

Wessex Community Assets

Raise the Roof Project: April 2021 – March 2023

Final Report to Friends Provident Foundation



1 Introduction

WCA has for 20 years played an important role within the movement for new economic thinking and acting in the UK. WCA weaves together theory, policy and participatory practice in order to develop alternatives to the current dominant 'neo-liberal' model. WCA has been a key organisation in the development of new social investment financial mechanisms including community shares. WCA also pioneered the development of community land trusts, including building up the UK's largest enabling service for community-led housing. WCA has provided support to over 150 community economy initiatives, in fields such as local food and farming systems, renewable energy and affordable housing.

In 2017, WCA began the development of the Raise the Roof project. The Raise the Roof project addresses three inter-locking crises:

- The crisis in the housing sector across the UK, characterised by lack of affordability, lack of sustainability and lack of security.
- The crisis of livelihoods in the UK's towns, characterised by low average wages and job insecurity, lack of access to skills training, and lack of support and resources to support the start up or expansion of local enterprises.
- The ecological crisis, encompassing climate change, biodiversity loss and poor management of the natural environment, including agricultural land and woodlands, combined with pollution and resource depletion.

The Raise the Project seeks to answer these questions:

- Can we imagine new and creative designs and construction methods for the houses we want to (re-) build – and ensure they are affordable?

- Can we build or refurbish housing in such a way that we help maintain and create jobs within a resilient local economy, by supporting decentralised and democratically owned processing and manufacturing infrastructure?
- Can we draw on sustainable materials that flow out of regenerative forestry and agriculture, by supporting the cultivation of crops such as hemp and developing new supply chains for local timber?



In summary, the Raise the Roof project is developing a model for locally rooted manufacturing and the construction of affordable housing, linked to regenerative land use. The project aims to support the production of sustainable resources (e.g. timber and hemp), create local infrastructure for processing and fabrication, and enable communities to build affordable housing drawing on these local materials and local infrastructure.

Main proposed activities

- Regenerative land management:** We proposed to work with partners to support the improved management of woodlands and the cultivation of “woody fibres” such as hemp and flax, linking this to a network of farmers and an on-line platform for co-ordinating the supply of sustainable materials.
- Local enterprise infrastructure:** We proposed to develop workspace to process timber, hemp and flax into the key elements of sustainable construction materials, including panels, frames, furniture and other fittings.
- Affordable & sustainable housing:** We proposed to work with Assemble and local community-led housing groups to develop new designs for housing, and create a new co-operative to co-ordinate suppliers, contractors and the off-site construction process.

Partnership

Raise the Roof is a partnership project that emerged from research in 2017-18, exploring the potential to use local materials in construction. Initial partners alongside Wessex Community Assets were The Arts Development Company, Bridport Town Council and Common Ground. Subsequently, we have worked with Assemble Studio, an architecture practice with a national profile, Bridport Area Community Housing, which has emerged from the Raise the Roof process, and Plymouth University’s design faculty and FabLab.

2 WCA and the 4D Economy

WCA's work contributes to the development of economies that are more diversified, decarbonised, democratised and decentralised. Friends Provident Foundation has proposed the following interpretation of these terms:



The Raise the Roof addresses all four areas:

- Community-led affordable housing, the creation of local jobs and access to sustainable materials are all required for a diversified economy that has equity, solidarity and social justice at its heart.
- The construction industry is a key contributor to climate change, so the use of materials that sequester carbon, such as timber and hemp, and the design, construction and retrofit of buildings with a low carbon impact is essential.
- The construction industry is highly concentrated, with power resting with a small number of very large corporations. There is therefore a crucial need for the development of democratic businesses – in particular community benefit societies and cooperatives – which can give local communities greater power, ownership and control.
- These democratic businesses need to be locally based, but linking their decentralised nature with an emphasis on being open and connected to potential partners elsewhere.

In a report on “Building Community Resilience”, prepared for the Friends Provident Foundation¹, WCA addressed the 4D economy through the lens of local economic resilience. The report defined the economy as a system that transforms resources such as energy, finance, materials and knowledge into goods and services. There is a ‘formal economy’ where products are bought and sold, a public sector economy where goods and services are funded by taxation, and a ‘core economy’ comprising households and civil society that operates outside the market. There is also a range of resources provided by the commons (Raworth 2017²; Ostrom 1990³).

¹ Crabtree, T. & Sander-Jackson, P. (2017) *Building Community Resilience*. York: Friends Provident Foundation.

² Raworth, K. (2017). *Doughnut Economics*. London: Random House.

³ Ostrom, E. (1990). *Governing the Commons: The evolution of institutions for collective action*. Cambridge: Cambridge University Press.

A common definition of resilience is “the ability of something to return to its original shape after it has been pulled, stretched, pressed, bent, etc.”⁴ This might then be applied in a community context to mean “how stable is a community in the face of changing circumstances and challenging dynamics.” However, human societies, of whatever size or complexion, are never “stable” and in equilibrium. They are **complex** – there is a constant weaving together of a large number of “agents” (people, organisations, non-humans, etc) and dynamic forces (economic, social, environmental, political). They are also **adaptive** – there is a constant process of responsiveness which leads to the emergence of new patterns, flows and events.

The Friends Provident Foundation commissioned the New Economics Foundation to undertake a review of the “resilience” literature, and they (Greenham et al, 2013, p.12) come to a similar conclusion:

The conception emerging from the literature that is particularly applicable to human (socio-economic) systems in the broadest sense is that of an adaptive or evolutionary process. This is exemplified in the ability to self-organise, innovate and learn. According to this conception, the most valuable quality of a system is an ability to adapt to changing external circumstance or shocks in a way that maintains functionality, including supporting well-being and social justice outcomes, rather than to merely rebound quickly to its previous state.⁵

If local economies are thought of as systems that have different degrees of resilience, then we need to have some understanding of the dynamic forces they are subject to. From an economic point of view, people in localities of whatever size need to have access to a range of goods and services. Analyses of household and public expenditure indicate that these fall mainly into the following eight categories:

- food
- energy
- housing
- care and health
- education
- entertainment/culture/sport
- communication
- transport

Two ends of a spectrum can be identified:

(a) The local economy may produce none of these goods and services itself, instead buying them in from outside the area. This would require transfer payments from government (e.g. welfare benefits and state pensions) and funds brought in by residents (e.g. second home owners, visitors and retirees) rather than earned locally.

(b) A local economy might produce a significant percentage of these goods and services itself. This would imply a local economy made up of a wide range of employment in a variety of sectors. There might also be a high ‘local multiplier’, with local firms and employees spending a significant percentage of their earnings in other parts of the local economy, thus multiplying up local incomes and employment.

⁴ <http://www.merriam-webster.com/dictionary/resilience>

⁵ <http://www.friendsprovidentfoundation.org/wp-content/uploads/2013/12/nef-Mapping-Economic-Resilience-1-report.pdf>

In reality, communities will find themselves somewhere along this spectrum, but it seems clear that for a community to enjoy high levels of well-being for the widest range of citizens it makes sense to try to move towards a more vibrant and diverse local economy as described in (b) above.

However, trends over the last 30 years have made this more difficult and this can be conceived as a challenge of maintaining resilience in the face of dynamic external factors. Before asking what might help a community to be more resilient in the face of these challenges, we need to understand more about these dynamics.

The provision of goods and services depends on combining various factors of production, and in economic theory these are land, labour, money and technology. Recently, knowledge and social capital have been added to this list. All of these factors have been subject to great change over the last 30 years and this has affected the ability of communities to remain resilient and ensure the well-being of their citizens.

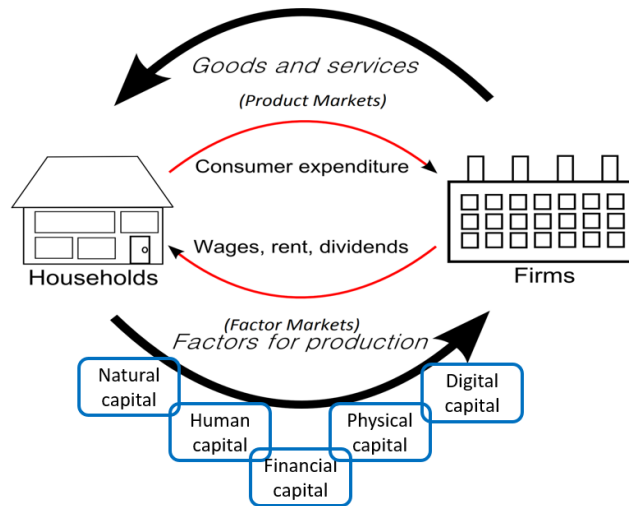
The following table explains these challenges in further detail:

Factor of production	Key trends
Land	The cost of land, for agriculture, housing and workspace, has risen dramatically over the last 30 years, well in excess of inflation. Land has become a speculative asset, with prices driven up by “easy” credit, a deregulated financial sector, subsidies and tax breaks, and land-banking by regulators. This land cost does not relate to the land’s capacity to produce marketable goods, nor to the state of health and residual fertility of its soil.
Labour	The labour market has shifted towards services and away from manufacturing and land-based industries. Employment has become more “precarious” with more part-time, low income jobs and zero hours contracts becoming prevalent. See also technology below.
Money	The financial sector prioritises the financing of land and property while small businesses can find it difficult to access finance for start-up or expansion. This has an impact on local economic development.
Technology	The UK economy has slowly been “outsourcing” its making of products, and there has therefore been a decreasing emphasis on the importance of technology for manufacturing. There are two other trends worth noting in relation to technology. On the one hand, some technology is becoming smaller and less costly, and this is allied with the development of open source hardware, 3D printing etc. This opens up the possibility for “distributed manufacturing” at a local level (albeit this is in an early stage of development). On the other hand, there is the trend towards automation due to the developments in robotics and artificial intelligence/computer learning, with estimates that 40% of jobs will be lost in the next 10 – 15 years.
Knowledge	This relates closely to technology, but on a positive note there is greater availability of information, education and data through the internet, including “open source” knowledge and “peer to peer” collaboration.

