construction techniques. Each approach was found to have distinct limitations and potential benefits (fig. 2, below). Some benefits impact on project **delivery** (eg. affordability, reduced site time, fewer defects). Others relate to the development **in use** (eg. reduced fuel bills, lower carbon footprints, energy generation, increased flexibility / adaptability). A third category of **contextual** benefits are wider ranging. Some approaches lend themselves to intensification of existing neighbourhoods, or could deliver higher quality, even zero-defect, building. Locally centred approaches establish opportunities for local training, and promote the use of local materials and resources. Other approaches reduce the specialist skills involved in construction, increasing applicability and putting the power to develop directly into the hands of communities. However, unless these approaches are delivered at scale in a coordinated way, their full benefit will not be realised.

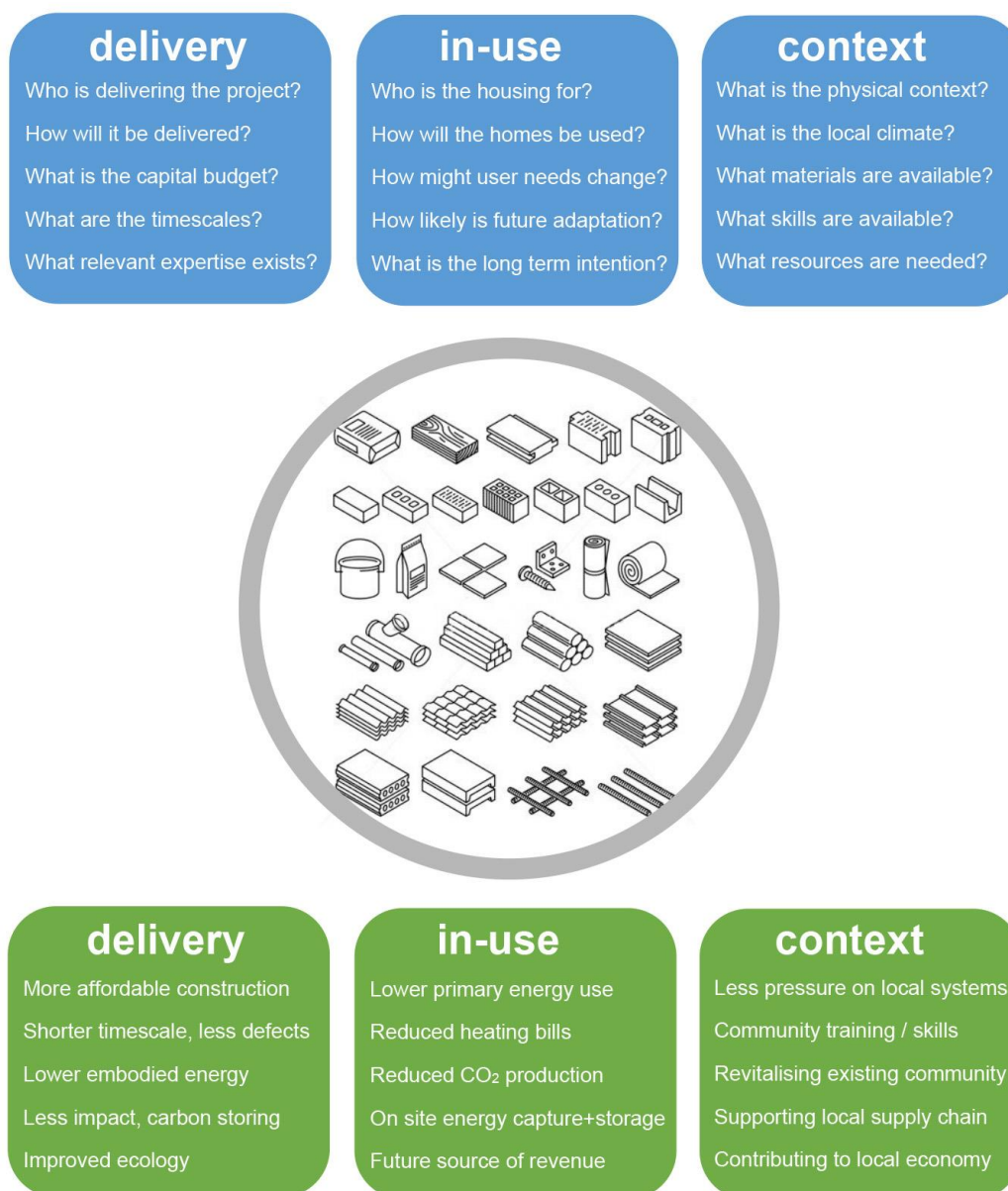


Figure 2. Identification of 'considerations' (blue) and 'benefits' (green) inherent in alternative approaches.