Social capital	Studies of successful local economies have demonstrated the importance of e.g. trust, communication, networks and places for gathering as key factors. However, maintaining this social capital is under pressure in all sizes of community.
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Before explaining in more detail WCA’s response to these challenges, it is important to understand more about these dynamic forces impacting on local economic resilience. This understanding also informs our approach to building 4D economies.

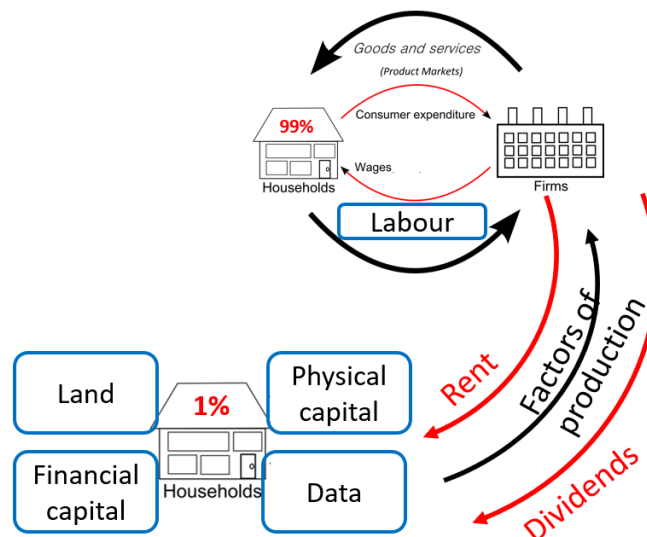
A standard economic textbook will tell you that an economy is based on a simple flow of resources and income between households and firms.



However, this is to ignore the fact that there are two types of household:

- The 99% - sell their labour and rely on *income*
- The 1% - own the other factors of production and their livelihoods are based on *wealth*

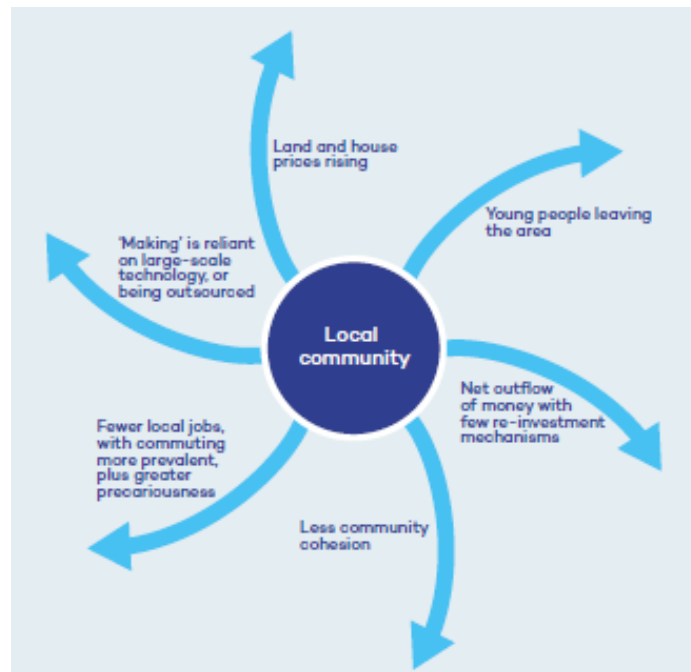
There are four types of wealth – land (and privatised natural resources), physical capital, financial capital and “data” (intellectual capital and the platforms that harvest digital material). So a more accurate representation of the economy would be:



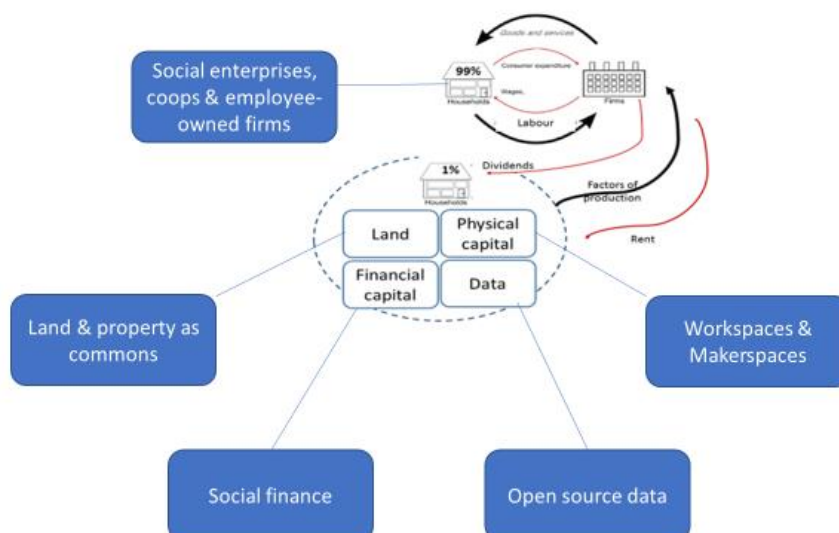
Of course a static picture does not accurately represent what is happening over time, because the economy is a dynamic system and, as Thomas Piketty points out⁶, the value of wealth grows faster than incomes. So the 1% - in a neo-liberal, low tax, low re-distribution context – see the value of their land, physical capital, financial capital and data grow over time.

Moreover, there is a spatial dimension to the above dynamic, as wealth flows from “peripheral” areas of the UK to large cities and the south east of England:

The diagram below illustrates the types of challenges faced by people living in localities served by WCA:



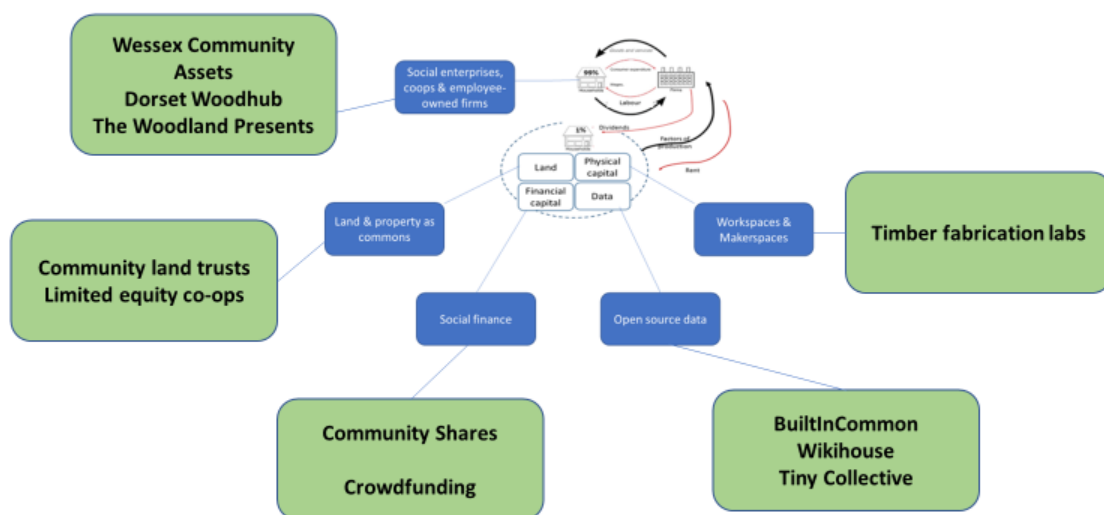
Taking the diagrams above, we can then ask what we might do to push back against the forces of commodification. We suggest that there are 5 key responses that have become central to efforts to build the social economy:



⁶ Piketty, T. (2017). *Capital in the twenty-first century* (A. Goldhammer, Trans.). Belknap Press.

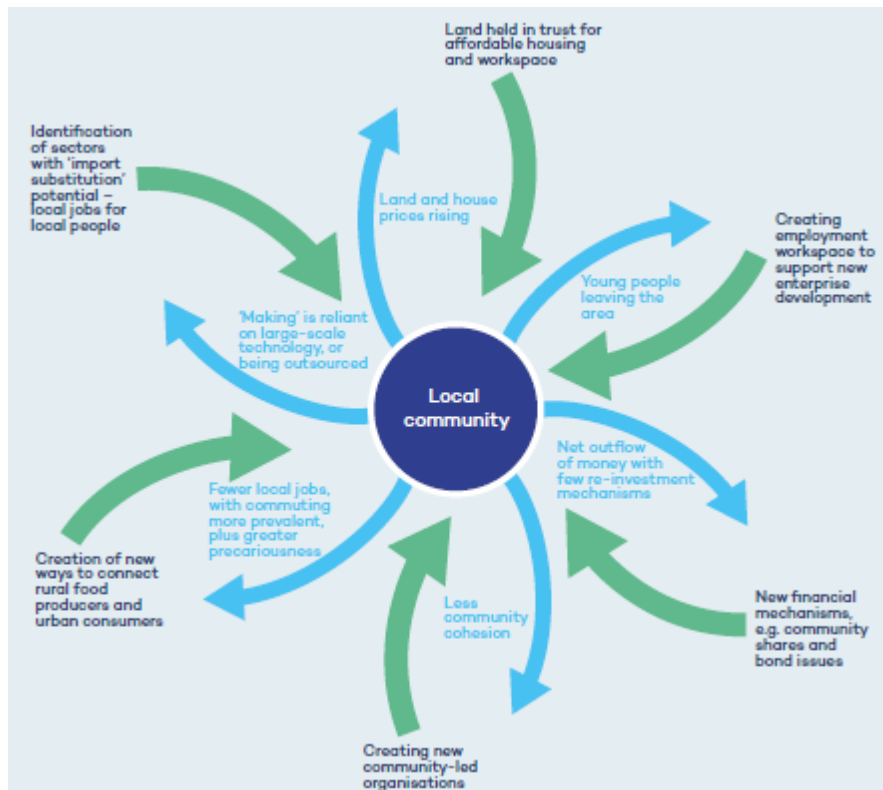
- Households can seek to increase their incomes by taking ownership and control of companies, through the creation of social enterprises, co-operatives and employee-owned firms.
- We can seek to hold land in the commons, through the creation of asset-locked trusteeship arrangements.
- We can work with social investment intermediaries or create our own financial mechanisms using community share offers and crowdfunding.
- We can seek to utilise open source data, such as that being developed in the housing domain by Wikihouse or BuiltInCommon.
- We can create physical capital in the social economy such as makerspaces and co-working spaces.

Organisations such as Wessex Community Assets are working with a range of partners to develop an alternative social economy eco-system, based on building the commons and capturing rent. The challenge will be to bring a range of approaches together in order to address all the ways in which the neo-liberal economic system is undermining the well-being of communities:

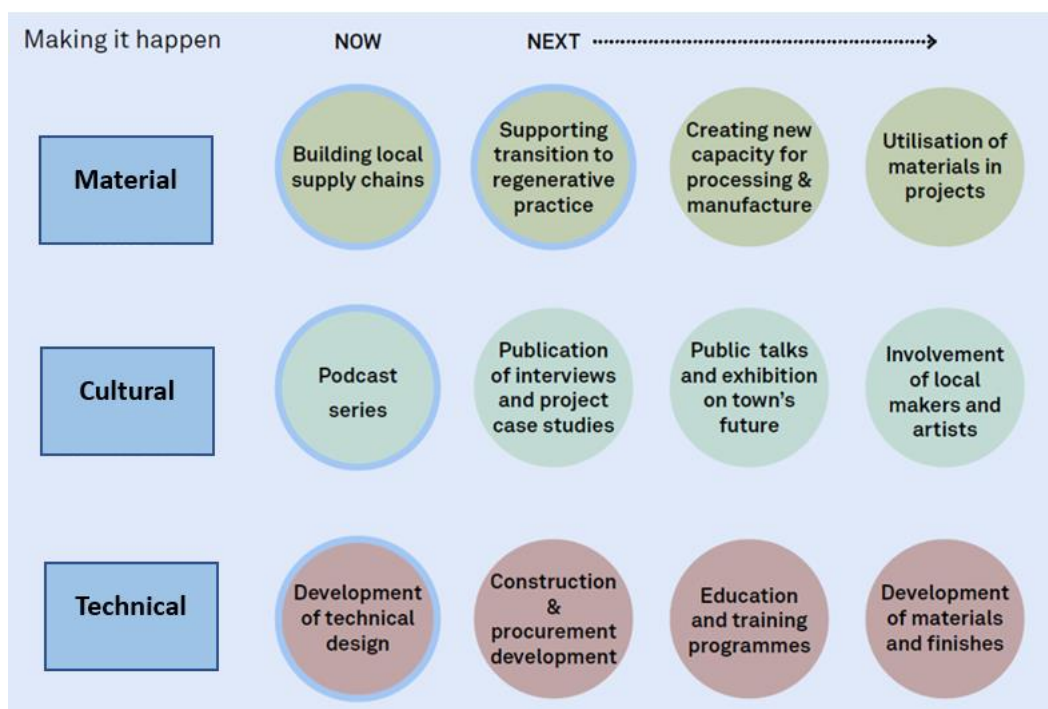


1. Reclaiming ownership and control of companies, through the creation of social enterprises, co-operatives and employee-owned firms.
2. Reclaiming the commons, through the creation of asset-locked land trusteeship arrangements.
3. Reclaiming finance, through the development of social finance: We can work with social investment intermediaries or create our own financial mechanisms using community share offers and crowdfunding.
4. Reclaiming our data: Contributing to, and accessing, open source data, such as that being developed by WikiHouse or BuiltInCommon.
5. Reclaiming physical capital, including workspace and equipment.

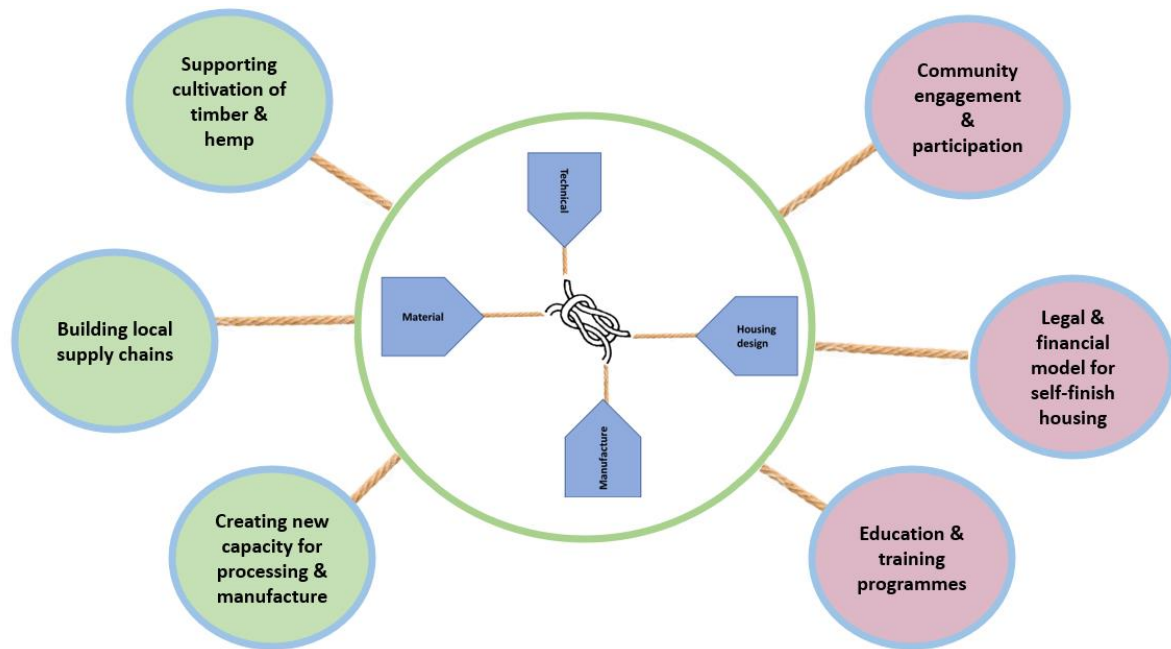
The diagram below illustrates this approach for a hypothetical community:



This analysis of local economic resilience and its links to the 4D Economy provides the theoretical underpinning for the Raise the Roof project. At a practical level, WCA had worked with partners and Assemble Studio from April 2019 to March 2021 on the first exploratory phase of Raise the Roof. Through this work, which was largely conceptual, we identified the need to address three key dimensions – material, cultural and technical.



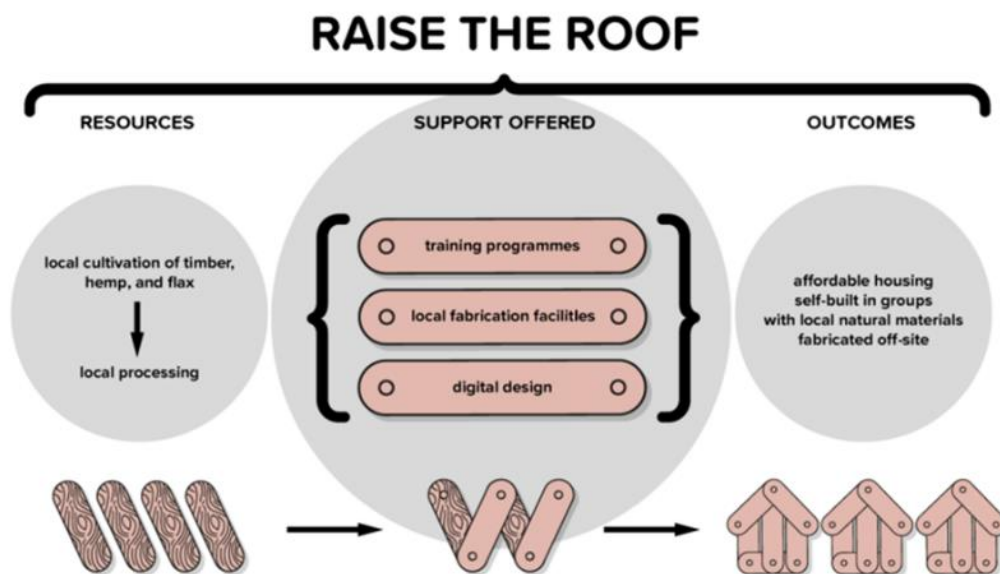
This was then evolved further into a set of areas that would need to be explored during a second phase of Raise the Roof:



The following outcomes for Phase 2 were proposed:

	The challenges we are addressing	The outcomes we are seeking
Regenerative land management	<p>The ecological crisis:</p> <ul style="list-style-type: none"> - Climate change - Biodiversity loss - Pollution, including from intensive agriculture - Resource depletion 	<p>New models of regenerative land management that can address the interlocking challenges we are facing. Increased awareness, new approaches to land management, and a new supply of appropriate raw materials.</p>
Local enterprise infrastructure	<p>The crisis of livelihoods:</p> <ul style="list-style-type: none"> - Fragile local economies - Job insecurity - Lack of skills & facilities to create regenerative & resilient local economies 	<p>Providing infrastructure and employment opportunities to link together regenerative land management & sustainable construction materials with community led housing initiatives.</p>
Affordable sustainable housing	<p>The housing crisis:</p> <ul style="list-style-type: none"> - Lack of affordability - Disparity between house prices and average wages - Lack of security - Lack of sustainability 	<p>New models to address the housing crisis, providing a greater range of options for community led housing groups, and leading to higher % of affordable & sustainable housing.</p>

3 The Raise the Roof Project April 2021 – March 2023



3.1 Regenerative land use

There have been two main areas of activity:

- Working with local farmers interested in growing hemp.
- Working with local woodland owners.