The More | Better project compared seven alternative construction techniques in use. Again, each was found to have distinct limitations and potential benefits, outlined in fig. 3 below. These have been grouped into four broad areas: building performance, design (form), materials, and fabrication. Using this matrix, construction techniques can be assessed for their suitability on a project by project basis.

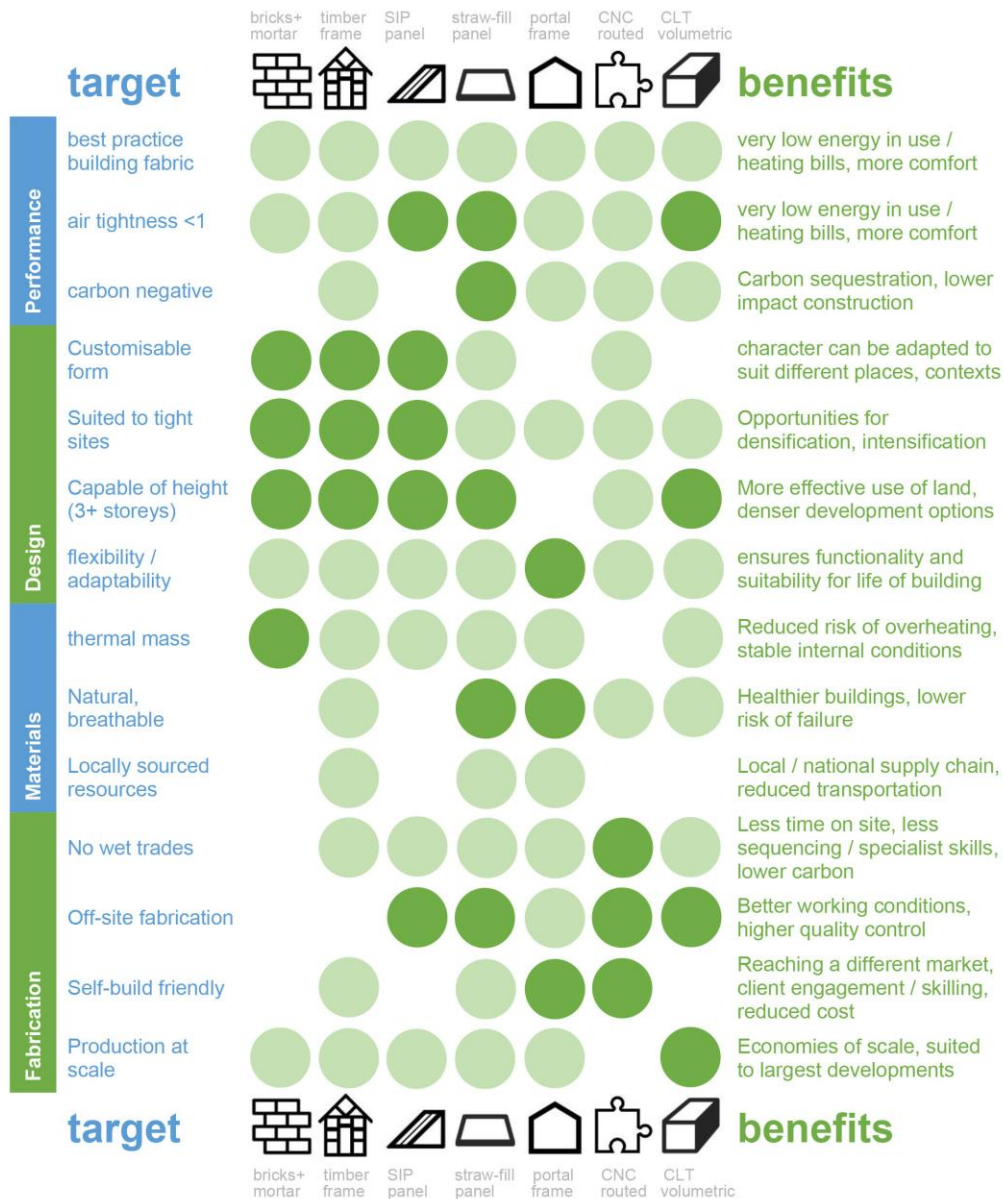


Figure 3. Mapping of 'possible' (light green) and 'delivered' (dark green) benefits by construction technique.