3.1.1 Hemp

Hemp is a multi-functional product with positive environmental benefits, including soil improvement and carbon sequestration. As a break crop in a regenerative farming system, hemp has the potential to solve many farming issues, while also providing material that can support greener economic development, such as zero carbon construction.

The Raise the Roof Hemp Group was formed in July 2021, to explore issues such as sowing, harvesting and processing hemp, and brings together 6 local landowners / farmers who have expressed interest in including hemp as part of their farm business plan. The Hemp Group have signed a partnership agreement to cover their involvement in the RtR project.

RtR was invited to submit a two stage application to the Farming in Protected Landscapes fund administered by Dorset AONB. Both bids were successful, with the initial stage covering the development costs of setting up the trials; the second stage covering the costs of baseline surveys, sowing seed, harvesting, processing and storage.

The RtR Hemp field trials aim to support a collaborative approach to researching and field testing the re-establishing Hemp as part of the transition to a more regenerative agriculture in West Dorset. As a relatively new and innovative crop local farmers will need to be convinced that it has a positive place in their future farm business plans and so to a certain extent the switch to including hemp in crop rotations needed to be 'de-risked' in this first year.

The RtR Hemp Field Trials aimed to understand the pros and cons of hemp growing and sought to rapidly develop agronomical approaches suited to the Dorset AONB landscape and local market opportunities. Agronomic principles pertaining to industrial hemp as a field crop will be explored, including the cultivation, management, and harvesting of hemp for fibre.

Phase 1 August 21 – March 22 Research and Development

Monthly meetings were held to connect the Hemp Group to national expertise and practice around growing, harvesting and processing hemp. Industrial Hemp is a controlled crop and the farmers needed to apply for licenses to be able to undertake planting in 2022. Support was provided to:

- Access research on methods of hemp cultivation practices for optimal crop quality and yield;
- Agree a series of field trials across different farm types;
- Secure licenses for all farmers looking to participate in the Hemp field trials;
- Bulk buy seed and acquire any necessary machinery to undertake the field trials.

Phase 2 April – December 22 Field Trialing Hemp in West Dorset

Three Members of the Hemp Group successfully secured cultivation licenses and sowed approximately 10Ha of Hemp in early May 2022. Each field trial plot was monitored and evaluated for the following attributes:

- Crop establishment;
- Crop productivity;
- Harvesting practices and issues;
- Environmental benefits; carbon sequestration, water, soil.



Three Farm Visits were arranged to help share learning from the field trials:

- July 2022 - Licensing, drilling and germination
- Aug 2022 - Harvesting
- September 2022 – Processing

A final evaluation report was co-produced with participating farmers to share more widely. This report should be of great value to others farmers in the Dorset AONB and beyond and could be a

significant driver for greater use of hemp as a natural material for local construction projects. Two short documentary films was also commissioned from a local community interest company⁷, which include details of the cultivation, harvesting and processing as well as interviews with farmers involved in the trials. A presentation was also made to the Oxford Real Farming Conference in January 2023.

The hemp used for construction is *cannabis sativa* or “industrial hemp”. Unlike marijuana, it has virtually no psychoactive components. Nevertheless, it is treated as a controlled substance, and a licence must be secured from the Drugs and Firearms Agency of the Home Office. This is a protracted, complicated and expensive process, and we were told that notification would be received after the point at which seed needed to be ordered and planting dates agreed. Nevertheless, licences for three farmers were secured, and we took the risk of purchasing seed in advance of approval, so although the sowing date was later than would have been ideal, the three fields were sown in May, followed by enough rain to assist germination.

However, for the remaining 12 weeks there was virtually no precipitation, accompanied by periods of extremely high temperatures. By the end of the summer, one of the fields had grown so little that the decision was taken to mow it off and plough the hemp back into the soil.

The two other fields were also disappointing, growing to only half the height we had anticipated, and this also affected the potential volume of shiv. There was also uncertainty about the balance of stalk and seedhead, which could affect the two methods of harvesting - in one case, using a forage harvester to chop up the hemp in the field then take it to a silage clamp where it would be stored anaerobically until needed. The second field was cut at the base of the stalks, using a tractor with a disc mower, and the hemp then left to “ret” in the fields before baling. Retting begins the process of decomposition, particularly of the thin outer layer, which then makes the process of separating fibre from shiv (“decortication”) easier.

Although it was an extremely challenging time to be growing hemp, it was striking that everyone who encountered the hemp was affected. During the summer when most fields were scorched yellow, the field of hemp retained a vivid green. Moreover, walking into the fields, brushing past the crops, the hemp add a distinctive smell which everyone commented on - it seemed to leave a smile on the faces of all who encountered it.



⁷ <https://vimeo.com/user169411709>

Those smiles turned to consternation, however, when it came to harvesting the hemp. On one of the farms, two attempts were made to harvest the hemp using a standard Forage Harvester, a large and very expensive machine normally used for maize. The first attempt was abandoned due to wet conditions and a concern that the moisture would produce effluent when the hemp was stored in a silage clamp. A second attempt was abandoned when the thin hemp stalks repeatedly clogged the Forage Harvester blades. Finally the hemp was successfully cut at the base using a single bar cutter, with the Forage Harvester then collecting and chipping the hemp into trailers for transport to the clamp. Even then, the contractor reported that collecting the hemp did pose issues of wrapping around the gearing on the Forage Harvester.



A clogged up Forage Harvester

On the second farm, it was decided that the best option would be to experiment with field (dew) retting, a process which helps to separate the outer fibre from the inner shiv. The hemp was cut using a single bar mower and left to ret for 3 weeks. The contractor raked the hemp into rows ready for baling into round bales. Unfortunately, the rows proved too large and fibrous for various baling machines. Both a square and round baler machinery ended up jammed with hemp stalks. It was possible to make one bale at a time and then clear out the surplus/ stuck hemp stalks. Any more than 1 bale resulted in severe wrapping. It took 2 hours to clear the hemp from the baler.



A clogged up baler

At the third farm, the hemp struggled to grow, due to soil conditions and the lack of rain. It was decided that the thin stalks, large seed heads together with the poor stalk growth and weed contamination meant that the crop would not be viable for processing as fibre or shiv. Hence, with some reluctance, the farmer decided to mow the field. The hemp was subsequently baled, but it is unlikely to be usable for anything other than compost.

We were concerned that the three farmers would be upset by the challenges and would not want to grow hemp again. However, what became clear, as we explored the different ways to harvest the crop, was that their work entails dealing with one problem or unexpected event after another. They seemed to take the challenges in their stride, but we were still uncertain as to whether they would want to continue the following year.

We had prepared the ground for the initial trials by inviting farmers to join a study group, we had a series of meetings, and we then got funding to do further research. This led on to securing funding to pay for the trials, and this de-risked the process financially for the farmers. However, the most significant moment in the whole process was when one of the farmers started saying: "I'm really interested in this because my grandfather used to grow hemp and told me about it. I'm fascinated by the possibility of bringing it back." This encouraged other farmers to take part. So although one aspect was "assembling" the inquiry and the funding, another crucial element was that they already felt part of a tradition that has been going on long before them.

When it came to deciding whether to undertake a second year of field trials, this continued to be a factor. Of course there is one "layer", which is the practical experience of what worked and what problems were encountered. Moreover, the demand for hemp is still low, given the challenges of processing it into usable material. If the farmers were focused just on these considerations, then the process would have been quite brittle. However, they were also focused on much longer relations - traditions of agricultural craft, of community, of industrial heritage. The farmers had also been affected by the hemp – it looks striking, it smells distinctively aromatic, it retained a vivid green colour in the summer, even when all the fields around were parched and yellow. People were drawn to walk into the crop, feeling the different textures of stalk, leaves and flowers.

So for 2023, 5 farmers have now signed up for the second series of field trials. This year we are particularly concentrating on growing varieties that produce seed for processing into oil, but that also produce fibre as a by-product. This will be used to continue the development of hemp-based materials for construction and retrofit.

3.1.2 Timber

Raise the Roof has developed, with Dorset Wildlife Trust, a woodland management group (the Wood Club), which has taken on the management of a small woodland on the Crutchley Estate near Bridport. Volunteers have been cutting overgrown hazel coppice, and also pollarding ash, with the aim of supporting greater biodiversity, tree health and also developing a supply of local timber for fuel. The cut hazel and ash is being stacked for use as firewood by volunteers.



In addition, the Raise the Roof partnership has convened, with the local Forestry Commission worker, a group of woodland owners and forestry managers, with the aim of exploring how to support local supply chains for woodland products. The group has met on a number of occasions and there is significant interest in developing a **physical platform – a Woodhub** – to support active woodland management, timber processing and greater use of local timber for local markets, including design-make and construction.

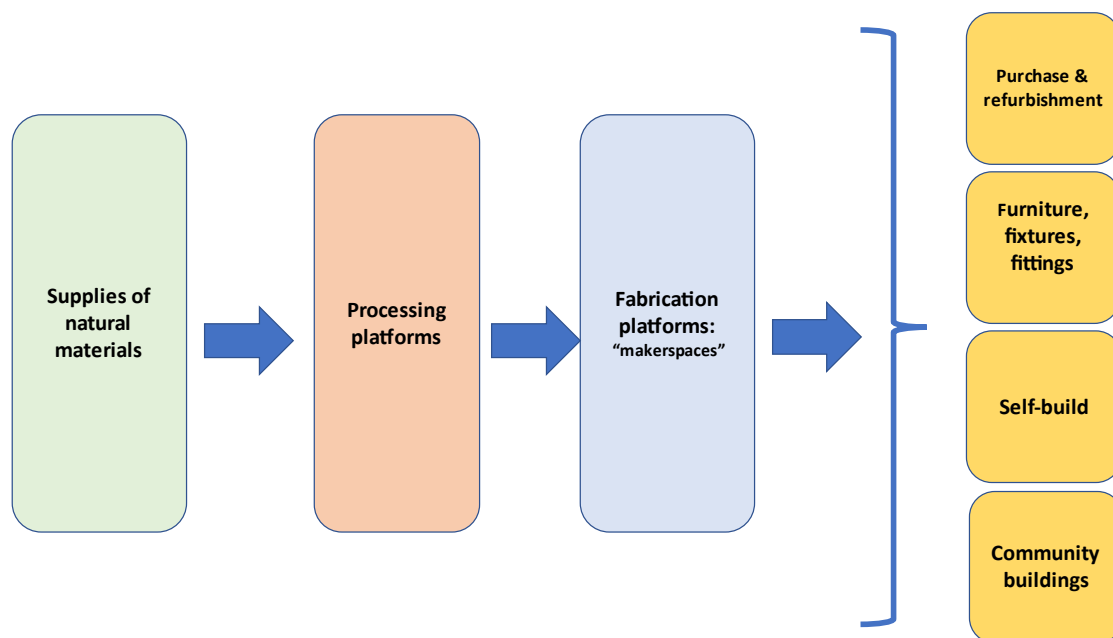
To further this idea and provide the necessary detail as to what a Bridport Woodhub would provide and how it would operate, Raise the Roof organised a programme of on-line '*connected conversations*' with a wide range of interested groups and individuals. If a Bridport Woodhub is to become a viable proposition it will need to engage with and provide benefits to businesses managing woodlands, processing wood products as well as the many end users of timber.

The latest discussions have revolved around the potential to develop and manage the new facility as a partnership with The Woodland Presents CIC – they run www.wood-lab.org in Totnes and have developed a viable model backed by on-line systems plus relevant policies and procedures. To support this, a funding application to the Forestry Commission will be submitted in May 2023.

3.2 Local enterprise infrastructure

Raise the Roof has identified need for local infrastructure, for both processing of natural materials as well as the fabrication of construction components (e.g. hempcrete panels) and other goods such as furniture, joinery, etc.

This is summarised in the diagram below:



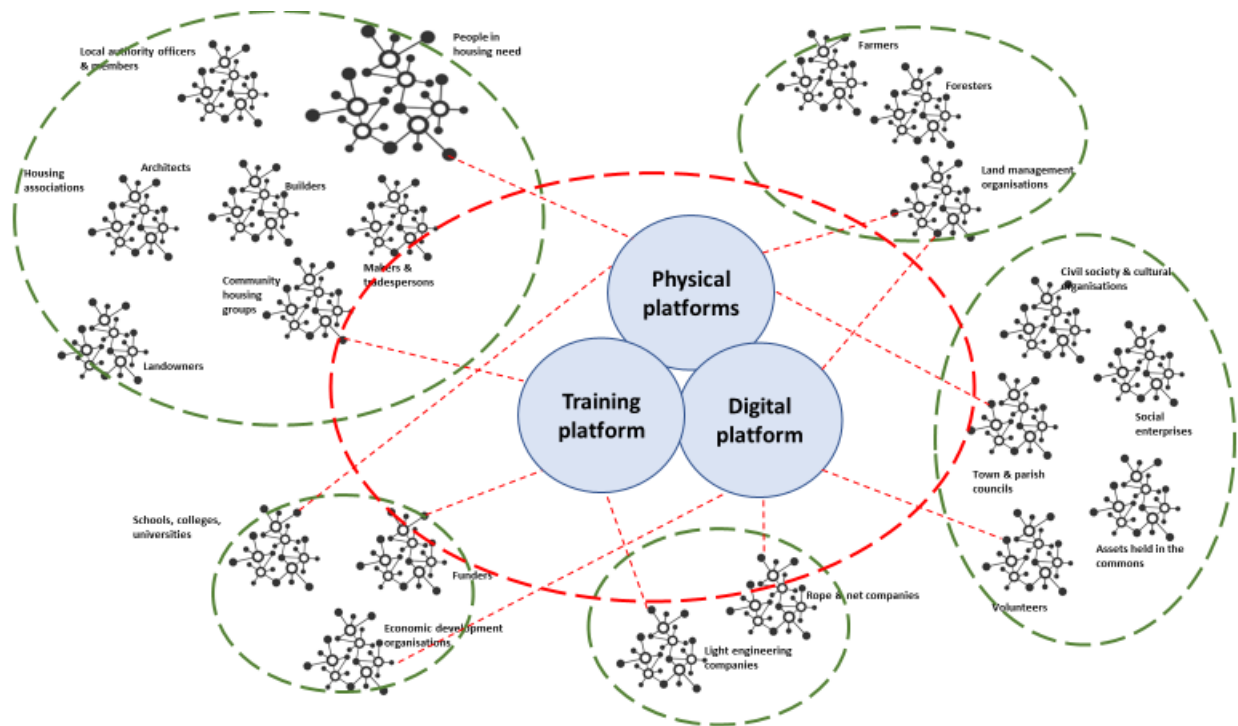
The section on timber above has already highlighted a perceived need for a “woodhub” platform. However, it is important to distinguish between the different stages of processing:

- Once trees have been felled and “brought to roadside”, they then need to be sawn, ideally at a local sawmill.
- The second stage can include some or all of a number of elements: drying in a kiln, cutting and planning, and then storage.
- The third stage is using the timber for fabrication, within a makerspace that provides access to specialist machinery, benches and specific expertise (e.g. digital design and fabrication).

These three elements can be brought together (e.g. The Sylva Centre in Oxfordshire) or kept separate. Raise the Roof is exploring the feasibility of developing second stage processing of timber alongside processing of hemp and clay, at Denhay Farm. Raise the Roof has also explored the development of a makerspace during the period April 2021 – March 2023, working with two farms to develop pilot fabrication spaces, most recently also at Denhay.

Raise the Roof proposes that physical platforms must be complemented by two additional platforms, in order to help connect together a complex local ecosystem of actors:

- Digital platforms
- Training platforms



Raise the Roof has not yet progressed the digital platform, but has made progress on the training side. The sections below provide details of the five projects that have provided the main focus for the development of the physical and training elements of Raise the Roof between April 2021 and March 2023.

Project 1

In autumn 2020, Raise the Roof had organised a sustainable construction course for unemployed people. 70 people applied and 14 were selected. The course was led by Karen Hansen and 10 of the participants were women. Funding came from the Golden Bottle Trust, Dorset AONB and Dorset Local Enterprise Partnership (the latter provided funds from the Education & Skills Funding Agency matched by the European Social Fund). The 10 day course took place over three weeks.

The aim was to construct a tiny house, which would be donated to a homelessness charity, Elim Connect, to support one of their rough sleeper clients. The tiny house had a mezzanine, and was designed to sit in small pad foundations.

During July and August 2021, Raise the Roof organised a second tiny house course, with a total of 12 participants. Karen Hansen was the main tutor, and in the second week was joined by Keith Mott (both had studied together at the original iteration of Hooke Park 30 years ago – when it was The School of Woodland Industries). This tiny house was designed to sit on a trailer, unlike the structure in the first course in 2020. Following discussions with Elim Connect, we had concluded that it would be easier to find a land owner willing to provide a home for a rough sleeper in a tiny house if it was more “mobile”. It has proved difficult to find a site for the structure, partly because of the pandemic, partly because of planning restrictions, and partly because landowners were concerned about the size, visual impact and difficulty in moving the tiny house if necessary.

The decision was also made to redesign the tiny house to be single story (i.e. with no mezzanine, which takes the structure to 4 metres) and to be moveable on a trailer (but able to be lifted off when

in a semi-permanent position). WCA subsequently bought a trailer and planned to rebuild the first tiny house in January-February 2022 (see project 3 below).



Project 2

Raise the Roof secured funding, with Plymouth University's Design faculty and Digital Fabrication Lab, from the Engineering & Physical Sciences Research Council's Connected Everything Fund to explore the feasibility of linking digital design and fabrication with the use of local natural materials such as timber, hemp and clay. This builds on initial work undertaken with Assemble Studio on initial technical designs for timber & hemp panels.

In October 2021, Raise the Roof organised a workshop for sixth formers at Bridport's secondary school (the Colfox Academy). The workshop was delivered by Melissa Mean from Knowle West Media Centre's We Can Make project in Bristol and Danae Parissi from Automated Architecture (AUAR). The aim for the workshop was to experiment with the digital design and fabrication system that AUAR have developed.