Performance: All case studies adopted a fabric first strategy, but to differing degrees. Thermal performance of the building envelope in line with Passivhaus standard are achieved by most of the case studies, typically achieving U-values of at least 0.15 W/m²C for walls and roofs, while floors are more varied. Simple, compact building forms are often exploited to make higher standards more affordable. Glazing performance is the most varied, primarily due to the higher cost of better performing glazing products. The case studies all achieved, or propose to achieve, air tightness of no more than 4 air changes per hour@50Pa, but with a considerable range in the values achieved on site. Some construction techniques (SIP, CLT volumetric) are able to guarantee very low air leakage rates. As a result of these measures,

thermal performance is improved between 12% and 35% over target fabric energy efficiency standards (TFEEs, from SAP 2012). When renewables are also taken into account, improvements in performance range between 15% and >100% (TER, from SAP 2015).

Design: Some of the case studies utilise construction techniques that are prescriptive in terms of built form. Two of the systems that are suited to self- and community- build projects are limited to simple mono- or dual pitched forms, and have not yet been constructed beyond two storeys. In contrast, other techniques are highly flexible; one case study demonstrates that the same system is capable of two storey row houses, four storeys town houses and ten+ storeys apartment blocks. Techniques based around large modules, including rigid closed panel systems and volumetric systems, are not suited to tight or awkward sites. There are also implications in terms of character; many of the benefits around programme, cleanliness, and carbon are diminished if the buildings are clad in brick or other loadbearing masonry.

Materials: Many of the case study approaches utilise timber extensively. A small number maximise the use of local timber, but most rely on imported European timber. For reasons of cost, performance and perception, currently around 85% of UK construction timber is imported (Moore, 2015); manufacturers believe that “home grown timber [is] low quality and that to ensure a reliable supply of products would involve further costs.” (TRADA, 2012). One case study in particular proposes to use low value local timber to produce higher value construction products. Timber is, of course, lauded for its carbon sequestering properties. By combining timber with other carbon-storing materials (eg straw), a number of the case studies achieve carbon negative status. Many of the case studies also emphasise their low cementitious content, resulting in low carbon footprints and reducing specialist skills. Against these benefits, few of the techniques offer much in terms of thermal mass, which will become increasingly important in offsetting cooling requirements as the environment continues to warm. A small proportion of the case studies deliver ‘healthy’ construction and breathable envelopes with anticipated health benefits for users (RCP 2016), but many of them employ rigid petrochemical-based insulants, either for reasons of utility or economy.

Fabrication: There have been a number of well-reported forays into housing using modern methods of construction, in particular off-site fabrication. Two of the case studies utilise volumetric construction. Delivered by fabricators seeking to operate at different scales and using different construction techniques, both have significant capacity to operate at scale, and deliver on the benefits expounded by *Rethinking Construction* almost twenty years ago (Egan, 1998), including reduced timescales, fewer (or even zero) defects, higher quality and improved working conditions. However, other fabrication techniques offer different benefits. Self- and community-build have scope to meaningfully reduce capital costs (see following section), while the use of locally sourced materials and resources, including skills training, labour and capacity (for pop up factories, for example) unlocks a range of wider economic benefits. Participatory fabrication also moves housing away from the ‘finished’ architectural product, to better “take into account precisely the unexpected.” (Habraken, 1999)

Findings 2: Delivering MORE | cost versus value

According to BCIS data, the cost of new housing in the UK is among the most expensive in Europe, at around £1050/m². In the drive for better performance, historical social and affordable housing pilot projects attempting to attain higher standards (for example CfSH

level 5/6) have often done so by adapting traditional approaches rather than considering alternatives holistically, which has resulted in untenable cost increases: “...the Code Pilot programme supported the emerging trends and understanding that the cost of delivering zero carbon on site was prohibitive, and could offer serious challenges in both cost and design principles.” (BRE, 2013) For lower income communities in Wales, the prospect of purchasing new housing outright at elevated costs is unrealistic. Alternative approaches are needed, that deliver ‘better’ affordable housing without untenable cost increases.