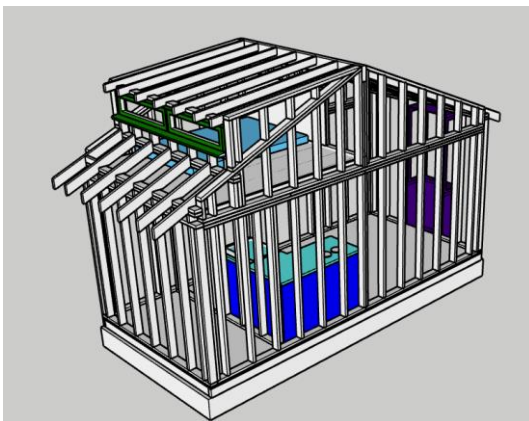
The new construction system uses a set of large plywood "cassettes", similar to very large Lego bricks. The cassettes can be made either with a CNC machine or through robotic fabrication. They can be joined together to make a complete house.



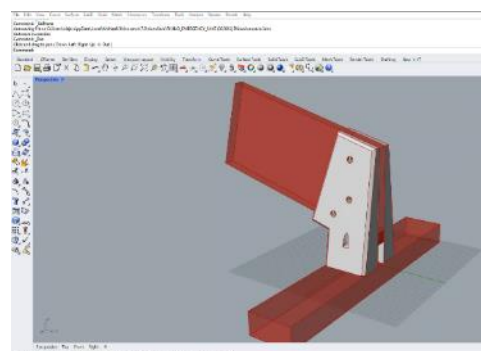
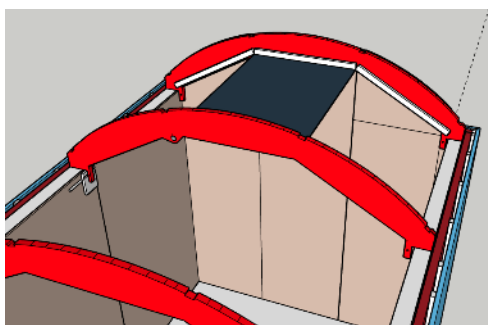
Raise the Roof and Plymouth University were interested to learn more about the digital co-design tools that AUAR have developed, and to see whether the plywood can be replaced with local timber.

Project 3

This led on to the third project, focused on re-designing the original tiny house to be single story, and on a trailer.



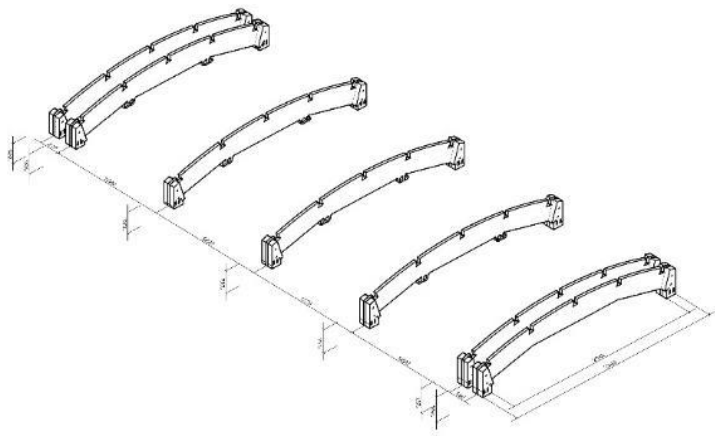
In addition, the aim was to digitally fabricate a new roof structure, using CNC machines in Plymouth's Digital Fabrication Lab.



The rebuild process has been led by Jack Cardno, who recently finished working for the Architectural Association for two years at Hooke Park. He worked with our colleagues Alejandro Veliz Reyes and

Alexandra Carr at Plymouth University on the digital re-design. The roof elements were then fabricated in the Immersive Digital Lab.





CNC machining of the roof truss connectors



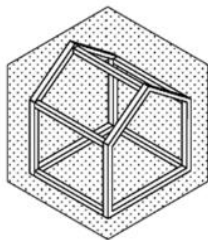


Project 4: Development of timber-hemp panels

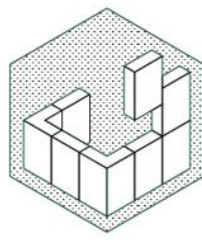
The next stage of the work with Plymouth University has been to find ways to incorporate natural materials into digital fabrication. A great deal was learned through the previous project, in terms of the challenges of co-design and deploying digital fabrication tools.

There are a number of new systems emerging which could support distributed fabrication of housing components. However, they use materials that are imported and/or are not sustainable such as plywood sheeting. There are two key approaches:

Framed with Cassette Infill Panels



Structural Timber Cassettes



Working with our partners at Plymouth University, we wanted to replace sheet materials with locally available timber, such as ash, spruce and larch. This would then form the basis for panels which could be in-filled with hemp and a binder (lime or clay). It is very unusual to introduce natural timber into a FabLab context, so the project has begun to receive considerable interest.

For this project, Raise the Roof created a new workspace at Denhay Farm, in an old dairy barn:



Project 5: Partnership with Foundry Lea Skills Academy

Raise the Roof has been in discussion with Barratts and Vistry about developing a partnership with the proposed Skills Academy at Foundry Lea, the 760 home development which will begin on-site next to Bridport in late 2023. Due to planning issues, the start has been pushed back twice, and now the Skills Academy will not begin until summer 2024, so that has delayed the proposed partnership.

Vistry Partnership

Skills Academy

Local skills investment

The Foundry Lea consortium will support the local economy through the use of local suppliers, craftspeople and tradespeople in the delivery of this new community.

Investing in local skills development is a driving principle for Vistry Partnerships, which will bring its innovative 'Skills Academy' to Foundry Lea, supported by Barratt David Wilson.

The Skills Academy provides an on-site learning environment for local people to develop practical skills in construction over a 4- 6 week training course. The Skills Academy will then support learners into work by offering work placements, full-time employment and apprenticeships.



Raise the Roof has proposed co-locating a Woodhub with the Foundry Lea Skills Academy. This would offer the opportunity for a co-ordinated training offer in Bridport to provide:

- Training courses designed to give learners basic theoretical and practical training in building skills,

- Modules to offer carpentry and joinery for simple timber construction,
- Modules focused on the use of zero carbon materials sourced locally such as timber, hemp and clay,
- Further options of learning modules covering modern methods of construction, including off-site fabrication and digital design and manufacture.

Raise the Roof has also proposed that initial cohorts of learners could be engaged in building prototype Woodhub structures using natural materials and modern methods, and that these buildings would then act as a resource for the ongoing training of learners. The Woodhub buildings would be modular structures, capable of being re located.

Target Participants would be:

- Young people,
- Unemployed people,
- Local tradespersons & designer-makers,
- People interested in self-build.

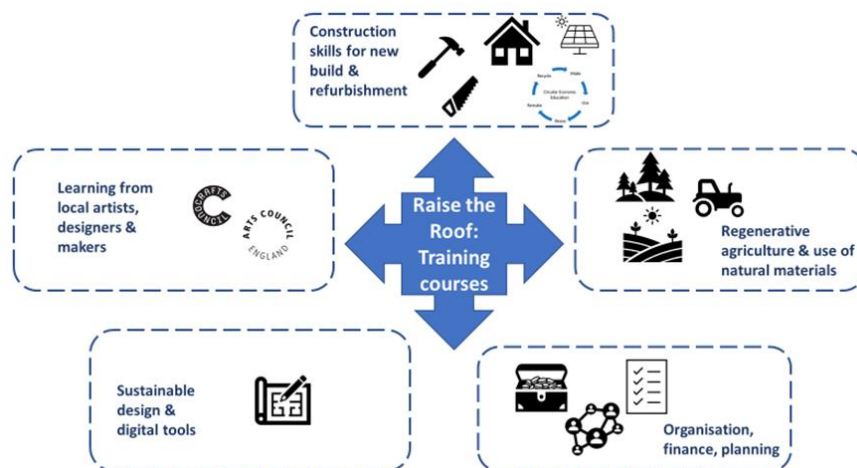
What Vistry Partnership would provide:

- A site for the Woodhub alongside the Skills Academy facility at Foundry Lea,
- Support from Training4 All with construction of the prototype Woodhub as part of skills development,
- Support from Training4All for skills training,
- Work placement for learners.

What Raise the Roof would provide:

- Technical design work for the prototype Woodhub,
- Tutors for carpentry and joinery training,
- Modules on modern & sustainable methods of construction, and the use of natural materials.

The diagram below, and the business canvas that follows, gives an indication of the range of training which the Raise the Roof project could offer:



<p>RESOURCES</p> <ul style="list-style-type: none"> • Workspace • Hand tools & machinery • Materials (inc timber from local woodhub) • Network of Tutors • Delivery framework • Enrolment process • Website 	<p>OPERATIONS/ ACTIVITIES</p> <p>Courses in:</p> <ul style="list-style-type: none"> • Carpentry & joinery • Green woodwork • Sustainable construction • Design & make for production, e.g. for furniture and fittings • Woodland Ecology • Woodland Creation • Woodland mgt • Extraction • The Timber Processing Chain • Machinery Operation • Social forestry approaches • Social prescribing – “woods for well-being” plus crafts/making 	<p>OUTPUTS/ VALUE PROPOSITION</p> <p>Learners will benefit from:</p> <ul style="list-style-type: none"> • Access to new knowledge • Gaining new skills • Industry integration • Potential career change • Workspace • A community of peers <p>Linked to practical and socially useful making of things such as furniture, buildings, wood stores, animal architecture, renovating community spaces.</p>	<p>PROMOTION/ MARKETING CHANNELS</p> <ul style="list-style-type: none"> • Through the network of partners. • Dedicated website: www.raisetherooft.info • Social media • Community events • Press releases. 	<p>BENEFICIARIES/ CUSTOMER SEGMENTS</p> <p>People who are unemployed or in low paid, precarious employment.</p> <p>Local 18 – 40 women + men eager to re-train, upskill, or supplement previous education & training.</p>
<p>PARTNERS</p> <p>Raise the Roof core partners</p> <p>Arts Development Company Bridport Area Community Housing Bridport Town Council Common Ground Dorset Woodhub Wessex Community Assets</p>		<p>Post-COVID recovery: making and creating is good for mental health.</p> <p>Capacity-building & enhanced community cohesion through working on practical projects together.</p>	<p>CUSTOMER/BENEFICIARY RELATIONSHIPS</p> <p>During training courses:</p> <ul style="list-style-type: none"> • Co-creative focus • Emphasis on building capacity & confidence • Practical & immersive experience <p>Online:</p> <ul style="list-style-type: none"> • Supportive resources • Forum space • Mentoring & Business start-up support 	<p>People keen to access affordable housing through self-build/self-finish.</p> <p>People referred by GP’s and other agencies for “social prescribing” activities/”green gyms”.</p>

3.3 Affordable & sustainable housing

3.3.1 Bridport Area Community Housing (BACH)

Raise the Roof is working closely with BACH, WCA having registered the organisation as a community benefit society – and Tim Crabtree is acting as one of the founder directors. BACH received funding to develop plans for an initial housing project, which would utilise local natural materials and off-site construction (see below).

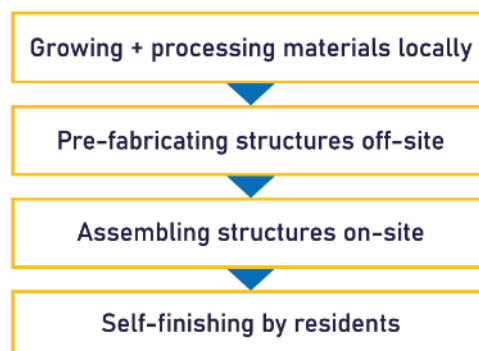
3.3.2 Bridport Housing Week

Raise the Roof helped to organise events for Bridport Housing Week, including the workshop with Colfox school, a public meeting on 21st October, 2021, and the Bridport Housing Fair on 30th October in the Town Hall. All events were seen as successful, with good attendance and press coverage. The Fair was opened by the Mayor, Cllr. Ian Bark and included a Raise the Roof stall:



3.3.3 Pilot housing project

Raise the Roof is supporting BACH to develop plans for a terrace of houses, built using local materials through off-site pre-fabrication:



Assemble have developed initial propositions:



It is proposed that the housing be developed by a cooperative of self-builders, and the Mutual Home Ownership approach will be assessed for its feasibility:



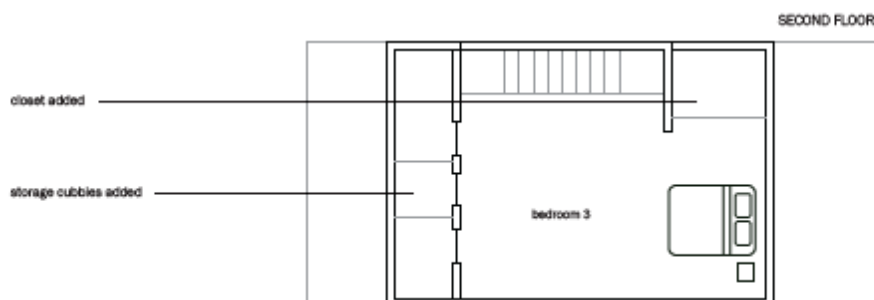
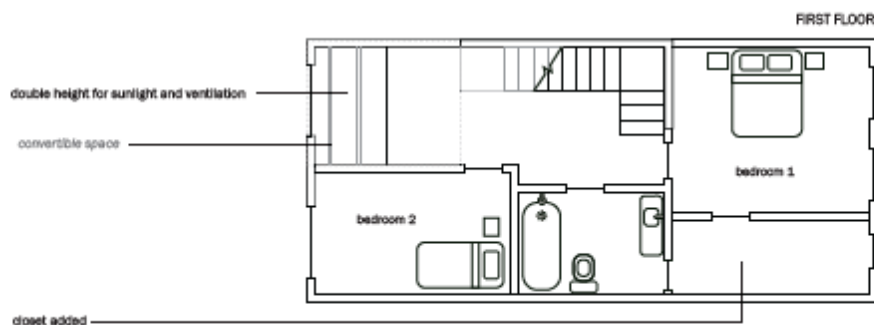
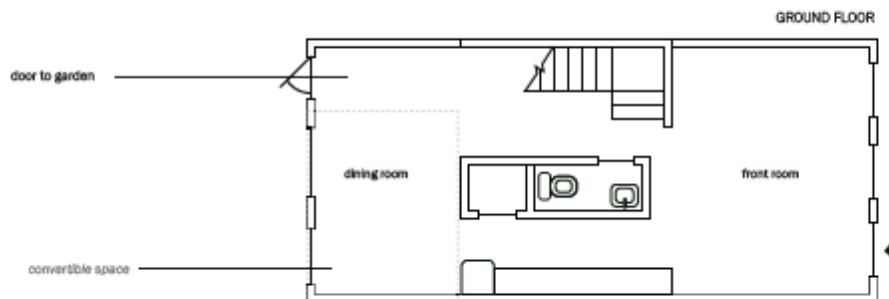
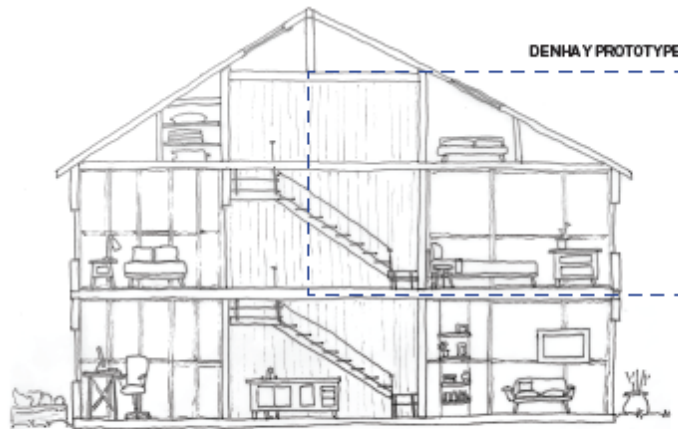
Raise the Roof is also in discussion with Bridport Town Council and Dorset Council about possible sites which could be transferred to BACH as the local community land trust. In a Mutual Home Ownership model, this land would then be leased to the self-build housing cooperative.

3.3.4 Prototype build at Denhay farm workspace

In March 2022, Raise the Roof began work on a prototype building with BACH, Plymouth University and a recent graduate from the Architectural Association's Hooke Park Design-Build Masters course (Georgina Bowman). The aim was to develop the concept of the "row house" which Assemble had introduced, and in particular to test construction methods using pre-fabricated hemp-filled panels in a post and beam frame.

TYPE 1: ROW HOUSE - BASIC

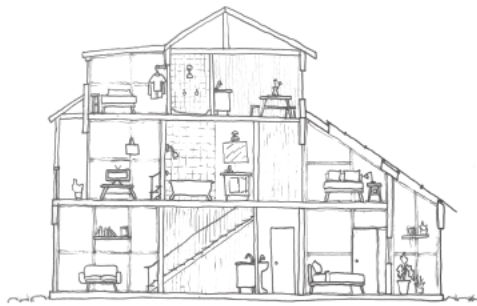
This layout provides the fastest route to a finished, mortgageable shell. Minimum partitions need to be added initially aside from toilets and optionally bedrooms. This offers the greatest flexibility for the home owners to decide spatial configuration throughout time.



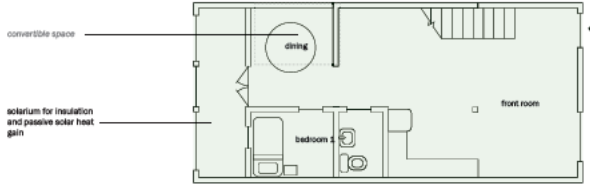
**TYPE 2:
ROW HOUSE - SPLIT UNIT**

The split unit offers diverse types of dwelling, from families to single dwellers. This recognises Singapore's needs to provide for both families and single individuals.

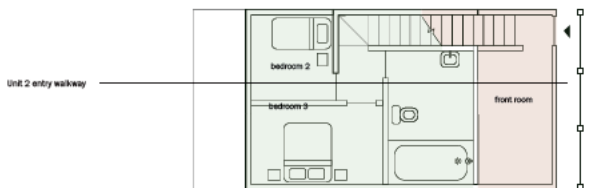
This layout could work as an end cap to a terrace of houses where the second floor has its own stairs, or in a series of the same layout with a continuous walkway.