Capital costs for the fourteen case studies are in the range £500/m² to £1500/m². At the lowest end, they did not deliver ‘finished’ buildings, only shells. Self-build construction dominated the lower cost case studies due to savings on labour (typically 25-45% of total capital costs), but with limited applicability. For the remaining case studies, the capital cost of delivering new homes by a third party remains within conventional margins of £1000/m² to £1500/m² (tier 1, below). However, it is important to distinguish between cost and value. Alternative approaches should deliver better value homes, without considerably increasing capital costs (tier 2). All of the case studies delivered thermal performance considerably better than compliance with Building Regulations requires, and consequently reduced heating bills. Other approaches propose to increase value through wider benefits such as reduced pressure on local systems (including environment and healthcare), skills provision, increased local employment, and benefits to the local economy.

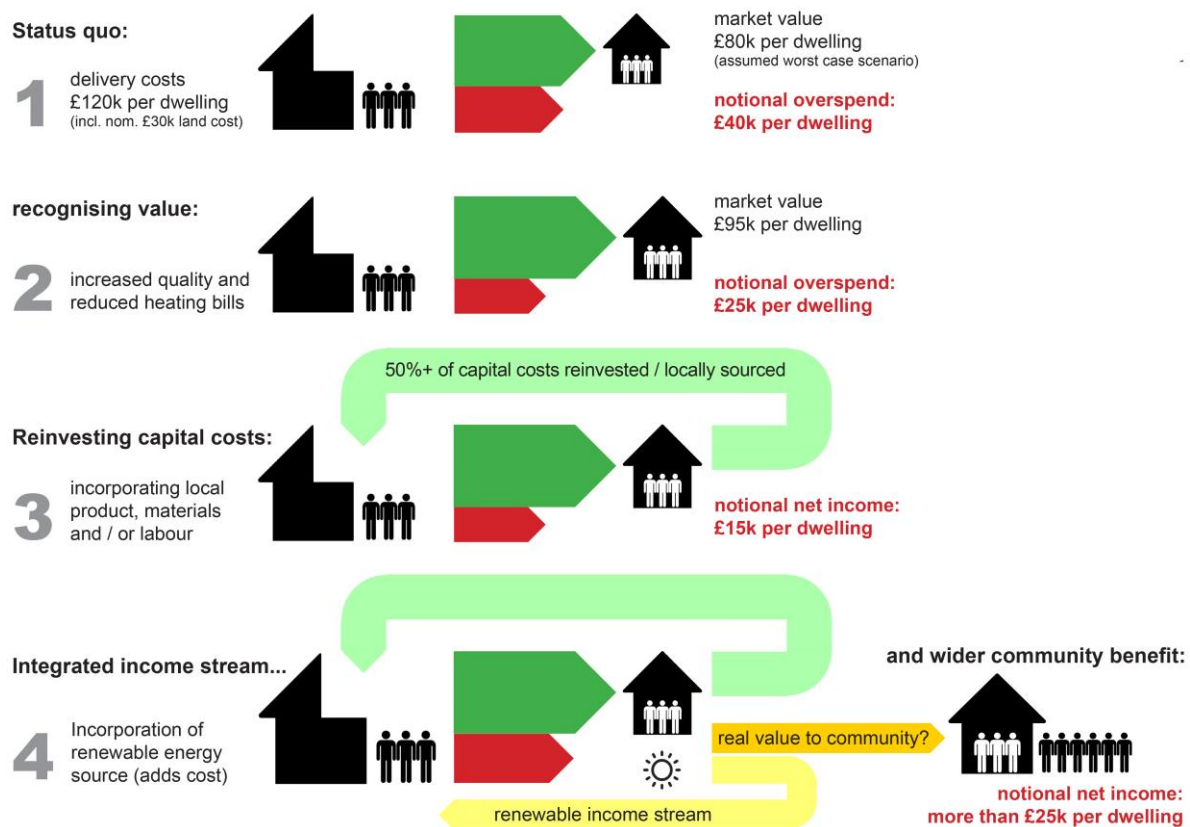


Figure 4. Four tiers of opportunities to impact upon capital costs through the use of alternative approaches.