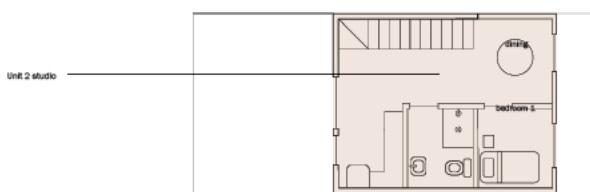
GROUND FLOOR



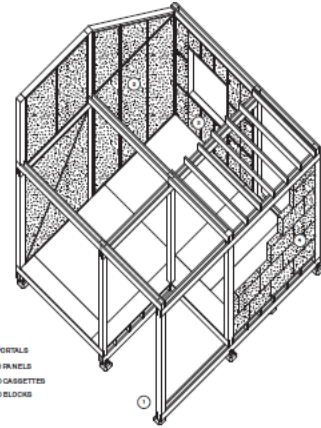
FIRST FLOOR



SECOND FLOOR

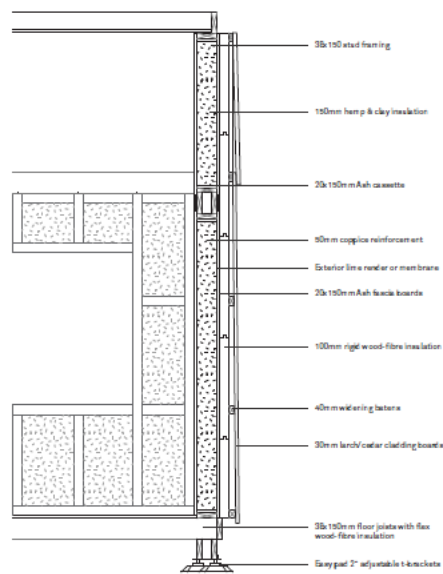


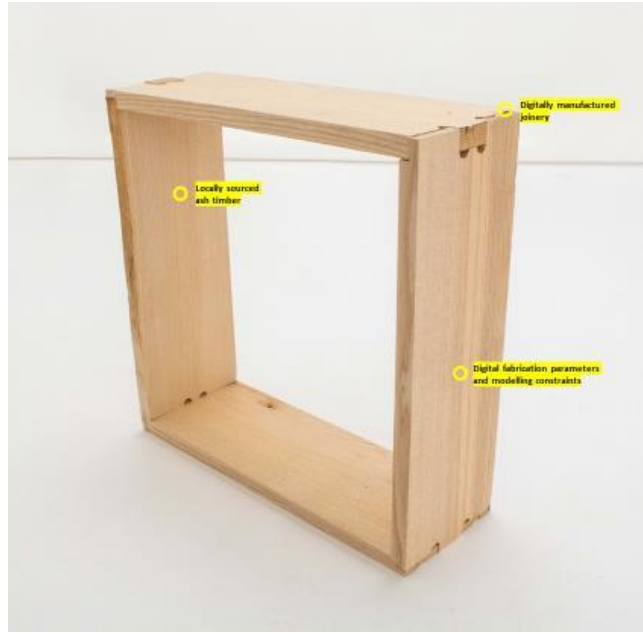
**DENHAY
PROTOTYPE:
DETAILS**



- 1 150x150 POST AND BEAM PORTALS
- 2 STRUCTURALLY INSULATED PANELS
- 3 INTERLOCKING PRE-FILLED CASSETTES
- 4 PRE-CAST LIME MORTARED BLOCKS

TYPICAL WALL SECTION - EXTERIOR





4 Raise the Roof Phase 2: Progress to Date

	The activities we are proposing	The outputs we proposed	Progress to date
<p>Regenerative land management</p> <p>Key partners: Dorset Woodhub Local farmers & landowners Common Ground Dorset Wildlife Trust Dorset AONB</p>	<ol style="list-style-type: none"> 1. Work with Dorset Woodhub and other partners to explore how the supply of timber for construction could be increased. 2. Develop network of farmers and growers to grow and supply regenerative crops, in particular hemp and flax for processing. 3. Develop on-line platform for suppliers 	<ol style="list-style-type: none"> 1. Securing agreements with woodland owners to supply timber grade products to Woodhub. 2. Pilot programme with 2 farms to grow woody fibres. 3. 30 suppliers on the platform 	<ol style="list-style-type: none"> 1. Relationships developed with a number of woodland owners for supply of timber. 2. Secured AONB funding to explore hemp cultivation with 6 farmers, and additional funding for 2 x field trials of hemp, first on 3 farms, then 5 in 2023. 3. Two separate funding applications for supplier platform – neither was successful.
<p>Local enterprise infrastructure</p> <p>Key partners: Bridport Area Development Trust Dorset Woodhub The Arts Development Company</p>	<ol style="list-style-type: none"> 1. Develop a workspace to provide secondary processing capacity for timber and wood fibres, plus operational capacity for off-site pre-fabrication of affordable housing. 2. Develop a makerspace for craft work and digital fabrication, to support “self-finish” affordable housing. 	<ol style="list-style-type: none"> 1. Business plan, design of workspace and securing funds for rent & equipment. 2. Work with partners to fund and open the makerspace. 	<ol style="list-style-type: none"> 1. Agreement from Barratts-Vistry to co-locate makerspace with new Skills Academy at Foundry Lea housing development in Bridport. Delayed until 2024. 2. Business plan being developed in partnership with The Woodland Presents CIC, exploring co-management of Bridport makerspace and Totnes-based Woodlab. Designs based on prototype built at Denhay Farm workspace. Feasibility of using latter for processing hemp and drying/storing/cutting timber being explored. Application to Forestry Commission being prepared. <p>The new makerspace will provide space, equipment and training for both craft and digital fabrication approaches.</p>

<p>Affordable sustainable housing</p> <p>Key partners: Assemble Bridport Town Council Bridport Area Community Housing</p>	<ol style="list-style-type: none"> 1. Work with Assemble Studio & other partners on designs for new build eco-housing. 2. Prepare business plans and designs for off-site pre-fabrication of low impact dwellings and affordable housing 3. Detailed plans for pilot community self-build development. 	<ol style="list-style-type: none"> 1. New designs and construction methods detailed. 2. Create new co-operative to co-ordinate suppliers, contractors and the off-site construction process. 3. Achieve planning permission for pilot housing development and secure construction finance. 	<ol style="list-style-type: none"> 1. Secured funding with Plymouth University to develop new approaches that combine the use of natural materials with digital design and fabrication. Tested on new roof structure for tiny house, then “prototype” house developed with Bridport Area Community Housing (BACH) – built at Denhay Farm workspace March-June 2022. 2. Feasibility of new co-operative being assessed as part of review of future of Raise the Roof. 3. Working with BACH and Bridport Town Council to identify site for pilot housing development. Barratts & Vistry have offered 8 plots for a CLT development and 6 plots for self-build – from 2025.
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5 Next steps

Wessex has secured funding to continue with hemp field trials, and our partners at Plymouth University have secured funding for a researcher to work with Raise the Roof partners over the next 12 months. In addition, Bridport Town Council has received funding to research the feasibility of a College of Sustainable Skills and Technologies, and Raise the Roof is seen as a key partner.

Funding from Dorset AONB's Farming in Protected Landscapes (FiPL) fund:

WCA has secured a third grant from FiPL, in order to support the cultivation, harvesting and processing of hemp by a wider group of 5 farmers. The bid also includes £28,000 of capital funding for machinery, which will support the development of a new processing and manufacturing cooperative, focused on hemp and other natural materials. The intervention rate for this round of funding is only 40%, so WCA will need to part fund its own management of the next series of hemp trials.

Collaboration with Plymouth University:

The university has secured funding from the AHRC's Design Exchange Partnership programme. The project is called *Building with/for Bridport: A systems thinking methodology for housing codesign in coastal communities*. This follows the successful completion of a collaborative project with Raise the Roof called *Participatory Housing Manufacturing: Co-making and co-producing community housing*, funded by the EPSRC's Connected Communities programme. For the new project, Alexandra Carr, who was the researcher on the previous project, will work with the WCA and the Raise the Roof partners and act as designer in residence. The aim is to continue to explore with local people and organisations the intersection between natural materials and digital fabrication, but also to develop new approaches to product development using biocomposites and other sustainable resources. The AHRC funding is only for the university – WCA needs to provide funding in-kind to organise workshops and cover the time of its own involvement.

Collaboration with Bridport Town Council and the University of the Arts, London:

The Council has developed a Bridport Investment Plan which includes a key role for the Raise the Roof project, as part of a virtual and distributed Bridport College of Sustainable Skills and Technologies. The Council and UAL also submitted a successful Design Exchange Partnership bid, and this will fund a researcher to develop the model for an innovative new College in rural West Dorset, focused on skills to support the green transition. The project responds to local needs and key Council strategies around supporting businesses, and providing training for young people, in sustainable transitions. The project will develop a 'distributed', low-carbon model utilising existing spaces and facilities, operating across the community, on-site in businesses as well as in the classroom. Raise the Roof's proposals around training will be a key focus of the research, but WCA's involvement will not be funded.

Application to the Forestry Commission

As explained, WCA has reached agreement with Barratts and Vistry Partnerships, to build a makerspace (a “woodhub”) on a large new housing development next to Bridport, co-located with a Skills Academy focused on brick-laying, concreting and other “industry-standard” skills. The makerspace will be the focus for training in new approaches to construction, including the use of natural materials and off-site pre-fabrication, linked to retrofit and self-build.

We are preparing an application to the Forestry Commission to fund the makerspace. The makerspace would be developed in partnership with The Woodland Presents CIC, which runs the Woodlab in Devon, on a social franchising basis – with the process then able to be replicated across the UK. Barratts and Vistry are providing funding in kind by offering a section of the main contractor compound plus access to services.

Woodlab has been operational for over two years, and has developed both the necessary systems to run a makerspace, as well as a business model based on training, rental of space and equipment, and commissions. The aim is to develop a replication and co-management model, using the proposed Bridport makerspace as the initial focus, and then, as explained, to franchise this approach widely across the UK.

Barratts and Vistry have informed Wessex that the development is delayed by planning issues, so the makerspace on their development will not be possible until Summer, 2024. In the meantime, we will extend the prototype building at Denhay Farm to create a makerspace within their large barn. This will be dismantlable so that it can be moved next to the Skills Centre when the time is right. Wessex will use Denhay as the base for training, fabrication and processing of timber and hemp in the meantime.