Perhaps most importantly though, some of the benefits offered by alternative approaches have potential to directly impact on capital costs. Such savings could be generated through reduced labour costs due to self- or community- build. They could also be generated through the use of local materials or resources, whereby capital costs are

reinvested in the local economy (tier 3). However, this would break existing supply chains and necessitate incentivised local resource use, which are not simple changes to make. Finally, tier 4 represents the savings accrued by a number of the case studies, which offset capital costs or rental levels through the inclusion of an integrated renewable income stream (notably photovoltaics). Together these findings suggest that if capital costs can be considered holistically, at the level of the community or even more broadly, there is considerable scope to make new housing more 'affordable'. In isolation, alternative construction techniques cannot 'solve' the affordable housing crisis. However, combined with innovation in delivery, they could produce housing that meets established and emerging aspirations for sustainable, low energy communities, and make better quality homes accessible to households that are currently excluded from them.

A Step Change

A key assertion of the More | Better report is that Wales should lead the way by placing affordable housing and affordable warmth at the centre of national policy. The WFGA requires that commissioners of housing cease thinking purely in terms of capital costs, and encourage the industry to replace construction that drains resources with buildings that generate them – that are energy positive and carbon negative. This perspective shift requires a fundamental step change in Welsh housing standards and existing / established patterns of housing procurement. To facilitate this step change, the report proposes that Welsh Government:

- task a working group with understanding housing in the context of the WFGA.
- map existing / emerging housing standards against existing performance standards.
- liaise internationally with innovative policy makers, commissioners and practitioners.
- establish an open-access forum for anyone interested in building homes.
- map housing need, supply and opportunities in a transparent, joined-up way.
- nurture industry in Wales with potential to contribute to locally based supply chains.
- explore the intensification of lower density communities in viable locations.

Conclusions

There is no single silver bullet for the affordable housing crisis. Variations in geography, functional need, socio-economic and cultural settings demand different approaches to ensure 'appropriate' responses that make the most of their context. When a new Welsh Housing Standard emerges, it must promote diversity and equality along with sustainability and shared learning. It must be capable of adapting to emerging best practice as well as demanding excellence, to ensure that Wales has a clear pathway forwards, and a means of developing sustainably for the future. These conclusions are equally valid outside of Wales.

By employing alternative approaches, we could be constructing new homes and neighbourhoods in a more contextually appropriate way, with greater long term value. Alternative approaches have the potential to deliver affordable homes in parallel with more established methods, so long as knowledge is shared with commissioners and constructors. Different delivery pathways and construction techniques could lead to more diverse housing that is better quality, more fit-for-purpose, more affordable and more sustainable. Benefits could include the growth of employment, local supply chains, greater long term resilience, and renewable energy infrastructure as a source of income. The creation and maintenance of sustainable communities could provide a new focus for post-industrial settlements, facilitating joined-up development that works at a local level. If we are to rise to the challenge

of the housing crisis by constructing a legacy of homes that future generations consider to be a blessing and not a burden, the correct standards, incentives and monitoring must be put in place to encourage all existing pathways, along with some that do not yet exist.

Future research

The work conducted to date was conceived as an incubator for further research. The success of More | Better lay in the frank and open contributions offered by a broad church of collaborators. The longer term intent is to deliver a relevant, current resource for key stakeholders involved in housing delivery, working within Wales and elsewhere. For this to happen, the collaborator network must grow, supported by an increase in the depth of investigation, and a rigorous methodology for collaborative analysis. When conducted through an open protocol, this should build the kind of resource that is needed by the industry at this time.

Welsh Government is in the process of supporting the first in a series of phases of innovative housing projects, to learn in a truly open way about innovation, to inform discussion around the type of homes that should be supported in the future, and to direct the shape of the emerging Welsh housing standard. A key next step is identifying, and possibly establishing, the networks that will facilitate the sharing of resources among many industry stakeholders, promoting excellence and innovation throughout the industry. While the conditions that currently preclude more, better housebuilding in Wales are challenging, they are not insurmountable, nor new. As co-founder of RM-JM Sirrat Johnson-Marshall commented, faced with similarly austere circumstances following World War II:

We are forced to choose between three courses of action: The first is to build only the small amount we're likely to be able to afford. This is to acknowledge defeat. The second is to accept a drastic reduction in space and quality while maintaining the same total. This again is defeat, and why should we accept defeat in this, when we have accomplished so much in other fields – radar for instance, nuclear fission, or jet propulsion? The third course is to approach the whole problem of building afresh, with the objective of devising a fundamentally simpler technique, a technique which will give us greater beauty, comfort and value at a lower cost.

Johnson-Marshall (1960)

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